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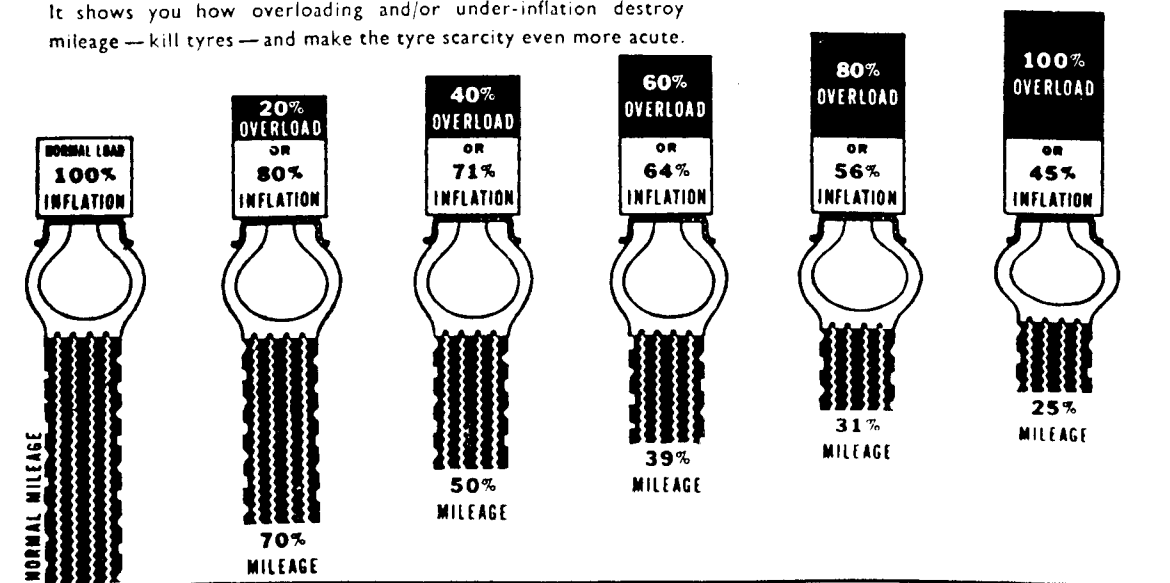
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MAINTAIN CORRECT INFLATION PRESSURES AND DON'T OVERLOAD YOUR TYRES

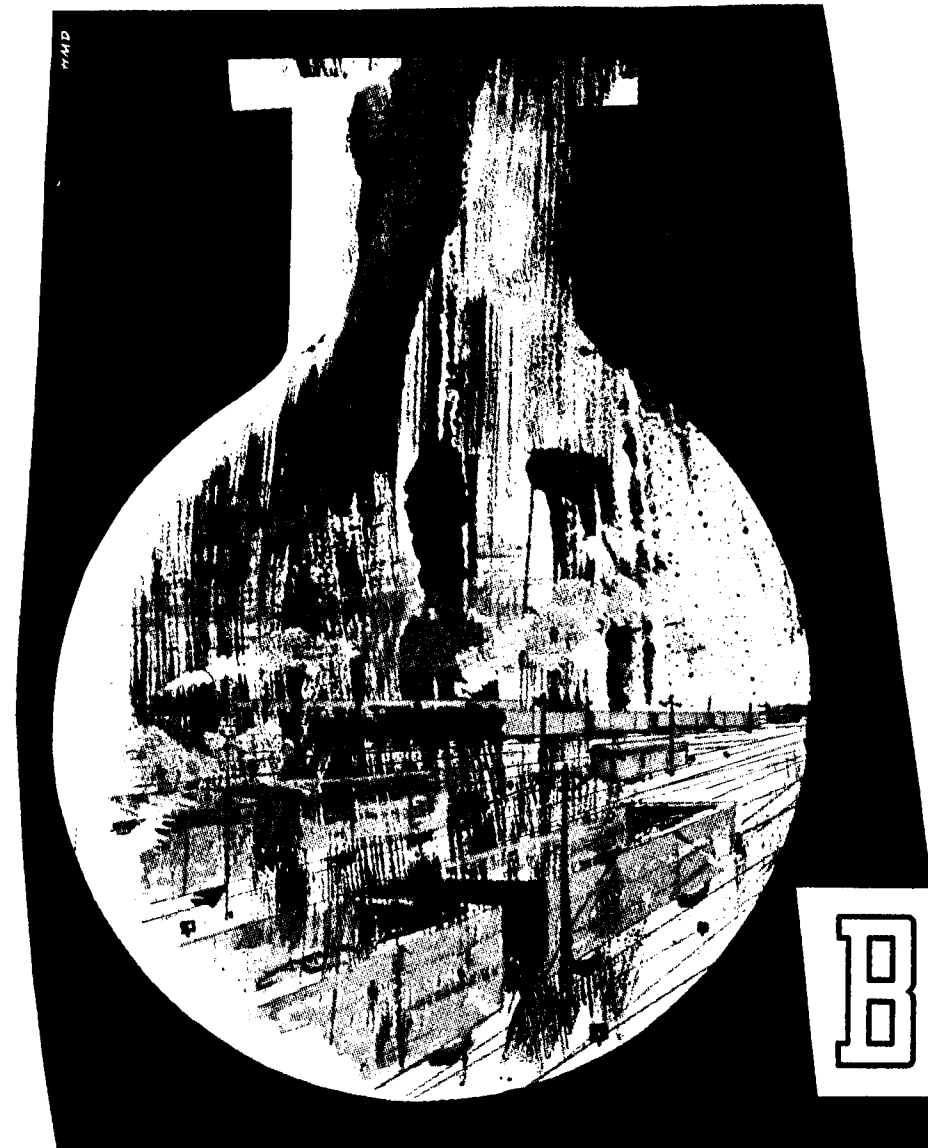
LOOK AT THIS CHART

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JOURNAL OF INDUSTRIAL ENGINEERING

THE
BRNO
INTERNATIONAL TRADE FAIR
Supplement



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Manufacture and Assembly of Medium Electrical Plant in India

By H. C. Hardy, M.I.E.E., M.I.A.E.E.
Associated Electrical Industries (India) Private Ltd.

SHORTLY before the commencement of the second World War, it became apparent that industrialisation would spread rapidly in India, and consideration was then given by a number of companies to the possibility of manufacturing electrical plant in India, and, not unnaturally, the articles in common use were selected first.

For some considerable time before the war fans, lamps and cables had been manufactured in India, and these industries were expanded considerably. At the same time the quantity manufacture of electric motors, transformers, and the simpler types of switch-gear was taken in hand. The initial expansion was naturally severally limited during the war years, as all kinds of machine tools were difficult to obtain and deliveries were very long, but after the war development was rapid and indigenous production of the above types of electrical equipment is now expanding considerably. A summary of the development of the main lines of production may be of interest.

FANS

The electric fan industry is probably the oldest electrical industry in India, manufacture commencing as far back at 1924. The present range of manufacture includes ceiling, table and pedestal fans for domestic use, railway coach fans, and various types of air circulators. In addition, a number of large fans for air-conditioning plants and other purposes are produced. At present the total requirements of domestic fans for the country are met by indigenous manufacture, and the export market is being expanded.

The production of this industry has increased from 193,000 fans in 1950 to 727,000 fans in 1959.

CABLES AND WIRES

Manufacture of cables and wires in India commenced on a very small scale in about 1923, and since that time the industry has expanded until today all

classes of wire, together with many special types of cable—including paper insulated power cables up to 11 kV and telephone cables—are now produced.

Production during 1959 covered the following items:

Bare copper conductors	7308 tons
Winding wires	3902 tons
Aluminium conductors	16,855 tons
VIR and PVC cables	214 million yards
Paper insulated power cables	443 miles

This industry has now expanded to a large number of units in all parts of the country, there being, of course, more factories manufacturing VIR and PVC cables than underground cables. There will thus be a considerably increased manufacturing capacity during the Second Five Year Plan.

LAMPS

Manufacture of lamps in India commenced in the early 'thirties, and nearly all grades of electric lamps used in the country are now indigenously produced. Manufacture started with vacuum filament lamps of low wattage, and now extends upwards to the 1500 watt range of filament lamps, and also includes fluorescent and mercury vapour lamps.

The total production of filament lamps during 1959 was about 34 million, and that of the fluorescent lamps about 1.1 million.

It is anticipated that the industry will keep pace with the requirements of the country and continue to supply all the nation's needs; in fact, an almost immediate increase in output of filament lamps could be achieved by stepping up production to the full rated factory capacity, as at present the actual production is about 80 per cent of capacity.

ELECTRIC MOTORS

A few electric motors were manufactured in India as far back as 1935, but production on any considerable scale commenced only after the last war. The range of production now covers A. C. three-phase squirrel-cage and slipring motors, including special types such as loom motors, high-torque motors, hollow-shaft vertical-spindle motors, and many other diverse types of specialised application.

Motors up to a rating of 500 h. p. can be manufactured at present, but by far the greatest output of motors is in the range up to about 35/40 h.p., as this range covers the majority of motors required for smaller industrial and textile drives. Large quantities of motors in the smaller h. p. rating are also manufactured for irrigation pump sets, etc.

The present installed capacity of the Indian electric motor industry, on a single-shift basis, is 602,520 h.p. per annum. The output during 1959 was 593,878 h.p., the total number of motors being 98,545; targets for 1960/1961 being 800,000/1 million h.p. production and an installed capacity of 1.25 million h. p.

The majority of materials for medium voltage electric motors are produced indigenously, the main imported components being ball and roller bearings in the larger sizes and steel sheet, approximately 24,000/25,000 tons of dynamo grade steel sheet being required annually, whereas, indigenous production is much less than this.

An adequate quantity of winding wires is now produced in India although, of course, the electrolytic copper for producing these wires, and the special varnishes used, are imported.

TRANSFORMERS

The Indian transformer industry was begun before the second World War, but, as in the case of the motor industry, wide progress has been made only in the post-War years. The transformer industry has also been handicapped by difficulties caused by the necessity of importing basic materials, such as core steel, insulating materials, etc. Copper conductor for windings is now made in India but, as the majority of this conductor is paper insulated, with a special quality of paper not manufactured in India, and as the conductor is manufactured from imported electrolytic copper, the actual imported component on a transformer is quite high.

Cooling tubes are now manufactured in India but there is no satisfactory supply of transformer grade electrical steel sheets, and the present requirement of this is of the order of 5000/6000 tons a year.

It is understood that Tata Iron & Steel Co. have submitted proposals for the manufacture of transformer grade electrical steel sheets in their proposed tool, alloy and special steel plant, and it is believed that the Rourkela plant of Hindustan Steel is also planning the manufacture of transformer grade sheets. It is hoped, therefore, that indigenous production of electrical steels of suitable quality will be available in the not too distant future.

So far as production is concerned, the industry produced transformers totalling 1,052,624 KVA in 1959, in a total number of 8,246 transformers. This figure is, however, nearly 200,000 kVA below the 1957 figure. This fall in production is largely due to foreign exchange difficulties during the Second Plan, causing a reduction in the number of installations requiring transformers. Plans for expansion of the transformer industry are already in hand, and the target capacity for 1960/1961 is 2,200,000 kVA per annum. This capacity will be considerably exceeded in the larger sizes with the coming into full production of the Heavy Electricals factory at Bhopal, which has already commenced manufacturing transformers and will be equipped to manufacture transformers up to 220 kV with capacities up to 400 MVA.

SWITCHGEAR

The assembly and manufacture of switchgear in India is of comparatively recent origin. The industry covers a wide range of products, from simple knife switches, fuses, iron-clad switches, starters etc., to industrial and medium power switchgear, mainly utilising imported circuit breakers in switch units manufactured in India.

The targets for 1960/61 are 1600 11kV circuit breakers, 3500 low voltage circuit breakers, 120,000 sets of motor control gear, and 800,000 iron-clad switches and switch fuses.

There is also a very considerable production of isolators and air break switches in various voltage ranges up to 132 kV. These high-voltage isolators and switches have been manufactured by one company in Calcutta for the last 14 years, and are in use in large quantities on practically every grid

transmission scheme in the country. Over 1000 three-phase units for voltages of 66 kV and above, and over 1200 three-phase units in the range 3.3 kV to 37.5 kV have been produced to date, a considerable contribution to India's transmission and distribution systems.

The Heavy Electricals factory at Bhopal now has a large number of items in its first year's production programme, and is offering switchgear up to 66 kV, together with a large number of items of control gear, and will, in most cases, take over where the medium electrical industry leaves off. In the Second and subsequent years' production circuit breakers up to 220 kV are included.

HOUSE SERVICE METERS

Although the house service meter industry in India is of recent origin, there are now a number of factories in the country, all associated with foreign companies, with a total installed capacity (according to the rather varied assessments of different authorities) of the order of 384,000 meters per annum. The majority of the manufacture is limited to A. C. single-phase service meters of up to about 10 amperes capacity.

According to official figures, the production of meters during 1959 was about 376,428.

THE INDUSTRY AND THE FIVE-YEAR PLAN

As already indicated, the very large expansion in electrical generating capacity proposed under the Five Year Plans is certain to result in a considerable increase in demand for motors, switchgear, transformers, etc., and the proposed expansions of the various sections of the industry are based more or less on the increase in electrical power to be provided by the various projects now under construction, or shortly to be commenced. However, in addition to this direct stimulus, the electrical industry is bound to receive great impetus from the fact that more and more of the basic materials will become available from indigenous manufacture as the proposed industries begin production.

The new steel plants alone will provide a great contribution to this, as they should produce steel of the highest tested quality and thereby eliminate one of the major hinderances to production, i. e. the inspection of raw steel which is often insisted on by Government Inspectors.

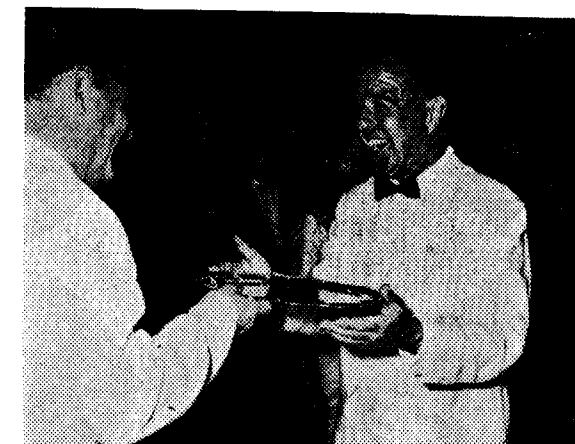
Factories for the production of various types of insulating materials are being planned, while the

range of production of ball and roller bearings is to be considerably extended.

The contribution of the medium electrical industry towards the prosperity of India is thus assured, and the benefits will be manifold, as not only will the country eventually become self-sufficient in medium electrical plant, with the consequent enormous saving in foreign exchange, but also the industry will provide employment for large numbers of persons and help to increase the standard of living.

Mr. W. R. Monk

Born in 1906, Mr. W. R. Monk finished his studies at the London University. After working in London for a few years Mr. Monk spent three years in the West Indies followed by a further spell in London. His experience in the West Indies further strengthened his desire to work abroad. Since his arrival in India in 1933, Mr. Monk was throughout with the Shalimar Paint, Colour & Varnish Co. Ltd., Calcutta.



In the photograph Mr. W. R. Monk is seen receiving the Silver Salver presented to him by the Head Office Staff of the Shalimar Paint, Colour & Varnish Co. Ltd., by Mr. D. Jaffray—Chairman of Shalimar Paint and Senior Director of Turner, Morrison & Company Limited.

He started with Shalimar Paint as Chief Chemist, became Assistant Works Manager, in 1939, then works Manager, in 1947. In 1955 he became the Chief Executive of this company.

Mr. Monk took an active part in the promotion of the new Indian Paint Research Association, of which he was first President. He was a member of the Governing Body of the Indian Paint Association, and been Chairman of its Packaging Committee. He was also on the I.S.I. Drums and Kegs and the Tin-plate Containers Committees and the West Bengal Government Advisory Committee on Technical Training.

He was a keen tennis player.

Largest Travelling Monotower Crane in the World

By Benjamin Butters

of Butters Brothers and Company Ltd.,
Engineers, Glasgow, Scotland

THE largest travelling monotower crane of its kind in the world has been designed and built by a Scottish firm of engineers and crane-makers for use in a large English shipyard. With a maximum rated load of 100 tons at a radius of 122 feet (37.1 metres), the crane can handle the transferring of extremely large prefabricated sections from welding bays to the slipway. A load of as much as 40 tons can be handled at a radius of 160 feet (48.7 metres), and the auxiliary hoist can handle a ten-ton load at a radius of 170 feet (51.8 metres). At the other end of the scale, the full 100 tons can be handled at a minimum 52-feet (15.8 metres) radius.

The provision of this wide range of hoists is by a crane which itself stands 120 feet (36.5 metres) above the track. Thirty-two wheels carry the whole 890 tons, half of these being driven by four synchronised electric motors, each of 32.5 brake horse power. The gears run in oil; a time-lag is incorporated into the braking system to prevent undue shocks to the crane structure, and irregularities in the track are provided for by individual compensation of bogies and sill girders. The maximum wheel load under working conditions is 45.5 tons, and 45.625 tons under gale conditions.

TELEPHONE FOR DRIVER

The tower's base provides a portal opening 48 feet (14.6 metres) high and 49 feet (14.9 metres) wide; the top of the revolving mast is 214 feet (65.2 metres) above the track and the point of the 175 feet (53.3 metres) luffing jib stands 300 feet (91.4 metres) above the track at minimum radius.

A separated cabin 126 feet (38.4 metres) up houses the crane driver, who has a clear and uninterrupted view of the loads being lifted, and control over the four motors for travelling, and a further four for operations. A telephone links cabin and ground.

The principal motor is the main hoist with a capacity of 115 brake horse power. This lifts the 100-ton load on a triple pulley block at a speed of 10 feet (3 metres) per minute. Through a change speed

clutch, loads up to 40 tons can be lifted at a speed of 25 feet (7.6 metres) per minute. The spur gearing of the hoist motion is enclosed in cast iron gear boxes and runs in an oil bath, with the exception of the barrel spur wheel and its engaging pinion. The gear cases are fitted with ball and roller bearings to carry the shafts. An electro-mechanical brake is fitted to the motor extension shaft, capable of controlling the loaded motion. An additional spring-loaded, air-released disc brake is included in the motion on the barrel pinion shaft; this is continually in the "holding" position and is released by air through an airflow regulator valve in the operator's cabin. Electrical counter current lowering is also included.

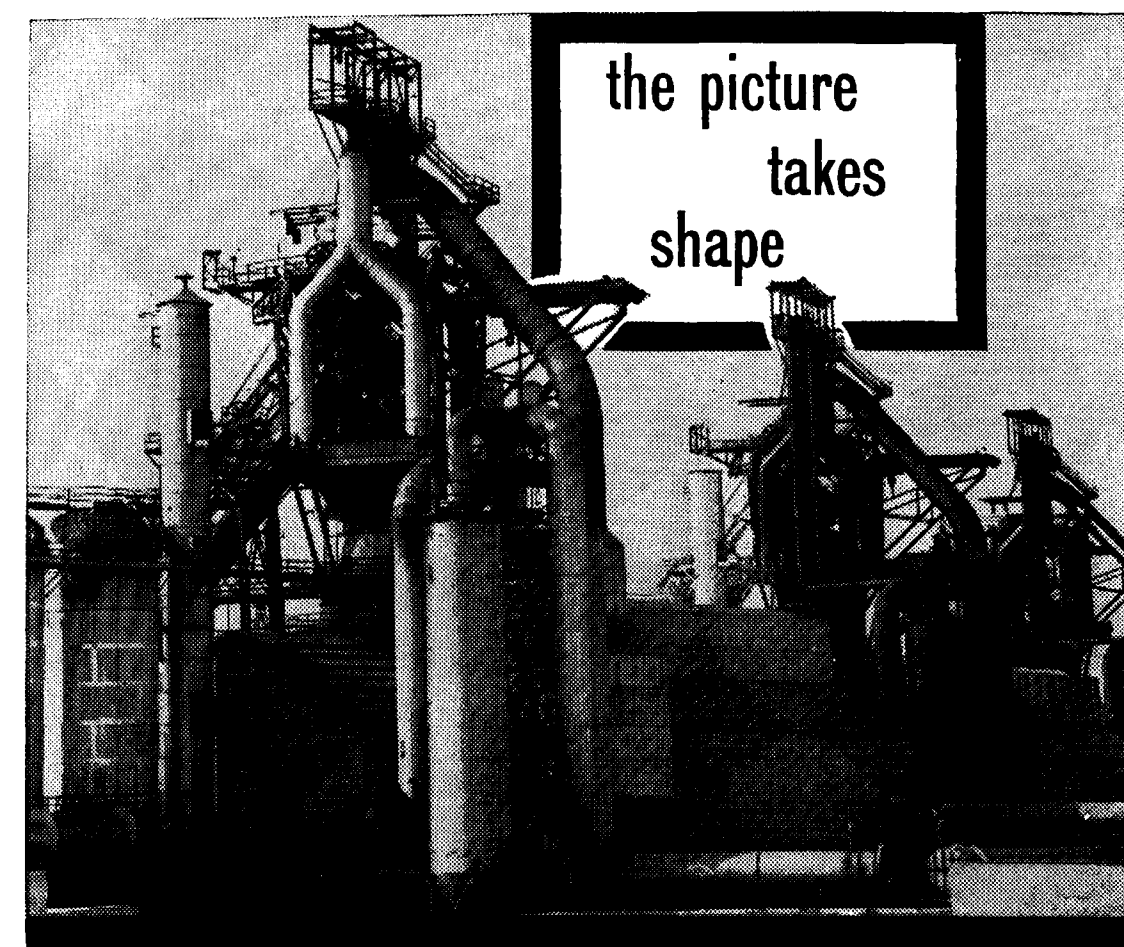
ELECTRO-MECHANICAL BRAKES

The main hoise rope barrel is ten feet (3 metres) diameter by eleven feet eight inches (3.5 metres) long; the main hook of the crane is of the "Flemish Eye" type mounted on a taper roller bearing.

Two 95 brake horse power motors control the auxiliary hoist and the luffing motion. The auxiliary hoist can lift its ten-ton load at 90 feet (27.4 metres) per minute and the gearing and shafting are enclosed and mounted as in the main motor.

The luffing motion, enclosed and running in oil, is driven by a 95 brake horse power motor at a speed up to 30 feet (9.1 metres) per minute at full capacity. Braking is by disc and electro-mechanical brakes.

The levelling barrel to which the return part of the hoist rope is anchored gears with the luffing barrel through a spur drive so that when the luffing rope is paid out, the hoisting rope is coiled in at the proper speed to give the desired horizontal path to the load. This also has the effect of reducing the horse-power required to luff in the jib as the torque applied to the levelling barrel by the return part of the hoist rope tends to rotate the luffing barrel in the direction required to luff in the jib.



All Iron and Steel making facilities have now been installed at Durgapur Steelworks. Rated at a daily output of 1250 tons of iron each, Nos. 1 & 2 Blast Furnaces have frequently exceeded this figure. No. 3 Blast Furnace, now ready for operation, completes the Iron making Plant. Up to date nearly 2 lakh tons of steel have been produced from the Open Hearth Furnaces which have been put into operation in the Steel Melting Shop. All the Open Hearth furnaces are now ready for operation.

Head Wrightson & Company Ltd.
The Wellman Smith Owen Eng. Corp. Ltd.
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BRITISH COMPANIES
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ISCON

INDIAN STEELWORKS CONSTRUCTION CO. LTD.

The last of the four motors enclosed in the 55 feet (16.7 metres) long machinery housed, located behind the operator's cabin, is the 55 brake horse power motor for slewing. This runs at 720 revolutions per minute and can slew at maximum radius and load at a speed of 180 feet (54.8 metres) per minute.



The largest travelling mon tower crane of its kind in the world has been designed and built by the Scottish firm of engineers, Butters Brothers and Company Ltd., McLellan Street, Glasgow, S. 1, and is now operating in the shipyard of Cammell Laird and Company Ltd., Birkenhead, Cheshire, England. It is powered by eight individual motors and is controlled by an operator 126 feet (38.4 metres) above the rails on which it runs so silently that an alarm bell has had to be fitted to give notice of its movement. The crane towers 300 feet (91.4 metres) above the ground and lifts 100 tons pre-fabricated ship sections.

FOOT PEDAL CONTROL

In slewing, the motor drives through a flexible coupling to a single reduction spur gear box. The double output shafts of this spur box drive twin sets of worm and spur reduction gear to the final drive shafts of the motion. These shafts each carry slew race spur pinions which mesh with the main race wheel which is bolted to the top of the travelling tower structure. This

race wheel, which is nearly 32 feet (9.7 metres) in diameter, is made in twelve segments bolted together to form a ring. The inner face of this ring forms the turned horizontal roller path on which bear the horizontal slew rollers.

An electro-hydraulic brake is fitted to the motor extension shaft of the slew motion. When the main isolating switch is moved to the "ON" position, this brake automatically comes off and leaves the slewing motion under the control of a foot pedal in the operator's cabin. When the main power is switched "OFF" and the crane is to be left unattended, the brake comes on automatically, holding the revolving portion in any required position.

The deadweight of the revolving portion - 580 tons - is carried on a spherical roller bearing at the bottom of the mast. This type of bearing is used to allow for the changes in alignment which occur due to the deflection of the structure and also to transmit the horizontal reaction at the base of the mast.

COMPANION BEING ERECTED

The horizontal slew rollers fitted just below the machinery frame transmit the other horizontal reaction from the mast to the roller path at the top of the tower. Eight of these rollers are fitted—four on the back and four on the front of the mast, mounted in pairs, on compensating beams, to transmit the load equally through each roller. Four more rollers are fitted, two on each side of the mast, to give lateral stability, the whole system forming a large radial roller bearing.

Aluminium alloy sections and plates have been used in the construction of the jib, as opposed to the rolled steel sections used elsewhere, and the jib consists of braced four angle sections. At its outer end it is supported by a multiple rope reefing. The return part of the main hoist rope is reefed between jib point and mast top before it passes over a "Wylie" indicator. This arrangement helps provide the levelling effect on the load path, reduces the load on the luffing gear and reduces the capacity required for a motor and the size of bridle and luffing ropes.

The crane, and a companion which is now being erected at the same yard, has been manufactured by Butters Brothers and Company Ltd., of McLellan Street, Glasgow, S. 1, Scotland.

New Zeiss Instruments at the 1961 Technical Fair in Leipzig

By Dr. Rudolf Jobst, Jena

(Specially contributed)

THE wide and manifold manufacturing range of VEB Carl Zeiss JENA will also this year be enriched by new designs in almost all groups of instruments. Below a survey is given of the new instruments on show for the first time at the Technical Fair in Leipzig, on the Zeiss Stand in Hall XV and in the adjoining Zeiss Pavilion.

The measurement of threaded spindles used as measuring or lead screws and having therefore to meet special demands in accuracy, is a technological measuring task, which hitherto could be carried out in a reasonable time only with the Universal Horizontal Metroscope. With the development of the Lead Screw Tester (Fig. 1) VEB Carl Zeiss JENA have produced an instrument which can be used in the

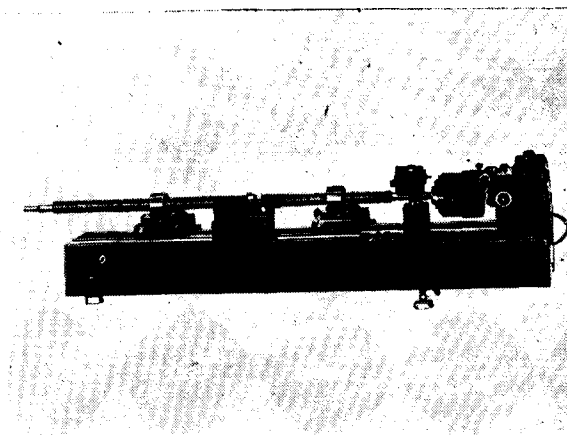


Fig. 1. Lead Screw Tester.

testing laboratory and workshop. Measurement is carried out by comparing the test pieces with a built-in glass scale, resulting in a reading, free from guide error as in the special optical system used in the Universal Horizontal Metroscope and known as the EPPENSTEIN principle. A metal rule on the guide bed permits coarse orientation and coarse setting of the measuring carriage at the required measuring position. For reading the glass scale a spiral microscope with a scale value of 1 μ m is used, with 1/10 μ m being easily readable. The test piece lies in adjustable V-bearings, for measuring the periodic lead error in special ball bearings.

The Sonovisor 2 (Fig. 2) is an ultrasonic material inspection instrument for the non-destructive testing of metals, porcelain and plastics with regard to cracks, blowholes, pitting or structural changes. The

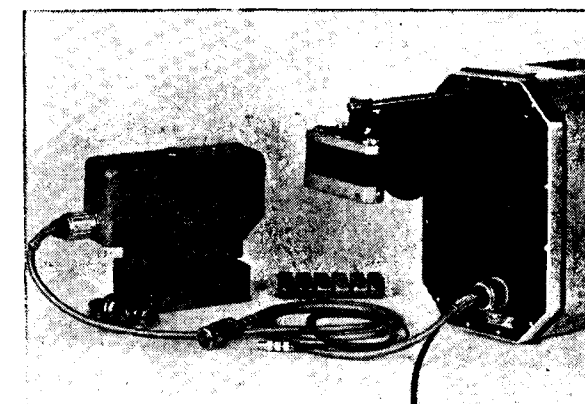


Fig. 2. Sonovisor 2 - Instrument for the non-destructive ultrasonic material testing.

special advantage of this instrument, based on the principle of the pulse-echo method, is the two-dimensional image presentation by means of the rotary section and vibration section method. Both methods produce cross sectional images of round bodies and plane faced test pieces. By simple switching the Sonovisor 2 with scanning sound transducer and toothed recording can be used like any reflectoscope. With the vibration section image transducer the maximum testing thickness is 250 mm, with scanning sound transducer the maximum range 3 metre steel. According to the imaging scale 20 to 50 cm of the tested length are visible on the screen. The instrument acts as a sort of depth magnifying lens. The applicability of the instrument, usually operated on A. C., is extended by easy changing to 12 V battery operation, so that the instrument can be used anywhere independent of the mains; this ensures safe electrical working in metal containers. The instrument dimensions permit it to be taken into boiler manholes. On correctly setting the brightness and definition of the electron beam, the instrument produces an extremely clear image. Amplification and pulse width can be controlled manually so as to produce the toothed or section image required for testing. For photograph-

ing the screen images, WERRA can be attached to the extendable photographic tripod. The very versatile instrument will, when properly used, be of great economic advantage in many works.

The *Zeiss Ultrasonic Intensity Meter* (Fig. 3) for the frequency range from 0.4 to 10 Mc/s is a small instrument operating on the basis of radiation pressure, used for measuring the radiation intensity of ultrasonic sources, built-in immersion and therapy sound

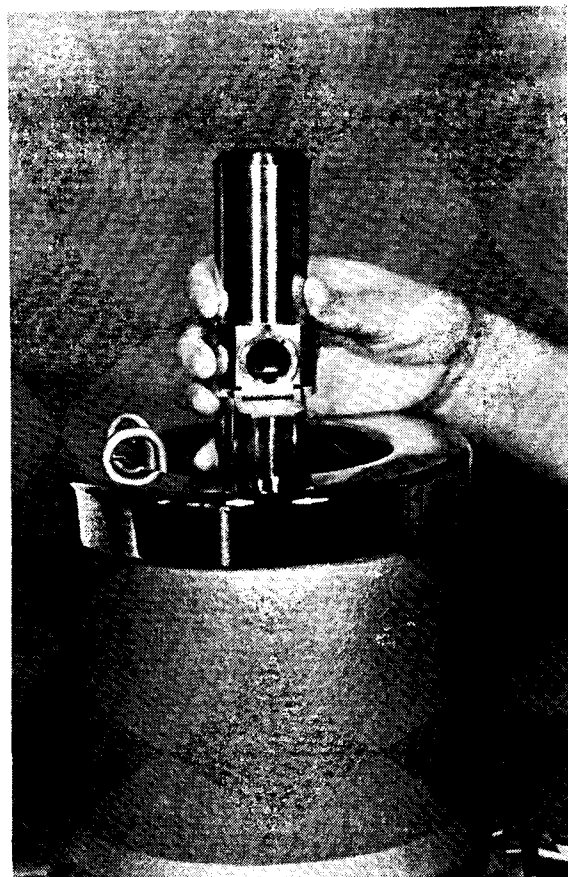


Fig. 3. Ultrasonic intensity meter

generators, as well as for the intensity measurements in the free ultrasonic field. Two designs of the instrument cover the intensity range from 0.01 to 10 W/sq. cm.

The *High-vacuum Vapour Coating Plant HBA 2* (Fig. 4) is a universal instrument for almost all coating processes used in present-day vapour depositing techniques. It is especially suitable for vacuum preparation methods in light and electron microscopy. The High-vacuum vapour Coating Plant HBA 2 can be used for carrying out the following processes under vacuum: thermal evaporation, cathode sputtering,

glow discharge, carbon evaporation after the Bradley method etc. The working processes are fully visible due to the protected glass receptacle of 250 mm

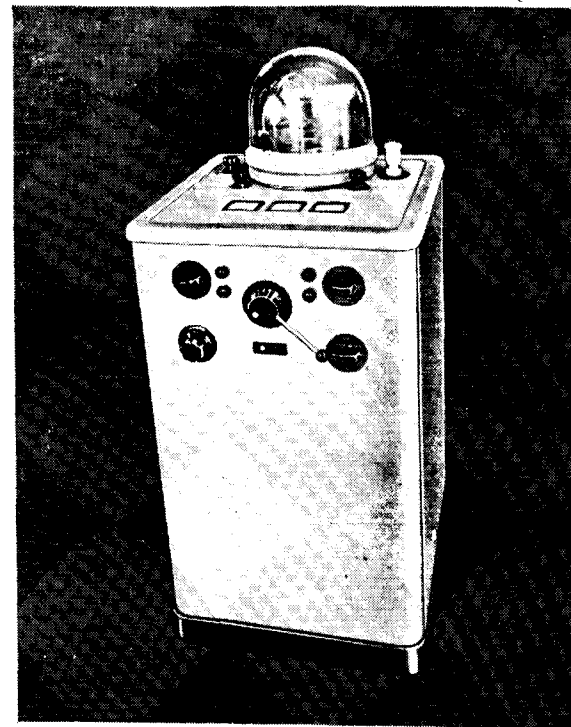


Fig. 4. High-vacuum coating plant HBA 120/2.

diameter. Simple and safe operation of the plant is ensured by using the Oil Diffusion Pump HVPO-120 (120 litres/sec), the programme controlled valve combination PV 65 and the automatic backing pump protective valve VVma 20. Due to the short evacuation time of the efficient vacuum plant a rapid change of batches is possible. The mechanical design corresponds to the requirements of modern preparation techniques and consists of three rotary holders, finely dosed gas inlet by means of Needle Valve NV 20 Torr 1/sec, object holder with cartridge for 3x5 electron microscope preparations, whereby 5 preparations can simultaneously be put under vacuum in the vapour depositing beam. The setting of the vapourising angle can be effected from the outside. Movable and fixed diaphragms for making and limiting the vapour beam as well as two holders for thermal evaporation are adjustable and easily interchangeable. This high-vacuum vapour coating plant, with its preparation devices permitting a number of specimens to be prepared within a short time under variable conditions, is indispensable, for instance, for economic series investigation with the electron microscope.

The *UV image Converter BW 35 QS* (Fig. 5.) can be used for all conversions from ultraviolet to visible images, especially in ultraviolet microscopy.

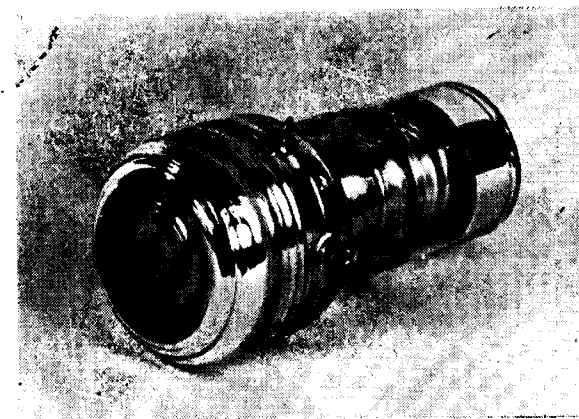


Fig. 5. Image Converter BW 35 QS.

The *Selenium Photoelectric Cell Type SeD* (Fig. 6) is a radiation receiver on a selenium base with photo-current sensitivity in the visible region of the spectrum, used especially in photometric measuring instruments. These cells can be provided with their contacts arranged in various ways with or without connecting cables.

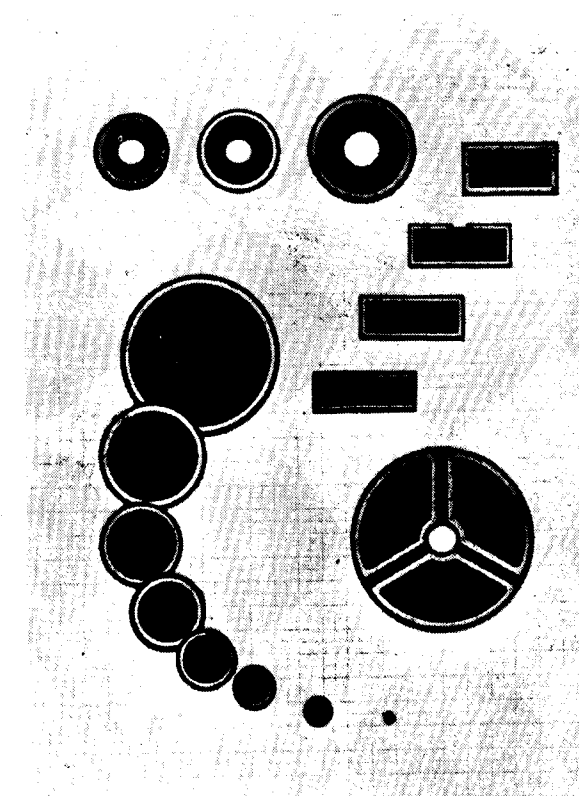


Fig. 6. Selenium photovoltaic cells SeD.

Three new items are introduced in the field of Zeiss Surveying Instruments: The *Theodolite 120* (Fig. 7) is intended for work of lower accuracy in a wide variety of fields including not only geodetic tasks. This small theodolite is used primarily in forestry, structural and mining surveying, but also for simple geographical, geological and geo-physical tasks, for simple municipal surveys, re-distribution of land, new surveys, for technical work for structural and civil engineering, and last but not least also for supplementary orientation problems in photogrammetry. With a telescope of high brightness and image contrast, with very easy

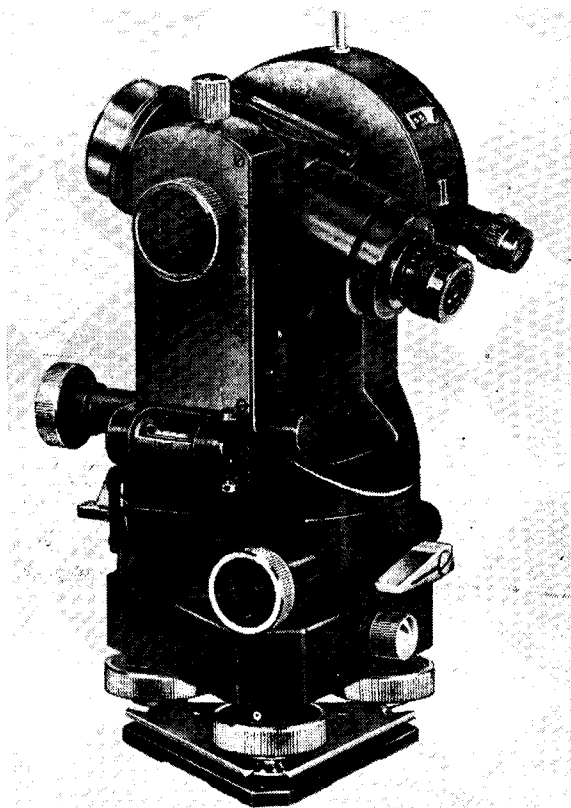


Fig. 7. Tenminute-Scale Theodolite "Theo 120"

reading of the divided circles, with index and any required erection possibility of the always positively centered instrument, whether standing or suspended, it is suitable especially in those fields where there are difficult conditions with regard to target illumination, target contrast against the background and possible assembly.

Economic surveys in built-up areas are only possible on applying optical distance measuring to a great extent, whilst eliminating at the same time the difficulties arising from using bulky horizontal or vertical stadia rods. The *Reducing Telemeter 006* (Fig. 8) was

designed especially for detail surveys with cadastral accuracy. This is a double image rangefinder with the base in the instrument and with automatic reduction of inclined distances to the horizon. Over a distance range from 2 to 50 metres it is possible to determine,

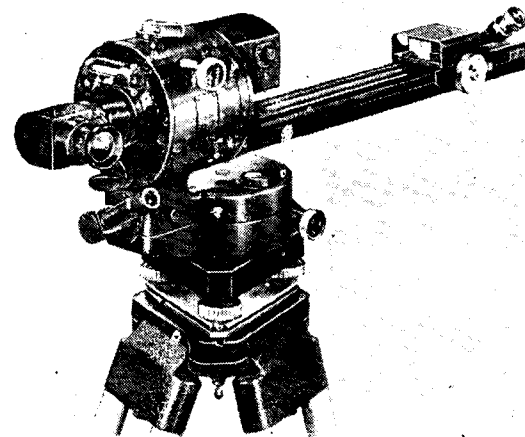


Fig. 8. Reducing Telemeter "BRT 006"

as required, horizontal or inclined distances without erecting a stadia rod at the survey point. The Reducing Telemeter 006 is, as a special instrument for precision tacheometry, especially suitable for the following tasks: polar detail surveys, angle measuring of polygonal traverses, architectural surveys, civil engineering works.

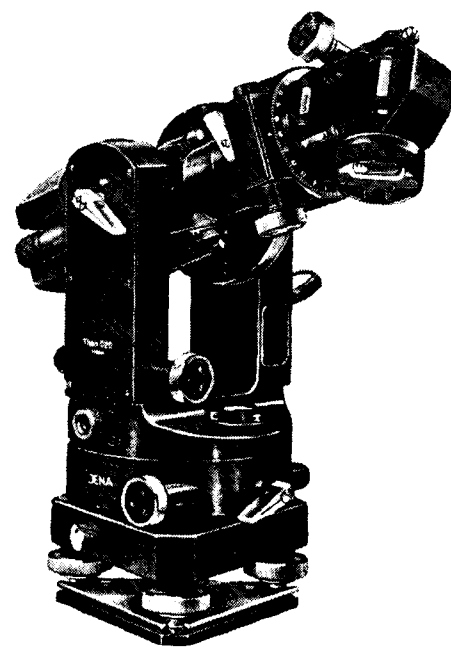


Fig. 9. Tacheometer Theodolite "Theo 020" with Meridian Finder.

A Meridian Finder (Fig. 9) has been developed for the Theodolite 020, permitting the determination of the astronomical azimuth of a terrestrial target with an average error of approx. ± 1 . Compared to other methods of azimuth measuring this process has the advantage of not requiring a clock and of obtaining the azimuth without complicated calculations.

The range of photogrammetric evaluation instruments of VEB Carl Zeiss JENA has been extended by two new instruments. The Stereometrograph (Fig. 10) is a

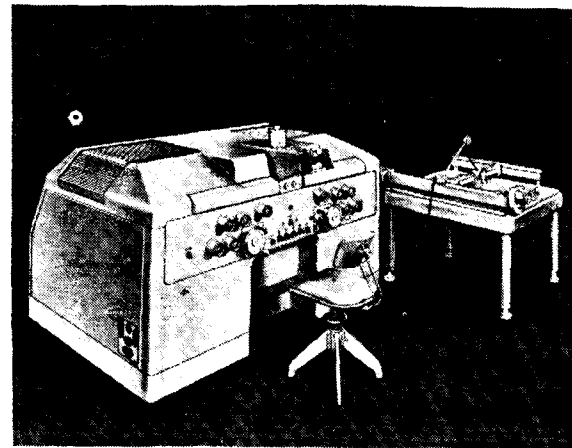


Fig. 10. Stereometrograph.

two-image evaluating instrument for graphical and numerical individual model evaluation of standard and wide angle vertical exposures up to a format of $23 \text{ cm} \times 23 \text{ cm}$ at a scale of $1 : 2000$ to $1 : 25000$. The instrument is outstanding for its high accuracy, easy and economical operation, as well as for the possibility of connecting an automatic recording and calculating instrument. The compact design realised for the first time in a photogrammetric evaluation instrument affords great protection from mechanical damage and penetration of impurities and dust, also ensuring long life and constant precision.

The Zeiss Co-ordimeter (Fig. 11) is a programme controlled recording and calculating machine for photogrammetric evaluating instrument, carrying out automatic recording of machine co-ordinates as well as programme-controlled calculations. This new combination is a further step towards the automation of photogrammetry. It is an essential factor that, compared to already known recording equipment of this kind, the range of application and efficiency could be considerably increased with a relatively modest additional expenditure. The Co-ordimeter permits, for example, without any intermediate recording, the

conversion from machine co-ordinates to the final field co-ordinates. Hence it solves problems which could hitherto only be tackled by the relatively much more expensive electronic or relay automatic machines.

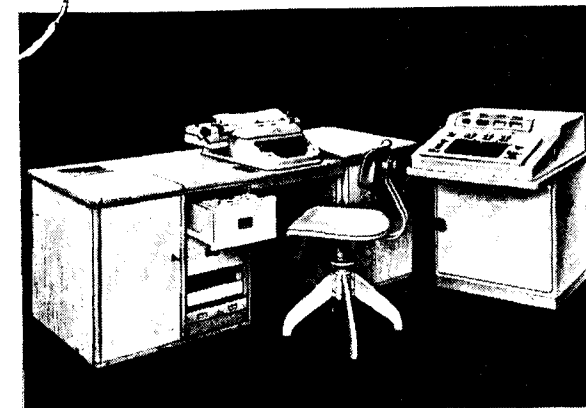


Fig. 11. Co-ordimeter.

Its operation is easy as the calculation processes are firmly programmed in the form of mechanical programme rollers or control guides and can be interchanged by the operator with only a few manipulations. By means of electrical transmission channels

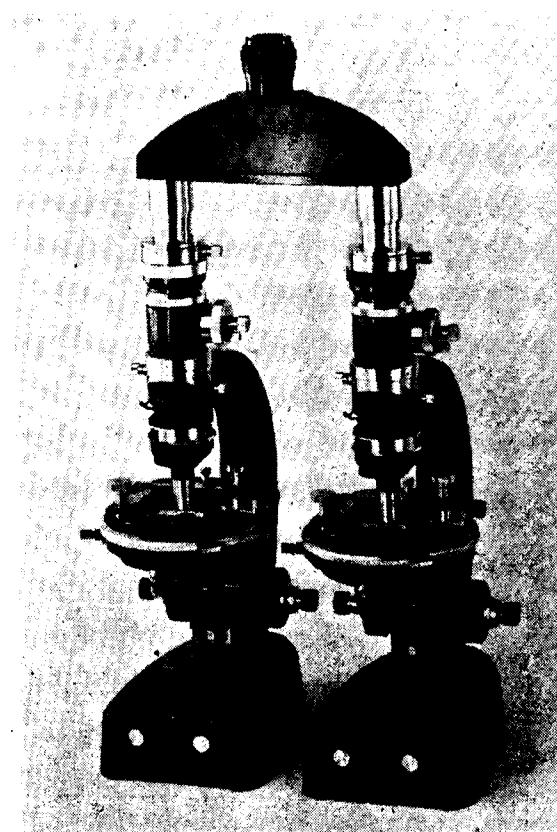


Fig. 12. Comparison Eyepiece.

the plant can be connected to the stereoscopic evaluation instruments, the Stereoplanigraph and the Stereometrograph, and be used quite independently as automatic calculating plant.

This instrument will contribute considerably towards increasing efficiency in numerical photogrammetry.

In the field of microscopic research two new models will facilitate the tasks of the microscopist.

The Comparison Eyepiece (Fig. 12) for attaching to microscopes makes half of the fields of view of two

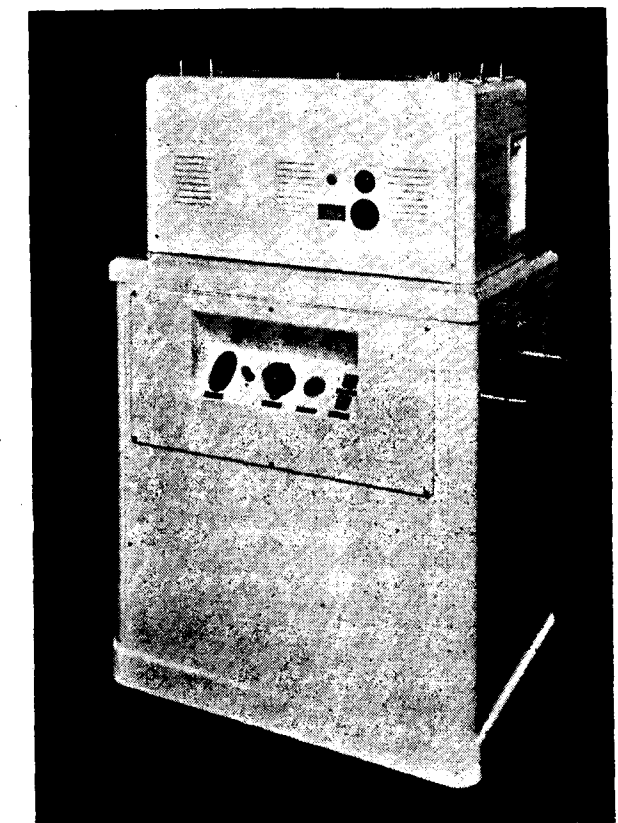


Fig. 13. Elektrokymograph.

microscopes visible next to each other. The Drawing Device for Microscope is an auxiliary instrument for drawing microscope objects even under low illumination methods up to the upper limit of permissible magnification.

Of the new medical instruments, the following deserve special mention: The Electrocymograph (Fig. 13) is an instrument for recording the progression of heart wall movements or lung pulsations during irradiation of the patient with X-rays. A photoelectric

cell with secondary electron multiplier in a light-proof casing is connected to a small fluorescent screen and is attached to the observation fluorescent screen of the

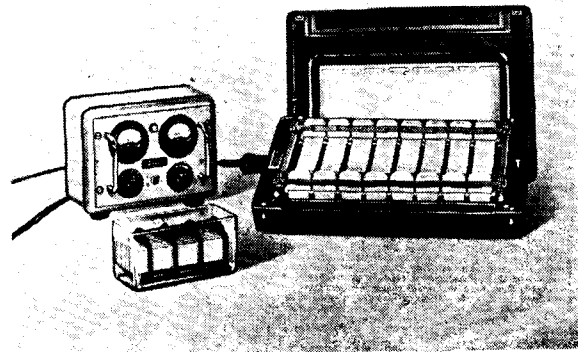


Fig. 14. Separating Cell for Paper Electrophoresis.

X-ray plant. The patient is situated between the X-ray tube and the secondary electron multiplier. The secondary electron multiplier converts the light intensity fluctuations on the auxiliary fluorescent screen, caused by the movements of the heart wall, or the

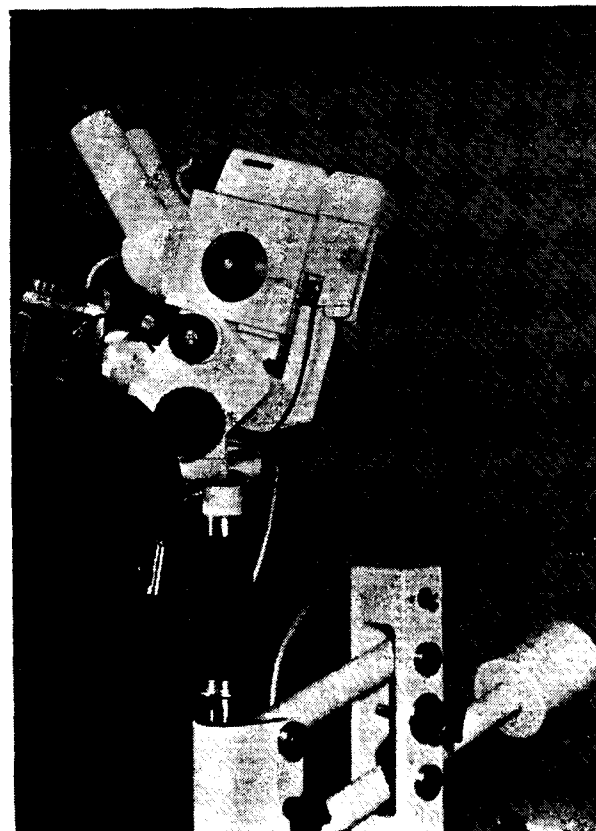


Fig. 15. Colposcope III

pulsating expansion of the lung with blood into a proportional photoelectric current. The output signal is amplified in a 2-channel electrocardiograph and recorded in conjunction with an electrocardiogram of the patient. The importance of the Electrocymograph as a diagnostic aid for the radiologist will by far exceed its existing application for cardiac examinations. When the results of research carried out by STRAND and KRAUS in Germany and by M. MARCHAL in France are generally confirmed, this instrument will become of primary importance in the early diagnosis of bronchial carcinomas.

The Separating Chamber for Paper Electrophoresis (Fig. 14) serves for electrophoretic separation of colloidal solutions (blood serum) on filter paper and ensures by uniform test results the reproducibility of the separation tests. The Separating Chamber forms with the Extinction Recording Instrument ERI 10 of VEB Carl Zeiss JENA a complete unit for paper electrophoresis. The Separating Chamber illustrated in Fig. 14 takes 8 filter strips each of 300 mm length and 40 mm width. Two Separating Chambers can be connected to the respective rectifiers, produ-

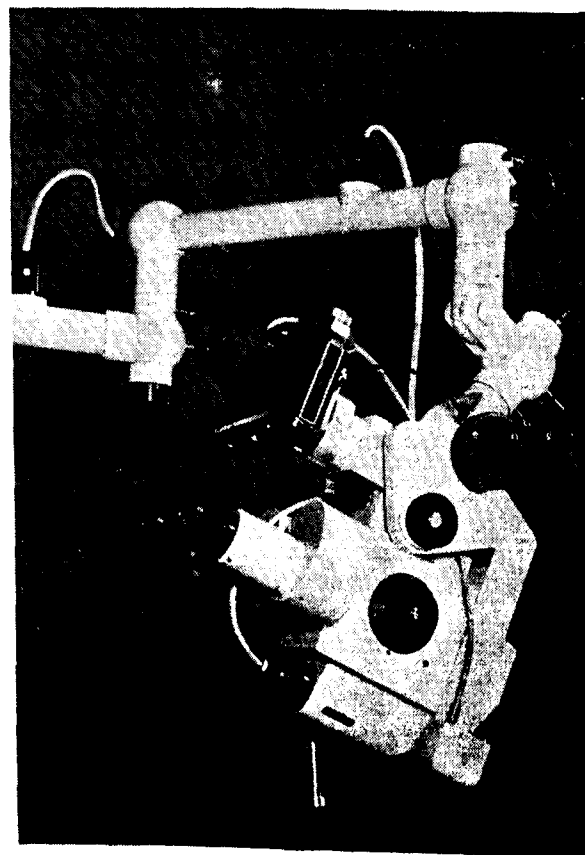


Fig. 16. Surgical Microscope II.

cing a stabilised controllable direct voltage of max. 200 V at up to 30 mA, so that 16 strips are obtained in one working process. The separating process does not require any supervision and can be carried out overnight.

The Colposcope III (Fig. 15) is a stereoscopic instrument for optical investigations for the early diagnosis of portal carcinoma with a magnification changing device for 5, 8, 12, 5, 20 and 32 times magnification and insertable red free and daylight filters. Control knobs permit precision setting in the direction of the optical axis and setting of the inclination. Inclined viewing with the eyepieces which have a diopter setting can, if required, be exchanged for an upright viewing tube. Camera and flash attachment can be simply fixed to the instrument. The rigid stand allows easy setting, two set-screws permit fixing of the instrument in any position.

The Surgical Microscope II (Fig. 16) is a stereoscopic surgical microscope for universal application in nose, throat and ear surgery. The magnification can be switched to 5, 8, 12.5, 20 and 32 times and red-free

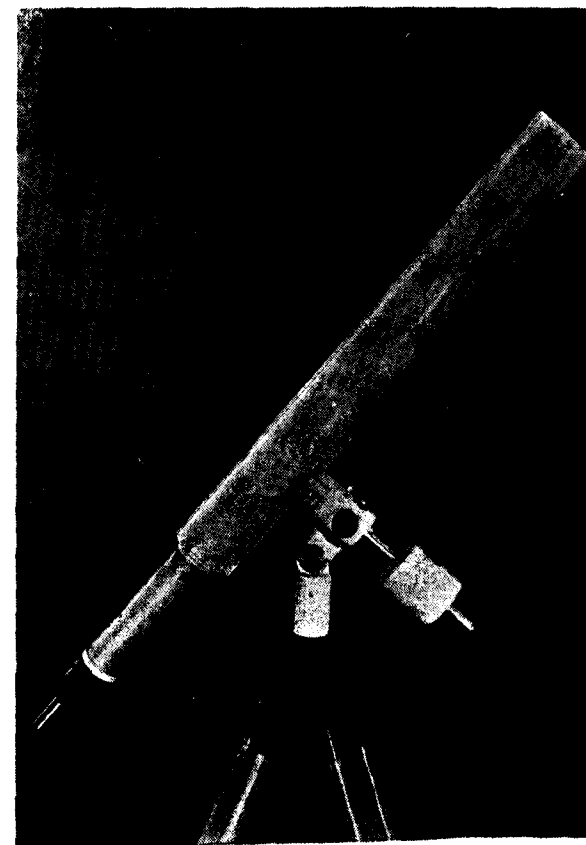


Fig. 17. School Telescope 63/840.

and daylight filters can be introduced into the beam as required. The instrument has all the devices of the Colposcope III. For sterile operation of all setting knobs, rubber caps are provided. The Surgical

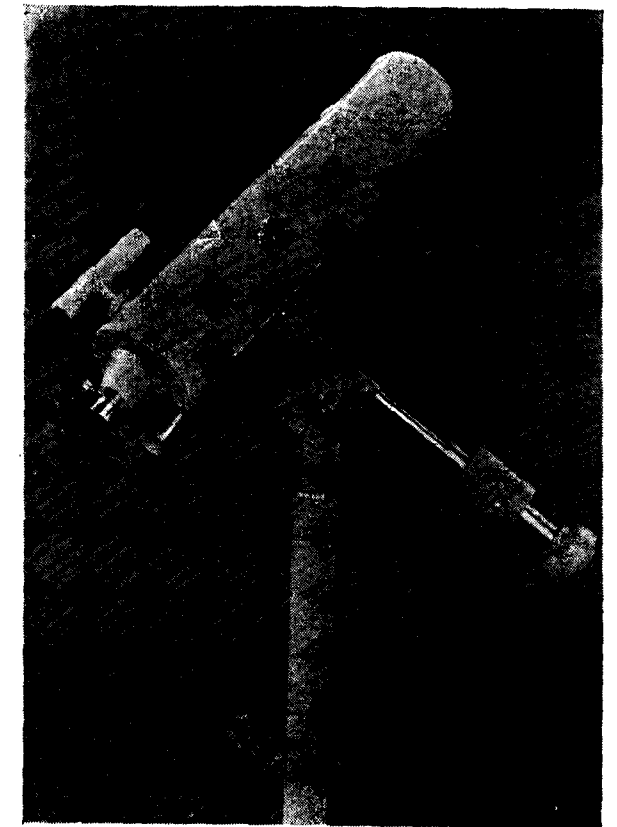


Fig. 18. Meniscus-Cassegrain Reflector "Meniscas" 150/2250.

Microscope II makes an improvement of the surgical technique possible and allows for the development of further surgical treatment in nose, throat and ear surgery.

The Astro-Division of VEB Carl Zeiss JENA which attained world-wide success by building the 2m-Universal Reflecting Telescope for the KARL SCHWARZS-CHILD Observatory in Tautenburg, of the German Academy of Science in Berlin, introduced two new small astronomical instruments: powerful astronomical telescope (Fig. 17) for schools and amateurs with a semi-apochromatic lens AS of 63 mm. internal aperture and 840 mm. focal length, and the Meniscas 150/900/2250 (Fig. 18) a cassegrain reflecting telescope with a miniscus-shaped entrance lens with polished Cassegrain mirror (principal mirror 150 mm. dia. focal length 900; Cassegrain system=2250 mm. equivalent focal length). The high image quality

permits in addition to visual observation, photographs of celestial objects and close subjects from 30 metres distance upwards. For speedy location of the objects, an 8-times magnifying viewfinder is firmly attached to the end of the eyepiece. The telescope can be attached to the equatorial mounting I b with pillar stand.

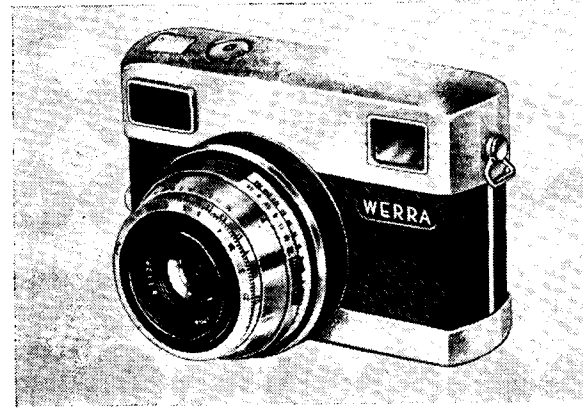


Fig. 19. Miniature Camera WERRAminiature.

The WERRAminiature (Fig. 19) is a new type of WERRA miniature camera, having the same coupled exposure control with all data required for photographing being visible in the viewfinder as with the WERRA V (WERRAminiature), but dispensing with interchangeable

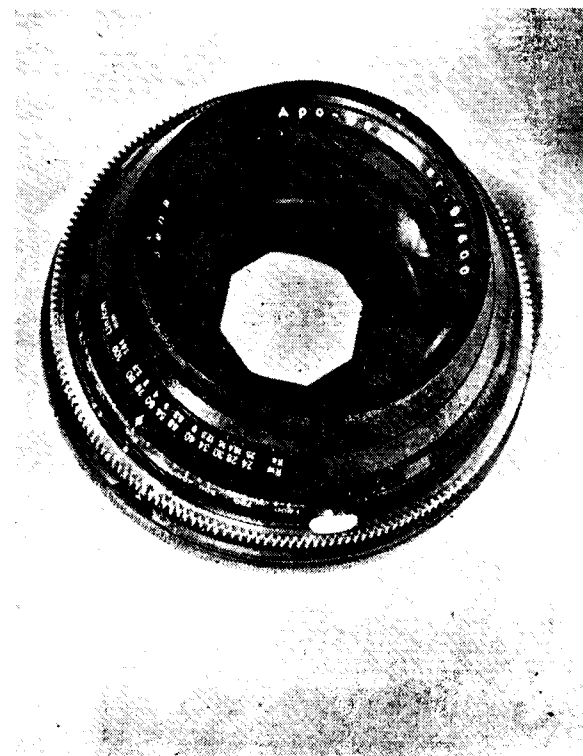


Fig. 20. Reproduction-lens.

lenses and rangefinder. This camera is intended especially for the wide circle of amateur photographers who wish to take photographs quickly and without trouble and to take colour photographs also. The WERRAminiature is equipped with a world-renowned Tessar 2.8/50, a setting range for film speeds from 9/10 to 27/10 DIN and with the Presto shutter with exposure times from 1 second to 1/750 sec. and B, as well as a delayed action device and M and x contacts. As viewfinder the brilliant large-image prismatic viewfinder is incorporated.

Apo-Germinar 1:9 (Fig. 20) is a newly developed special lens for the reproduction work in focal lengths from 140 mm. to 900 mm. and 1200 mm. with an aperture ratio f/11. The lens, a symmetrical type with 6 individual elements is practically distortion-free and without colour magnification aberrations up to the infrared region. All lenses from focal length of 300 mm. upwards are provided with a ready reckoner for automatic determination of the most favourable aperture for screen photographs, taking into consider-

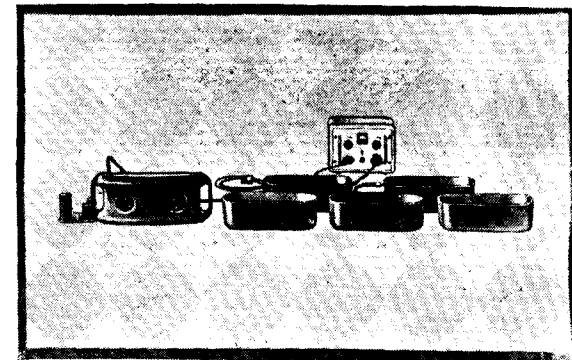


Fig. 21. Universal Film-Developing Equipment.

ation the screen distance, screen width and imaging scale. The image quality meets the exacting demands needed for the perfect reproduction of finest line drawings.

The Universal Film Developing Apparatus (Fig. 21) with which perforated and unperforated 35 or 70 mm films up to 50 metres length can be developed and fixed, is intended especially as an ancillary unit for X-ray screen cameras and for the documentation system of VEB Carl Zeiss JENA; it is accordingly suitable for development of X-ray Fluorapid Films and Document Films. It is however also possible to use it for processing other negative film types.

Mass Movement of Work Rationalisation in USSR

By A. Osipov

At every Soviet enterprise or workshop colourful posters featuring the achievements of the most advanced workers are displayed. A lathe operator, having sharpened his cutting tool in an original way, has succeeded in speeding up the production of parts; a moulder who has managed to insert the mould core with his left hand, now simultaneously performs two operations; an assembly fitter has altered the sequence of operations and has thus been able to reduce each process by several minutes—all these people are work-rationalisers, the pride of Soviet industry.

Rationalization proposals include new inventions and methods for improving the use of equipment—machines, instruments, tools, for raising the quality of the goods produced, for improving production technology, safety engineering, and labour protection, as well as measures contributing to the raising of productivity of labour, to more efficient utilisation of electric power, materials, etc.

In the Soviet Union there are special offices, that work with rationalisers, called the BRIZ, the Russian abbreviation for Bureau of Rationalisation and Invention. Such offices exist at every enterprise, and their function is to organise, plan, take into account, examine and utilise the rationalisation proposals that are submitted by the workers and technicians. Besides, there are special engineers who deal with rationalisation and invention at each shop. They maintain direct contact with various production sections; they are the first to examine the proposals, to estimate their engineering advantages; they help the author with the drawing and description of the innovation and to make the essential calculations.

There is a saying in the Soviet Union that "the one who invents wins fame". Rationalisers in the USSR enjoy popular esteem and respect. Conferences of innovators are held both at the enterprises and in the industrial branches. Inventors and rationalisers from all parts of the country meet at national conferences.

TRADE UNIONS AND RATIONALISATION MOVEMENT

An important role in the rationalisers' movement is played by trade-union and youth organisations. Factory trade-union committees appoint special commissions that work with inventors. Young workers and engineers who are successful in their rationalisation work are decorated with a special badge: "To the Young Front-Ranker". A USSR Society of Inventors and Rationalisers has been recently established with workers, engineers, technicians and office employees as members.

A rationalisation proposal is first submitted to the concerned enterprise. If the innovation can be utilised at other factories also the author has the right to submit it to the ministry or the economic council. Rationalisation proposals have to be examined at the enterprises within 15 days. At the ministers, central bodies, and economic councils the time limit is a month and a half.

If the proposal is being introduced at the factory where the author is working, he is either relieved of all other work and paid his mean wage, or the enterprise concludes a working agreement with him, and he does the work during the working hours with special pay. In case the rationaliser works on his proposal at some other enterprise, he has a lien on his job at his factory. He is remunerated according to the terms of the agreement. All complaints concerning the rejection of a proposal are examined by the chief of the enterprise jointly with a trade-union representative, in the presence of the rationaliser.

MATERIAL INCENTIVES

Rationalisers who have been issued a certificate for their proposal receive a premium of up to 50 thousand roubles, depending on the economy achieved



From the beginning of the Seven-Year-Plan the Uralmashzavod already produced 600 excavators. At present erection of an experimental EKG-5 excavator which distinguishes from the other machines of the same type by considerably less weight, better system of control and bigger capacity of bucket-5 cum. meter is being completed at the erection site. (Photo: EKG-5 new excavator on the erection site of the assembling shop.)

as a result of the proposal. In case, the proposals are designed to improve labour conditions, work safety or the quality of the goods, the amount of the premium is determined by the chief of the enterprise or the office which has accepted the proposal.

Those who help to implement the proposal in the production process are also given premiums. They receive up to 35 per cent of the amount paid to the innovator. Of course this sum is not a part of the premium the latter is to receive; it comes from a special fund allotted for invention and rationalisation. Rationalisers enjoy a number of other benefits, too.

But it is not only for material gains that Soviet workers engage in rationalisation activities. They know that any new development introduced into production will not deprive them or their fellow-workers of their jobs. On the contrary, it will contribute to raising the living standards of the people as a whole. Mention should be made in this connection of a basic principle operating in the Soviet land: "One for all, and all for one".

COLLECTIVE SPIRIT

Collective forms of rationalising activity are a characteristic features, finding an ever increasing scope in Soviet industry. Combined teams are being set up at the enterprises. One of the first was set up by mechanic Kuznetsov at the Hard-Alloy Plant in Moscow. Formerly he used to work out his proposals by himself, but then he came to the conclusion that it was better to put his complicated creative ideas into practice in a collective way. In the course of its activity the team designed 15 machines, mechanisms and apparatuses. The original designs of three machines were patented.

The activities of rationalisers in the Soviet Union recarried out on a mass scale. Millions of innovators and rationalisers submit innumerable proposals every year. The majority of such rationalising schemes are introduced into the national economy as a result of which many million roubles are saved every year.

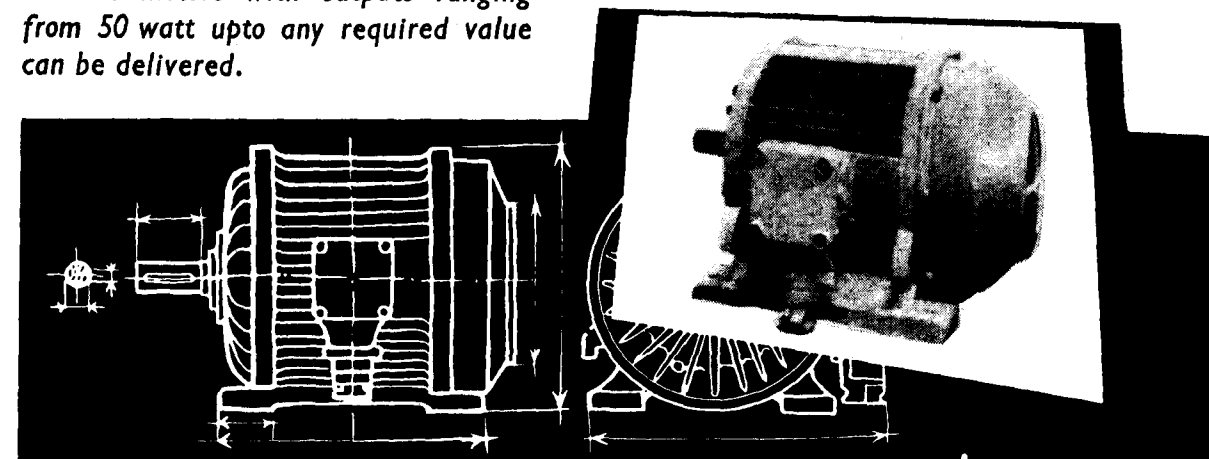
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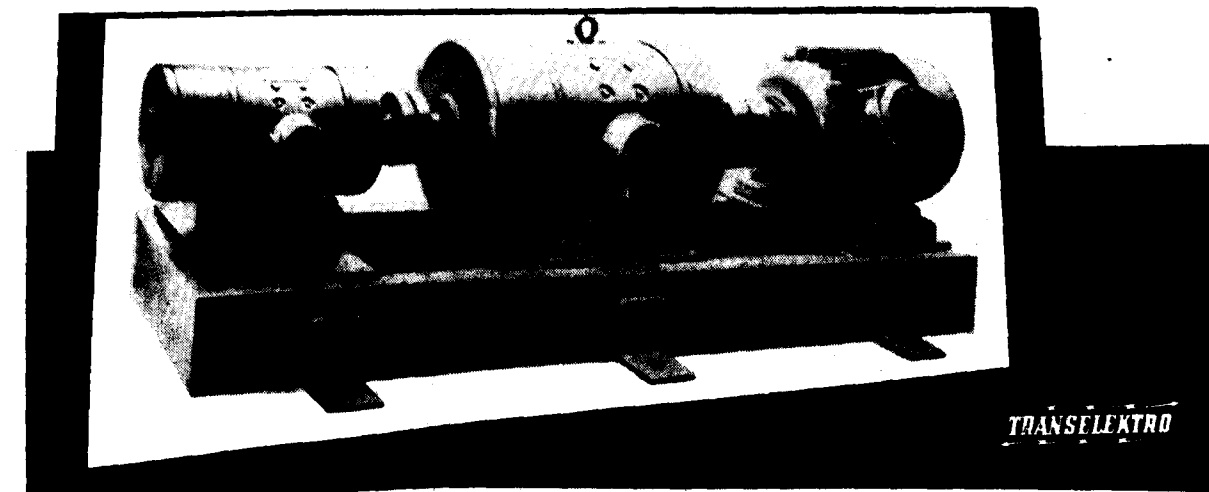
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ROLE OF HINDUSTAN MACHINE TOOLS

(Specially Contributed)

By A Special Correspondent

SINCE the advent of independence, India has been rapidly industrialising itself and engineering and industrial goods until recently imported are now being increasingly manufactured in the country.

We are today producing our own bicycles, automobiles, electric motors, aeroplanes, etc. This increasing manufacturing and industrial activities has resulted in phenomenal increase in India's requirements of plant and equipment. Machine Tools are the prerequisite to the production of all plant and equipment.

Obviously, the country's requirements in terms of machine tools have been on the increase as can be seen from the following statistics :

Year	Annual imports (In lakhs) Rs.	Annual Prod'n. (In lakhs) Rs.	Total (In lakhs) Rs.
1950	249.00	28.59	277.59
1951	250.00	47.31	297.31
1952	221.00	44.37	265.37
1953	312.00	44.08	356.08
1954	385.00	47.30	432.30
1955	628.00	67.13	595.13
1956	837.00	108.18	945.18
1957	1,464.00	201.00	1,665.00
1958	1,531.00	373.00	1,904.00
1959	NA		
(Estimated)	1,700	435.00	2,135.00

PRODUCTION AT HMT

Financial Year

1956—57	Rs. 54.00 lakhs
1957—58	155.00 „
1958—59	201.00 „
Calendar Year 1959	214.00 „

Machine Tools thus form the very basis of the country's industrial programme and in this very vital requirement India has been largely depending upon foreign sources for its plant and equipment. The long term remedy to get rid of this dependence at the cost of our limited foreign exchange resources is expanding our machine building industry.

It is necessary that at the earliest possible stage in the future, India should be able to establish its factories with plant and machinery manufactured in India and thus be free from the limitations imposed by foreign exchange shortage and the 'strings' and the semi-colonial status that often goes with it. Before plant and machinery for our future factories can be manufactured in the country, it is necessary to manufacture machine tools with which machinery for our future factories are to be manufactured. These reasons make the Machine Tool Industry in the context of our industrialisation plans and economic independence, perhaps the most vital basic industry in the country.

STATE STEPS IN

By its very nature, this industry does not hold out promises for large and quick returns, and in the already 'capital-shy' conditions, private capital is never easily forthcoming for such an industry. The Government had, therefore, to take the lead in setting up a plant and organise the Machine Tool industry. Subsequently, Government of India entered into a technical collaboration agreement with a well-known firm of Messrs. Oerlikon Machine Tool Works, Buehrle & Co., Zurich, Switzerland, and a plant to produce medium/heavy machine tool industry in the country was soon set up in Bangalore. The Hindustan Machine Tools Project thus came into being in the latter half of 1949. The period between 1949 and 1953 was mainly devoted to preliminary work and the factory commenced production late in 1955. The first series of lathes manufactured in the factory came off its production lines in May 1956.

PRODUCTION PROGRAMME

The original production programme of the Company

drawn up in consultation with Messrs. Oerlikon Machine Tool works in 1955 and early in 1956 was to reach a production of 400 machines per annum by 1960-61. A number of steps since undertaken during the latter part of 1956 as the introduction of multiple shift, emergency recruitment of additional personnel, and the provision of increased training facilities, emergency provisioning of stores and raw material to the extent required and increased supervision and 'efficiency' have resulted in a substantial increase in production during 1956-57, it was possible to achieve an output of 135 machines—an increase to 237% of the target.

Subsequently, the HMT turned out 402 machines in 1957-58, 502 in 1957-58 and finally 702 in 1959-60. Simultaneously it has diversified its production programme as to include 90 different types and sizes of machine tools.

PROGRESSIVE REDUCTION IN SALE PRICES

Consequent on the phenomenal increase in the factory's rate of production over the previous financial year, i.e., 1956-57, and over the Second Plan target for the year, the prices of Hindustan Machines have been substantially reduced. The price of 1000 mm. lathe which was fixed at Rs. 36,000 as on June 1, 1957 was reduced to Rs. 29,500-00 as on June 1, 1958. When the Company started production for the first time, the sale price of this lathe was fixed at Rs. 39,500-00 against the imported landed cost of Rs. 40,500-00 of lathes of equivalent quality.

EXPANSION PROGRAMME

During these four years operation, the Hindustan Machine Tools has been able to wipe off a very heavy initial Development and Commissioning Expenditure of nearly a crore of Rupees. In spite of this, however, adequate financial resources have been built up by the HMT and the same are being ploughed back to double the capacity of the factory from the targeted production of 1,000 machine tools to 2,000 machine tools

per annum without any financial assistance from the shareholder or the Government of India.

The total estimated expenditure involved in doubling the factory will be Rs. 280.87 lakhs of which Rs. 114.35 lakhs will be foreign exchange expenditure. The construction of 2 Stores Buildings, 3 Machine Shops and 1 Assembly and Despatch Shop have been commenced already. The Foundry of 3,000 Tons Capacity under construction is being doubled to 6,000 Tons capacity. Orders for the plant and machinery required from foreign suppliers have been placed. Nearly two-thirds of the number of machines required for the doubling of the factory will be supplied from the Company's own production of lathes, milling machines, radial drills, grinders and other machines.

This expansion Scheme estimated is expected to be completed without any foreign technical assistance as the factory has now been completely Indianised. It will be completed within 2 years as against the 7 years taken for the completion of the original factory. When this expansion is completed and the production of 2,000 machines per annum is achieved, the annual output of the factory is estimated to double to Rs. 7 crores or more with the share capital remaining at only Rs. 5.31 crores and with a corresponding increase in the annual profits and return on capital.

In view of the very substantial capacity of the HINDUSTAN MACHINE TOOLS plans are under consideration to further diversify its production so that more items of basic machine tools will be manufactured in the factory in the near future. The addition of more types of Machine Tools will also give further flexibility to the production programme of the factory. Simultaneously, plans are well in hand for the expansion of several units notably Mysore Kirloskars, Praga Tools and Prototype, Ambarnath. If these plans materialize and are not impeded by any difficulties, Hindustan Machine Tools, Mysore Kirloskars and other machine tool producers in India will be able to meet a substantial portion of the rising demand for machine tools in the country and will make India self-sufficient by the end of the Second Plan in the most basic categories of machine Tools.

PROJECT READY FOR DOUBLING ORE OUTPUT AT RAJHARA

Leningrad engineers have completed the technical project of expanding the Rajhara iron ore mine. Under the project, iron ore production is to be doubled to four million tons annually. The expenditures on the project's expansion will amount to about a third of the cost of the project's first stage. The Indian engineer Shashi Aggrawal took part in the development of the project.

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Non-destructive Material Testing by Supersonics Sonovisor-2

By Herbert Trommler
Jena, German Democratic Republic

APPROXIMATELY 10 years ago the method of non-destructive material testing by supersonics was used for the first time in actual practice. In the meantime it has developed into an important factor in the field of inspection techniques, and forged piece inspection, the inspection of metal sheets, and the inspection of pipes and welded seams can no longer be thought of without it. Several methods have been suggested and various instruments developed. Some have given excellent results in special fields of application and afford a great economic advantage, reflected by the following:

Saving of working time (by using only tested materials) and thus an increase in the working productivity, in the correct distribution of raw materials, by using faulty material only where these defects do not make any difference,

In achieving maximum safety in the plant, operating under highest speeds, enormous pressure and maximum load, In achieving an improvement in quality of the goods produced.

The most widely used method is the *Pulse-Echo-Process* which is easily applicable in many instances and with some experience permits one to record defects especially in large materials such as shafts,

rollers and forged pieces. Short high frequency pulses are produced by means of quartz or barium titanate transducers, ultrasonic pulses which spread out through the test body with the propagation speed in the respective metals to the back surface and are then reflected back to their transmitter. The sound head, acting at the same time as receiver, converts the returned ultrasonic pulses into electrical pulses, which are amplified and brought to the oscillograph tube. The transmitted pulse and the back wall echo are visible on the screen as teeth. If there is any disturbance in the path, this already reflects part of the ultrasonic wave to the sound head. This means that between the first two mentioned teeth a defect tooth appears at the appropriate time (Fig. 1). With complete shading the back wall echo disappears entirely. The smallest testing thickness, at which the transmitted pulse and the back wall echo are recorded so closely to each other that the defect tooth between them can no longer appear, is between 3 and 6 mm. The process is capable only of ascertaining the presence of a disturbance by means of an indication, i. e. through a tooth, and its position with regard to depth by measuring the delay time (Fig. 2). But the shape, location, size and type of defect cannot be read from the tooth and can only be

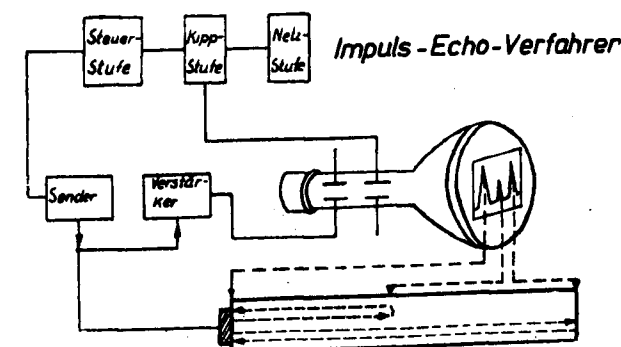


Fig. 1. Diagram of the ultrasonic pulse echo method.
1. Control stage 2. Tilting stage 3. Mains stage
4. Amplifier 5. Transmitter.

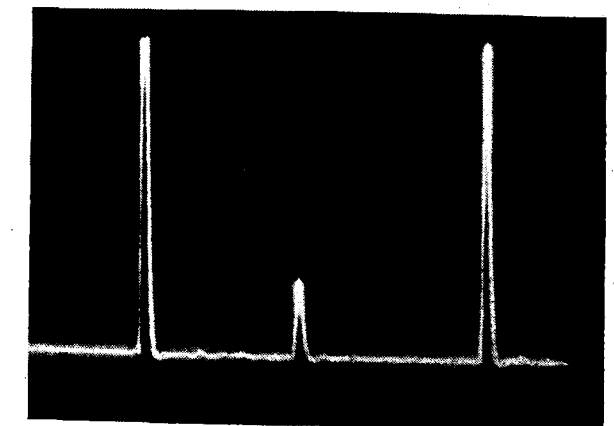


Fig. 2. Hydronalium piece thickness 150 mm. with borehole of 3 mm dia. (left tooth = transmitted pulse; centre tooth = defect echo; right tooth = back wall echo)

gauged from experience and from the previous history of the workpiece.

In most recent times VEB Carl Zeiss JENA developed methods which although based on the pulse echo method record the testing process not as a toothed recording but as figures. It is the rotary section image and the oscillation section image method which both have particularly high information content due to the two-dimensional illustration.

THE ROTARY SECTION IMAGE METHOD

serves for testing cylindrical workpieces (rollers, shafts, pipes with wall thicknesses above 3 mm), rotating slowly about the longitudinal axis whilst a sonic transducer moves simultaneously along the cylinder, emitting waves radially. The rotation of the workpiece is transmitted by a mechanical or electrical clutch on to the electron beam system of a Braun tube, the electron beam of which rotates synchronously in the same manner and records a brightness controlled image on the after-glow screen (Fig. 3). On the screen there appears therefore

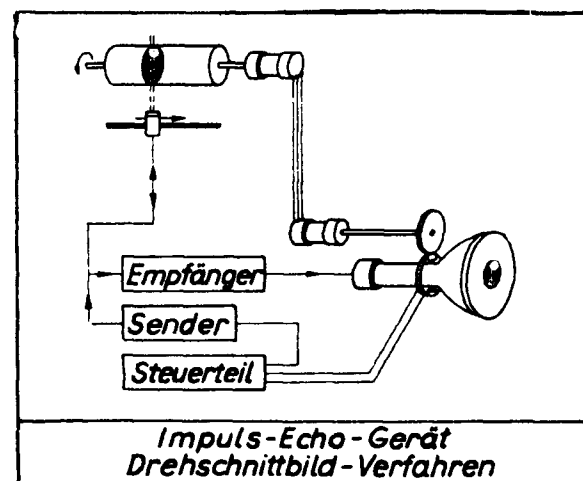


Fig. 3. Pulse echo instrument, rotary section image method. 1. Receiver 2. Transmitter 3. Control unit.

an image of the cross-section of the testpiece at the position at which the sound transducer is just located (Fig. 4). The contour of the testpiece and its defects appear in the brightness controlled lines or points and regions, resulting in a clear picture of the condition of defects of the testpiece which can be recorded quite easily for subsequent evaluation. For perfect and non-varying couplings in this instance a coupling over a water surface is used.



Fig. 4. Rotary section image of a hydronalium roller of 160 mm dia. with defects.

THE OSCILLATION SECTION IMAGE PROCESS

is excellently suited for testing rough metal sheets and other plane-surfaced workpieces. But also built-in tubes and pressure flasks or workpieces rounded off on one side only can be tested. At the same time it is possible to investigate and control the frequently unknown wall thickness of built-in tubes and pressure containers. The electrical part is the same as that of the rotary section image method, the sound-head however is continuously moved in a straight line backwards and forwards over the testpiece. A control voltage obtained from this movement causes

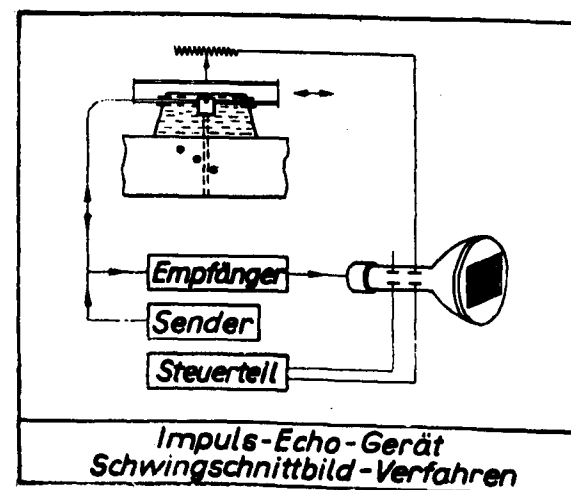


Fig. 5. Pulse echo instrument. Vibration section image method. 1. Receiver 2. Transmitter 3. Control unit.

the electron beam in the oscillograph tube to carry out the same horizontal movement synchronously, whilst in the vertical direction it is deflected proportionally to the path of the ultrasonic wave in the testpiece (Fig. 5). Thus an image of the surface is formed which is given by the amplitude of the movement of the sound-head and the material thickness under the sound-head (Fig. 6). If the oscillating sound transducer is in addition passed at right angles over the

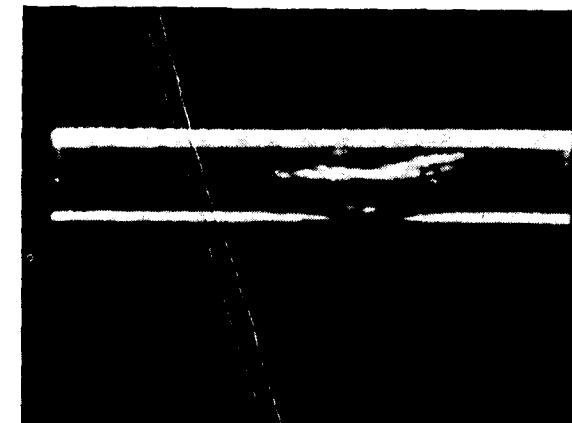


Fig. 6. Vibration section image of a hydronalium plate of thicknesses of 40 mm. with centre defect causing the back wall echo to disappear.

surface of the material a very quick testing of the entire metal sheet or tube can be carried out. This ensures also a much more economical testing with a complete investigation of the entire workpiece compared to scanning with a sound head of 20 cm diameter when using a standard reflectoscope.

These methods resulted in the development of the Sonovisor instruments.

SONOVISOR 1 (Fig. 7)

is a mobile desk instrument in which the image screen is arranged so that it can be observed by the operator whilst sitting or standing. When using a suitable rotary device or an oscillating sound transmitter the two above described testing methods can be carried out. The instrument can be switched to 2, 4 and 8 Mc/s.

SONOVISOR 2 (Fig. 8)

is a light-weight (15 kilo), easily portable ultrasonic test instrument, which can be used in the workshop as well as on the site without any difficulty. The use of transistors and modern manufacture with printed circuits resulted in an instrument of small dimensions

and very low weight. This becomes especially noticeable when using the instrument in large workshops and on the site. The size of the instrument is kept within such limits that it can easily be taken into boiler rooms and also for testing of boilers and containers.

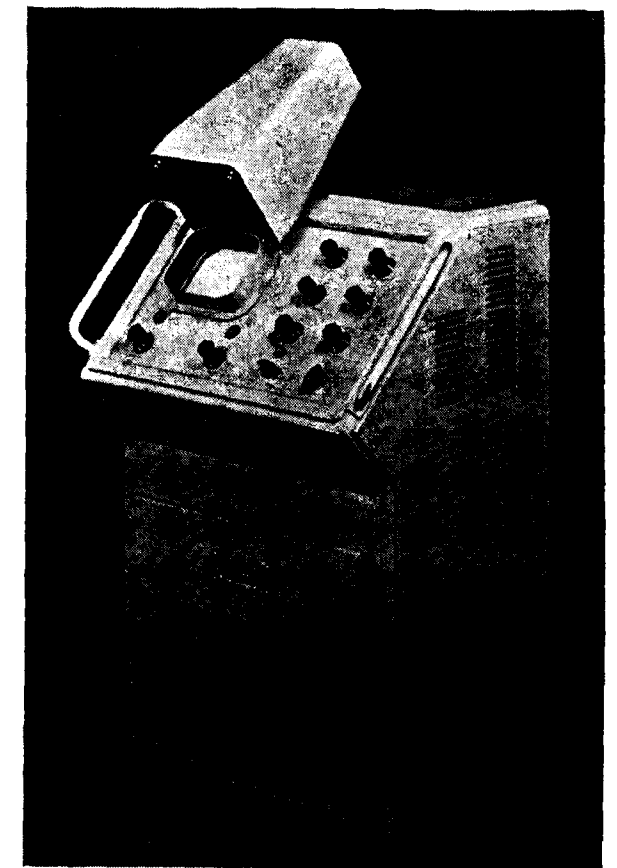


Fig. 7. Sonovisor 1.

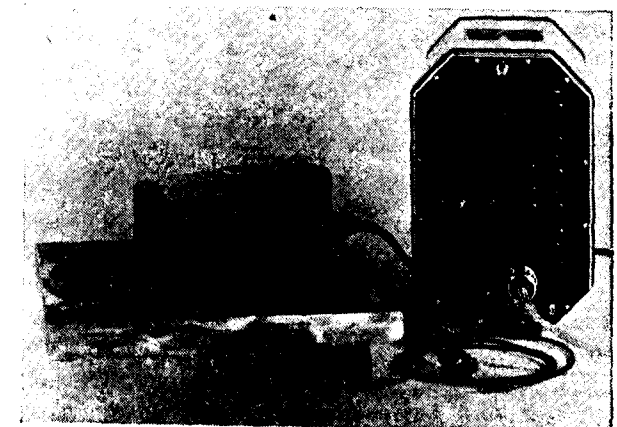


Fig. 9. Sonovisor 2 in operation. On the left, vibration section sound generator standing on the material under test. In the front the angle sound generator and sound generator cable with scanning sound generator. On the screen the test result is visible.

The advantage of the new instrument, unique of its kind, lies however in the fact that tests can be carried out by *oscillation section image methods* (Fig. 9) or the slightly modified *rotary section image method*, and also after a simple switching by means of the classical method of scanning (scanning transducer). This means that in places where oscillation section transducers cannot be attached because of their size or when applying methods which still require tooth recording, for instance, in the testing of welded seams, the Sonovisor 2 can be applied like a normal Reflectoscope.

The applicability of the Sonovisor 2 is further increased by the instrument, which is usually operated on A.C. being convertible by changing a small unit into a *battery instrument* (Fig. 8) which can be used anywhere, independent of the mains, by means of a 12 volt battery. It may be a great advantage to have all types of operation available in case of mains not being available or in case of power failure. This also ensures danger-free electrical work in metal containers.

Sonovisor 2 is equipped with a frequency of 4 Mc/s. On setting the *brightness* and *definition* of the electron beam correctly the instrument gives an extremely clear image. *Intensification* and *pulse width* can be adjusted by hand so that the most favourable image is toothed or section recording is obtained during testing. Parts of the image which are not interesting can be erased by built-in electronic methods. Cases for barium titanate transducers, for high resistance sonic transducers such as quartz, lithium sulphate and a case for the receiving sonic transducer when using the transmitted sonic methods, are available. An illustrated scale facilitates the setting and orientation of the screen image. The brightness of this illumination can be adapted to the respective requirements of observation of the screen image or photography. An extendable light shield permits the vibration section image, which contrary to the toothed image is only retraced several times, to become more clearly visible. For photographing the screen image a WERRA can be attached on an extendable photographic tripod. This camera can be clamped upwards in the rest position so as not to disturb the testing process. If a typical defect image is to be recorded the light shield is pulled out, the camera swivelled down so that a cone fixed to the camera gives a light-proof connection to the light shield. At the same time a figure is photographed as well, facilitating subsequent comparison with the records.

There are two testing methods which make the

Sonovisor 2 a testing instrument of versatile applicability and render valuable services to the material tester and quality control staff.

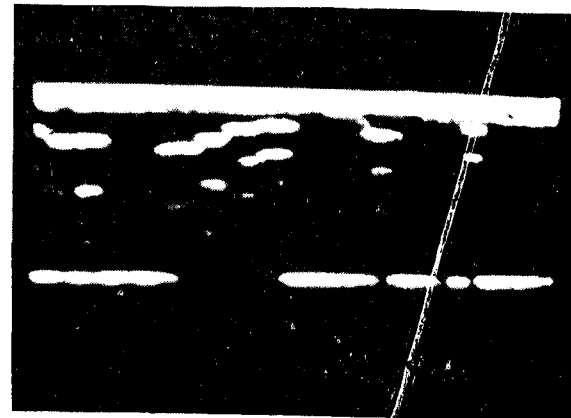


Fig. 10. Piece of steel (thickness 50 mm) with defects. The defects are in part so great that the ground echo is covered. The reflected intensity was for several defects sufficient for the second forward and back return between surface and defect. Therefore under the first indication a second echo appears.

THE TESTING WITH VIBRATION SECTION SONIC TRANSDUCER

The vibration section sonic transducer is attached whilst adding a liquid film on to the plan surfaces of the test-piece. The vibration width of the built-in barium titanate power transducer (8 mm dia.) and thus the testing length appearing on the screen image is set to 120 mm. The length of the preformed liquid surface in the vibration section sonic transducer determines the maximum possible testing thickness. With normal design of the sonic transducer the maximum testing thickness is 250 mm. of steel. If greater thicknesses are tested the second surface echo appears in the image of the testpiece and may lead to erroneous conclusions. With thicknesses of 50–250 mm. usually only one material thickness is recorded (Figs. 10 and 11). With thinner material the imaging of several forward and backward courses (multiple echo) is recommended. The operator thus receives a better idea and can judge the defect with more certainty. The scale of reproduction can be modified in such a manner that a sufficient number of multiple echos is recorded. It is advisable to set the screen image in such a manner that the transmitted pulse and the forward distance are turned out of the field of view and the first surface echo becomes visible as the top marking (Fig. 12).

A new arrangement is being prepared, namely a manual section image transducer, where the scanning



Fig. 11. Steel billet (thickness 140 mm) with defects in the upper part, which however are sufficient to make the ground echo disappear. The two horizontal indications in the lower part are the basis of bore-holes bored from the underside. The left bore-hole base of 5 mm. dia. is a distance of 117 mm. from the surface. The base of the bore-hole in the centre dia. 10 mm. distance from the surface 126 mm. Ground echo interrupted.

movement is made by hand over a certain distance. This permits greater distances and primarily curved material to be scanned.

TESTING WITH MODIFIED ROTARY SECTION IMAGE METHODS

The practice of testing tubes and rollers according to the rotary section image method shows that rigid synchronisation between workpiece rotation and recorded rotation is only possible with considerable expenditure. With the Sonovisor 2 a modified method is therefore used which represents the circular cross-sections as a long drawn out band (Figs. 13 and 14).

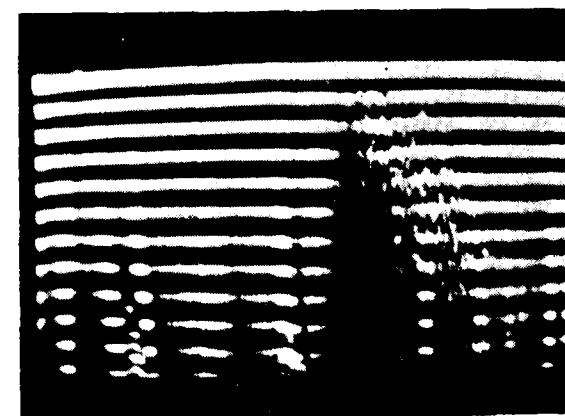


Fig. 13. Steel tube of 66 mm. dia., 9 mm. wall thickness, recorded as band with the multiple echo stressing the dish defect.

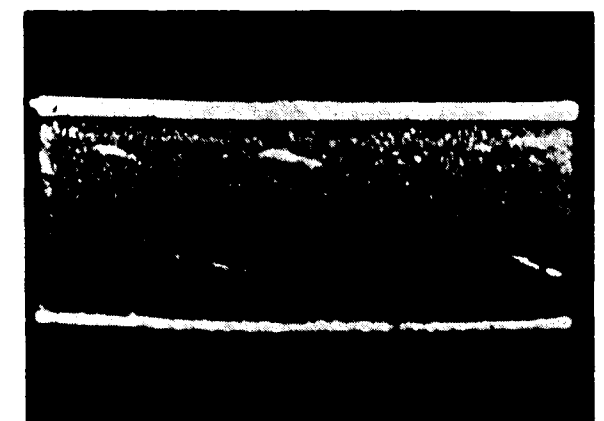


Fig. 14. Hydronalium roller of 160 mm. dia. recorded as band with defects. The illustrated granularity close to the surface is to be regarded as modified structure.

By using a rotary potentiometer as direction pointer which can easily be coupled to the rotating test object and which is connected by an electrical circuit to the object under test, the instrument can be erected wherever the operator requires and can best carry out observations, for instance, directly on a lathe. Although it is not easy to indicate immediately the accurate position of the defect the clear testing is as quick to carry out as with the rotary section image. Once or twice angled immersion sonic transducers are used as sound transmitter units, which naturally can also be used for other underwater investigations.

TESTING WITH SCANNING SONIC TRANSDUCERS

The instrument is equipped with *straight scanning sonic transducers* of a diameter of 8, 12 and 25 mm, which are connected to the lower case B (barium titanate) after switching the switch to scanning operation. They can be used with or without protective foils (Fig. 15). The coupling is effected with a liquid film. According to the setting of the image scale 20–50 cm. length of steel is visible on the screen (Field of view). If greater lengths are to be investigated another rotary knob "overall range" is used to scan an entire length of the above mentioned field of view (20–50 cm.) continuously. The maximum test length with scanning sonic transducer and toothed recording (overall range) is for steel 3 m. Minimum distance of defect from the surface (dead zone), which can still be viewed, is 3–4 mm. in steel. For special purposes a further scanning sonic which has practically no dead zone is being prepared. It is intended for investigation of defects close to the surface.

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MINING INDUSTRIES ANNUAL SUPPLEMENT

HAWTHORN COMBINED MINE

Under a combined mine scheme approaching completion in the Durham Division No. 2 Area of the National Coal Board, the Murton, Eppleton and Elemore collieries have been connected by an underground locomotive haulage system by which all the coal produced is delivered for raising at a new shaft. This scheme has extended by some sixty years the economic lives of the three old collieries which, with extensive modernisation and mechanisation, have a planned combined annual output of 1,600,000 tons of coal. New washing and carbonisation plants have been built adjoining the new Hawthorn shaft as part of the project to treat the combined output of the mines.

A PROJECT of particular interest carried out by the Durham Division No. 2 Area of the National Coal Board is the Hawthorn combined mine scheme which is now approaching completion. Under this scheme a new shaft has been sunk at Hawthorn and connected by an underground locomotive haulage system at two levels, 1100 ft. and 1400 ft. deep respectively, with the workings at Murton, Eppleton and Elemore collieries. By these haulage systems the whole of the output of the three collieries is delivered for raising at the Hawthorn shaft, at the head of which there have been built new coal preparation and coking plants. (This coking plant was described in detail in THE ENGINEER of September 4, 1959).

Each of three collieries involved in the scheme is well over 100 years old, Murton having been sunk in 1838, Eppleton in 1825 and Elemore in 1825, and for many years their respective outputs have been of the order of 3000 tons, 1500 tons to 2000 tons, and 1250 tons of saleable coal a day. At each of the collieries there still remains a considerable amount of coking, steam and industrial coal of good quality. The linking up of the three mines under the scheme has not been effected with a view to increasing their output but to make possible more efficient production and effect the economic survival of the three ageing pits, each of which was burdened with deteriorating, out-of-date plant and working coal reserves far from shafts at the end of old roadways. Further, none of the pits had preparation plant to effect the cleaning necessary to meet modern requirements in view of the seams being worked.

When the scheme is fully operative 8000 tons of coal will be raised daily at the Hawthorn shaft and the known coal reserves will last at this rate for some sixty years. Apart from the main coal transport and winding system, each of the pits will continue to work as a separate unit with its own administration and winding facilities for men and materials, supplies, and stone disposal. To ensure efficient operation, each pit has been extensively modernised with new winding equipment and surface buildings. Underground, each pit is now fully equipped for mechanical coal cutting and handling.

The new 1500 ft. deep, 22 ft. diameter Hawthorn shaft is concrete lined and its sinking, which was started in 1952, was completed in 1958. On this site Permian water-bearing magnesium limestone and yellow sands extend from a depth of 276 ft. below the surface for a thickness of 131 ft. When a point some 26 ft. above the top of the Permian formation was reached in course of sinking the shaft, the diameter was extended to provide a large working chamber. From this chamber a ring of holes was bored down through the water-bearing strata and sands to enable the area to be frozen in the conventional manner for further sinking of the main shaft. This procedure was followed to avoid freezing of the ground near the surface and any possibility of affecting the foundations of the permanent reinforced concrete head-gear structure which was put up initially and used for shaft-sinking purposes. The freezing chamber was subsequently filled with concrete when the shaft walling was lined up.

One of the most important tests in metal processing is welded seam inspection for which ultrasonic testing is beginning to become generally used for acceptance



Fig. 15. Scanning sound generator of 12 and 8 mm. dia. with protective foil cap.

testing. For this test the scanning sonic transducer in the form of angle sound generator (Fig 8 in front) is used which, in passing from a plastic wedge into the metal produces oblique transverse waves, falling on the welded seams from the side. In homogeneities in

the welded seams produce reflections towards the sonic transducer and record an error tooth (Fig. 16).

For the most varied thicknesses of sheet metal the instrument is equipped with angular scanning heads with incident angles in steel of 35°, 45°, 60°, 70° and 80°. In addition an angle sound head with an incident angle of 90° to be used for *generating surface waves* is provided. To complete the welded seam testing instruments, the variable angle sound head with an incident angle of 35°—90° in steel with continuous setting is intended. For testing of thin sheet metal a plate-wave method has for some time been used. By means of a continuously adjustable angle sound head—in our instance variable from 25°—55°—it is possible on setting a certain angle with a definite thickness of the sheet metal to produce curved or extended waves running along a small wedge in the sheet metal and reflected from the defect. The advantage of such a plate-wave angle sound generator is that the testing distance is increased to approximately 30—40 cm. Seamless and longitudinally welded tubes of wall thicknesses up to a few mm. can be tested with a tube-testing prong. Two angle sound generators with

ground radii radiate the tube surface with wave bundles in a zig-zag course, thus comprehending the entire cross-section. On using a built-in running water supply this arrangement can be used for continuous tests in the manufacturing process.

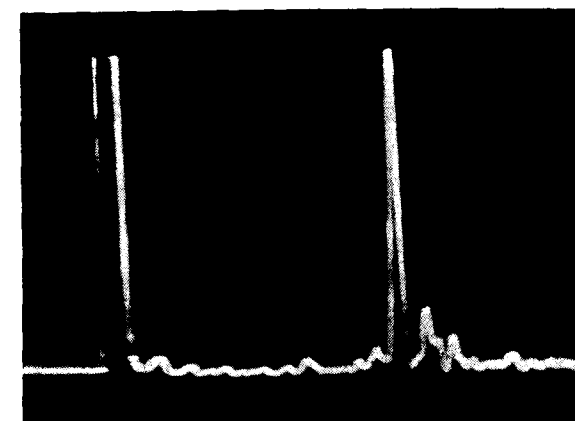


Fig. 16. Welded seam testing on a 10 mm. thick steel plate. Left tooth = transmitted pulse, right tooth = defect in welded seam.

generators and receivers, the provided case should be used for the receiving transducer. When the testing requires, it is therefore possible to connect two straight sound generators or two angle sound generators or two plate-wave sound generators and to obtain the result by toothed recording.

The enumeration of a few applications already shows that the modern instrument Sonovisor 2 is very versatile and that if correctly applied the instrument can bring useful economies in many works. Primarily metals can be tested with it but also other materials such as porcelain, glass or plastics. On connecting a monitor when using the scanning method, the Sonovisor 2 can be made an instrument for automatic plants, where the defect condition of the testpiece is recorded optically or acoustically, and results in an interruption of the testing process or a notification of the error on the testpiece.

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TESTING BY THE TRANSMITTED AND SOUND METHOD

If it is necessary with a certain testing problem to use instead of the reflection method, the transmitted sound method, i.e. to work with separate sound

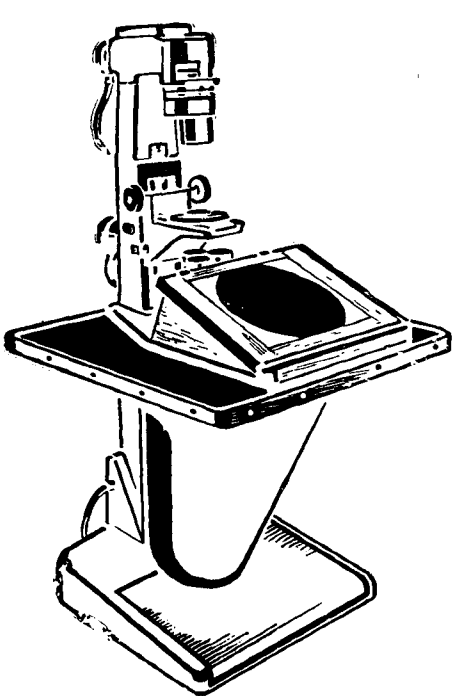
AUTOMATIC LAUNDRY WITH JETSTREAM CONDITIONER

A new machine capable of drying and "shaking out" large quantities of washed linen in a continuous automatic process has been introduced by a U.K. firm. Shown at the recent International Hospital Equipment and Medical Services Exhibition in London, it can take, in one hour, just under 4 cwt. (203 Kg.) of tightly-packed laundry, and can deliver it dry with the items separated and loaded, ready for ironing, on a conveyor belt.

The "Jetstream" conditioner, as it is known, is described as an attempt to produce a flow-line, shaker drying, tumbler on the "closed-circuit" principle. Previous efforts in this direction have resulted in a machine of the continuous shaker type, either cold or hot, but open to atmosphere. The new machine, however, will take a 100 lb. load (45.35 Kg.), shake out, and remove, under efficient drying conditions, the required amount of moisture for the finishing process, then automatically unload on to a conveyor

at the delivery end. In a six-minute drying cycle over 40 per cent. of the residual moisture in the goods is claimed to be removed.

Figures as low as 1.4 lb. (.63 Kg.) of steam per 1 lb. (.45 Kg.) of moisture have been recorded and in a series of tests the highest steam consumption noted was 1.6 lb. (.72 Kg.) per 1 lb. (.45 Kg.) moisture extracted. This is due to the air circulation. The Jetstream tumblers embody a highly efficient method of "overspill" recirculation which, combined with carefully calculated cage speed, lifter shape and size, serve to give a drying efficiency and economy never previously known. The machine is fully lagged for operator comfort, and efficiency, and discharges the load automatically at the end of pre-selected time cycle. Standing 7 ft. high (213.3 cm.) and 13 ft. 6 ins. long (411.4 cm.) the conditioner weighs 2,596 lb. gross (1222.83 Kg.).



ZEISS

CONTOUR PROJECTOR 320

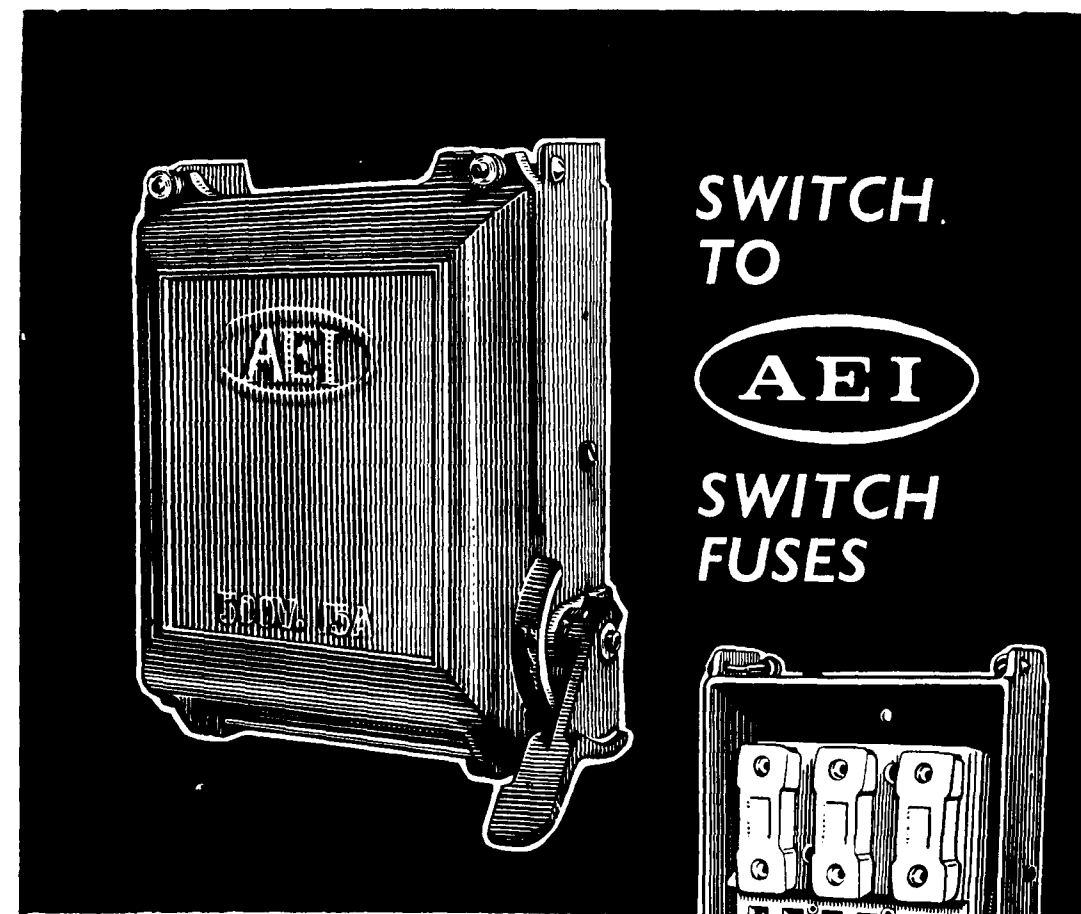
for the checking of large production parts, making direct measurements of the optical image, comparing contours with transparent scale drawings, and tracing projected contours on the reproduction scale.



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grade is automatically indicated on illuminated display panels.

The coal from each level in the shaft is handled by a separate skip plant and each of the two winding installations, supplied by Associated Electrical Industries, Ltd., works a pair of 8-ton skips to one of the levels. Of these two winding engines the one serving the 1100 ft. level is driven by a d.c. motor rated at 1100 h. p., 250 r. p. m.; its 16 ft. diameter drum has an operating speed of 27.2 r. p. m. The winder for the 1400 ft. level is driven by a 1500 h. p., 300 r. p. m., d. c. motor and its 16 ft. diameter drum is driven at 32.6 r. p. m. Each of the installations is operated on the Ward Leonard system with closed loop control via a laminated yoke exciter controlled by flux resetting amplifiers. With a



Train of loaded cars arriving at Hawthorn shaft

winding time of 76.9 seconds, each winding engine is designed to make up to forty-seven winds an hour to raise some 375 tons of coal in the 8-ton skips. Under the fully automatic cycle speed, current, acceleration, deceleration and peak power are accurately controlled, switching facilities also being provided for manual control of the winders for raising and lowering men when required. Each winding cycle is initiated when the skip at the surface has been emptied and its door-lifting frame retracted, the skip at the underground level has been loaded, all bridge chutes retracted and the pocket doors closed.

From the pithead receiving hoppers coal is delivered by steel plate conveyors on to two 42 in. conveyor belts for transport to the new washery. This washery is designed to handle 750 tons of run-of-mine coal an hour; as already mentioned, the grades of coal from the mines are segregated into

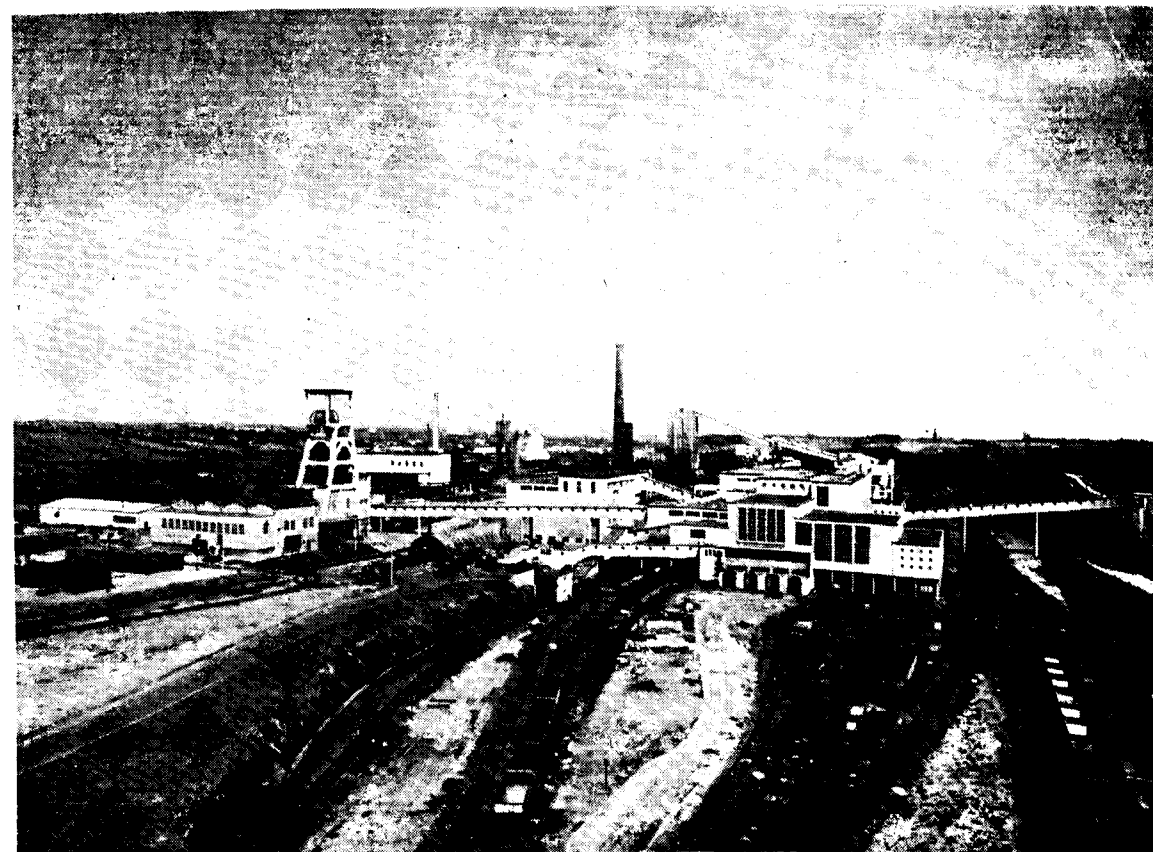
main categories and with each change in delivery, notice is given to the washery controller allowing him ample time to make the necessary arrangements. The plus 8 in. coal is removed by two primary screens and delivered on to picking belts for crushing to minus 8 in. The whole of the minus 8 in. product is then delivered to two secondary raw coal screens for separation in to 8 in. to 1 in. and 1 in. to 0. The 8 in. to 1 in. coal is then washed in a Chance cone and the 1 in. to 0 conveyed to one of four 1000-ton capacity bunkers according to its grade. From these bunkers the 1 in. to 0 coal can be drawn at a rate of 300 tons an hour and, after the $\frac{1}{8}$ in. has been screened out, delivered for washing to a second Chance cone. The remaining $\frac{1}{8}$ in. fraction is treated in a froth flotation plant. The washery delivers some 1400 tons of $\frac{1}{2}$ in. to 0 product a day to the blending bunkers of the nearby carbonisation plant. The plus $\frac{1}{2}$ in. cleaned coal is graded in four sizes—8 in. to 4 in., 4 in. to 2 in., 2 in. to 1 in. and 1 in. to $\frac{1}{2}$ in. and delivered from the screens to four rail wagon loading stations. The washed $\frac{1}{2}$ in. to 0 feeding the carbonisation plant can be readily diverted to rail wagons or road vehicles.

At these wagon loading stations the coal trucks are handled by "wagonrollers" and filled by boom loaders operated by weighmen on a gantry above the loading points; automatic weighing machines being installed to check and record the weight of incoming empty and outgoing loaded trucks.

The consulting civil engineers for this project were the British Reinforced Concrete Engineering Company Ltd.

Contractors:

Civil engineering work, earthworks and site preparation, Dowsett Engineering Construction Company, Ltd.; shaft, Blandford-Gee Cementation Company, Ltd., and the Foraky Boring and Shaft Sinking Company, Ltd. (first 75 ft. carried out by Sir Robert MacAlpine and Co., Ltd.); coal preparation plant, General Electric Company, Ltd.; railway sidings, Thos. W. Ward and Co., Ltd.; winding engines, Associated Electrical Industries, Ltd.; skip plant, Head Wrightson and Co., Ltd.; headgear, Henderson Brothers; underground locomotives, English Electric Company, Ltd.; Huwood-Hudswell Company, Ltd.; underground signalling, Westinghouse Brake and Signal Company, Ltd.; mine cars, W. G. Allen and Sons (Tipton), Ltd.; weighbridges, Henry Pooley and Son, Ltd.; wagonrollers, Norton-Tivdale, Ltd.; access road, George Wimpey and Co., Ltd.



Hawthorn Combined Mine, with Murton Coking Plant in the background.

For the transport of coal underground some 17 miles of new steel arch-lined roadways have been constructed and about 24 miles of 2 ft. gauge rail track laid between the workings of the satellite mines and the Hawthorn shaft. From the Murton and Eppleton workings the coal is hauled in trains of twenty-four, 2-ton Allen mine cars by 64 h. p. English Electric battery locomotives operated in tandem over certain sections to ensure effective braking. From the Elmore mine the trains are handled over gradients varying up to 1 in 30 by 100 h. p. Huwood-Hudswell diesel locomotives, to a transfer point where the trains are taken over by the electric battery locomotives. In addition to the coal trains, the locomotives also handle the stone trains to the service shafts at the three collieries, as well as the haulage of materials and man-riding trains.

In laying out the haulage system particular care was taken in the positioning of the single and double tracks to ensure a smooth flow of traffic so that, whilst giving a good measure of flexibility, need for shunting operations was reduced to a minimum. The rolling stock is maintained in underground workshops, and battery charging stations (such as that shown in our

illustration) have been installed at strategic points throughout the system, three stations being on the upper level and six on the lower level. The Crompton Parkinson traction batteries of 405 Ah capacity, which are used on many of the locomotives, weigh some 5 tons each and are divided into four sections bolted together on a sub-frame. To facilitate removal of the batteries for recharging purposes the case of each is fitted with four rollers which run on strips placed across the locomotive frame. At the charging stations the locomotives are driven between two banks of charging racks and as one battery is rolled off the chassis for charging its replacement is rolled on from the other side.

The haulage system is divided into sections controlled by colour light signals arranged to admit only one train at a time into a section, and a colour signal with a diagram of the section of track ahead is mounted on the tunnel wall at driver's level at the end of each section. All signals automatically reset at red and when the driver of an approaching train stops he can, by leaning out of his cab, depress the appropriate push button of the route he wishes to take on the diagram. If the section selected is

unoccupied all the power operated track points are automatically set for the route and the green signal then lights. Immediately the train enters the selected route the signal reverts to danger. At the approaches to the Hawthorn shaft on both levels there are despatcher's cabins equipped with mimic diagrams of the tracks in the vicinity so that the man in charge can check at a glance all train movements. From these cabins, one of which we illustrate, the despatchers route the outgoing empty trains to the various mine districts as required. In addition to there being direct telephone communication between the loading stations in all districts and this cabin, telephones at all signal points throughout the system provide means of immediate communication between drivers and the despatcher in charge of train movements.

Trains of full mine cars arriving at the Hawthorn shaft are hauled past a control and weighing cabin into sidings where they are back-shunted on to a line of marshalling creepers and their locomotives uncoupled. The locomotives are driven round a loop leading back to marshalling lines for trains of emptied cars. The marshalling creepers propel the trains of full cars in turn up a slight gradient to a point ahead of a weighbridge where their further movement is taken over by a creeper controller. Through this creeper controller, train movement is integrated with the operation of the weighbridge and the car tippler beyond. The equipment moves a train forward in steps under automatic control to place cars in pairs, without uncoupling, on to the weighbridge and then on to the tippler. The weighing system is arranged to subtract automatically the tare weight of the mine cars and their contents weight is recorded on a machine in the control cabin. Beyond



Signal and driver's route selection panel at track side

the tippler the trains of empty cars are marshalled to be hauled back to the loading points as required by locomotives driven back along the return loop from the ingoing track.



Train despatcher's cabin for routing outgoing trains of empty trucks

From the tippler the coal passes on to a "Sherwen" vibratory feeder delivering on to a belt conveyor feeding skip measuring pockets suspended on batch weighers. In these pockets the coal is weighed in 8-ton batches and as one pocket is full the flow of coal is automatically diverted into the other. When both pockets are full the feeder conveyor is automatically stopped. The measuring pockets load the coal into the winding skips and are arranged to discharge their contents automatically into the appropriate skip when it comes into line. As each skip arrives at the surface its guillotine door is lifted automatically to discharge the coal when it is in line with the chute of a receiving hopper. From the bottom of the receiving hopper the coal is removed at a controlled rate by steel-plate conveyors which discharge on to the main conveyors feeding the washery.

It should be pointed out here that, as the grades of coal raised at Hawthorn are used for carbonisation, industrial and domestic purposes, it is essential that the different grades be segregated into these categories for delivery into the washery. For this purpose an electronic signalling and control system has been installed to monitor each grade of coal through the tippler, winding plant and the conveyors delivering the washery. As each train of full mine cars approaches the weighbridge the attendant in the adjoining cabin depresses the button appropriate to the grade of coal being carried. When the coal arrives at control points leading into the washery its

110 MILLION TONS OF STEEL BY 2000 A.D.

Indian Consultant Outlines Perspective

DELIVERING the Sir M. Visvesvaraya Lecture at the annual meeting of the Institution of Engineers in Bombay recently, Dr. M. N. Dastur a well-known metallurgical consultant, outlined a long range perspective of steel development which envisaged consumption reaching the level of 110 million tons a year in India by the end of the century. The estimate, he said, was arrived at on the basis of per capita consumption to be attained in successive plan periods corresponding to the degree of industrialisation visualised in the country's long-term plan. These estimates, which were incorporated in the preliminary project report on the Bokaro steel plant prepared by his company indicated that steel requirements by 1965/66 would be 12 million tons, giving a per capita consumption of only 26 kg. as against the current consumption of 40 to 70 kg. even in many Latin American countries with under-developed and predominantly agricultural economies. He pointed out that China's steel output had multiplied twelve-fold in the last eight years compared with only a two-fold increase in India. It was expected that consumption in India would reach the level of 19 million tons by 1970, going up to 28 million tons by 1975.

BULK OF STEEL FROM LARGE INTEGRATED PLANTS

Referring to the world-wide trend towards large iron and steel works, Dr. Dastur said that India would have to rely on a few large steel complexes for the bulk of the future capacity, but this did not preclude setting up a large number of widely dispersed small plants to meet regional demands. In the next 40 years, he visualised 8 to 10 large plants coming up with capacities of 3 to 12 million tons per year to contribute 50 per cent of the total steel requirements. The other 50 per cent would have to come from about 18 plants of 1 to 3 million tons and a 100 smaller units. Policy decisions taken today, he urged, should bear this perspective of development in mind, and provide sufficient space in the initial layout of new steel plants for maximum future expansion.

COAL AND LIMESTONE SUPPLIES CRITICAL

He said that the expansion of steel capacity required urgent attention to the raw materials base of the industry. The quality and extent of our resources had caused anxiety. While iron ore reserves are one of the largest and best in the world, the known reserves of good coking coal were comparatively small and the ash content is high. The availability of suitable fluxes with low insolubles for steelmaking was even more critical. The position of coal and limestone thus allowed absolutely no ground for complacency. The large investments being made in building steel plants were likely to be rendered idle

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In use throughout the world

CONCENTRATING TABLES

Head Office and Works:

The Wilfley Mining Machinery Co., Ltd.
Allen Road, Rushden, Northants, U.K.

unless, taking a lesson from the Second Plan, there was a sustained and coordinated effort to survey, investigate, raise and transport these materials to the steel plants.

NEW TECHNIQUES

Discussing the technical requirements of expansion, he emphasised the urgency of stretching out coking coal supplies by washing, blending and the adoption of new production techniques to reduce coke consumption. He pointed out that similar efforts in the U.S.S.R. had reduced coke consumption by 35 per cent between 1930 and 1958, and by 28 per cent in the U.S.A. during the same period. Commercially feasible techniques such as the use of self-fluxing sinter, increased blast temperature and high top pressure operation at the blast furnace should bring down by 30 per cent the requirements of coke per ton of pig iron produced in India.

RE-ORGANISATION OF MANAGEMENT

Analysing the human implications of steel expansion programme, Dr. Dastur pleaded for better management of public sector undertakings through effective use of Indian technical talent. The autonomy such undertakings were supposed to enjoy was largely frustrated by the predominance of Government officials on the Board and by inadequate delegation of financial powers. For instance, the Board of Hindustan Steel, charged with execution of projects costing Rs. 550 crores, had powers to sanction capital expenditure only up to Rs. 40 lakhs, less than 1/12th of 1 per cent of the total cost. It was undesirable, he said, that the management of large science-based industries should be entrusted to people without technical knowledge or industrial experience and also handicapped by a bureaucratic outlook, unsuited to running such undertakings. Not surprisingly, civil service procedures and red tape held sway everywhere, making these industrial undertakings move even slower than departments of Government.

Making a plea for comprehensive re-organisation, Dr. Dastur urged that the theoretical autonomy of these undertakings should be made operative in practice by giving chief executives powers of unitary management, by eliminating both the veto now

exercised by the finance men and the insidious interference from officials put on the Board. There should be no objection to formal and public directives from Government, since these were subject to Parliament's scrutiny.

ROLE OF ENGINEER-ADMINISTRATORS

A major aim of the re-organisation should be to bring technically qualified personnel into top management positions as in the U.S.A., U.S.S.R. and other advanced countries. Suitably qualified and correctly oriented cadres of engineer-administrators could make all the difference between success and failure in Indian planning, provided, of course, they were given an opportunity to make a full contribution. This would help to avoid the set backs in planning and execution that projects had suffered during the Second Plan due to a distressing lack of confidence in Indian technical talent. Urging a decisive break with the past, he recommended that each project should be given a 'technical audit' before it was finalised and at suitable intervals during its construction. This audit was particularly important in relation to the designing of plants to ensure that processes suited for Indian conditions and raw materials were adopted. It would also help to standardise equipment for new industries and give the machine building plants now coming into existence a chance to cope with demand and cut their production costs. In an expanding economy, construction programmes should be scheduled on a continuing basis to make full use of scarce equipment and personnel. It was unfortunate, therefore, that the construction force at the new steel plants has been disbanded when expansion of these projects was already decided and new projects like the alloy steels plant at Durgapur and the fourth steel plant at Bokaro were definitely scheduled.

Earlier, discussing the role of steel in the country's economic development, Dr. Dastur said that the objection raised in some quarters against rapid development of the industry was only a short-term view. Those who doubted our ability to mobilise our raw materials and technical manpower resources, and cope with the large expansion visualised, exaggerated our difficulties—and also did not take into account the bold progress we have made in the last decade despite many odds.

FULLY AUTOMATIC CONTROL OF SPRAYED LIQUIDS

(*CONFLOW* system ensures economy by going into action only when spraying is required)

CORRECTLY sited sprays or sprinklers are usually installed for spraying, cleansing and quenching transported materials such as coal, coke, sand, etc., and in such cases it is important that the sprays shall operate consistently while loads are moving, and that they shall cease operating as soon as movement stops.

This is one of the interesting features of the latest Code 100 Auto Spray Control Unit, made by CONFLOW LIMITED, LENTON, NOTTINGHAM, which ensures automatic functioning of this process and, when used with water, oil or other fluids precludes the hazard of spraying empty belts.

The Code 100 control unit supersedes the earlier Code 80 model of which large numbers have been supplied, chiefly for use with conveyor systems, and it is of interest to note that the original CONFLOW apparatus was the outcome of close collaboration between N. C. B. officials and technicians of the firm. The original units have achieved important reductions in air-borne dust counts—even up to 85 per cent.

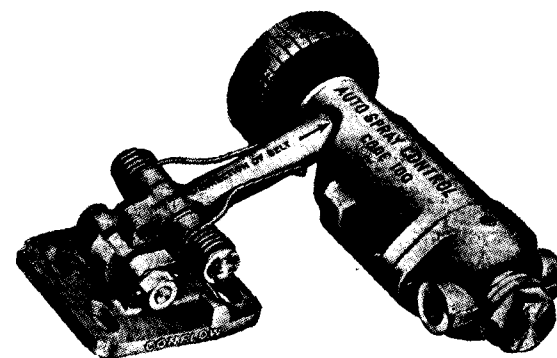
It will be appreciated also that the improvements effected in the Code 100 unit enable the system to be applied to many material transporters other than the conveyor type. Another particularly interesting feature is that it is designed to operate in horizontal, vertical or angled positions, and that by very simple

modification the standard unit can function with practically any set of conditions.

Driving-wheel rotation is imparted by the material transporter itself, by deflection of the top carrying belt in conveyor units, and in other applications by the movement of wagons, cables, rotary plant, shafts, etc. Supplies of independent power are unnecessary.

On rotation of the driving pulley, a gear pump delivers a *special* hydraulic fluid at low pressure from a reservoir to the rear of a piston which moves forward and carries with it a push-rod, thus lifting the control valve from its seat and thereby permitting liquid to pass through the unit to the spray pipe-line. Stopping of rotary motion causes the control valve to close. All operational and functional components are integrally incorporated in the closed circuit of a precision-engineered body which, by being attached to the upper end of a pivotal arm, is capable of depression according to the applied load. Water, or some other liquid, passes through the valve section of the unit to effect cooling, although it is isolated from the unit hydraulic circuit.

As already stated, mainly the purpose of the unit is to control and conserve the liquids passed to the belts, and to permit spraying *only* when materials are moving. Empty belts and stationary belts, whether loaded or otherwise, are *not* sprayed. Many of these



CONFLOW AUTO SPRAY CONTROL

Automatic Control of
Sprayed Liquids

Dust Suppression
Dampening &
Quenching

For use with Conveyors,
Trucks & Tipplers

Motive Power provided
by Conveyor or
Transporter

Power Points
unnecessary

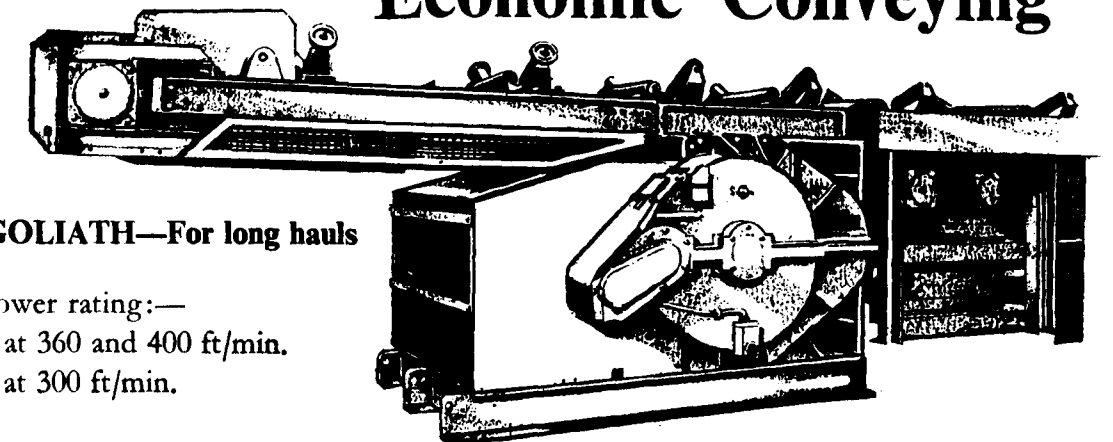
Only Moving Loads
Sprayed, No Wastage
of Water or Liquid

Quick, Positive, Safe,
Uncannily Effective

Operates at All Speeds
and Normal
Temperatures

Suitable for Electrical
Micro-Switch Operation

For Powerful Fully Reliable Economic Conveying



SUPER GOLIATH—For long hauls

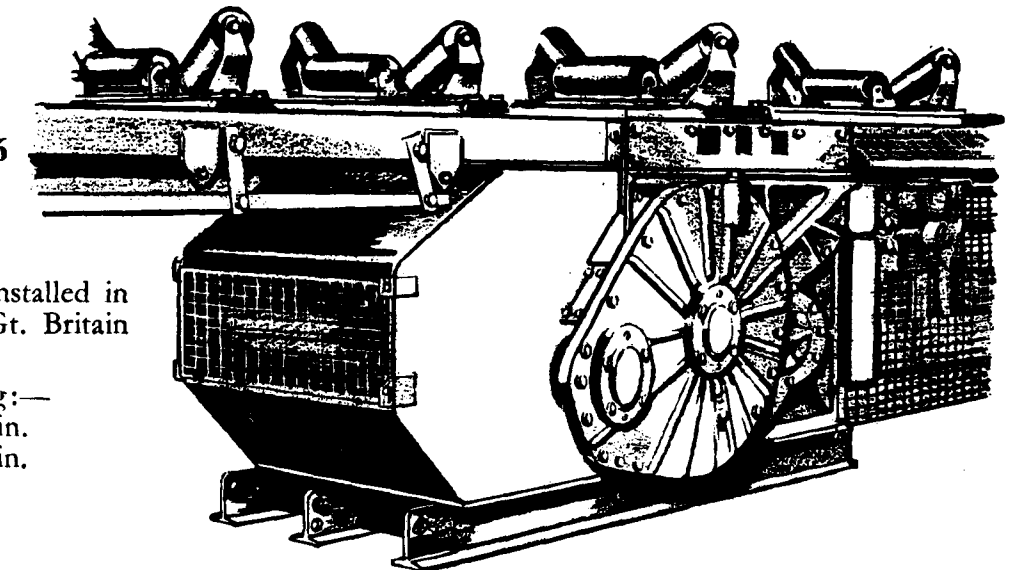
Horse power rating:—
120 h.p. at 360 and 400 ft/min.
100 h.p. at 300 ft/min.

Specify



EQUIPMENT

GOLIATH Mk. 6



More than 2,000 installed in
the coalfields of Gt. Britain
alone.

Horse power rating:—
60 h.p. at 350 ft/min.
50 h.p. at 280 ft/min.

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Representatives for India:—

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RICHARD SUTCLIFFE LTD HORBURY WAKEFIELD ENGLAND

units are operating with belt conveyors of the conventional roller or cable type and a typical layout is shown in the sketch.

Quickness of the control valve operation has made it possible to develop the unit for spraying the contents of mine-cars and wagons and the unit is installed and adjusted to permit the sprays to operate immediately on the first contact of the unit driving wheel with the moving wagon side—and to cease spraying immediately the wagon end is reached. Spraying into the gap between wagons is both detrimental and untidy and it is eliminated by this method.

The effectiveness of this principle applies to almost every size and speed of truck. The standard unit has a maximum depressible movement of approximately 3 in.; therefore, variations in the width of wagons up to this amount present no difficulty.

Automatic Spray Control for Dust Suppression, Dampening, Quenching, Etc.

The latest *Conflow* Code 100 Auto Spray Control is the culmination of several years experience of manufacture, application and extensive research. It incorporates every beneficial feature of which we have become aware and its greatly improved performance, reliability and serviceability leave very little to be desired.

The purpose of this unit is to AUTOMATICALLY as opposed to manually, control supplies of water and fluid sprayed or sprinkled on to transported materials such as Asbestos, Coal, Coke, Granite, Gravel, Iron and other Ores, Sand, Stone, etc. Properly sited sprays or sprinklers are usually installed for spraying, cleansing and quenching of transported materials, and it is important that such sprays operate consistently while loads are moving, and cease operation when stationary. This unit ensures Automatic function of this process, and, when used with conveyor belts precludes the hazard of spraying empty belts.

Water and Liquid wastage is automatically eliminated.

ROTARY MOTION IS THE PRINCIPLE OF ACTUATION

Driving wheel rotation is imparted by the material transporter itself, by deflection of the top carrying belt in conveyor installations, and in other applications

by moving trucks, cables, rotary plant and shafts, etc. Supplies of independent power to this unit are unnecessary. Upon rotation of the driving pulley in the direction of the arrow, a gear pump delivers special hydraulic fluid at L. P. from a reservoir to the rear of the piston which moves forward together with the push-rod, thus pushing the control valve from its seat, and thereby permitting water or liquid to pass through the unit to the spray pipe-line. Cessation of rotary motion causes the control valve to close. All operational and functional components are integrally incorporated in the closed circuits of the precision engineered body, which, because it is attached to the upper end of a pivotal arm, is capable of depression to applied load. Water or other liquid, passes through the valve section of the unit to effect cooling, but it is isolated from the unit hydraulic circuit.

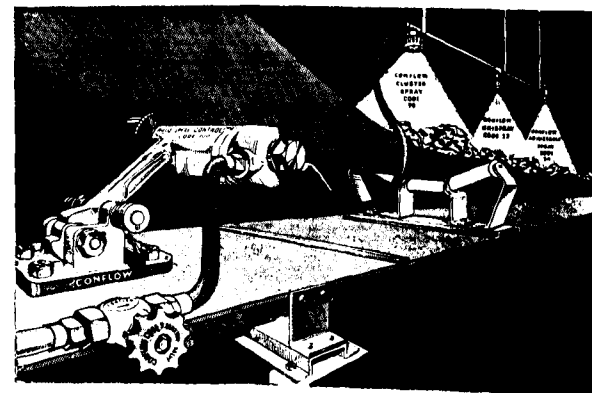
Reversal of drive rotation is not detrimental in any way whatsoever to the *Conflow* Code 100 Auto Spray Control, and on such occasions liquid is not allowed according to pass to the sprays on the assumption that it is undesirable to wet reverse-bound goods or materials.

ROBUST, COMPACT, GUARANTEED

The unit is unobtrusive, robust, compact, attractively finished and packaged. GUARANTEED for 12 months against faulty workmanship and materials, and is easily serviced at home and abroad by purchase of interchangeable spares as detailed.

USE WITH CONVEYORS

The purpose of this product is to control and conserve water or other liquid supplies passed to correctly sited sprays and to permit spraying only when



materials are moving and **not** when stationary. Empty belts and stationary belts, whether loaded or otherwise, are **not** sprayed.

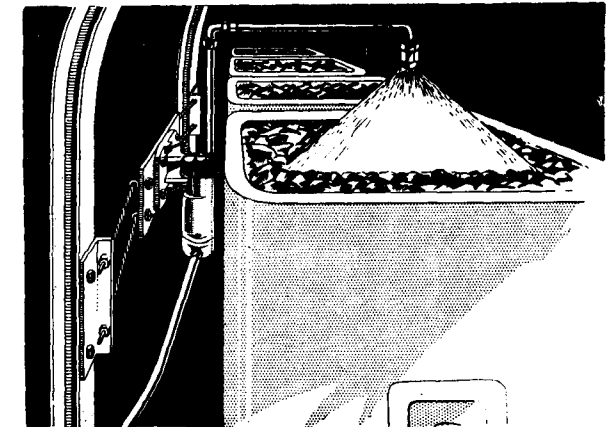
Many *Conflow* units are operating with belt conveyors of the conventional roller or cable type, in mid-belt, driving-end, idling or tail-end positions, and at transfer or junction points.

Belt speeds and water pressures may vary considerably but installation procedure is similar in most instances. The general lay-out is typified in the sketch shown on page M.S. 10.

The *Conflow* Code 100 Auto Spray Control is sited beneath the top conveyor belt, midway between two sets of conveyor rollers where maximum deflection takes place, and the unit driving wheel requires rotation in the direction of the arrow. It is sited centrally to the width of the belt. The unit, supplied ex works in the recommended installing position of 5.812°, is fixed to just avoid contact between the driving wheel and an **Empty** running belt. Operational function is achieved by the slightest deflection of the moving belt which thereby contacts and rotates the unit driving wheel and causes the control valve to open. Cessation of driving wheel rotation causes the control valve to close. The driving wheel is adjustable towards or away from contact with the belt by application of a boxspanner from either side of the belt to the cam adjusting bolt. Inlet and Outlet hoses can be brought from *either* side of the conveyors, whichever side is most convenient, and connected to the unit. The sprays over the belt, of *Conflow* manufacture, are sited no more than 6 feet outbye of the unit. For regulating and isolating purposes a stop valve, *Conflow* Code 7 Maxway valve, should be installed in the Inlet supply line.

USE WITH MINE-CARS TUBS, TRUCKS, WAGONS

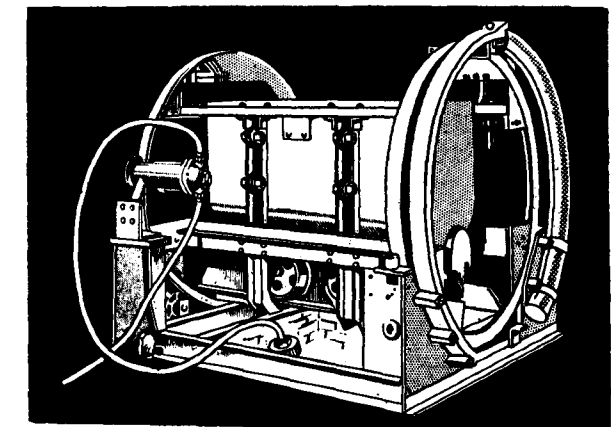
The development of the *Conflow* Code 100 Auto Spray Control for spraying the contents of moving Mine-cars, etc. has been made possible by the quickness of control valve operation. The unit is installed and adjusted to permit the properly sited sprays to operate immediately on the first contact of the unit driving wheel with the moving truck side, and to cease spraying immediately the truck end is reached. Spraying in the gap between mine-cars or trucks is detrimental and untidy. On the other hand empty trucks only may be sprayed. The units are designed for operation by wheel rotation in the direction of the arrow and may be fixed horizontally, vertically or angled. Full details must be given when ordering units for this type of installation. Length of truck or car, gap between, speed, water or liquid pressure, and ambient temperature.



The effectiveness of this principle applies to almost every size and speed of truck but imagination and ingenuity will assist installation. The flexible method of mounting such units is obviously one which meets certain conditions and not others. The Standard unit has a maximum depressible movement of approximately 3", therefore variations in truck, wagon or car widths up to this amount present no difficulty. If further movement is desirable it can be accommodated by supply of a Special Unit mounted to suit site conditions.

USE WITH TIPLERS AND ROTARY EQUIPMENT

With Tiplers, the intention is to spray truck and mine-car contents as they are tipped or transferred

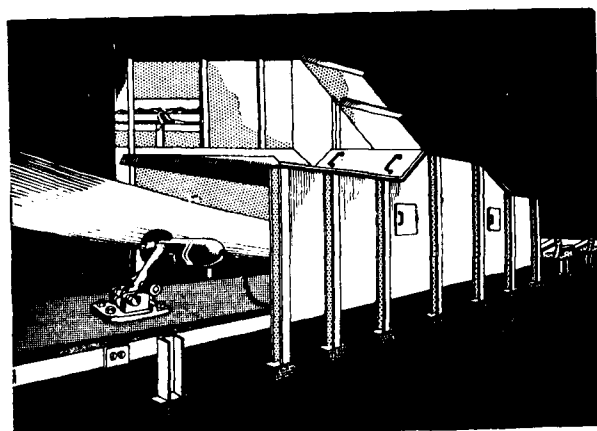


from one level of transport to another. The *Conflow* Code 100 Auto Spray Control is installed to contact the periphery of the Tippler drum as it commences to rotate in the unloading direction, and to permit water or other liquid supplies to pass to the correctly sited sprays at such time. Cessation of rotation or reversal causes spraying to cease.

In most instances the driving wheel of the *Conflow* unit is in permanent contact with the tippler drum. Structures, conditions, requirements, will vary from one installation to another and ingenuity is obviously the best means of achieving desired results. Units may also be arranged to operate with other rotary equipment, shafts, etc. full details of which must be given.

USE WITH MICRO-SWITCHES FOR SEQUENCE CONTROL

Sequence control, stopping and starting of auxiliary equipment, conveyors, motors, etc., to coincide with specific requirements is a further application of the *Conflow* Code 100 Auto Spray Control. With this unit the water or liquid control valve is



omitted. Instead, the push-rod, is extended through the unit end so that, as rotation in the direction of the arrow is imparted to the unit driving wheel, the push-rod is moved forward and operates a Micro-switch. Cessation of unit driving wheel rotation or reversal of drive direction, causes the push-rod to retract or return and to break contact with the switch. The push-rod movement is .188" maximum.

Many opportunities of adaptation will present themselves for this switch-operation unit, and it is impracticable to describe them all here, but to mention only a few.

1. Sequence operation of subsidiary conveyors bringing them into operation only when main or trunk conveyors are running. Or vice versa with other combinations of effect.

2. Sequence operation of trap-doors on conveyors by means of which various materials, fillers, etc., may be mixed by opening/closing of auxiliary conveyor trap-doors when main conveyor is running.
3. Automatic cessation of machinery operation when main equipment is stopped, etc., etc.

It is advisable to send full details of the installation when ordering *Conflow* Code 100 Auto Spray Control Units for micro-switch operation. Type of equipment with which unit is to operate, mounting position, RPM or FPM of driving medium, duty of unit, ambient temperature of site, electric supply details and any other helpful information.

HISTORY

This *Conflow* Code 100 Auto Spray Control supersedes the earlier Code 80 model of which many have been supplied, chiefly for use with conveyors. The original apparatus was the outcome of close collaboration between several NCB officials and *Conflow* technicians. The older units have achieved some very remarkable reductions in air-borne dust counts, up to 85% in certain instances, and many non-approved dusty areas have been converted to approved conditions.

The unit is designed to operate in Horizontal, Vertical or Angled positions, and by very simple modification the Standard unit can be made to function with practically any set of conditions. The improved design and high engineering standard enable some really Fast and Snappy opening and closure times to be achieved by the control valve. It will be obvious that the improvements and advantages associated with this new code 100 unit enable it to be applied to many other material transporters as well as conveyors, and numerous further applications will be apparent as time progresses.

In this respect the technical staff at *Conflow* works are very eager and willing to co-operate in the development of special adaptations.

The foregoing pages serve to illustrate one or two of the applications already operating.

STANDARD UNIT

CONFLOW Code 100 Auto spray control

Attractive wide range of operational conditions.

Eminently suitable for all AVERAGE purposes within the following range.

Water and Liquid flow pressures over 10 P. S. I. up to 1500 P. S. I.

Moderate volumes or quantities of Water and Liquid.

Revolutions per minute (R.P.M.) or Feet per minute (F.P.M.) 70 and over up to 500.

Ambient of Working temperatures 40°F to 140°F.

It is NOT necessary to give details of working conditions for STANDARD units.

The already wide range of performance of the STANDARD unit can be extended still further to cater for almost every situation, simply by interchanging the bye-pass regulator screw, No. 17, and/or the control valve and seat, Nos. 22 and 23. Such interchanges are possible before and after supply.

L. V. UNIT

CONFLOW Code 100 L.V. Auto Spray Control

Is more particularly suitable for installations where LARGE VOLUMES of Water and Liquid, etc. are required for rapid quenching or dousing, usually from LOW feed pressures as in Gasworks, etc.

The unit is exactly similar to the Standard product except that the control valve and seat, Nos. 22 and 23, are interchanged for larger, $\frac{1}{2}$ " bore components to permit Larger Volume of water or liquid to pass through same.

The unit operates favourably on flow pressure of 5 P. S. I. and upwards to 150 P. S. I. It is NOT recommended for P. S. I. over 150. Ambient or Working temperature range is identical with Standard unit, 40°F to 140°F.

The interchange of the control valve and seat will modify a Standard unit to LV type.

It is preferable to give full details of conditions for LV type for testing purposes—see detail required below.

SPECIAL UNIT

CONFLOW Code 100 S.P. Auto spray control

By simple interchange of the Bye-pass Regulator screw No. 17: R.P.M. or F.P.M. below 70 or over 500, and ambient temperatures below 40°F and over 140°F can be accommodated.

For those units outside STANDARD range, it is advisable to give full details in order that tests can be made to simulate actual conditions either at *Conflow* works or by Agents Abroad.

DETAIL REQUIRED FOR L.V. & SPECIAL TYPES

1. *Type of Equipment*, conveyor, tippler, truck, etc., with which the unit is expected to operate.
2. *R.P.M. or F.P.M.* of transporter, conveyor or driving medium.
3. *Duty of Unit*, to control sprays for Dampening, Dust Suppression, Quenching, to operate Micro-switch, etc.
4. *Material transported*, Asbestos, Coal, Coke, Granite, Gravel, Iron or other Ore, Sand, Stone etc., etc.
5. *Liquid to be controlled*, Water, Oil, Creosote, or other liquid mediums, and viscosity.
6. *Feed or flow pressure* available at point of installation.
7. *Number of G.P.M.* required to spray.
8. *Ambient temperature* of working conditions.
9. *Size of Connections* if different from British Standard Specification.

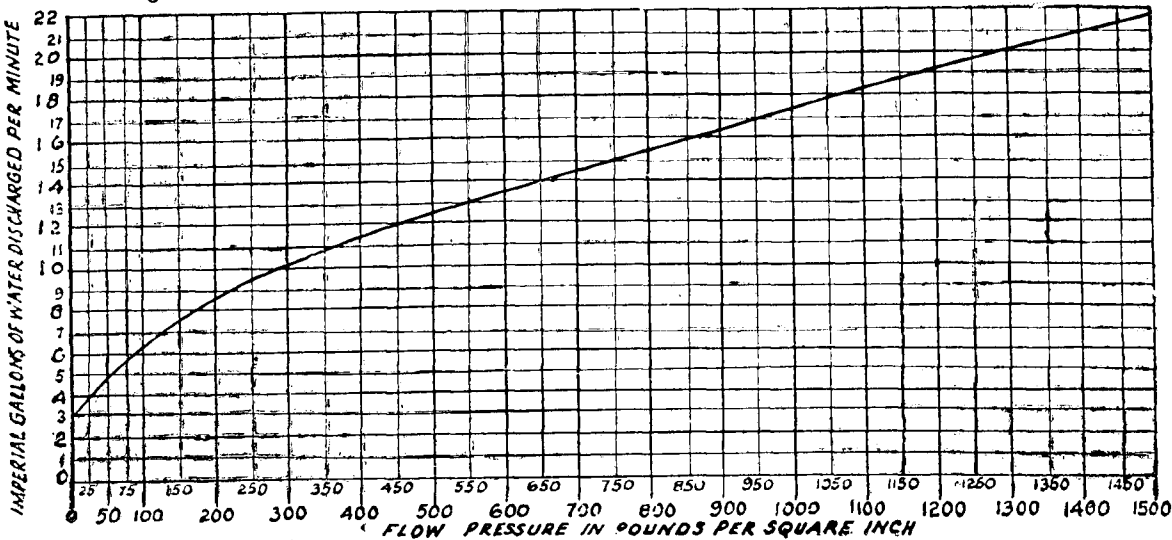
Every CONFLOW Code 100 Auto spray control is thoroughly tested and run-in before despatch. Each unit is guaranteed for 12 months after despatch.

Range data is subject to review as experience develops.

STANDARD

CONFLOW Code 100 Auto Spray Control Unit

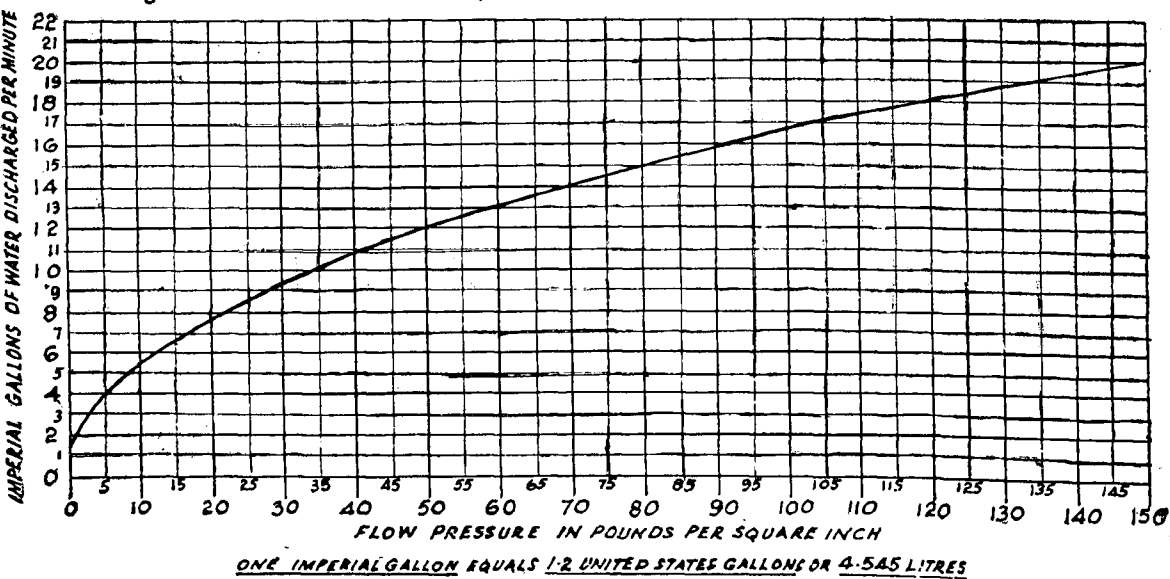
Maximum gallons per minute (G.P.M.) capable of being passed through a STANDARD unit.
The charted figures are for maintained FLOW pressures.



L. V.

CONFLOW Code 100 L. V. Auto Spray Control—Large Volume Unit.

Maximum gallons per minute (G.P.M.) capable of being passed through a L.V. unit.
The charted figures are for maintained FLOW pressures.



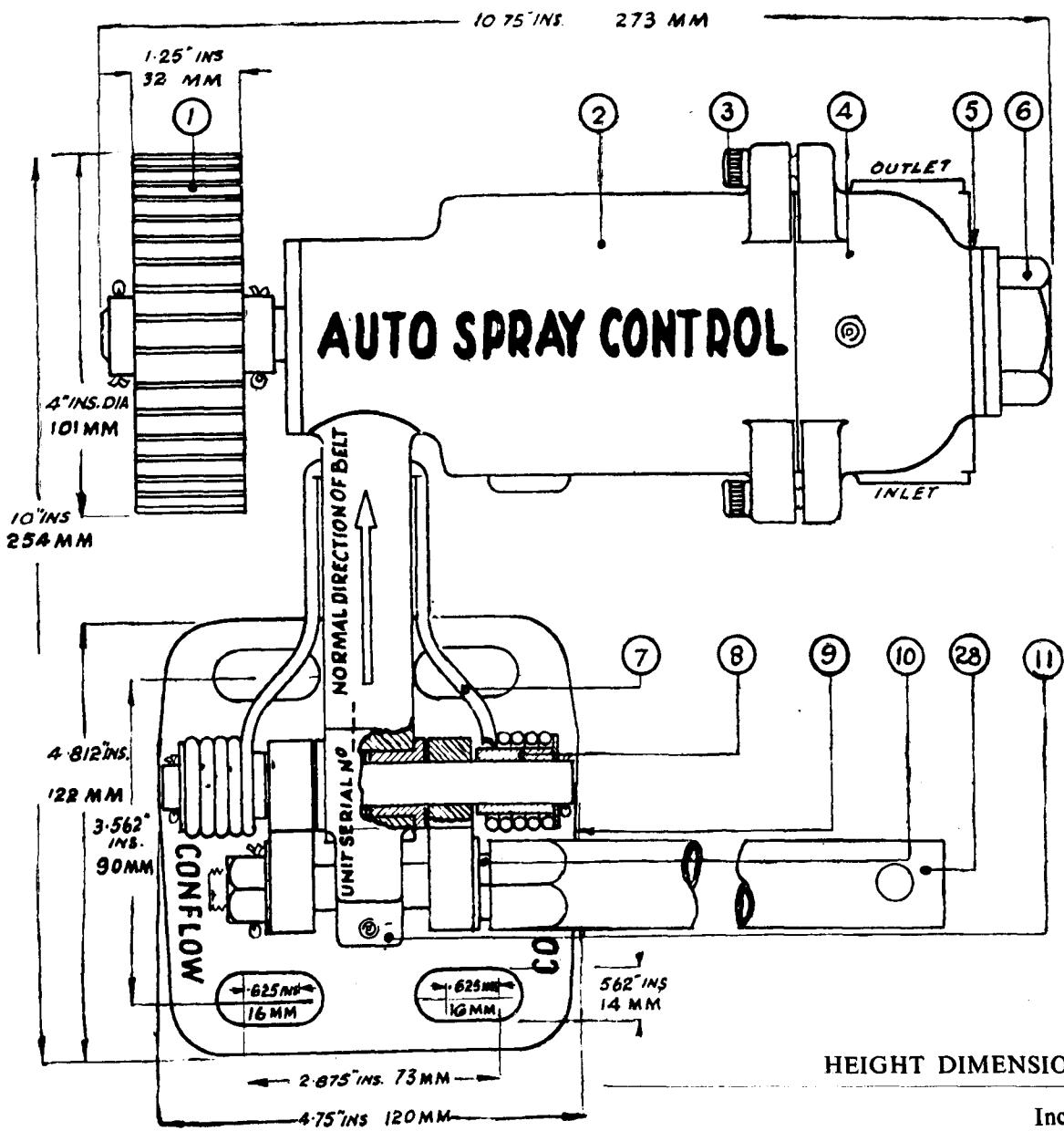
The baseplate bolt fixing centres for 1/2" bolts are identical with previous model, Code 80.

The treaded Driving Pulley, which is 4.00 inches. (102 mm.) dia., represents approximately 1 foot (306 mm.) of travel per revolution.

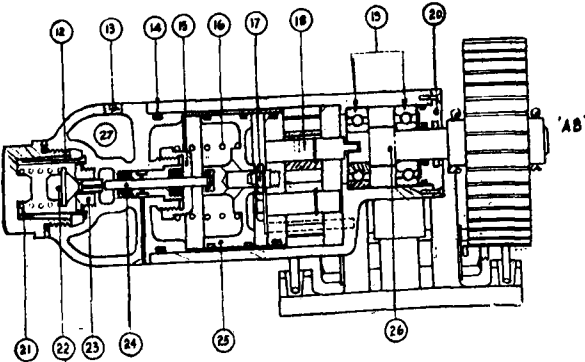
The unit has 1/2" pipe INLET and OUTLET connections to B. S. P. Specifications in Great Britain.

The unit can be screwed to suit corresponding National Standards abroad, upon request.

Scale 1/2 Full Size.



Scale: Full Size



HEIGHT DIMENSION "AB"

	Inches	Milli-metres
MAXIMUM Upper Adjustable position	5.937	151
Recommended Installing position	5.812	148
MINIMUM Lower Adjustable position	4.312	110
To accommodate Load, there is further spring-loaded depressible height to baseplate level of	0.312	8
If structures permit, there is further spring-loaded depressible height below baseplate level of	1.000	25
Total movement from maximum height to Minimum depressible height	2.937	75

Note how functional parts are contained within closed circuit of body.

The Production of up-to-date Electric Motors in Hungary

THE production of electric motors has old traditions in Hungary, reaching back to the discovery and first trial series of these motors. Again speaking even in global dimensions, of the modernisation and development of electric motors, one cannot disregard the Hungarian firms and experts who deserve the credit for the development of the present high level of technology in producing machinery with outstanding electric characteristics. We can safely say that as regards quality, modern design, economic working as well as production technology, the Hungarian electric machinery runs no risk in being compared to the machinery and production technology of the largest international concerns.

It has been a point of utmost importance when fixing the dimensions of electric motors, to achieve the values specified in the Hungarian and international standards with the usual production tolerances, through the employment of the most outstanding active materials (iron, copper). The housings and shields of the motors are made of amply dimensioned cast iron, offering safe protection and proper heat conduction for the wound plate body.

The running of the machines is easy and practically free of noise.

It is quite right to put the question, in what manner are the perfectly uniform electrical and mechanical properties of the motors, within the permitted tolerances, ensured the course of production. The answer is very simple: through the built-in control for every operation of the up-to-date production in series and by a running belt system respectively.

To enumerate all the technological procedures to which the motors are subjected in the course of production would take too long a space, consequently we are describing only a few important processes characterizing production.

All the raw materials, whether dynamo plates, enamel wires, insulator sets or chemicals, arriving in the factory are passed strict laboratory tests and can be employed only after having passed the tests.

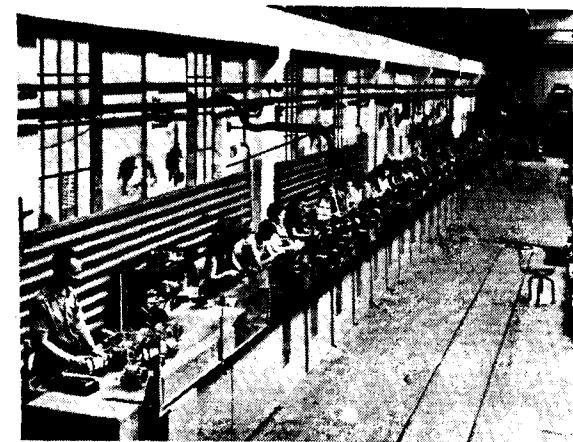
The pressing of stationary and rotor parts of the motor is effected by the latest technology, by means of the so-called multiple-step automatic presses. This

process ensures the production of satisfactory stationary and rotor part plate bodies.



Automatic presses for the pressing of stationary and rotor part plates.

In addition to the iron body, the winding of the stationary parts represents the soul of the motor. This operation is done by the running belt system.

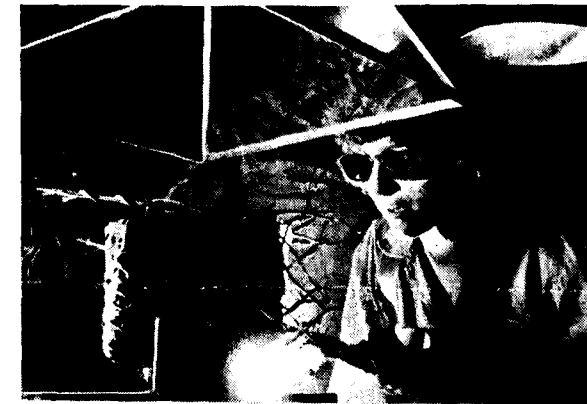


Winding running belt.

Clever and ambitious female hands attend daily, several hundred times to the very same simple operation ensuring in such manner high quality and the attractive development of winding heads.

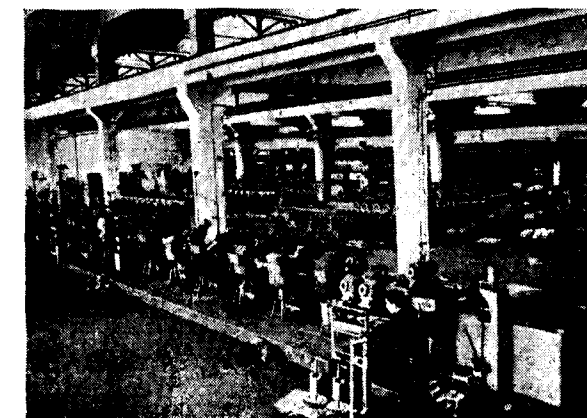
The test room completing the running belt system, performs body closure, phase closure and winding closure test on the stationary parts provided with

windings and only faultless units are passed on to the impregnating section.



Welding of winding-ends.

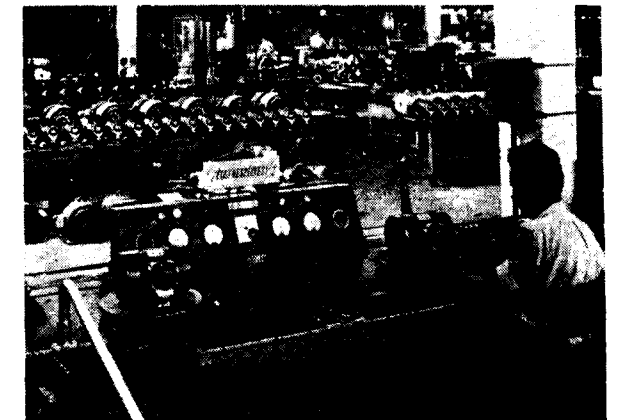
The assembling and fitting of motors is similarly performed by the running belt system. The process has been broken down to 16 simple operations, every one of these operations having a separate assembly point provided with a proper auxiliary machinery. It is an interesting feature of the running belt system, that we have eliminated the use of the hammer and mechanised every operation calling for physical effort.



Assembling belt for 1-10 kW motors.

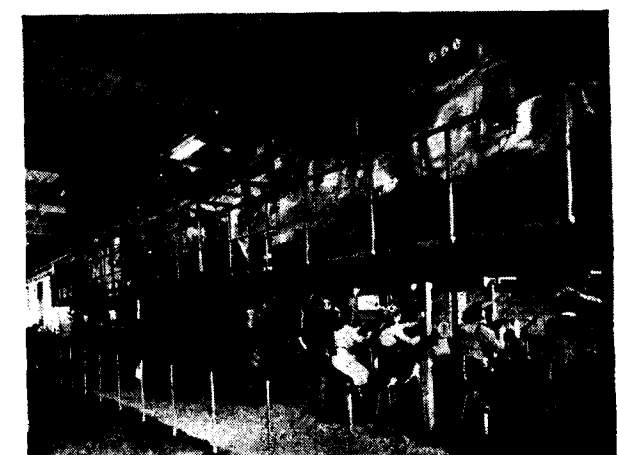
In this way hydraulic presses press the bearing shields onto the motor housings,—the ball bearings onto the shaft and into the bearings shields,—the ventilators onto the shaft end. The rather heavy weight rotor parts are similarly being put in by hydraulic devices, while the screws are tightened by mechanical spanners.

The trained female mechanics do a minimum amount of physical work while attending to the fitting. Thus they can concentrate every attention on the quality. Through the use of the above mentioned equipment, the fittings of the ball bearings free of injury, is ensured up to 100% and the reflection of the running surfaces remains in its original state in the assembled motors. The test room check ups are performed on the assembling running belt. We perform the tests specified in the standards, on every motor and supply a quality certificate of the successful tests.



Trial station within the assembling belt.

The last technological operation on the motors is the external finishing—painting. We insist on the principle that every motor leaving the factory, should be subjected to the same kind of finishing and that



Painting belt.

there should be no difference between them, not even in their external appearance. To achieve this, we have broken down to several parts the similarly

extensive operations of quality finish and built a modern painting belt to attend to this job. The belt includes the degreasing, priming—and the drying hereof—of the motors, the nutting (if necessary) and drying respectively of the motors, then the polishing and carrying up of the final protective coating and its drying.

The motors are passed by way of a clever, underground transport belt, to the forwarding room, whence they are distributed. The principle of production is that there should be no raw or semi-finished materials held at any point of the workshops, they should be on the move all the time towards the section stores and the assembling belt respectively. The same principle is enforced in the transport section: lorries stand in attendance for the motors arriving on the belt and promptly forward them to their point of destination.

The progress and development of electric motors and electric machinery can never be considered as closed, what is the latest to-day can become out-of-date by to-morrow on basis of further research work. It is the job of our test and research departments to check up on and subject to testing, from the point of view of technological exploitation, and new (plastic) material connected with electrical machinery, provided that the use of same is likely to improve the quality and modernity of our machines. Should this be the case we will introduce such new materials, without delay.

Our short description includes merely a few of the cross-sections of the productions process, these we

consider, however, as sufficient to enable the reader to draw his conclusions as to the full process of manufacture and its quality. It is due to these factors



Section of the factory park.

that as regards price, quality and external appearance our motors are able competitors of the leading motor brands to be found on the world markets.

GLASS WALL THREE STOREYS HIGH AND 65 ft. WIDE

A new method of window assembly has been developed by a world famous U. K. glass manufacturing firm. It is a complete glass wall three storeys high without solid obstruction of any kind and it has been installed at the firm's new £2 million research station a few miles from St. Helens, Lancashire, north-west England.

The firm say that by using this system, shop front-ages of the future could be completely glazed, ridding shopkeepers of present restrictions imposed by size of one piece of glass.

Developed from the "armourplate" doors which the firm introduced during the inter-war years, the new assembly is 65 ft. wide and 30 ft. high. Known

as the Lathom glass wall or window after the name of the research station, it is believed to be the biggest in Europe and is made up of 42 panels of $\frac{1}{2}$ -inch "armourplate" weighing a total of more than seven tons and it is suspended entirely from above.

The glass panels are each about 120 ins. by 56 ins., and are assembled from the top centre working outwards and downwards in stages. The top plates have a metal rail bolted to the top edge and from this, special metal hangers are attached to steel supports in the buildings.

Within a few days of its installation, the quality of the glass wall was severely tested by a 120 m.p.h. gale which buffeted directly on to it but it completely withstood the pressure.

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(By A Special Feature Writer)

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THE range includes machines of 200, 300, 350, 400 HP etc. up to 1,400 HP. These horse powers are now possible with the advent of heavy duty belts using synthetic fibres in the duck construction and thus extending the economical range of belt conveying far beyond the capacity of standard cotton ducks.

THE BUNKER CONVEYOR

As a typical instance of a machine to overcome abnormal operating conditions, the bunker conveyor is an outstanding example.

Analyses of many stoppages in the handling systems of British mines has shown that a very large proportion have their origin in the inability of one unit to handle the peak load.

Usually, it is found that the bottleneck is the shaft winding capacity, and with this in view, the bunker conveyor is sited as near as possible to the shaft bottom. Its capacity is small compared to the flexibility it provides,—in one case at a colliery producing 1,800 tons per shift, with short peak loads at the rate of 420 tons per hour, and peak loads averaging 285 tons per hour in any one period of 60 minutes,—a bunker conveyor of 120 tons capacity has proved to be ample although the maximum amount which can be handled by the shaft is only 220 tons per hour.

Previous attempts to provide storage capacity by the use of a bunker conveyor have failed because in every case they acted as one of the series in the handling system and were therefore required to accept the whole of the oncoming peak load at the tail end and yet at the same time, only discharge to ensuing units the smaller load which the least powerful could handle. Unlike these previous attempts, the "Sutcliffe" Bunker conveyor is a by-pass unit located underneath one of the main conveyors. As such it only receives

feed when the bottleneck capacity is exceeded, and when this occurs, no matter what the rate of feed, the discharge to the outbye unit is always at the pre-determined rate, the surplus being stored in the bunker conveyor by progressively moving the point of feed inbye as required.

As the bunker conveyor can be installed at any suitable point in a roadway of little more than average cross section, it is obviously a quick and easy method of securing bulk storage underground, but in addition it is both cheaper to instal and operate than a vertical staple bunker excavated in the strata, which not only needs means of filling and emptying but which, in addition, is a prolific source of coal degradation.

Illustrated and described in detail below the bunker conveyor owes much of its success to the novel method of propulsion by hydraulic rams, which not only provide a shockless and almost noiseless power transmission to the conveying chains and plates, but at the same time eliminate the bulky and heavy reduction gear unit that would otherwise be necessary. Similarly, the use of hydraulic power from the same pumping unit provides energy for the chain tensioning gear and for operation of the travelling plough.

The efficiency of this method of power transmission is demonstrated by the fact that in the four years in which these conveyors have been in constant daily use, no replacements have been necessary and no maintenance other than the routine attention to lubrication.

Where space is at a premium, the Bunker conveyor has much to commend it, and obviously scores heavily over storage in tubs or mine cars which not only need much greater room for the same buffer capacity, but in addition demand the use of a larger labour force to provide and discharge the same storage capacity.

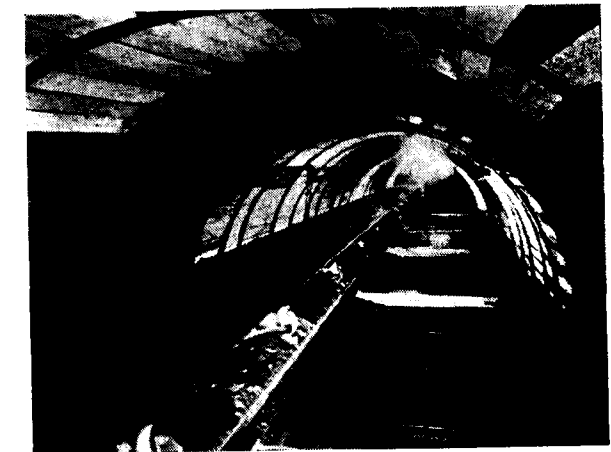
Although the 120 ton size, with an overall length of 200 feet, meets by far the large majority of underground requirements, units of other capacities are available when required, and for bulk storage on the surface, where space is less at a premium, bunkers of 800 tons capacity are already planned.

SMALL BUNKER CONVEYOR

The success of this type of bunker conveyor, as initially installed at Gibfield Colliery in the North-Western Division of the National Coal Board, has led to the renewed demand for a unit of smaller capacity and cross sectional area whose reduced dimensions will enable its incorporation into transport systems further inbye.

The nearer the installation is to the coal face the more varied can be its uses, and with this in mind it is obvious that not only its capacity, but also its final arrangement will vary accordingly.

There is, for instance, a demand for a bunker conveyor to store a quantity of coal and to release it at some future time when the situation allows, but the more general need is for a unit which can reduce a highly fluctuating load from the face conveyor to one of manageable proportions, thus enabling the outbye conveying system to continue operating at its optimum efficiency.



Bunker Conveyor.

In general it may be said that the most suitable position for a bunker of this size is under the jib of a gate conveyor where it can be supervised by the man normally in charge of the transfer point. Its position ensures that it will be static for the life of the gate road and should suffer less from settlement of the

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ground in this position than if it should be installed at the face end of the gate conveyor. On examination this latter position proves undesirable as to make full use of its capabilities, it would require a rapidly extensible stage loader with a long jib capable of feeding the unit at any point, which in the long run boils down to an additional gate conveyor.

As a bunker conveyor located at the jib end of the gate unit could conceivably remain in the position for a matter of little more than a year under unfavourable conditions, it is clear that the construction must be such that its movement to a new site does not become too great an undertaking, and with this in mind the structure must not only be highly standardised, and of lighter construction than that used in the larger unit, but also the chains and trays must similarly be easy to handle and transport.

RICHARD SUTCLIFFE'S STABLE HOLE CONVEYOR

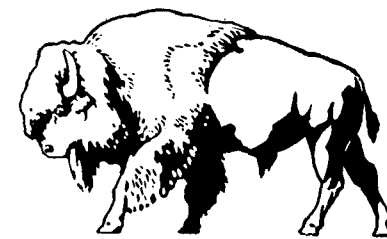
The stable hole conveyor has been designed for the maintenance of stable holes in advance of the coal face, and for the reduction of the man power required to remove coal, etc. at this point. Easily transported it can be used wherever coal or stone has to be moved short distances in confined spaces.

The conveyor is designed to use an 18" wide belt. It is driven at the tail end by a combined electric motor and drive pulley assembly, and at the delivery end by a tensioned return pulley.

The frame is fabricated from mild steel sheets which form a trough for the top belt and at the same time provide complete protection for the bottom belt. A hopper is fitted at the loading end to receive the material and removable spill plates are fitted for the full length of the machine at one or both sides as required. The whole unit is transported by sliding on the tubular steel skids.

The drive is made up of a heliocentric gear mounted in a drum shell of our own manufacture and powered by a flange mounted Brook motor. The motor is continuously rated at 1.33 H.P.; it has a starting torque of 180% full load torque and a guaranteed starting

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June 1961

JOURNAL OF INDUSTRIAL ENGINEERING

M.S.23

SPECIFICATION

Capacity—50 tons of coal per hour.

Drum centres—10' 0" + 3" adjustment.

Overall length—11' 3".

Overall height—17 $\frac{1}{4}$ "

Overall width—3' 2" (over terminal box).

Belt speed—140 f. p. m.

Belt (supplied with machine)—18" wide P. V. C.,
3 ply, 32 oz.

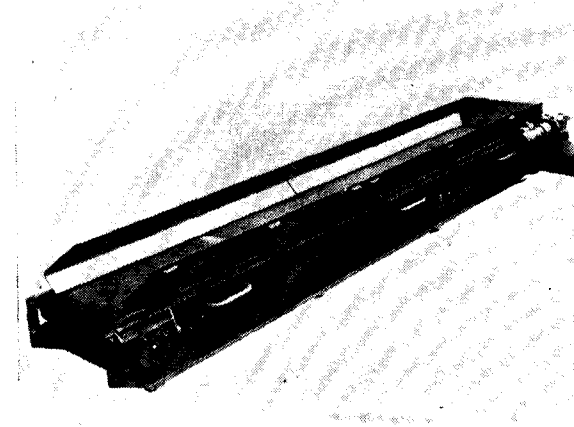
Tugron Duck with 3/64" top and back covers.

Power supply—3 phase, 50 cycles, 125 volts.

Motor fitting—30 amp. Huwood plug and socket
with I.P.C. gland.

Weight complete 6 cwt. 30 lbs.

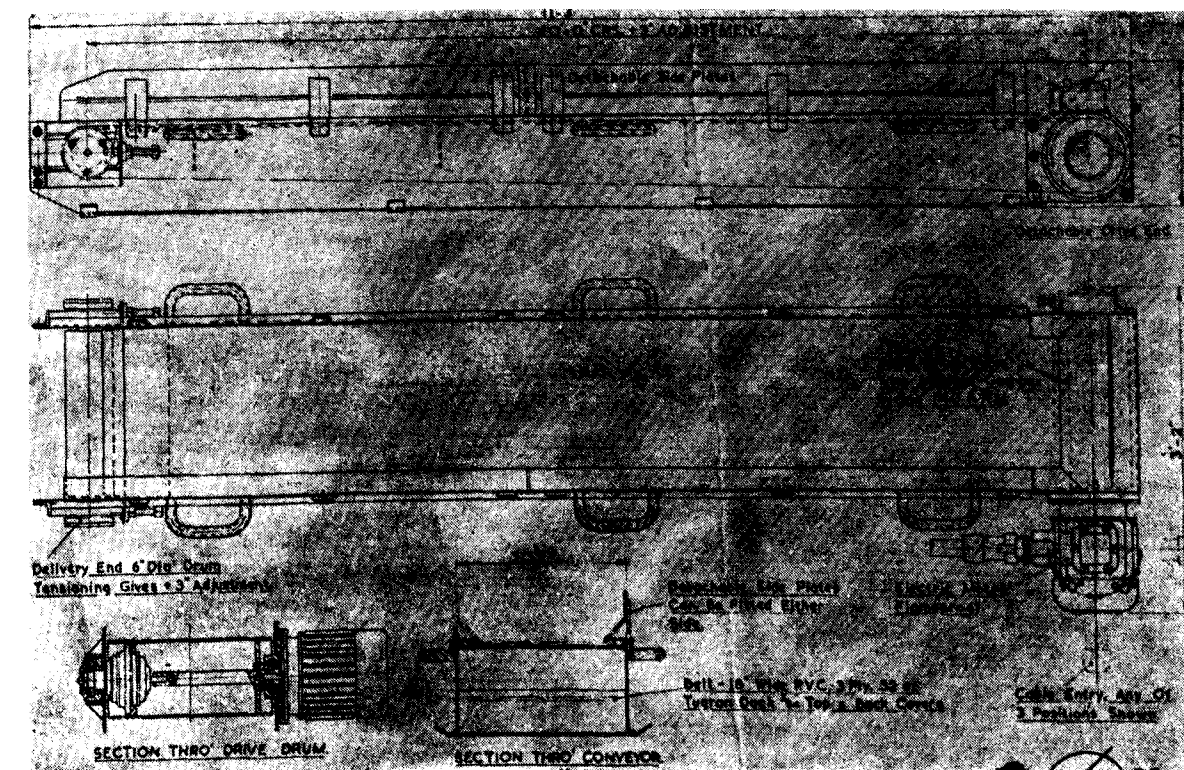
Weight without detachable spill plates—5 cwt.
24 lbs.



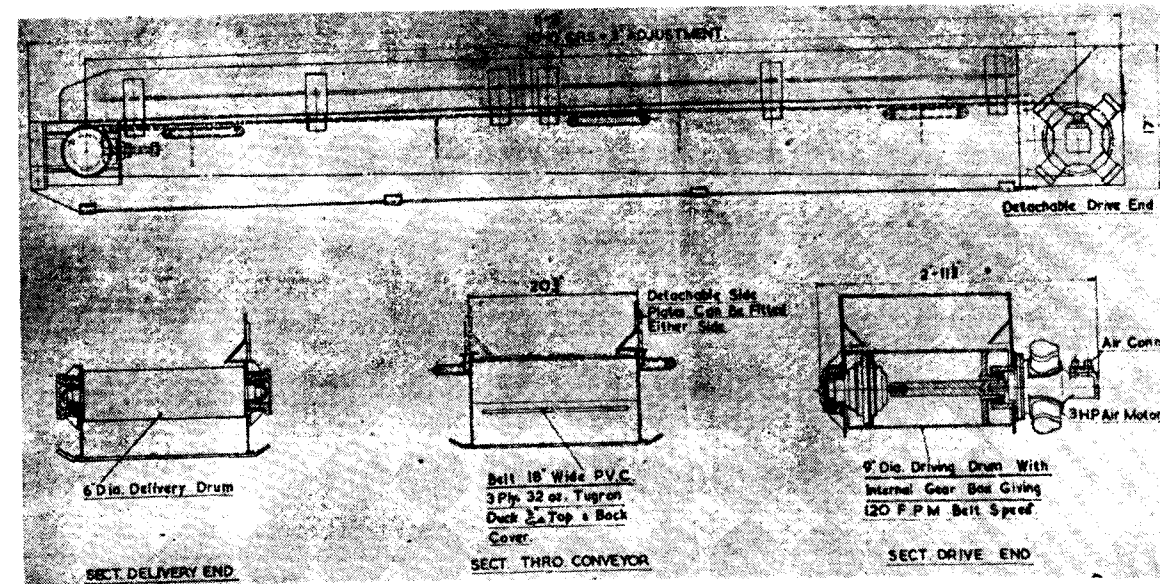
Stable Hole Conveyor.

current of not more than 42 amperes. The motor is suitable for starting with drill panels to N. C. B. standard specification No. P9/1950.

The belt supplied is P. V. C. 3 ply, 32 oz. Tugron Duck with 3/64" top and back covers. Normal drum centres are 10 ft. but other lengths may be arranged to suit varying applications.



MK. II Stable Hole Conveyor.

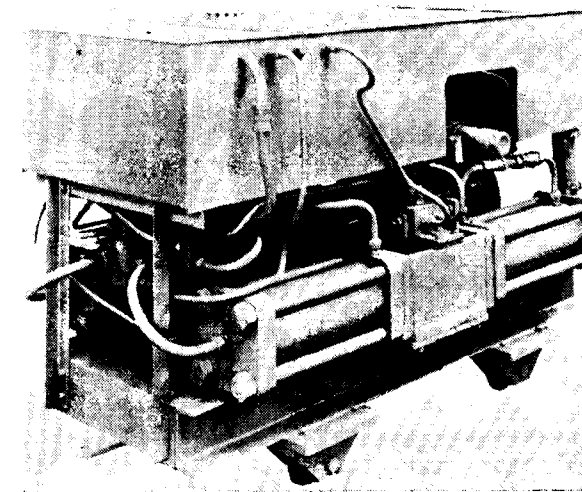
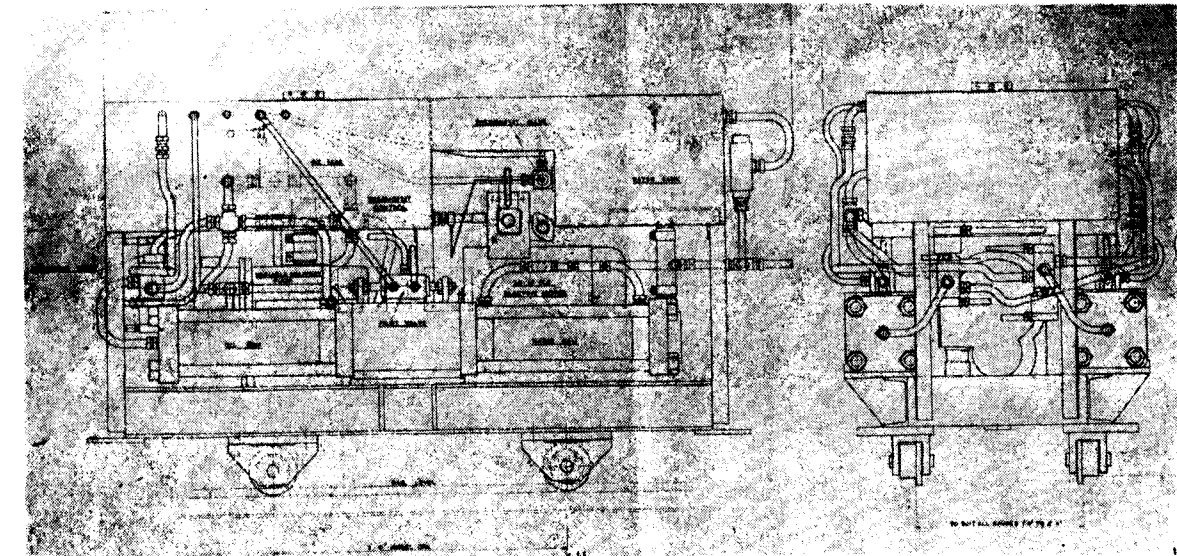


Stable Hole Conveyor—Compressed Air Drive.

WATER INFUSION UNIT*Specification*

The water infusion pump consists of an oil hydraulic circuit which drives two reciprocating rams which are

in turn directly coupled to the two rams of the water pump. The oil is supplied from a variable delivery pump which allows the oil circuit to select automatically the pressure and quantity of water which suits it best. The output of the water pump is eight gallons



Water Infusion Unit.

The control of the pump can be adjusted so that an output of 5 gallons at 1,500 lbs. per sq. ins. is obtained to supply water for a conveyor ramming system. Under these conditions, at a small extra cost it is possible to utilise the oil circuit to drive a 5 H. P. portable stable hole conveyor or a Hydraulic drill.

The variable delivery oil pump is driven from a 30 H. P. electric motor—fan cooled—flameproof, (550 volts—3 phase—50 cycles).

Mounted above the electric motor and pump is a mild steel tank with two compartments in which are stored the water and the hydraulic oil and a temperature thermostat is fitted to the tank. The whole of this equipment is mounted on a mild steel fabricated baseplate mounted on wheels at a rail gauge to suit the customer.

at 3,000 lbs. per sq. ins. and infinitely variable down to twenty-two gallons at 1,100 lbs. per sq. ins., the pressure and volume varying inversely.

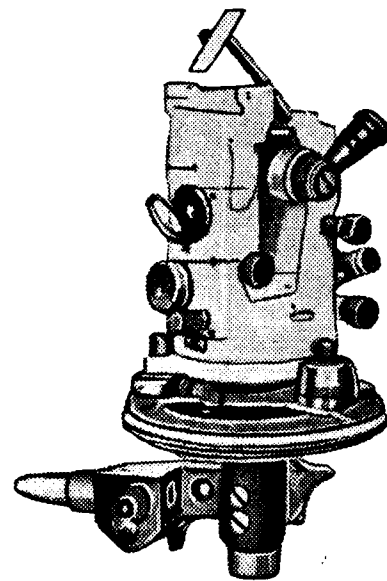
POWER UNIT FOR SHORT HAUL JET AIRCRAFT

The Spey by-pass jet engine, first announced in the autumn of 1959, is establishing itself as a leading low-economy engine specifically suited for the coming generation of short/medium haul jet transports.

Announcing this recently, Rolls-Royce, in an appraisal report say the engine, in the 10,000 lb. thrust class, has not only been selected to power the 24 de Havilland Trident medium range aircraft on order for British European Airways, but also the new B.A.C. One-Eleven short haul transport.

British United Airways, the newly-formed independent airline, recently placed an order with the British Aircraft Corporation for ten One-Eleven aircraft with an option on five more. A number of other airlines are showing strong interest in this aircraft including Continental Airlines, and Ozark Air Lines in America, who have announced their intention to order five One-Elevens.

Rolls-Royce has also earlier this year received a development contract from the U.K. Ministry of Aviation for the military version of the Spey.

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Serves for underground traverse surveying, using the three-stand system, and can be applied universally even under severe conditions, especially in cramped quarters, steep galleries, in case of heavy mine haulage and interrupted working periods. It mounts on tripods and set up bars but, owing to its compactness and light weight, can also be attached to brackets.

It is adapted for both supplementary and accurate surveying e.g. main and secondary traverses, for break-off working as well as for precise measurements of dynamic changes on galleries and longwall faces.

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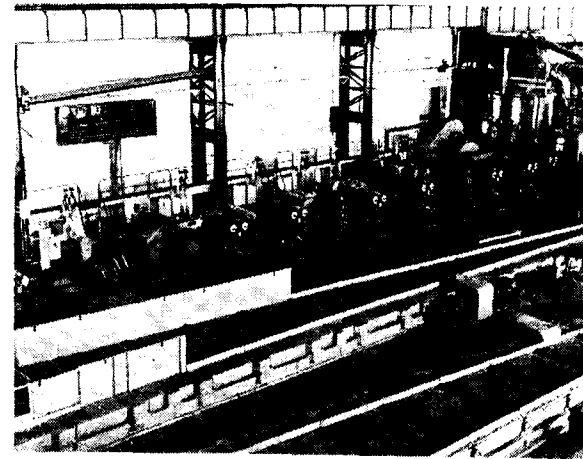


ISCON—Rolling Mills Plant at Durgapur Steelworks Completed

THE last of the five Rolling Mills to be provided under the ISCON contract at Durgapur—the Continuous Merchant Mill—was commissioned and is ready to go into production. Completion of this Mill marks the completion of the Durgapur Steelworks, with the exception of the Wheel & Axle Plant, which will come into operation in a few months time. Many sections of the Steel Plant have been put into operation well ahead of the schedule date.

The Merchant Mill is a nineteen-stand Mill comprising seven roughing stands, two intermediate stands, six looping stands, and four edging stands. It is fed by a billet reheating furnace, and will be capable of producing nearly a quarter of a million tons of products per annum. On small products, e.g. 12.5 mm. diameter bar, delivery speeds are of the order of 2000 feet per minute.

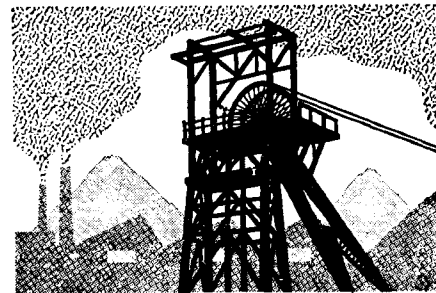
The wide range of products to be rolled on the Merchant Mill, will include rounds, squares, flats and angles up to 4" x 3". These products together with those from the Medium Section Mill, already in



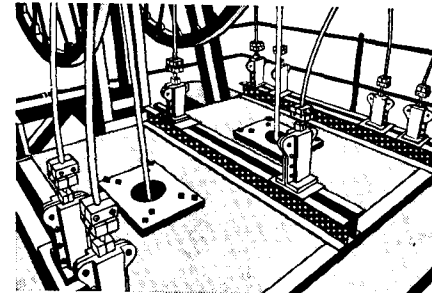
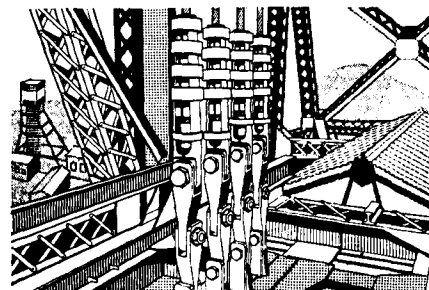
operation will help to meet the demand for sections urgently needed by constructional and civil engineers in this country.

The Mill was designed by the Morgan Constructor Company and supplied and installed by Davy-United a Member of the ISCON Consortium.

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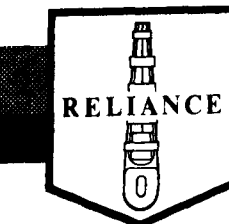


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IMPORT OF MINING EQUIPMENT

(By A Special Correspondent)

IMPORT DUTY ON MINING MACHINERY

IN September 1957, the Government of India reduced the rate of customs duty on mining machinery and component parts to five per cent ad valorem. Previous Annual Reports refer to the representations made by the Association against the refusal of the customs authorities to charge duty on certain mining machinery at the reduced rates on the ground that the machinery could be used elsewhere than in mines. During the year the Joint Working Committee of the producer associations took up the Association's representations and referred the matter to the Ministry of Steel, Mines and Fuel. A representative of the Association also discussed the matter with the Member (Customs), Central Board of Revenue, during his visit to Calcutta. The matter was also mentioned to the Minister for Steel, Mines and Fuel when he visited Calcutta in October.

This matter has been outstanding for three and a half years but it has not yet been finalised although it is obvious that the Government's intention to reduce the rate of duty on mining machinery is being frustrated.

SHORTAGE OF EXPLOSIVES AND ELECTRIC DETONATORS

During the year members reported an extreme shortage of explosives and electric detonators. The matter was taken up by the Association with the Coal Controller and it was discussed at a Progress Review Committee meeting. The Coal Controller approached the Chief Controller of Imports and Exports for the issue of the necessary licence for both items but importers had almost exhausted their stocks before the imports arrived. The Development Wing, Ministry of Commerce and Industry was also asked to explore the possibility of manufacturing electric detonators indigenously. It is understood that requirements of explosives and detonators are assured until mid-April but the Association has pointed out that it is important that the Chief Controller of Imports should be prevailed upon to issue an immediate licence to cover the requirements of the Coal Industry from April onwards.

EXPORT OF COAL

At the request of the Association the representative of the Associated Chambers of Commerce of India, Mr. G. A. Whitaker, in his speech at the Export Promotion Advisory Council held in August urged the Government to sanction the export of coal particularly to India's traditional markets such as Burma, Ceylon and Singapore. The possible earning of foreign exchange, not only on account of the coal itself, but also in respect of the freight was emphasised. Permission was given to exporters to quote against a tender from the Ceylon Government Railway, but Indian coal was not accepted. It is hoped that India will be able to regain a foothold in its traditional markets, particularly as the present shortage of coal is due only to transport difficulties and there are huge stocks of coal at pit heads.

Miscellaneous

COAL WASHERIES

The Annual Report for the previous year records that the Industry drew the attention of the Coal Board to the unsatisfactory progress in completing the coal washeries. The Industry also pointed out that the shortage of high grade coking coal was largely due to the delay in completion of the three new washeries at Dugda, Bhojudih and Patherdih, and urged urgent action to remedy the situation. The latest information is that full production may be expected from Dugda washery in September 1961. According to the terms of the contract Bhojudih washery should be commissioned in May 1962. At present tenders for Patherdih washery are being examined. The delay in erecting these washeries was responsible in some measures for the coking coal crisis during 1960 but, fortunately as a result, Government is reported to be taking measures to improve the position by planning increased capacity for the washeries already under construction and by building more washeries.

VOLUNTARY AMALGAMATION OF COLLIERIES

The Collieries Voluntary Amalgamation Committee,

formed to examine proposals for amalgamation and to bring about amalgamation by mutual agreement between the parties concerned, has continued its work during the year. Thirty-one proposals have been accepted, eighty-six proposals have been rejected for various reasons and forty cases are still under consideration.

INTRODUCTION OF THE METRIC SYSTEM

The Coal Industry introduced the Metric System as from 1st April, 1960. Subsequently, the Coal Controller invited the Association's comments on conversion tables which had been prepared for use in the Industry. The tables were considered in detail by the technical advisers to the Association and suggestions for improvements were made. Revised tables have recently been issued by Government.

ROADS IN COALFIELDS

As stated in the Annual Report for the year 1959, representations were made by the Association to various Government departments urging the immediate repair of many of the roads in the coalfields. The subject was raised at a meeting of the Coal Advisory Committee when the Coal Controller advised that according to the Development Commissioner, Government of West Bengal, the road to Ukhra and the road from Radhanagar to Dishergarh had been included in the Second Plan for development and that provision had been made in the Third Plan for development of the following eight roads :—

- 1. From the 10th mile of Panagarh—Illambazar road to Ukhra via Molandighi and Nachan
- 2. The Grand Trunk road to Kajora Haripur
- 3. Asansol to Runa-Kuraghat via Domohani and Gourangdih
- 4. Raniganj to the Grand Trunk road via Cholahad and Kalipahari
- 5. Asansol—Gourangdih—Lalganj
- 6. Sitarampur—Rupnarayanpur
- 7. Sitarampur—Lalganj
- 8. Ondal—Bonbahal

Although the State Governments admit their liability and responsibility for repairing the roads in the coalfield areas and levy a cess on collieries for the

purpose, the standard of many of these roads is deplorably low. The only real solution is for the District Board Roads to be taken over by the Public Works Department but although this suggestion has been made by the Industry on many occasions, no action has been taken.

ORISSA MINING AREAS DEVELOPMENT FUND ACT, 1952

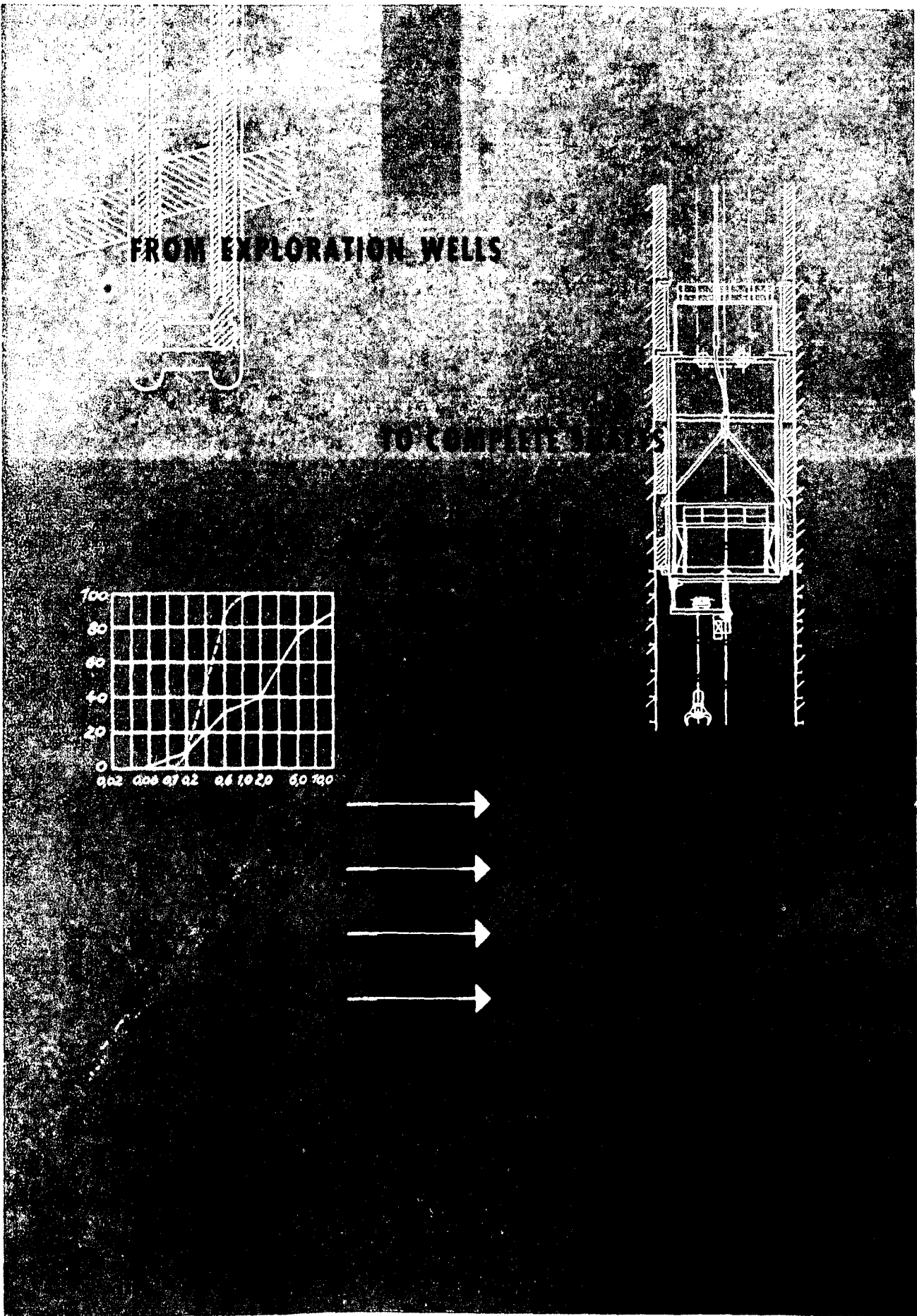
The Annual Report for the previous year refers to the Orissa Mining Areas Development Fund Act 1952, and the Orissa Mining Areas Development Fund Rules 1954 passed by the Orissa Government with a view to raising revenue to provide general welfare amenities to employees in mines. A member challenged the validity of the Act in the Supreme Court but the Court held that the levy of a cess under the Act was within the powers of the Orissa Government.

INADEQUATE SUPPLY OF POWER TO COLLIERIES IN THE BIHAR COALFIELDS

In reply to a representation made to the Bihar State Electricity Board and to the Coal Controller by the Industry regarding the inadequate supply of electric power to collieries in Bihar, the Deputy Coal Controller (Production) advised the Industry that the serious power shortage in the Bihar coalfields was due to an emergency caused by the delay in commissioning the new 75 M. W. sets of the West Bengal Government and the Damodar Valley Corporation's own Thermal Power Stations, as well as the exhaustion of the combined hydel power cushion in the Maithon and Panchet reservoirs at the end of March 1960.

The Industry took up the matter with the Coal Controller and submitted that the following additional estimated capacity should be available to the grid at the onset of the monsoon.

West Bengal (Durgapur) Government	30 MW
D. V. C. Durgapur 2×75 MW	150 MW
D. V. C. Bokaro 1×75 MW	} 25 MW
Less 1 set 50 MW taken off for overhaul	
Panchet 1×40 MW	40 MW
Maithon 3×20 MW	60 MW
	305 MW



While giving the above-mentioned estimates the Industry drew the attention of the Coal Controller to the serious difficulties which would result from a shortage of power. The subject was again discussed at a meeting of the Progress Review Committee when the Coal Controller requested the Industry to compile a detailed estimate of the power requirements during the Third Plan period. This is being done.

COMMITTEE TO INVESTIGATE THE DANGER OF SUBSIDENCE IN BIHAR MINING AREAS

The Annual Report for the previous year refers to a Committee set up by the Government of Bihar to investigate the various aspects of the problem of subsidence in Bihar mining areas. The draft of the Committee's report was brought to the notice of the Association and it was found that the recommendation appeared to cut across all accepted concepts of liability for damage. The survey in the affected areas appeared to have been carried out in a cursory manner, as had the valuation of the cost of rehabilitation. The report also proposed that owners should be obliged to pay compensation although negligence could not be established and that a general cess should be levied on owners to pay compensation for damage. Legal opinion was obtained and the Industry's representatives on the Committee submitted a Note of Dissent to the report. No further development has yet taken place.

COAL RESERVES: PROSPECTING DATA

At a meeting of the Coal Council of India held in May a suggestion was made that in order to assess more realistically the efforts of the public and private sectors of the Coal Industry, the Committee on Assessment of Resources should gather information regarding drilling carried out in both sectors. The Coal Controller's office was asked to carry out the

administrative work involved. The Coal Controller invited the Joint Working Committee of the producer associations to submit details of drilling carried out in the private sector, but as it would have been difficult for the Joint Working Committee to collect the relevant information members carrying out drilling work were advised to submit the information direct to the Coal Controller.

SPECIFICATION FOR MANUFACTURE OF SOFT COKE

In January 1960 the Fuel Efficiency Committee suggested the following specification for soft coke :—

Moisture	Below 6%
Ash	„ 45%
Volatile matter	„ 10% (or $\frac{1}{3}$ of the total volatile contained in the mother coal, whichever was lower).
Size	1" and above

The specification was considered at a meeting of the Coal Advisory Committee in June when the Coal Controller confirmed that as Grade II coal was being used by the Railways as a result of the shortage of better grades of coal, the manufacturers of soft coke would have to depend on Grades IIIA and IIIB coals. The matter was referred to the Joint Working Committee which has since advised the Coal Controller that as the proposed specification will involve the introduction of different grades, this will discourage expansion of production at a time when there is a grave shortage of soft coke and when additional production is urgently required in the national interest. It accordingly recommended that the status quo should be maintained.

PUMP WITH WORKING PARTS IN PLASTIC

A pump with working parts made entirely of P.T.F.E. (polytetrafluoroethylene) plastic and which can be used in the chemical and food industries has been developed by a U.K. firm. This form of plastic is chemically inert and is impervious to corrosion, so that it can be used either with corrosive fluids or for liquids which must be protected from impurities.

It is a diaphragm type and is self-priming. The

vacuum-formed diaphragm and all the other P.T.F.E. parts in contact with the liquid being pumped are housed in a cast aluminium body which is bolted directly to a capacitor-run AC geared motor. The motor gearbox provides a 7:1 step-down to give a diaphragm reciprocation speed of 200 cycles/minute. Life of the diaphragm is more than 1000 hours. Pump delivery at a 1-foot head is 2 litres a minute, and at the maximum working head of 15-feet is 1.25 litres a minute.

COAL STATISTICS

(a) All India Raisings and Despatches of Coal

Year	Raisings	Despatches
1954	37,363,821 Tonnes	32,456,673 Tonnes
1955	38,839,526 „	33,469,356 „
1956	40,066,708 „	35,519,148 „
1957	44,202,311 „	38,290,855 „
1958	46,047,072 „	40,975,529 „
1959	47,785,897 „	42,153,014 „
1960	52,613,312 „	46,326,840 „

(b) Comparative closing stocks for West Bengal and Bihar

Year	Closing Stocks
1954	2,719,985 Tonnes
1955	2,959,801 „
1956	2,676,508 „
1957	3,133,140 „
1958	2,610,788 „
1959	2,504,773 „
1960	3,136,710 „

(c) Total Gradewise Coal Production of all Collieries in West Bengal and Bihar showing the percentage of total for each grade

GRADES	1956 Tonnes	1957 Tonnes	1958 Tonnes	1959 Tonnes	1960 Tonnes
Sel. 'A'	6,935,809(21.7%)	7,725,000(21.9%)	7,555,629(20.6%)	7,444,957(19.6%)	7,577,308(18.2%)
Sel. 'B'	10,563,060(33.2%)	11,149,385(31.5%)	11,362,378(31.0%)	11,007,706(29.0%)	10,059,482(24.2%)
Grade I	7,099,585(22.3%)	8,624,074(24.4%)	9,296,135(25.4%)	11,132,222(29.4%)	14,566,370(35.1%)
Grade II	5,382,605(16.9%)	5,574,322(15.8%)	5,840,219(15.9%)	5,769,672(15.2%)	6,054,154(14.6%)
Grade IIIA	739,210(2.3%)	733,463(2.1%)	844,859(2.3%)	943,708(2.5%)	1,218,402(2.9%)
Grade IIIB	1,133,214(3.5%)	1,493,663(4.2%)	1,636,747(4.5%)	1,482,558(3.9%)	1,769,398(4.3%)
Non-Graded*	31,007(0.1%)	37,931(0.1%)	102,792(0.3%)	127,144(0.4%)	274,432(0.7%)
TOTAL	31,884,490	35,337,838	36,638,759	37,907,967	41,519,546

*Including Darjeeling

(d) Average Daily Allotment and Loading of Coal Wagons in West Bengal and Bihar Coalfields

Year	Allotment	Loading
1954	3,237	3,205
1955	3,254	3,262
1956	3,456	3,405
1957	3,696	3,670
1958	3,934	3,910
1959	4,039	4,010
1960	4,475	4,335

(e) contd.

	E. Railway		S. E. Railway		Total of E. & S. E. Railways	
	1959	1960	1959	1960	1959	1960
October	3,057	3,756	778	1,026	3,835	4,782
November	3,203	3,836	777	1,058	3,980	4,894
December	3,041	3,737	849	892	3,890	4,629
Average for the year	3,139	3,436	871	899	4,010	4,335

(f) Comparative Statement of Coal Exports to Pakistan and other Foreign Countries in 1959 and 1960 (in tonnes)

(e) Comparative Daily Average Wagon Loading by Eastern and South Eastern Railways in 1959 and 1960

	E. Railway		S. E. Railway		Total of E. & S. E. Railways	
	1959	1960	1959	1960	1959	1960
January	3,017	3,175	866	889	3,883	4,064
February	3,040	3,285	842	857	3,882	4,142
March	3,161	3,381	891	804	4,052	4,185
April	3,247	3,473	867	790	4,114	4,263
May	2,952	3,050	890	831	3,842	3,881
June	2,944	3,374	922	943	3,866	4,317
July	3,236	2,978	953	810	4,189	3,788
August	3,348	3,590	893	855	4,241	4,445
September	3,421	3,592	923	1,035	4,344	4,627

*Not Yet Available

Brno International Trade Fair Supplement

International Trade Fair Brno 1961— Meeting-place of Five Continents

For a further growth of Czechoslovak engineering and foreign trade X Characteristic feature of the International Trade Fair Brno 1961: strictly specialized engineering exhibition X What will be on show? X Final comment on the International Trade Fair Brno 1960.

THE gates of the International engineering trade fair in Brno will be open again from 10th to 24th September 1961 to welcome the visitors who will come to see the Third International Trade Fair in Brno—which has become a traditional trade meeting as well as a large and comprehensive display of the engineering and skill of five continents.

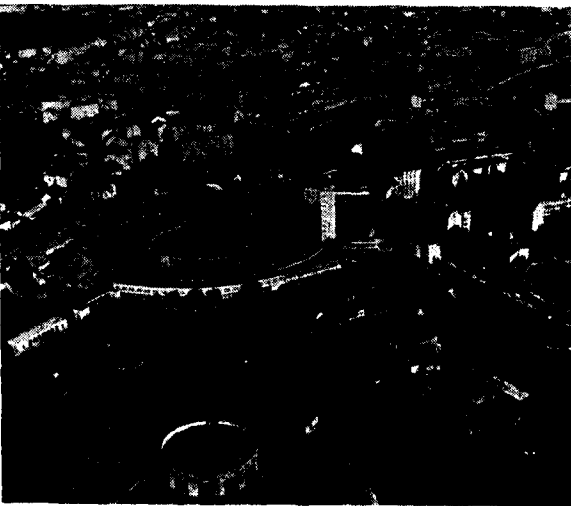
The Third International Trade Fair Brno 1961 is held in the first year of the third Five-Year Plan when the Czechoslovak working people have set out on the way of fulfilling its targets successfully. The steadily rising growth of Czechoslovak production is accompanied by an increasing trend in our foreign trade. Taking e.g. the index 100 for 1948, in 1958 the index of gross industrial production jumped to 300, while that of the turnover in foreign trade was 200. This shows that the development of Czechoslovakia's economy is directly proportional to the growth of foreign trade.

Above all, Czechoslovakia has developed her heavy industry, while the output of her engineering industries has risen more than five fold as compared with figures for 1948. Czechoslovakia has indeed reached a world level in production so that her workers and technicians can make the most intricate machines and complete plant equipment for most industrial branches.

Consequently, not only the whole structure but also the territorial tendency of Czechoslovak foreign trade has undergone great changes. This change becomes most conspicuous if compared with pre-war figures.

Whereas before the war the export of machinery amounted to 6 per cent of Czechoslovakia's exports and the share of consumption goods was 40 per cent, in the past 10 years the export of machinery and plant equipment has rapidly grown jumping up to nearly 44 per cent in 1959.

As to the volume of exports of machinery and plant equipment Czechoslovakia now ranks seventh in the world, while in the export of some categories of products she has won even more prominent place and has already surpassed many and industrially highly,



International Trade Fair in Brno—Aerial view showing the entrance gate of the wide exhibition area and the multi-storey administrative building. In the background a partial view of the city of Brno.



International Trade Fair in Brno—The administrative building, the commercial centre during the time of the Trade Fair, where representatives from all over the world meet to discuss business.

developed country with a long-standing tradition in production.

Thus, e.g. four and a half times more machine tools were exported in 1958 than in 1948, while the export of internal combustion engines rose ten times.

Most significant, however, is the increase in the export of complete plant equipment, which has risen more than twenty-two times since 1948. In the course of the last ten years Czechoslovakia has exported hundreds of industrial plant assemblies: engineering works, metallurgical and mining equipment, steam power stations and hydroelectric power, plants, cement works, equipment for ceramic works, rubber industry machinery, shoemaking and textile equipment, pumping equipment, etc.

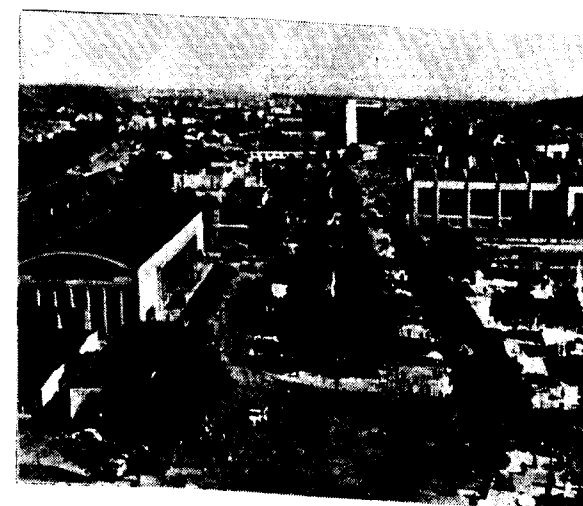
The creation of the world socialist system—from the point of view of the territorial tendency of Czechoslovak foreign trade—has brought about a steady and substantial growth in the share of the socialist countries in Czechoslovakia's foreign trade. In 1948 this share did not even amount to 40 per cent; in the course of ten years, however, it rose to 70.5 per cent, while

by 1965 it will have risen up to 75 per cent. We should underline the fact that this high share will have been attained by 1965, while the total volume of foreign trade will have increased by 62 per cent as compared with figures for 1957.

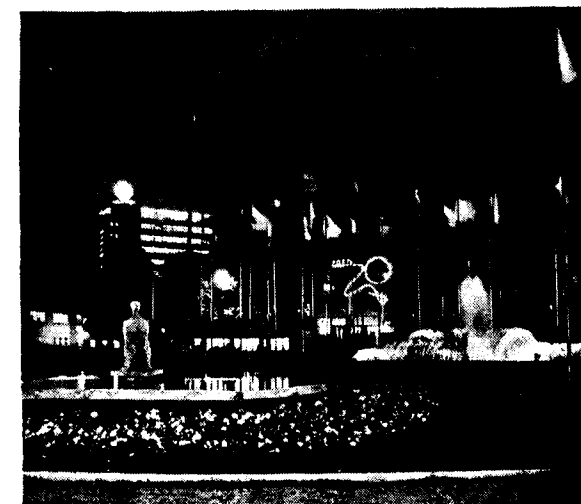
Czechoslovakia's satisfactorily developing foreign trade showed a rising trend also in the last year of the Second Five-year Plan. In 1960 new long-term agreements on economic co-operation were signed with Brazil, Indonesia, Iraq, Cuba, the Republic of Mali, Ghana and Great Britain. Consequently, today the Czechoslovak Socialist Republic carries on trade with 112 countries all over the world, and the trade relations with most of these 112 countries are based on agreements concerning economic co-operation and a number of other treaties for scientific and technical collaboration.

The specialized International Brno Trade Fair, which was admitted among the members of the UFI—International Federation of Trade Fairs—as its Casablanca meeting in October 1960, also has a considerable share in the satisfactorily rising development and further growth of Czechoslovakia's foreign trade.

The arrangement of exhibition according to special groups of products—branches—in the course of the Second International Trade Fair in Brno fully corroborated the fact that strict engineering socialization is the only proper, extremely advantageous and expedient solution fully meeting all requirements imposed on trade fairs of this kind.



International Trade Fair in Brno—Partial view of Brno Trade Fair area with the administrative building of the Trade Fair in the background.



International Trade Fair in Brno—The Trade Fair area never loses its peculiar beauty and charm, not even at night when it is illuminated by thousands of lights and when its lit up fountains sparkle like coloured jewels.

For this reason the International Trade Fair Brno 1961 will be specialized strictly according to branches; collective national expositions will not take place and the respective countries participating in this year's Trade Fair will be represented in the Pavilion of Nations more or less symbolically only.

A vast range of exhibits belonging to the same branch and displayed by the respective exhibitors from various countries will be concentrated in the other pavilions. Consequently, the visitors will have a unique opportunity to get well acquainted with the exhibits, appraise them and compare individual products from various commercial aspects.

The nomenclature of the International Trade Fair Brno 1961 is considerable: it comprises 41 items making up a fairly wide range of the world's engineering products of the highest workmanship. Among the most interesting items included in the nomenclature are e.g. fittings, pumps, Diesel engines and power units, means of transport, woodworking machines and tools, mining and earth-boring equipment, steel structures, machinery and equipment for metallurgical and chemical works, machinery for the leather and rubber industries, textile machinery, sanitary equipment, regulating instruments, electric measuring and time measuring instruments, electronic measuring instruments, cutting machine tools, forming and shaping machines, machines for powder metallurgy, power plant equipment, machines and equipment for the polygraphic and book-binding industries, heavy-current electrical

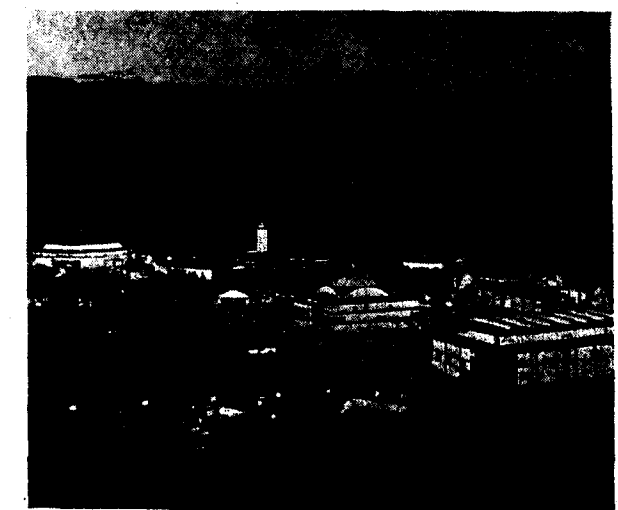
engineering instruments, physical and special appliances and apparatuses including those for nucleonics, light-current electrical engineering instruments, machines for surface finishing of metals, tractors and agricultural machinery, conveying and hoisting equipment, antifriction bearings, air engineering installations, etc.

28 European and overseas countries participated in the Second International Trade Fair in Brno, in the course of which the Czechoslovak Foreign Trade Corporations concluded contracts totalling four milliard seven hundred million Kčs. This, however, was not the only success of the Second International Trade Fair.

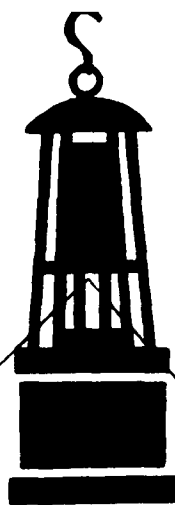
The Brno Trade Fair became an important meeting-place of prominent experts from all over the world; friendly relations were initiated during Specialists' Days, scientific symposia and on other occasions. These prominent visitors also exchanged technical experience and information as well as personal impressions of the new way of life in the Czechoslovak working people.

The Second International Trade Fair in Brno was visited by as many as 1,261,000 visitors including 22,400 foreign guests from 67 countries.

Before long, in eight months or so, the ceremonial flourish of the Third International Trade Fair in Brno will open the traditional trade meeting of five continents.



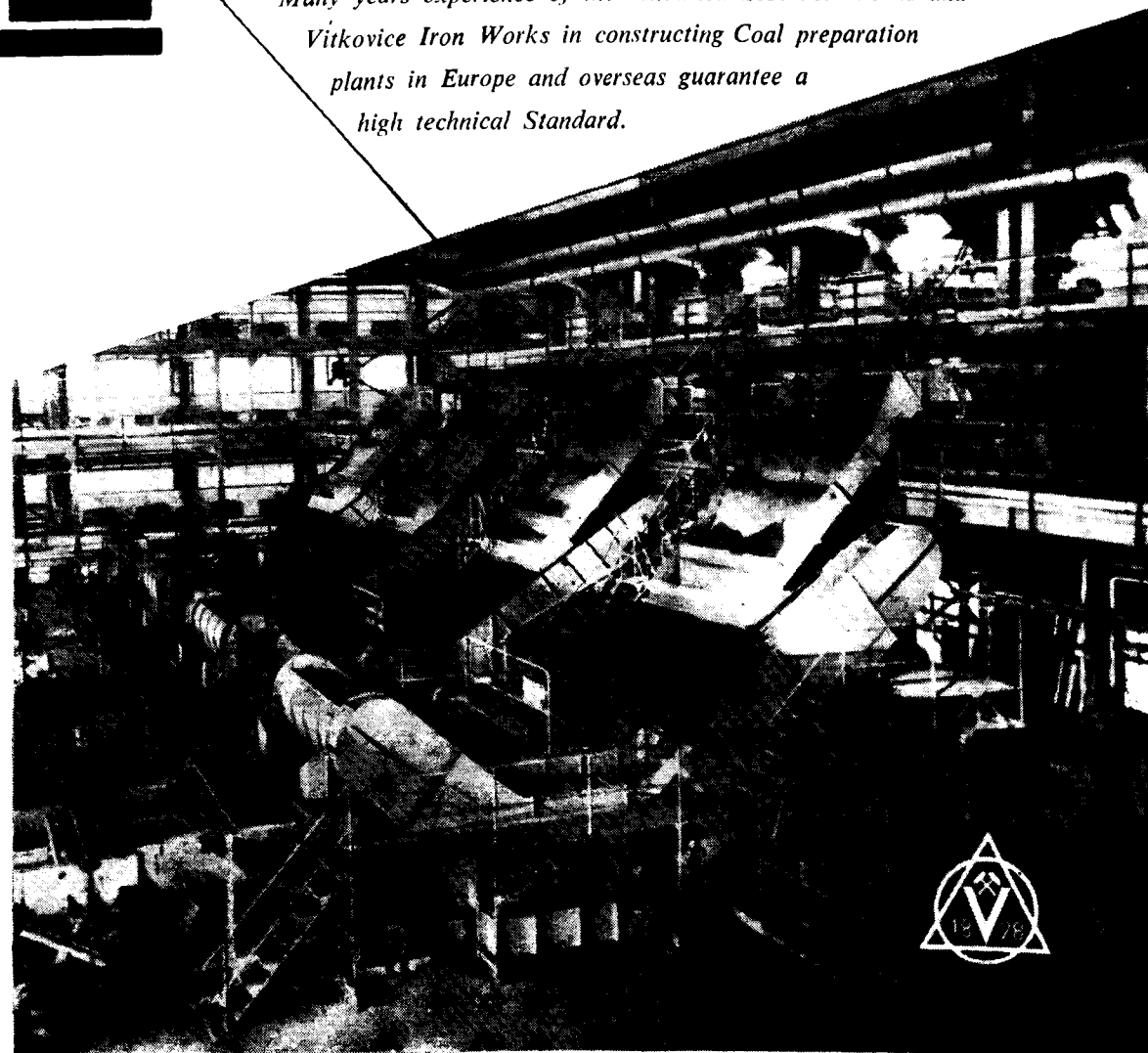
International Trade Fair in Brno—The mild September nights give a peculiar character to the Trade Fair. The illuminated pavilions and the open-air exhibition areas attract the attention of all visitors.



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June 1961

JOURNAL OF INDUSTRIAL ENGINEERING

B.F.5

The friendly and peaceful trade relations among nations from all over the world, which were successfully initiated already by the First International Trade Fair in Brno, have very good prospects for the future and are sure to be deepened and promoted.

At the Third International Trade Fair in Brno, too, the Czechoslovak people will be proud to demonstrate all visitors the high industrial standard of their country and give proof of their sincere striving for peaceful co-operation with all countries of the world—irrespective of their economic and political system—based on mutual terms advantageous to all partners.

A SURVEY OF CZECHOSLOVAK ENGINEERING INDUSTRY

The Third specialized Fair which will take place in Brno from September 10th till 24th, 1961, will be devoted to products of engineering and metallurgical industries and semi-products related to these two branches, as well as to consumer goods of engineering character.

Like during the past years, in the 1961 Brno International Trade Fair too, will take part the majority of Czechoslovak export and import corporations which will display, for the benefit of visitors from abroad, the products of the latest designs from many manufacturing companies.

The list of participating Czechoslovak Foreign Trade Corporations has been already made up. Now the employees of manufacturing plants are getting ready the exhibits which will document the progress of Czechoslovak technical maturity achieved during the last period.

By the largest exhibitions will be represented Foreign Trade Corporations STROJIMPORT, STROJEXPORT, TECHNOEXPORT, MOTOKOV and KOVO.

Foreign Trade Corporation STROJIMPORT prepares for the Fair a wide selection of machine tools, forming machines, and machines for powder metallurgy. The machine tools will, the same as last years, again prevail.

Foreign Trade Corporation STROJEXPORT will display fittings, pumps, Diesel engines and generating sets, marine Diesel engines, turbo-generators, rolling stock and other products of transport engineering, mining and earth-drilling equipment etc.

The exhibition of Foreign Trade Corporation TECHNOEXPORT will be devoted to woodworking machines and tools, equipment for metallurgical and chemical industries, refrigerating plants and equipment, machines and equipment for production of building materials, refractories, building and road-making machines, etc.

Foreign Trade Corporation MOTOKOV will be represented by exhibits of transport engineering, pumps, electrical and gas appliances. The interest will be, for certain, focused on passenger cars, lorries, tractors and agricultural machines.

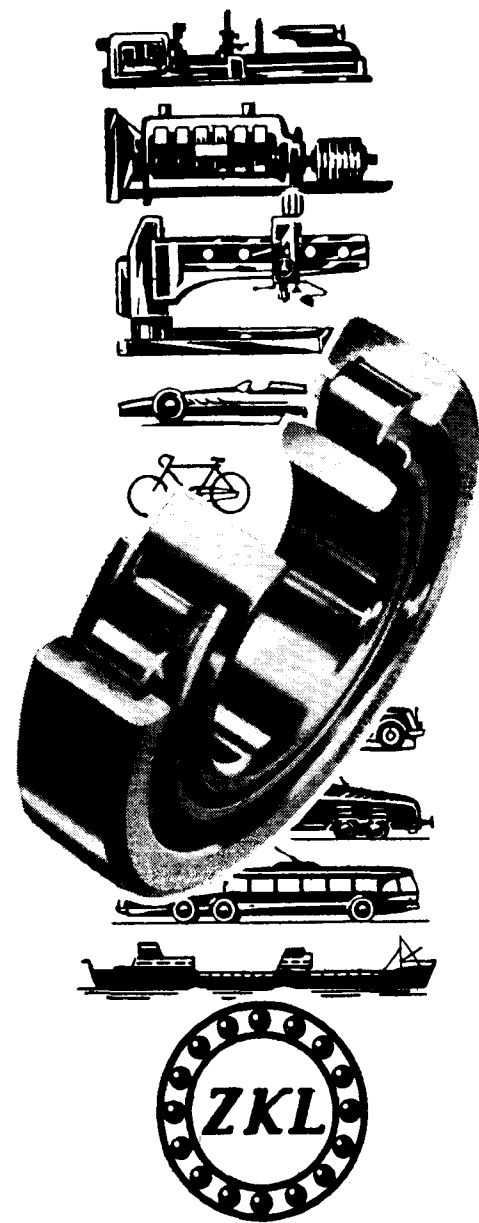
Foreign Trade Corporation KOVO prepares for the Fair a wide selection of measuring and regulating instruments and apparatus, wireless and television sets, time-measuring equipment, photo and cine optical equipment, leather and rubber working machines, textile machinery, and a number of further exhibits.

Smaller, though not less interesting, will be the exhibitions of Foreign Trade Corporations OMNIPOL, METALLIMEX, FERROMET, CHEMAPOL, CESKOSLOVENSKA KERAMIKA, SKLOEXPORT, CENTROTEX, PRAGOEXPORT, OMNIA, UNICOOP, and POLYTECHNIA.

Foreign Trade Corporation OMNIPOL will display



International Trade Fair in Brno—Hardly any trade fair grounds can boast of such beautiful natural setting as Brno. The verdure of the trees—directly on the Trade Fair Grounds as well as on the wooded slopes of the adjacent surroundings—perfectly harmonizes with the daring curves of the pavilions leaving an unforgettable impression in every visitor.



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sports aircraft, airport equipment, flying instruments,
and hunting and sporting arms.

Foreign Trade Corporation OMNIA prepares
medical and special purpose and laboratory apparatus
and instruments.

Foreign Trade Corporation FERROMET will
display products of the metallurgical, iron and steel
industries, the METALLIMEX raw materials, semi-
products and basic chemical materials related to the
engineering and metallurgical productions.

Foreign Trade Corporation CESKOSLOVENSKA
KERAMIKA will exhibit ceramic raw materials of all
sorts, abrasives, and basalt products, the SKLO-
EXPORT all kinds of laboratory glass and special
industrial apparatus, the CENTROTEX textiles for
different branches of industry.

Foreign Trade Corporation PRAGOEXPORT will
be represented by office and statistical machines and
other equipment for mechanized office work and the
POLYTECHNA by models of complete plants.

The exhibition of Foreign Trade Corporation
CHEMAPOL will document the up-to-date Czecho-
slovak chemical production.

Czechoslovak manufacturing co-operative societies
and their standard in wide engineering assortment will
be represented by Foreign Trade Corporation
UNICOOP.

Toughened Windscreen for Cars

New British cars may be fitted by next year's Motor
Show with a new type of safety windscreen which
provides better visibility should the glass suddenly
fracture. The new screen which has won the approval
of the British Standards Institute when shattered does
not block the driver's view. When the ordinary
toughened screen, now in use, shatters, the whole area
becomes opaque obscuring visibility.

Sir Graham Cunningham, chairman of the Institute's
Safety Glass Committee, said in London that experi-
ments had been made with thousands of windscreens
in all sorts of conditions before the new screen was
approved.

June 1961

JOURNAL OF INDUSTRIAL ENGINEERING

B.F.7

Final Report on the Second Brno International Trade Fair (1960)

COMPARED with pre-war times Czechoslovakia's
economy has undergone profound changes
and shown unprecedented progress. In the
perspective plan for the development of Czecho-
slovakia's national economy, targets have been laid
down for a further considerable expansion of her
productive basis, in which engineering will play a very
important role. Since 1945 engineering has developed
most rapidly of all branches of industry and, conse-
quently, has become the leading branch among
Czechoslovakia's industries. During the past years,
when our industry was being reconstructed and built
up, priority was given to the development of our
heavy industry, and particularly engineering. This
faster development of engineering before all other
branches of industry will continue to be the basic
directive for the further growth of our engineering
production.

Engineering products represent the main items in
Czechoslovakia's exports, and their share in the total
volume of exports now amounts to more than 40%.
In respect of the volume of exports of machinery and
equipment, Czechoslovakia now ranks seventh in the
world, while in the export of some machine categories
she occupies an even more prominent place. Conse-
quently, with respect to world trade in machinery
Czechoslovakia represents a factor to be more and
more reckoned with. In the series of International
Trade Fairs held in Brno, the first one was initiated
in 1959. These Trade Fairs are specialized in engineer-
ing and, consequently, products of the engineering
and metallurgical industries, as well as raw materials
and semi-products related to the respective branches
are exhibited. The first International Trade Fair Brno
1959 ended with great success both in respect of the
number of exhibitors and the value of all trade
contracts concluded. The 2nd International Trade
Fair in Brno was inaugurated on September 11, 1960.
It lasted a fortnight. The gates of the Fair Grounds
were closed on Sunday, September 25. A great many
machines exhibited by foreign firms will remain in
Czechoslovakia and will be put into operation in our
factories, while a great number of exhibits bearing the
trade-mark 'Made in Czechoslovakia' will be shipped

abroad. But notwithstanding this fact, business talks
have not ceased.

Though the gates of the Trade Fair Grounds were
closed on September 25, trade relations and friendship
contracted between many business and technical part-
ners will be promoted and strengthened. The Brno
Trade Fair enjoys a very good reputation as a world
trade centre. Czechoslovakia — a world power in
respect of engineering and the engineering shop of the
countries of the socialist block — both offers and
desires far-reaching international trade and technical
intercourse. Czechoslovakia plans a further great
expansion of her production. Directives have been
laid down according to which the annual volume of
her engineering production will, in five years' time,
i.e. by 1965, be equal to the present total output of
the engineering industries achieved in 22 months. In
1965, the monthly output of Czechoslovakia's engineer-
ing industries will be the same as the total yearly
output of all engineering works in pre-war capitalist
Czechoslovakia.

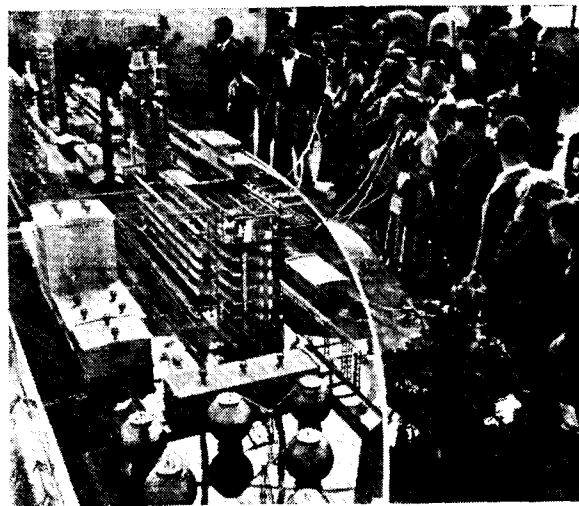
It is needless to say that Czechoslovakia with her
grand plans and future prospects is a welcome trade



International Trade Fair in Brno.—Aerial view of a
part of the Trade Fair area showing the multi-storey
administrative building.

and technical partner for all countries of the world, regardless of the fact whether they are industrially advanced or technically and economically less developed countries. Czechoslovakia is not only an important producer but also a good customer, and the agreements concluded with her are as reliable as all products bearing the trade-mark 'Made in Czechoslovakia', which is a symbol of the skill and workmanship of Czech and Slovak technicians and workers.

The 2nd International Trade Fair Brno 1960 has clearly shown to what extent Czechoslovakia, the second socialist country in the world, has succeeded in accomplishing her decision to overtake and surpass the leading capitalist countries both in the quantity and quality of production, and how far she has accorded assistance to those countries that rightly look upon Czechoslovakia as their model. The Brno Trade Fair was indeed a great survey of the successes achieved by socialist up-building. The 2nd International Trade Fair Brno 1960 has demonstrated that, compared with the world's best, the Czechoslovak products exhibited at the Trade Fair hold their own, and are even superior in some cases.



International Trade Fair in Brno.—The exhibits at the 2nd ITF in Brno attracted the interest of visitors from home and abroad.

Since the time of the Engineering Exhibitions held in Brno, the general trend of the Brno trade and technical meetings has gradually undergone far-reaching changes. Contrary to the wide range of engineering and other products shown at the former Engineering Exhibitions in Brno, the International Brno Trade Fairs have switched over to specialized arrangement according to the respective branches. A clear indica-

tion of this trend was given during the 2nd International Trade in Brno by a large exposition of machine tools from various countries of the world. This specialized international exposition was the very centre of this year's Trade Fair. After the good experience gained through the arrangement of this kind it is expected that further specialization will be realized. This trend is enthusiastically welcomed by both Czechoslovak and foreign technical experts, as well as by manufacturers and businessmen.

Czechoslovakia, the seat of the Permanent Commission for Engineering of the Council of Mutual Economic Assistance, is at the same time the engineering basis of the socialist block, and, consequently, the Brno Trade Fair is a parade of the successes and results achieved in the field of scientific and technical cooperation and unselfish assistance.

The exhibits of all countries belonging to the socialist block have given proof of unprecedented progress in the national economy of these countries. The Soviet Pavilion at the International Trade Fair in Brno ranked among the foremost. The extent of Czechoslovak-Soviet trade relations can be best shown by the results achieved at this year's Trade Fair in Brno: Just as last year, the trade agreements on the mutual exchange of deliveries between the two countries, signed at this year's Trade Fair in Brno, are the most extensive of all contracts concluded.

Soviet machine tools with programme control, automatic production lines, instruments for measuring radioactive impulses, medical apparatuses and appliances, television and wireless sets, mining and agricultural machinery, etc., etc., attracted great attention and keen interest both among experts and manufacturers.

The exposition of the People's Republic of China was admired by visitors from home and abroad much more than last year. China's machine tools and precision measuring instruments attracted the attention of the visitors and were highly appraised by all those who can appreciate good quality and workmanship. The Hungarian exhibits also evoked great attention and interest both on account of the wide range of products and the progressive conception of their design as well as the quality of their finish. Compared with the last pre-war year, Bulgaria has succeeded in increasing the volume of her industrial production eleven times. In Brno she exhibited a wide range of products that the Bulgarian people had never before dreamed of. Poland, holding the eleventh place in

ship-building among the world's ship-building countries, has demonstrated with her exhibits the high standard of her technical thinking. The Pavilion of the German Democratic Republic indeed demonstrated at the Brno Trade Fair, the great successes achieved by the technical revolution of the East German workers and technical experts.

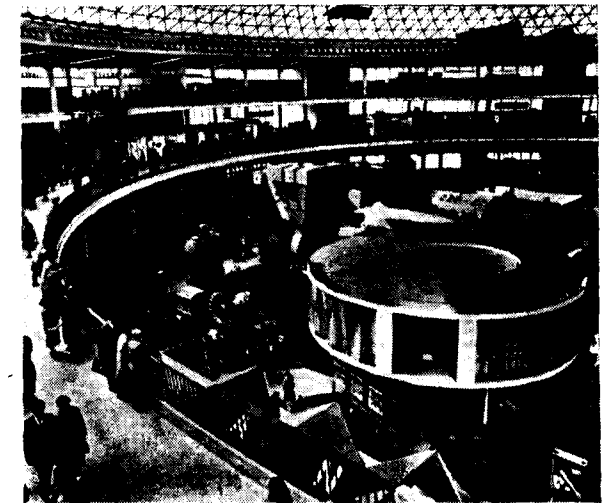
Many representatives from non-socialist countries have at last realized that the socialist block countries, whose industry had been technically undeveloped in the past, and, consequently, almost unknown to them, are reliable business partners. And as a result of this, they not only entered into business relations with some of these countries but also immediately concluded contracts with them for the mutual exchange of various commodities. Consequently, e.g. the People's Republic of China and the German Democratic Republic have greatly strengthened their position in the world of engineering and trade.

The steadily growing participation of firms from non-socialist countries bears testimony to the great interest in trade with the countries of the socialist block. The representatives of several firms declared unanimously that they would be participating in next year's International Trade Fair in Brno with a greater number of exhibits, and they would also recommend the Brno Trade Fair to their business partners and friends. The firms concerned were particularly those from the German Federal Republic, South America and Japan.

Among the non-socialist countries represented at the Brno Trade Fair, the largest exhibitors were Great Britain, France, and the German Federal Republic. All other countries were represented by firms that enjoy a very good reputation in the business circles all over the world and whose trade-marks are the symbol of good quality and technical progress.

Within a fortnight the 2nd International Trade Fair in Brno was visited by nearly 1,300,000 persons. The number of foreign visitors who came to see the Brno Trade was 22,000, and they were practically from all parts of the world.

At the 2nd International Trade Fair in Brno, the Czechoslovak Foreign Trade Corporations concluded contracts, the total value of which amounts to 4 milliard 7 hundred million Kcs. Among the most important contracts are the following: the delivery of two sugar factories, oil refinery equipment and accessories, chemical equipment as well as suction



International Trade Fair in Brno.—Interior view of pavilion Z which was erected in 1959 as a modern circular ferro-concrete construction. The pavilion is spanned by a huge dome of steel tubes; the roofing itself consists of aluminium sheet, glass and plastics.

dredgers to the Soviet Union, the delivery of complete industrial plants to Cuba, the export of knitting machines, tractors (among others even to Brazil), and a great number of other commodities to several other countries. Several business negotiations are still in progress. Among the most important import contracts are those for the import of agricultural machinery from the German Federal Republic, automobiles from Italy and Great Britain, television sets from Hungary, etc., etc.

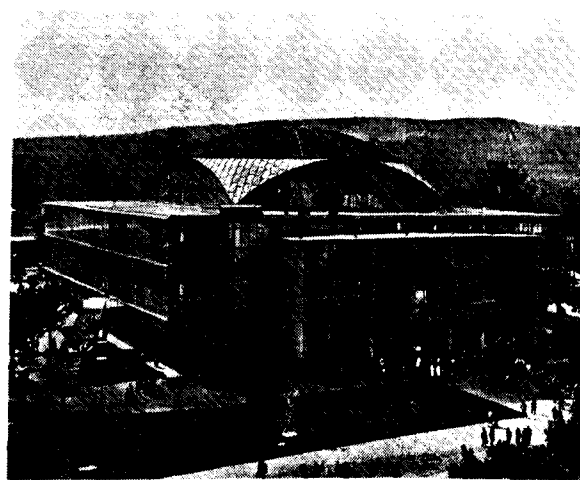
The countries of the socialist block have concluded with the Czechoslovak Foreign Trade Corporations large contracts for the mutual exchange of goods, the value of which amounts to more than 4 milliard Kcs. The value of contracts signed with the other countries is about $\frac{1}{2}$ milliard Kcs. The total turn-over in trade reached at this year's Trade Fair in Brno is about 12—13% higher than it was last year. The largest contracts have been concluded by the following Czechoslovak Foreign Trade Corporations: TECHNO-EXPORT, STROJEXPORT, STROJIMPORT, MOTOKOV, and KOVO. Important contracts have also been signed by METALIMEX, FERROMET, and CHEMAPOL.

The 2nd International Trade Fair in Brno became the meeting place of leading experts from all over the world. It afforded a great opportunity for exchanging experience and share information and knowledge. Hardly any country in the world can boast of being the meeting place of so many specialists, of creating

perfect conditions for the initiation of personal friendship among these bearers of technical progress, and, last but not least, for engaging technical progress in the service of peace. World-renowned scientists are looking forward to the symposia and specialists' days to be held on the occasion of the 3rd International Trade Fair in Brno, and have even promised to invite to Brno still more specialists from overseas. The 2nd International Trade Fair in Brno has shown that, in comparison with last year's Trade Fair, a great many things have improved. This year, the participation of foreign exhibitors and visitors from abroad was much more higher, both, the exhibitions and the organization were much better, and, generally, many other things connected with the Trade Fair had greatly improved. The organizers learned a great deal from the mistakes of the past Engineering Exhibitions as well as from the errors made at the 1st International Trade Fair, and, consequently, their efforts bore fruits. Last year's trade turnover was surpassed. Today, the Brno Trade Fair ranks among the most outstanding trade fairs in the world. Among other things, it is also the great interest of foreign exhibitors in the 3rd International Trade Fair Brno 1961 that bears best testimony to this fact.

The Brno Trade Fair has become an important part of international trade, a significant factor in establishing and developing new business relations. It has become a bridge of understanding among the nations of the world.

The great survey of successes achieved by our Socialist Republic in the 15 years of its independent



International Trade Fair in Brno.—Pavilion C built in 1959. Its construction is made of ferro-concrete. It has three galleries, offices for exhibitors and other facilities.

existence is over. May the 3rd International Trade Fair Brno 1961 demonstrate even to a greater degree what the free people of our Socialist Republic can create! The 2nd International Trade Fair in Brno is over, long live the 3rd International Trade Fair Brno 1961.

CZECHOSLOVAK FOREIGN TRADE CORPORATIONS

Strojexport

Strojexport is a Czechoslovak Foreign Trade Corporation for the export of machines of an investment character and of machinery equipment.

The most important export commodities of this Foreign Trade Corporation are combustion engines, Power units, products of the heavy-current engineering, pumps, compressors, and rolling stock. Strojexport was represented at the 2nd International Trade Fair in Brno in all these commodities.

In the export of combustion engines Czechoslovakia ranks fourth in the world after the United States of America, Great Britain and the German Federal Republic. Strojexport is one of the world's greatest firms exporting this assortment. About 80% of all stationary and marine Diesel engines produced in this country are destined for export, which has increased ninefold since 1948.

Strojexport exports Diesel engines to 65 countries, especially to Argentina, Brazil, Greece, Turkey, Egypt, Persia, Syria, Burma, India, Indonesia and Thailand. One of the interesting exhibits displayed at this year's Trade Fair in Brno was particularly the type ID 80 L engine used for the propulsion of small fishing boats and smaller river craft. The main features of this propulsion unit are its low fuel and oil consumption, as well as its low weight; it works reliably and is easy to operate and service.

Of modern design is also the type Skoda 6 L 160 PN pressure charged marine propulsion unit with an output of 210 HP, equipped with a reversing and reduction gear-box. Other interesting engines include the new types of stationary two stroke water-cooled oil engines D 110, whose fuel and oil consumption is very low. The work reliably and are easy to operate and service.

Demonstrated were also marine oil engines type Skoda 6 L 275 PN with pressure charging by a turbo-blower. They are especially used for the propulsion

of river and sea vessels, both passenger and cargo ships.

Diesel electric generating sets with Skoda type 6 S 275 PN oil engines have an output of 500 kVA and are used for generating electric power, for lighting and for driving machinery equipment in industrial plants.

The export of heavy-current power engineering products is steadily rising. Strojexport exports electric machines and instruments to 50 countries all over the world. Some of them were awarded prizes at the World Exposition in Brussels.

An interesting novelty was the air-cooled rectifier for DC. voltage with built-in ignitrons for 3300 V. This rectifier is the first industrially produced device of its kind. The mobile rectifying station with an output of 2500 kW 1650 V (railway design) is, with respect to installed capacity, one of the most efficient rectifying stations ever made.

Well represented at the Trade Fair in Brno were also elements of automation and regulation. Particularly remarkable among them were the Selsyn devices for various servomechanisms, servomotors, industrial relays, magnetic amplifiers and regulators for direct-current motors. A number of up-to-date current and voltage transformers, filled-up in resin, can be well matched with world standards.

Exhibited in the hall of machine tools was also a medium-frequency pre-heater, which enables progressive technology in mass and large-lot production. At the Trade Fair, it was inserted in the production link line for the forging of bevel gear pinions. In the branch of protection there were exhibited distance and comparison protective relays intended for installation in high voltage and very high voltage systems. These relays can be well matched with world standards to all intends and purposes.

Great attention was evoked by a semi-automatic machine for perfect grinding and polishing of free wheel casings (of bicycles) before galvanization by electroplating. The machine is designed as a unit head line with endless feeding. Type Montix 160 industrial X-ray defectoscope serves for detecting macrostructural defects in materials. Type MT 3 magnetic thickness gauge is used for detecting any reduction in the thickness of walls or pipes caused by corrosion.

In the line of welding equipment, in which Czechoslovakia ranks among the world's biggest suppliers, Strojexport exhibited, among others, special Argon arc welding machines, type SUM 1000 welding tractors, type SNK 500 pneumatic flux welding machines for welding tube adapters for boilers, and the most up-to-date electric semi-automatic metallizing machine, type EMP 2-57, which will find application particular by in the repair of machines. The fact, that only the United States and the German Federal Republic export more welding machines than Czechoslovakia, bears testimony to the quality of welding machines bearing the trade-mark 'Made in Czechoslovakia'.



International Trade Fair in Brno.—A wide range of most up-to-date machines, apparatuses and equipment at the 2nd ITF in Brno was admired by numerous visitors not only from Czechoslovakia but from nearly all the countries of the world.

In the line of pumps Strojexport exhibited a wide range of these machines manufactured in Czechoslovakia. Especially interesting were the exhibited pumping units used in agriculture, all kinds of rainers for sprinkling field cultures, vegetable gardens and pastures, and, last but not least, low-pressure tubular rainers for sprinkling young and delicate plants requiring extremely fine-size drops. All these pumps are driven by Diesel engines. Special attention was evoked by the transportable irrigation piping fitted with spherical couplings. It is extremely light, can be quickly connected and disconnected, and shifted from place to place in a very short time. The rapid couplings also facilitate to adapt the spray line to any uneven surface of the ground. These rainer-type irrigation units are in steady demand particularly by

the countries of the Far and Middle East as well as by Argentina.

Strojexport also displayed industrial pumps for handling chemicals and other liquids. Among these the visitor saw type Sigma 100-NEA-230 single-stage centrifugal pumps intended for the process handling of hot petroleum and chemical products at high temperatures and of low specific gravity. These special pumps have proved their high quality in the Syrian Zone of the United Arab Republic, where Czechoslovakia erected a big oil refinery last year. Intended for conveying and dosing small amounts of chemicals at high pressures up to 160 atm. is the type Sigma 5-VvCh dosing pump. It can be regulated while in operation.

Type Sigma 100-AVBV pump is intended for pumping water from deep wells. It is a vertical centrifugal pump designed for work in very narrow and deep bore-holes (diameter 200 mm. total head 160 m). Among pumps intended for handling a great amount of water by pumping stations. Strojexport exhibited various horizontal and vertical pumps with an output of 90,000 litres per min.



International Trade Fair in Brno.—Interior view of pavilion Z, the total area of which is 18,000 sq. m. The pavilion was built in 1959; its modern circular ferro-concrete construction has attracted the admiration of experts from all over the world.

An interesting novelty in the line of compressors was type K 100 Z tractor compressor. It is mounted on a tractor trailer and driven by the tractor's engine. Intended for work in the building trade are mobile two-stage air-cooled compressors with a sucked air volume of 260, 360 and 600 sq. m. per hour.

Type 2 DSK 160 B compressors are intended for work in the food and chemical industries, where the compressed air must be perfectly free of oil admixtures. It is a two-cylinder, two-stage compressor without cylinder lubrication. Among the turbo-compressors exhibited by Strojexport, the visitor could see some compressors that were awarded prizes at the World Exhibition in Brussels. Worth mentioning is, e.g. the axial turbo-compressor with a performance of 220,000 sq. m. per hour. Axial compressors, chiefly used for supplying pressure air to combustion turbines and blast furnaces, have a much higher efficiency than radial compressors hitherto used.

One of the most successful commodities of Strojexport is the export of electric locomotives. This follows the old tradition of the export of steam engines. Although in 1955 not a single locomotive was exported, in the years 1956—1957 Czechoslovakia's share in the world production of electric locomotives intended for line service reached 13%, and, consequently, she became the world's third biggest exporter of electric locomotives, ranking third after Great Britain and France. In 1958, when Czechoslovakia's export of electric locomotives (for line service) rapidly jumped by 580% (as compared with the exports of the preceding two years), she greatly surpassed France, and considerably approached the export of the world's greatest exporter of electric locomotives, i.e. Great Britain. In 1959 the export of electric locomotives (for line service) supplied by Strojexport rose by 22% as compared with the result achieved in 1958.

At the 2nd International Trade Fair in Brno Strojexport exhibited both electric locomotives (series E 469 and 41E) and Diesel electric locomotives (series T 435.0), which have given proof of their superior qualities in the Soviet Union, as well as type BN 150 Diesel mechanical shunting locomotives with mechanical transmission of power.

The class EM 475 four-car electric train for suburban traffic, and the series T 3 tram of a new type also attracted much attention.

STROJIMPORT

At the 2nd International Trade Fair in Brno, Czechoslovakia's machine tool industry was demonstrated by almost 40 novelties representing the main trends in the development of this very important branch of Czechoslovakia's engineering. More than one half of the exhibited machines contained elements of a higher degree of automation.

Prevailing among these machines were universal machine tools with programme control of the automatic work cycle, well suited for the automation of medium series, and even small series production, which predominates in engineering. Among the programme controlled machine tools, there were also machines controlled by a punched tape. These machine tools can be very easily set up. The new types of capstan lathes were of different design in accordance with the degree of automation. Their unit head design makes it possible to make full use of the greatest possible number of same parts and machine groups in different types of machines.

At the Trade Fair in Brno they were represented especially by the type RP 25 semi-automatic capstan lathe with programme control. It is a small size lathe (for bar work up to 25 mm. diameter of stock) derived from the basic type RC 25. The machine has a capstan turret slide revolving round the vertical axis, a front slide rest with a tool post for 4 tools and rear tool holder for several tools.

Type AN/40 six-spindle horizontal automatic lathe is designed for admitting bar stock up to 45 mm. diameter. This lathe has a number of features that raise its productivity and extend its range of application. The tool slide feeds are controlled by cams and the working stroke can be adjusted to any length. Cemented carbide-tipped tools can be used.

Worth mentioning is also the semi-automatic vertical copying lathe type SPK 563. It enlarges the popular series of semi-automatic lathes fitted with programme control SP 25 and SP 31, which won a Grand Prix at the World Fair in Brussels. The new type of this semi-automatic lathe is intended for machining more complicated shapes with a maximum turning diameter of 630 mm. and maximum turning length of 250 mm. The vertical working spindle permits to load the work-piece, to remove the turnings and to set up the tools. Two copying attachments and a cut-off rest enable to turn both external and internal profiles, to machine faces, vertical and slanting parts, to chamfer edges, and perform other similar operations.

Another novelty was the type A 40 single-spindle automatic lathe. Its design is the result of rich experience with the work of type A 20, A 40, and A 12 automatic machines, which are among the most exported Czechoslovak machine tools. A number of auxiliary accessories raise the productivity of this new machine by as many as 75%, as compared with the existing types of automatic lathes of current design.

Setting-up is much easier and requires less time. The main feature of the new design is the arrangement of cams for tool-block feeds.



International Trade Fair in Brno.—At the 2nd international Trade Fair in Brno, the exhibition of oil engines, a part of which is shown in our picture, attracted well-deserved attention of the visitors. Czechoslovakia ranks among the first five countries of the world in the production of oil-engines.

Machine tools type FB 31, FM 40 and FB 50 come up to the highest expectations as far as efficiency of the machine is concerned. They are extremely rigid and the output of the electric motor for driving the spindles is high in order to exploit fully the cemented carbide tools used for milling. These milling machines are operated by remote control from a control panel with push-buttons. The control panel may be set in advance. The entire working cycle can be programme-controlled either by means of stops or of a perforated tape.

Among Strojimport's exhibits the visitor could also see a very pretentious machine tool—the type OFP 20 gear hobbing machine—designed for the generation of spur and helical gears, spline shafts, and worm gears by radial method, as well as of all kinds of toothing generated by the hobbing method. This machine shows the steady systematic progress made by TOS Celakovice and by the Research Institute of Machine Tools and Machining, Prague, in solving the world problem of generating gears. Concrete results were achieved already in 1959, when they designed the type OF 10 gear hobbing machine equipped with a correction attachment, and produced the IMO-S and TMO-200 inspection apparatuses, which attracted great and well-deserved attention in the technical press of the world.

TECHNOEXPORT

There were 138 exhibits on show at Technoexport's stands. They included, in particular, machinery and equipment for the steam and water power engineering, chemical equipment, machinery and equipment, used in rolling mills and foundries, gas works and for water treatment, refrigerating plants and equipment for the food processing industry, machinery used in the rubber and plastics industries, vacuum engineering, models of complete small and large industrial plants, wood-working machinery, equipment for the heavy electrical engineering, cement works, ships, tugs, dredgers, etc. At the 2nd International Trade Fair in Brno altogether 33 novelties were demonstrated by Technoexport.

The export of machinery and equipment for the power engineering forms an important sector of Czechoslovakia's exports. Among the outstanding exhibits were the following: a two-cylinder condensing steam turbine with two automatic extraction points (rated output 25,000 kW, working steam pressure on stop valve 90 atm. abs., working steam temperature on stop valve 535°C), a model of a three-casing reheat steam condensing turbine with a rated output of 50 MW, a fan mill (output 45 t/hour) suitable for lower quality fuels, and in the line of hydraulic power plants a Pelton turbine runner (output 40,2 MW) and a hydraulic desk-type speed governor of modern design.

An outstanding novelty in heavy-current engineering was the three-pole air-blast disconnecting switch (circuit-breaker) consisting of three individual poles. It is also arranged for single-pole re-switching. It is designed for open-air high voltage switch plants (380 kV). Its rupturing capacity is 15,000 MVA. Another interesting exhibit was the isolating switch type OVN 380 Z with a rated voltage of 380 kV and a rated current of 1250 A. The voltage instrument transformer for 380 kV is of a new design.

The Prerov Engineering Works have produced a unit-type packing machine for cement works. It is a single-tube machine with an output of 200 bags of cement 50 kg/hour. It is designed for packing powder materials, such as cement, ground limestone, ground lime, etc. The attention and interest of the experts was also attracted by a road carrier for transporting loose cement (useful capacity of the pressure vessel is 10 cu. m.) and by a dosing feeder for loose materials with an output of 35 t/hour.

The model of a blooming line for rolling mills

evoked great interest. It is intended for the treatment of ingots. With a sufficient furnace capacity for standard carbon steels it is possible to achieve an output of 30 t/hour. The model of a continuous rolling mill for rolling strips (width 50—250 mm. thickness 0,8—4,5 mm.) was a further example of Czechoslovakia's production in this important export line. The output of this continuous strip rolling mill is 250,000 tons/year. The VZKG-Vitkovice Iron Works exhibited their calibrating equipment for heat-rolling steel tubes with an outlet diameter of 60—130 mm. and tube wall thickness of 3—22 mm. (according to the diameter of the tube).

The export of chemical equipment has a rising trend, which was also reflected in the exhibits displayed at the Brno Trade Fair. The ZVU Engineering Works from Hradec Kralove exhibited their cold exchanger for the separation of gas mixtures by low cooling method in the section where raw hydrogen is being scrubbed with liquid nitrogen. The cooling output of the cold exchanger is 598,000 kcal/hour.

Czechoslovak wood-working machines are in steady demand in the markets all over the world. An outstanding novelty of this year's Fair in Brno was the type KRN circular multiple rip saw. Another interesting machine in this line was type XDV-h woodwool cutting machine. When processing soft wood (thickness of the wool 0.05—0.5 mm.) the average output of this machine is about 35 kg/hour. Among the wood-working machines the visitors could also see the model of a chipboard production line with an annual capacity of 8,000—11,000 cu. m. The line has been designed on the basis of most up-to-date knowledge, and can economically process waste wood for the manufacture of chipboards. Czechoslovakia exports both medium and large chipboard production lines with an annual capacity up to 50,000 cu. m. Experts showed great interest in the veneering press type LN 16 for furniture factories. It is designed for veneering furniture boards, but can be also used manufacturing other kinds of boards, e. g. chipboards, fibre-boards, etc. The press has four hot plates (1300×300 mm.) and a maximum specific pressure of 16 kg/sc. cm.

Technoexport also exhibited models of ships for transporting passengers and cargo, as well as models of suction dredgers for regulating river beds. The passenger motor ship is designed for transporting 419 passengers and 70 crew members. The ship's cruising range is 7 days, its average speed 25 km/hour. One of the suction dredgers has an output of 725 sq. m/hour. It can dredge to the depth of 6—11 m

(depending on the quality of the dredged soil), and the mixture of the dredged soil and water is transported up to a distance of 600 m.

KOVO

The Czechoslovak Foreign Trade Corporation KOVO, which imports and exports precision engineering products, had 700 exhibits on its stands. Several of them were novelties. Among the exhibited textile and knitting machines the visitor saw e.g. a high-speed deck-twisting machine, type Skasil, for twisting all kinds of synthetic fibre yarns. It is destined for the chemical industry and for preparatory work in weaving and knitting mills. The shuttleless jet loom type Elitex is the result of most up-to-date knowledge in textile technology and the design of textile machinery. Another outstanding exhibit in the line of knitting machinery was the automatic single cylinder four-system knitting machine Uniplet for knitting ladies' seamless stockings.

The shoemaking machines exhibited by KOVO were demonstrated in full operation in a production line supplemented by a new air-operated machine—Mark Svit pneumatic heel seat shaping and shoe uppers folding machine. A novelty in this line was the leather grinding and dust removing machine type Svit L 1800 for grinding both sides of shoe uppers, and the hydraulic iron for smoothing out the front side of leather of all kind.

In the line of laboratory equipment KOVO demonstrated a new micro metallizing equipment made by Tesla for metal coating with pulverized metal in high vacuum, an ionization and combined vacuum gauge, a direct recording pH-meter which is sensitive up to 0.05 pH, a conductometer of new design, suitable for determining the electrical conductivity of solutions, a small methanometer for determining the methane content of the air, and, last but not least, a single-scale semi-automatic analytical balance type A-3/100 (capacity—100 g. sensitivity—0.01 mg.)

Among the well-known and reliable apparatuses and equipment for the medical services the visitor could see a number of novelties. One of them was the new six-valve diagnostic X-ray unit Chirana Stabilix another novelty was a newly designed 5-source standing lamp for operating theatres. It is also made by Chirana.

KOVO displayed a number of improved types in the group of optical equipment and photo cameras. Among these were enlargers type Axomat Ia and

Opemus IIa, the first Czechoslovak amateur cine-camera for 8 mm. films, Admira F, with a built-in exposuremeter, the most up-to-date 8 mm. cine-projector Meopta A.M. 8 and the professional projector FTP 1 for large cinemas. The latter can be used, when fitted with an anamorphic adapter, for projecting panoramic films made by the Cinemascope system. Another novelty was the Tesla 401 highfidelity reproduction stereophonic sound equipment.

In the line of wireless and television sets, Kovo demonstrated the new medium-size table wireless set Tesla 532, and some new types of television sets, such as Tesla Lotos 4211 U, Camellia 4210 U, as well as Tesla K of the latest design.

Automation and regulation devices were represented by a number of new products that enable automation of entire work cycles. The branch of measuring and regulation, both low-pressure and pneumatic, was represented by instruments working within the range of 0.1—1.00 atm. g.

Other interesting exhibits displayed by KOVO were in the line of precision and measuring instruments, e.g. a set of samples for comparing the surface roughness of machined parts. Exhibits in the line of cutting tools and all kinds of anti-friction bearings made in Czechoslovakia were also on show.

MOTOKOV

Great interest was evoked by Motokov's stands in Pavilions G and Z, as well as by its exhibits displayed in the open-air exhibition space in front of Pavilion Z. It was particularly our tractors, motorcycles, passenger cars and lorries that attracted great attention of both businessmen from abroad and visitors from this country. Automobile carburettors, spark plugs and other accessories used by motorists are becoming more and more popular all over the world. They are also exported by Motokov.

The attention of the visitors was naturally focussed on the novelties exhibited by Motokov. It was, e.g. MOPED S 22, a greatly improved successor of type Stadion exhibited last year. Moped S 22 has a larger petrol tank, a motorcycle saddle, hooded handle-bars and complete technical equipment which is usual with perfect motorcycles. The improved type also has a rear pivoted fork and hydraulic dampers.

The novelties in cars are represented by SKODA OCTAVIA COMBI, an ingeniously solved combination

of a four-seater, with ample space for luggage, and a two-seater delivery van. No alternation is necessary for changing the function of the inside space of the car; you simply tilt the rear seat and the seat rest, and the car is converted into a delivery van. Skoda Octavia Combi is equipped with the same engine as the well-known Skoda Octavia Super, and, owing to its qualities, it is an ideal car for touring and camping.



International Trade Fair in Brno.—Pavilion Z built in 1959 ranks among the most impressive buildings on the Trade Fair grounds. It is 38.5 m high and its total area of 18,000 sq. m. is covered by a daring dome of steel tubes laid with a roof of aluminium sheet, glass and plastics.

At this year's Trade Fair in Brno KOVO exhibited in the line of transport several special vehicles of a new type. Among them was e.g. Skoda 706 RTTN tractor for semi-trailers. In its design much use was made of the well-known trambus elements, the chassis was shortened and fitted with a turning table for attaching the trailer. The trailers may be tanks, buses, vans, platform lorries (drays), etc. Another interesting exhibit in the line of vehicles was the mobile workshop van. Its special body is equipped with machinery and appliances of every kind necessary for diagnosing and repairing defects in vehicles, and for servicing them. It also has a comfortably furnished lounge. This mobile workshop van left the Brno Trade Fair to go on a tour of Czechoslovakia for the purpose of a trial trip. Later, it will also tour several European countries. Another novelty at the Brno Trade Fair was a low-bed trailer to go with Tatra 141 road tractor. It is designed for transporting heavy and bulky loads, as well as heavy machines. This low-bed trailer dray for 20 tons will replace all trailers imported to Czechoslovakia from abroad. A particularly outstanding novelty of the Brno Trade Fair was the

ZETOR 3011 tractor. It is the first type in the series of unified line tractors that will be produced in the near future. Compared with Zetor Super 50, this new type has a higher performance. It is fitted with a three-cylinder water-cooled Diesel engine with direct fuel injection. The engine's design assures smooth running, high performance and low fuel consumption. The gear-box can be provided with as many as 10 forward speeds and two reverse speeds. The tractor's rear axle is of the portal type and, consequently, the clearance height of the tractor can be changed if necessary. The hydraulic brakes may be adjusted so as to act on each tyre separately. At the customer's request, the tractor can be also furnished with a heated booth for the driver.

Those engaged in agriculture were pleased to see among Motokov's exhibits a complete set of agricultural implements to go with all types of Zetor tractors. They saw machines for ploughing, preparing the soil, sowing, tending cultures at the time of their growth, forage and corn harvesters, ensilage mowers and cutters, etc. Among the exhibits was also the smallest Czechoslovak tractor—Motorobot M6—as well as a set of tools and implements to go with it, so that the Motorrobot can be used for work in orchards, gardens, vegetable gardens, nurseries, etc.

OMNIPOL

One of the important Czechoslovak Foreign Trade Corporations is OMNIPOL, engaged in the export and import of sports and hunting arms, ammunition, sports and civil aircraft.

Omnipol has trade relations with a great number of countries. E.g. in the line of sports and hunting arms, it exports our products to 76 countries all over the world, while it supplies 45 countries with aircraft.

The most successful exhibit of Omnipol at the Brno Trade Fair was the model ZH shotgun. It is a universal firearm that, thanks to its design, makes it possible, to have 5 guns in one by simply exchanging the barrels, and, consequently, it can be used for both hunting and sporting purposes. The possibility of exchanging the barrels yields not only financial savings but also other advantages, viz., the person handling the gun uses in all cases the same gunstock and the same release mechanism, so that he gets used to the same condition, bend and inclination of the stock. Another advantage of this shotgun is its simplicity. Compared with other shotguns sold in the

market, this Czechoslovak firearm has much fewer component parts (ratio 70 : 120).

The exhibited small-bore rifles occupied a special place among the hunting arms. They are intended for hunting, sport; and shooting competitions. Owing to their excellent qualities, they have achieved great popularity all over the world, and have become the basic firearm of a great number of both national and international sports shooting organisations and clubs. Czechoslovakia delivers thousands of these small-bore rifles to all parts of the world. A traditional Czechoslovak product is the single and double-barrelled rifle. Interested garties at the Brno Trade Fair saw model ZP 47 double-barrelled rifle, which is produced in several calibres. They are indeed general-purpose rifles, and enjoy a very good reputation all over the world. An outstanding specimen in the line of short arms was the Czechoslovak revolver model ZKR 551. It is perhaps the only revolver in the world designed exclusively for sporting purposes. Consequently, it possesses outstanding shooting qualities. Best proof of this fact is given at international shooting competitions, where marksmen using this revolver have won first prizes (e.g. at the 1958 World Championship in sports shooting—first prize and a new world record in group shooting—2,325 bull's eyes out of 2,400 shots, first prize at the 1959 European Championship and a new record in individual shooting—591 hits out of 600 shots). The world record in group shooting has been unofficially broken in Czechoslovakia with this revolver, viz., 2,341 bull's eyes were scored out 2,400 shots.

Thanks to their outstanding qualities, Czechoslovak aircraft have achieved great popularity all over the world. The best proof is given by the fact that they are exported to 45 countries and are flown in all parts of the world. One of the most remarkable exhibits in this line at the Brno Trade Fair was Trener Master model 326 training and aerobatics plane, the latest type in the development series of the world-renowned Trener aircraft. These planes have given outstanding proof of their high qualities as training and aerobatics aircraft, and pilots flying them have scored a number of international successes.

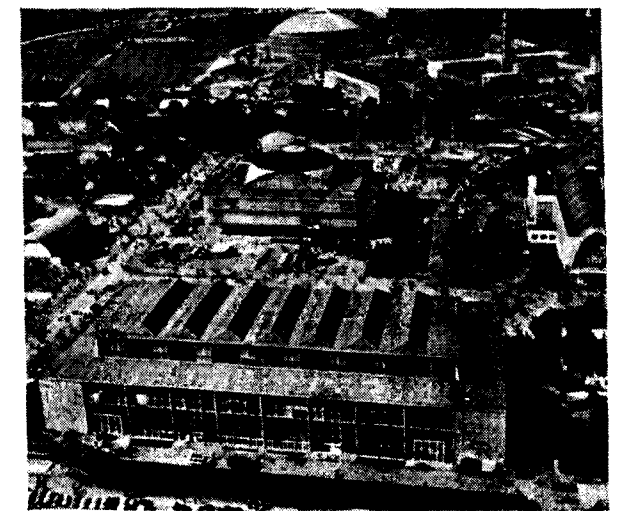
Another aircraft attracting great attention at the Brno Trade Fair was L 200 A Morava, a five-seater plane designed for passenger service as an aero-taxi, as an air ambulance, as an express service air-craft for big corporations, or, in De Luxe finish, as an aircraft for representative purposes. The exhibited L 40 Meta Sokol belongs to the sports category aircraft. It is an

all-metal three or four-seater for transport, aerobatics, training, etc. It is the latest type in the series of Sokol aircraft, holders of seven international records. Two new international records were achieved in 1959 by pilots flying L 40 Meta Sokol.

Also exhibited by Omnipol was model L 13 Blaník, an all-metal two-seater glider, designed for basic training in engineless flying and for competition purposes. In Western Europe it has been nicknamed (Cadillac) on account of its graceful shape.

OMNIA

Omnia is a Czechoslovak Foreign Trade Corporation importing and exporting fission materials and instruments used in nucleonics. At its stands situated on the first gallery of Pavilion Z, the visitors had the opportunity of seeing the basic equipment of a radio-isotope laboratory. It consists of a sectional L 3101 digester, N 3301 lead chamber 1,000, B 1101 lead joint, B 1102 umaplex joint, N 1201 tube tongs, N 1301 extension tongs, M 1103 extractor with netting, M 1501 bottle opener, Gamma M 6101 syringe, and N 7101 pipette. The most important part of the isotope laboratory equipment is the sectional digester made of stainless steel and plastics. It is designed for the purpose of exhausting gases and radioactive particles.



International Trade Fair in Brno.—Aerial view of a part of the Trade Fair grounds. In the foreground is Pavilion B, in which there are exhibited machine tools (the main branch of the specialized Trade Fair in Brno), further pavilion C, and in the background pavilion Z, which has attracted the interest of experts from all over the world and the beauty of which has enchanted all visitors.

Among other items in this line, Omnia also various manipulators for the preparation of radioactive solutions, for measuring, for taking samples, for weighing, and for other work with radioactive materials. Manipulation is easy, the operator is protected, and there is no risk of exposure to the effects of radiation. L 500 and L 700 are two types of small-size manipulators for work behind a shielding screen when manipulating radioactive materials of lower and medium activity. The length of the manipulator is 500 and 700 mm. respectively. These manipulators permit the transfer of radioactive materials up to 3 kilograms.

Among other items in this line, Omnia displayed at its stands various measuring instruments employed for work with radioactive materials. Worth mentioning are the transistorized Beta-Gamma monitors for detecting and measuring roughly the intensity of Beta and Gamma radiation. Thanks to them, the risk of exposure to the effects of radiation is minimized. Another advantage of this monitor is that it is charged by three close nikel-cadmium accumulators. After being in operation for about 20 hours, the accumulators are discharged, but can be re-charged by means of a special charger supplied from the mains. The accumulator charging device is delivered together with the monitor. It is consequently not necessary to exchange frequently the batteries, as with other types of monitors.

UNICOOP

The Czechoslovak industrial cooperative societies and communal corporations had more than 300 products on show at the stands of UNICOOP, Cooperative Export and Import Corporation of the Central Cooperative Council. Altogether 44 industrial cooperative societies and 38 communal corporations were represented at the Brno Trade Fair.

Among products of an investment character, UNICOOP exhibited the improved type ZUS 098 automatic regulator for the compensation of idle current. This automatic controller, a Czechoslovak patent, eliminates losses in the power supply, prevents the overloading of transformers and driving engines, and acts as a voltage stabilizer.

Type MPTK/60 heat flow meter, a set for measuring thermal losses and for determining the thermal conductivity of insulations, greatly contributes to the work of those employed in power engineering at larger industrial works. This flow meter, hitherto not produced in Czechoslovakia, will find useful applica-

tion in heat and refrigerating engineering, as well as in the building trade.

All photography fans using 8 mm cine camera have enthusiastically welcomed another Czechoslovak novelty—the first sound adaptor for the magnetic recording of 8 mm. Amatic films. The adaptor ensures not only high-fidelity sound reproduction but also its perfect synchronization with the pictures. The sound track can be erased any time, and recorded again. By developing this adaptor, Chechoslovakia has become the world's third country in the post-scoring of 8 mm. films.

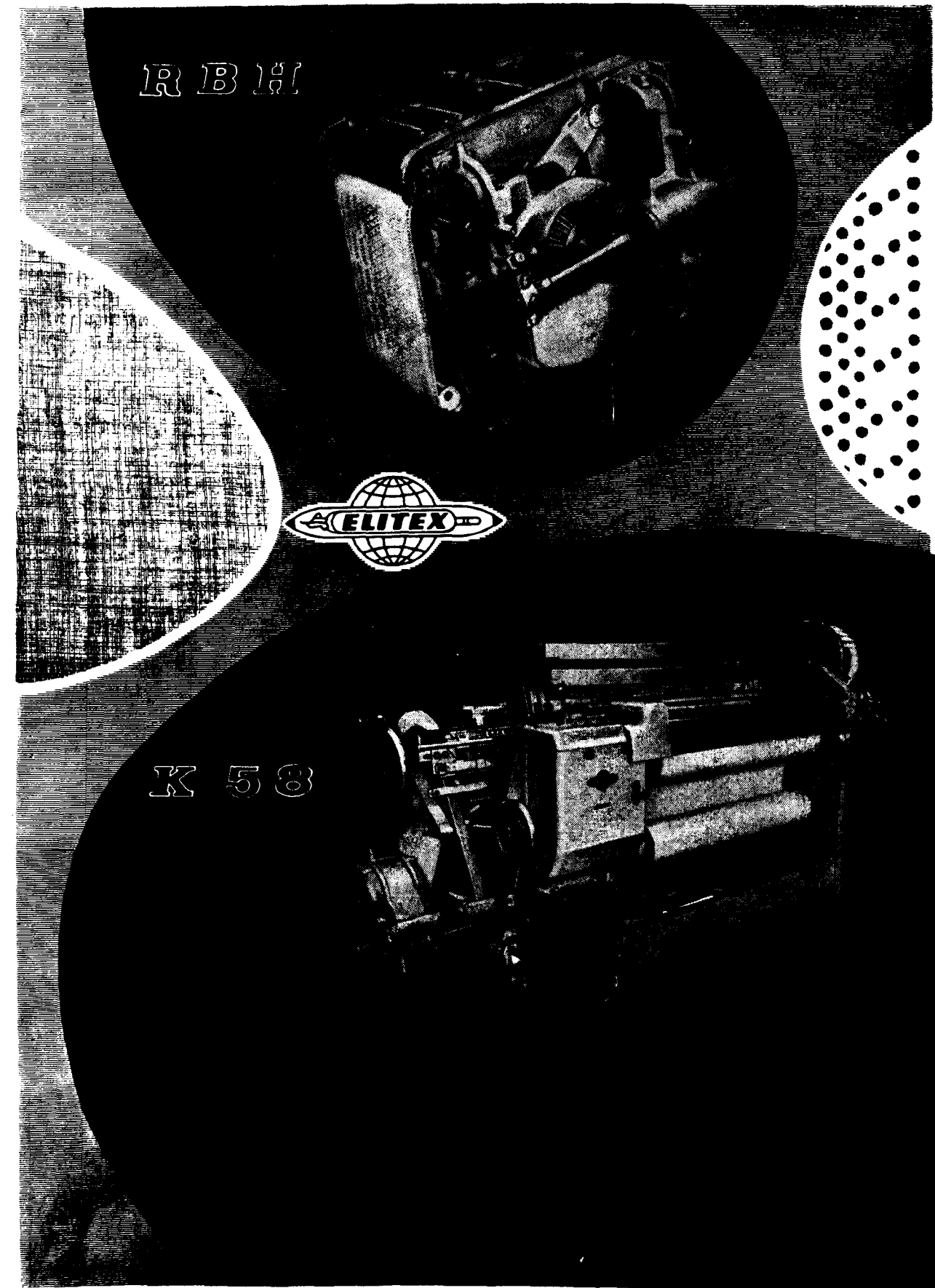
Another novelty in the line of photography is the fully-automatic Kovolux electric flashlight (for 300 flashes). The following commodities are intended for motorists: the collapsible caravan trailer for camping, the folding petrol cooker for all grades of petrol, and the motorist's coffee pot for making and serving coffee. Among the exhibited machines used in the building trade, let us mention e.g. the type Presto crane with three masts, and the portal crane. Both these cranes have proved their high efficiency in construction work, where they help to raise the productivity of labour.

Unicoop also exhibited agricultural machinery. Among the exhibits demonstrated in the open-air exhibition space, those interested in farming machinery admired, in particular, the general-purpose conveyor for agricultural products. It is used for the rapid loading of agricultural products onto trucks, platform lorries and other transport conveyances in field conditions without electric supply. The conveyor is driven by a Diesel engine.

FERROMET

Ferromet is a Czechoslovak Foreign Trade Corporation exporting and importing metallurgical products. Its main items today are rolled stock, both high-grade and low-grade (sections, plates and sheets), as well as tubes and tubular products of all kind. Mention should also be made of the export of secondary metallurgical products (nails, steel wire ropes, chains, netting, screws, forgings, castings, etc., etc.) as well as of the export of engineering products (i.e. cable industry products).

The stands of Ferromet were situated on the gallery of Pavilion B. Apart from various samples of shaped rolled stock, Ferromet also demonstrated the model a half-built crankshaft and a pressed boiler end. A



FOR FURTHER DETAILS CONTACT:

SEN & SHAH TRADING CO.,
Vakil Building, Khadia, Gandhi Road,
AHMEDABAD

HINDUSTAN EQUIPMENT SUPPLIERS LTD.,
45/47, Apollo Street,
FORT, BOMBAY-1

traditional export article in foreign markets are thick plates of different types, boiler plates, and plates used in shipbuilding, in accordance with technical specifications.

Samples of cables representing the cable industry were also on show. Czechoslovakia's cable industry has a tradition of long standing and our cable works produce nearly all kinds of cables and conductors. Czechoslovakia mainly exports cables with aluminium cores, as well as conductors insulated with plastic materials.

In the line of metallurgical products the visitor saw samples of steel wire ropes, strands, springs, nails, bolts and screws, as well as specimens of various grades of fuel, and, last but not least, also samples of wire cloth for the paper industry.

On other stands were displayed tubes and pipes of various types and sizes, intended for different purposes. The framework of an oil drilling rig clearly demonstrated the application of tubes, pipe couplings, and couplers. Large-size pipes were represented not only by tubes made at the Chomutov Tube Rolling Mills, but also by samples of spirally welded tubes and pipes. Among other articles, the visitor could not fail seeing samples of the most usual and most interesting sections of bar stock, as well as sheet piles, samples of section iron, and rails. Our rails have in recent years given proof of the high quality of products made in Czechoslovak rolling mills.

METALIMEX

At the stands of the Czechoslovak Foreign Trade Corporation Metalimex were on show the most important commodities exported from Czechoslovakia, e.g. antimony, ferro-alloys, semi-products made of non-ferrous metals, especially of aluminium, and, above all, solid fuels (coal, coke, lignite, briquettes, brown coal, semi-coke), which are the main export items.

Although the exports of Metalimex have reached a considerable volume, its main activity is concentrated on the import of important raw materials that are vital for the further growth and development of Czechoslovakia's industries. By 1965 industrial production in our country is to be raised by 90—95%, as compared with figures in 1957. It is Metalimex that imports a considerable amount of raw materials needed for our industry, such as iron ore, manganese ore, non-ferrous metals (copper, aluminium, lead, zinc, tin, nickel, and a wide range of others), and, last but not

least, ores and semi-products of non-ferrous metals. These basic raw materials, so vitally important for the further growth of Czechoslovakia's industries, are largely secured by imports.

PRAGOEXPORT

The Czechoslovak Foreign Trade Corporation Pragoexport had its stands in Pavilion C, where it exhibited drawing instruments, compasses, an entire mechanized head-office consisting of the manager's office, a planning, an accounting and a designing department. Office requisites, above all, special pencils (used by technicians and designers) mark Toison d'Or 1900 of 21 hardness grades were also on show. Situated on the groundfloor of the same Pavilion were Pragoexport's stands, where the following commodities were on show: machines for sewing buttons on overalls, machines for sewing hooks on trousers, tailors' and shoemakers' requisites, sporting goods and fishing tackle, leather articles and small utility goods.

CHEMAPOL

The Czechoslovak Foreign Trade Corporation Chemapol displayed chemical products and raw materials at the Brno Trade Fair. Among its exhibits were synthetic resins, industrial explosives, technical dentakryl, laboratory chemicals, paints, dyes, varnishes, plastics, and chemicals used in agriculture and in the rubber industry.

Of great importance are, particularly, synthetic resins, especially epoxides, which are used as substitutes for bottleneck materials, above all, instead of non-ferrous metals. As a matter of fact, they are not substitutes in the strict sense of the word, since they possess a number of properties that are superior to those of standard materials.

The Czechoslovak Foreign Trade Corporation Czechoslovak Ceramics had on its stands a large display of abrasives of every kind, ranging from small discs for dental purposes to large abrasive wheels and segments used in abrading articles with large surfaces.

The stands, where building and sanitary ceramics were on show, were very attractive. The exhibits were displayed in bathroom units, the walls of which were suitably tiled with coloured glazed wall tiles toning with the ceramic fixtures. The exhibited wash-basins lavabos, lavatory bowls, etc., produced in various

colours, were the object of interest. They are destined for export.

CENTROTEX

On the stands of Centrotex, Czechoslovak Foreign Trade Corporation for the import and export of textile and leather goods, the visitors saw a wide range of technical felts used in the paper industry and in asbestos-cement works, tannery jackets employed in tanneries, felt bobs and blocks used in the glass industry for polishing and grinding glass, in engineer-

ing for polishing chromium and nickel-plated parts, etc. Other exhibits on display included shaped felts of various size and quality, technical products of the linen industry, hemp ropes, beltings and cords, rayon-glass yarns and fabrics, artificial leathers, and a very wide range of other interesting articles.

The Czechoslovak Foreign Trade Corporation Skloexport displayed a wide range of technical glass and glass articles of every type exported to all parts of the world.

IMPROVEMENTS TO "ALLIGATOR" RESPIRATOR

The Kelleher Rotary Senior Respirator—known to most people as an iron lung—was shown at the recent International Hospital Equipment Exhibition in London. It is a development of a well-known unit called the Smith-Clarke "Alligator" Respirator. But although the mechanical breathing characteristics are the same, it has two important differences. These are:—

- (1) Without interrupting breathing the patient can be turned from the supine (face-up) to the prone (face-down) position, or anywhere in between by one person. To achieve this the cabinet in which the patient lies can be turned through 180 degrees either left or right of the normal horizontal position, but in order to simplify and safeguard the electrical connections it can only be returned through the arc described.

The cabinet itself has a triangular frame extension at either end, each extension terminating in a trunnion bearing supported in one of the raised ends of a long U-shaped tubular frame work.

- (2) Once in the prone position, the medical attendant has manual access to the patient's back, again without interruption of breathing.

The patient is enclosed from the neck downwards, and access by the medical attendant is through the airtight armhole ports on the side of the cabinet.

The cabinet, or respirator, is normally airtight but when for various reasons this airtight condition has to be interrupted the patient is enabled to breathe by means of a face mask which is operated by the small

bellows. In this case air is forced into and drawn out of the lungs.

The action of both sets of bellows is mechanically synchronised so that when medically desirable there are two means of assisting the patient.

* * * * *

PENNY-A-MILE TURBO-PROP AIRLINER MAKES ITS SERVICE DEBUT

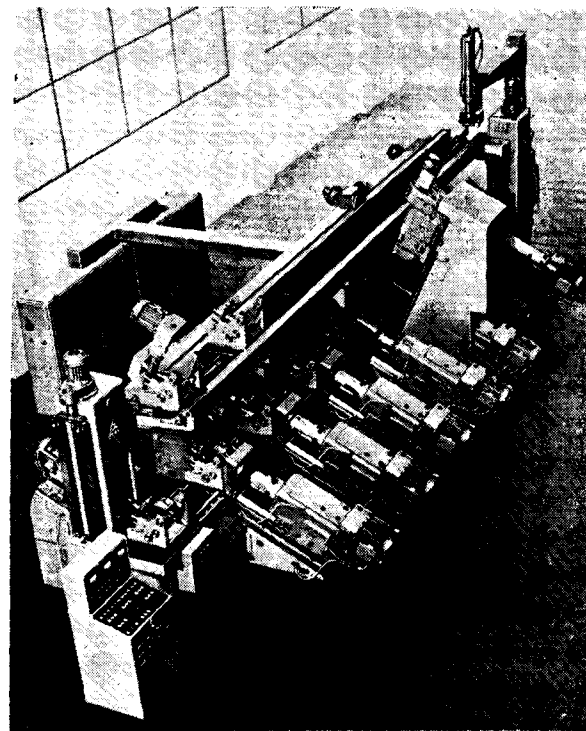
Jersey Airlines has become the first operator to put into service the Handley Page Herald turbo prop airliner which has an operating cost of only a penny a mile. This aircraft with built-in ability to operate from all types of airfields in all types of weather can carry 44 passengers and fly at 275 m.p.h.

Jersey airlines have six others on order each with a seating capacity of 50 and an option of six more, and will use the aircraft to operate between England and the Channel Islands, and Paris and the Channel Islands. The airline expects to achieve a total of one thousand revenue hours during the peak periods of July and August. Although it has gone into regular service only in May, the Herald has already proved its reliability during nearly 200,000 miles of demonstration flights which took it to 58 countries in five continents.

Later this year Herald will enter service in Canada with Maritime Central Airways and Nordair Limited. British European Airways who are to have three, and North-South Airlines, a British independent company who have ordered one, expect to introduce them next year.

In-Line Transfer Machine for Bearing Housings of Railway Carriage Axles

THE transfer machine for bearing housings of railway carriages, designed and produced by the Czechoslovak plant TOS Kurim for manufacturers of railway carriages, ranks by virtue of its performance as well as its concept among the foremost types of its kind. This machine is in operation not only in Czechoslovak plants; in 1958 it was also supplied for example to a Swedish firm of world renown, Messrs. SKF in Goteborg for their Katrineholm plant.

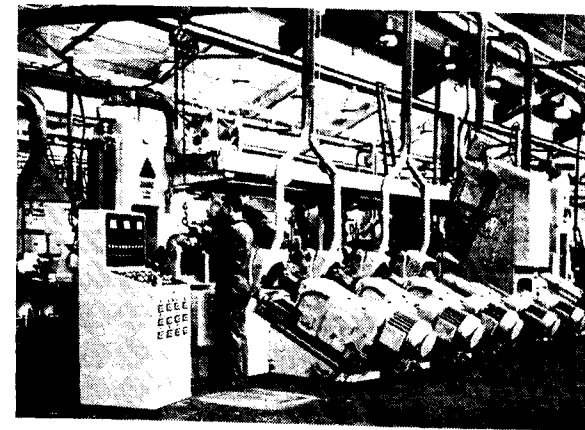


Overall view of transfer machine without cooling track and dust-removing equipment after completion at the TOS plant in Kurim.

In deciding on machining technology and the sequence of operations on this automatic machine the designers were guided by the following principles:

1. To machine the bearing housing in one setting,

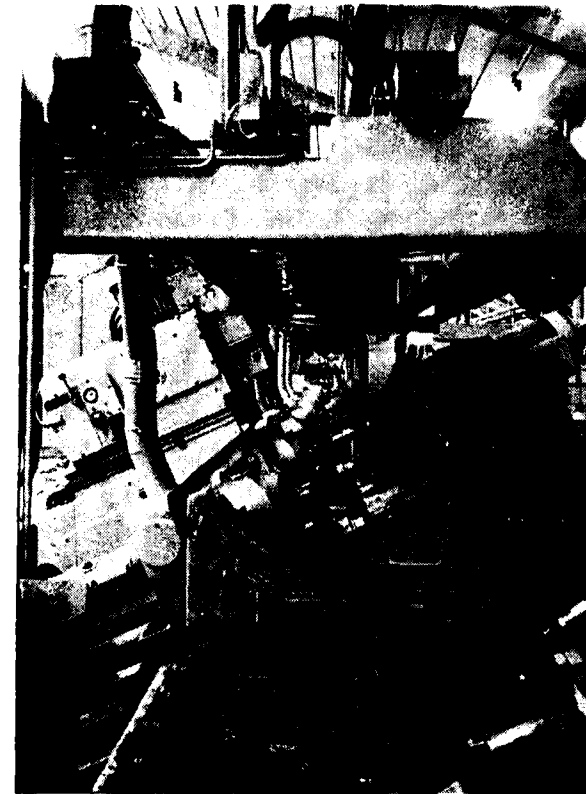
2. To achieve a duration of cycles corresponding to an output of at least 12 pieces per hour,
3. To keep dimensions within specified tolerances and to attain required surface finish with maximum tool life,
4. To attain minimum floor space of the machine,
5. To permit the addition of any number of stations to the machine,



View of the transfer machine in operation in the Katrineholm plant of the SKF Works in Sweden. The picture shows the control panel box, the loading station and the dust-removing devices at each station.



View of the transfer machine from the last station.



View of the machining space of the line in the direction of the transfer conveyor.

6. To design the transfer machine so that two other types of bearing housings could be machined on it.

Specification of operations and their sequence created conditions for machining the housings in one setting. This and suitable design of tools and pallets ensured the required capacity without resort to maximum cutting speeds and feeds, thus ensuring permanent accuracy and maximum tool life, as did provisions for the removal of hot chips.

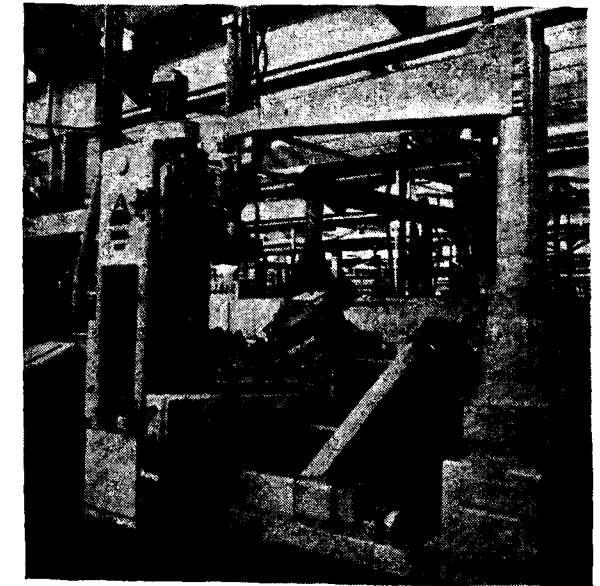
The housings are therefore machined at an angle of 25° so that the hot chips fall directly into sumps and do not cause the workpieces to dilate. In addition to that cast iron dust is sucked off at each station, providing cooling of the workpieces.

To keep the floor-space of the transfer machine as small as possible, the pallet-return conveyor is situated above the machine and the chip conveyor inside.

The concept of the machine makes it possible to insert between the existing stations any number of new stations. As regards accuracy, individual stations are mutually completely independent. They are only

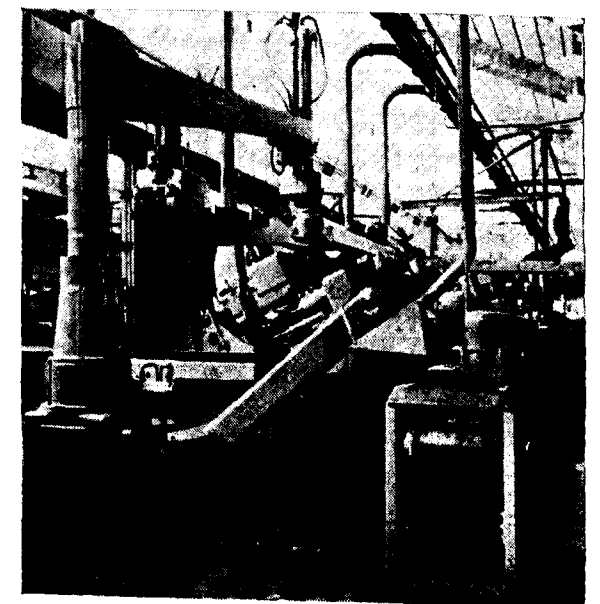
connected by the transfer mechanism and the chip conveyor.

Although the machine was designed for one size of workpieces, it was borne in mind to enable it to



Finished workpieces being lifted from the pallet by the automatic slewing hoist.

machine two other types of bearing housings. All that is needed is to replace or adjust the pallets, retool and set strokes etc. machining units.



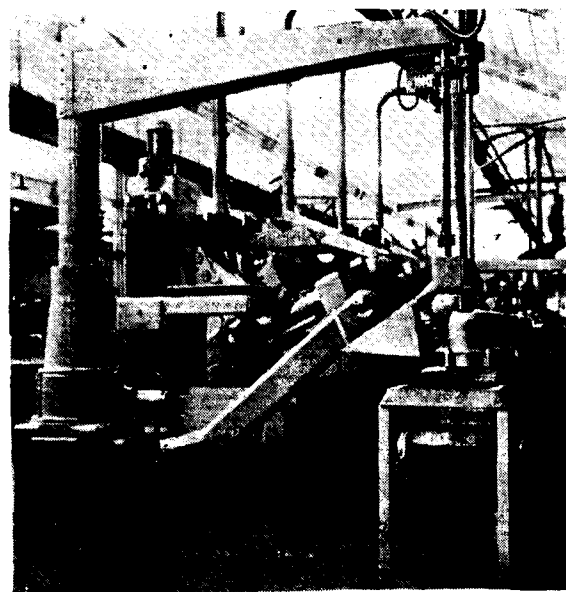
Slewing of the hoist to the cooling track.

This automatic transfer line consists of these five main parts:

1. Machining units with multi-spindle heads,
2. Transfer mechanism,
3. Pallet-return conveyor,
4. Equipment for automatic unclamping of finished workpieces from the pallets and their transfer to the cooling track,
5. Auxiliary equipment.

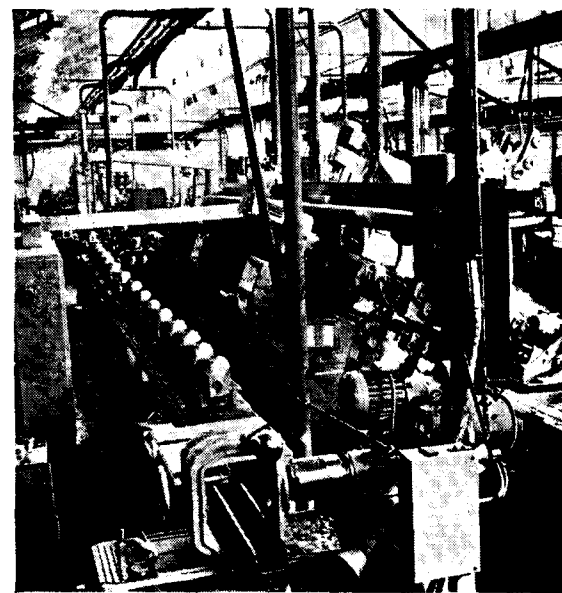
The pallet-type transfer machine has 9 work stations, 22 spindles and 11 hydraulic machining units for boring, tapping and milling. Each unit has its own pressure oil pump. Some units are equipped for facing. Most tools are carbide-tipped. Mechanical clamping of work-pieces is automatic and ensures their correct positioning for machining. An automatic slewing hoist transfers workpieces to the cooling track. It grips workpieces released from the pallet, lifts them about 800 mm, slews through approximately 90° and drops them onto the track.

The in-line machine is equipped with warning devices which automatically stop the line and indicate units where tools are so blunt as to need to be replaced.



Dropping finished workpiece onto the cooling track.

Electromagnetically controlled hydraulic controls actuate entire operational groups, such as supply and release of pressure oil to and from the hydraulic cylinders. Pressure oil is supplied by double hydraulic



View of the rear part of the transfer machine with instrument switch-box and cooling track for finished workpieces.

pumps. Electrical equipment is concentrated in switch boxes and in the control panel box which is near the first station. A single operator starts and stops the line from that control panel. The in-line transfer machine weighs 45,000 kg., its input is 100 kW and its floor-space is 14,000 × 6,000 mm.

This new machining technology of bearing housings considerably increases productivity, accuracy and quality of production, and simplifies planning and supervision.

All these operations were formerly performed on lathes, drilling and milling machines. With the old technology machining time was approximately 100 minutes. Machining of 100 housings per shift required roughly 14 lathes, 4 drilling machines and 2 milling machines.

The transfer machine processes 100 pieces in one shift at an efficiency of 85 per cent. Productivity thus increased 25 to 28 times.

Building Cranes of Larger Capacities Types MB 40 and MB 80

By Ing. Ivan Fáško

Mostař Brezno, Czechoslovakia

THE vehement development of building construction, mainly during the years following the Second World War, has resulted in considerable progress in the production methods proper and thus in the mechanisation of construction processes as well. The consequence of the most progressive present-day methods is the high percentage of prefabrication in and industrialization of building construction, mainly where the large-panel method of construction is employed. Among the decisive factors in building construction economy, transport and erection stand

adaptations of construction-crane types, three of which today form part of its production programme.

In the construction of apartment houses by the large-panel method where new residential districts are being built, it is the gantry (portal) cranes (Fig. 1) with two crabs of 5 tons capacity which excel with their advantages as regards output. Their utility depends largely on a high level of organisation of work. In spite of their simple erection and relatively light weight, their transport from site to site is rather costly. The revolving of the crane on one pair of legs on a turn-table allows its use also when building corner sections, and for travel in all directions.

After having verified several variants, the type GO 2×5 t was kept in production. For reasons of its narrowly specialized use, I shall mention here only its principal technical data:

Capacity	2×5 t
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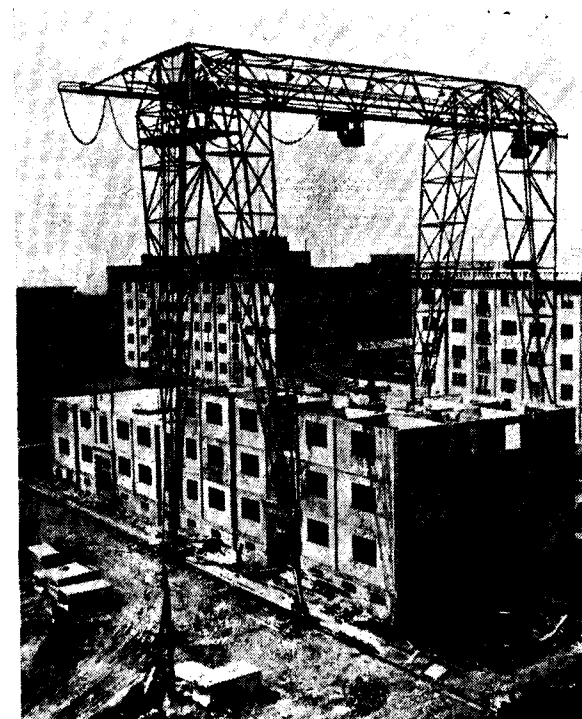


Fig. 1. Gantry crane engaged in large-panel construction of a group of apartment houses in Prague.

out more significantly than ever before. The effectiveness of mainly vertical transport and erection is clearly determined by suitable and capable special construction cranes (which are today almost the only means of mechanizing erection and vertical transport).

The construction office of the Czechoslovak Bridge Works at Brezno has elaborated some progressive

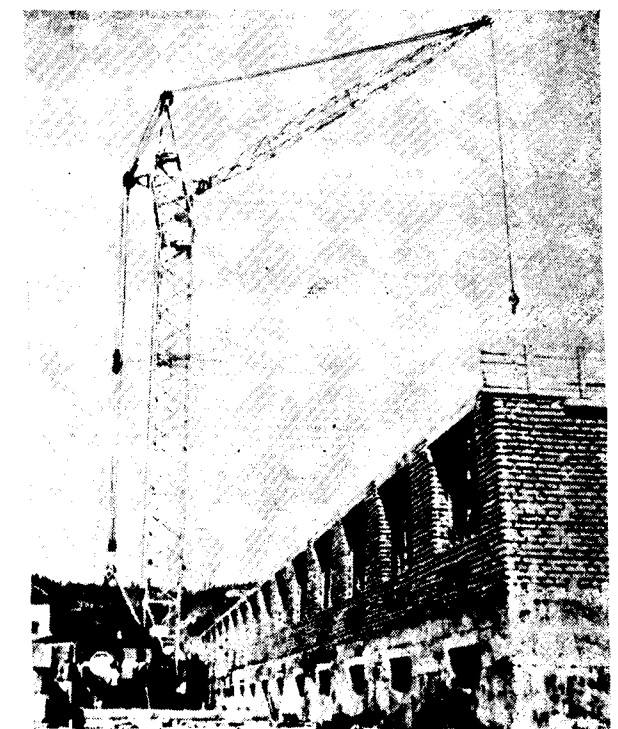


Fig. 2. Type MB 40 construction tower crane.

Length of travel of crabs	48 m.
Rail gauge	30 m.
Maximum height of hoist	25 m.
Travelling speed of crane	32 m/min.
Hoisting speed of load	5.5 m/min.
Travelling speed of crabs	15 m/min.
Total weight	45 tons.

As a result of the development of general purpose cranes in construction engineering during recent years, a similar design has been arrived at in several European countries with the following main features: a crane with a revolving tower, a mobile angular boom the possibility of transport without dismantling.

The parameters of both the MB 40 and MB 80 types of heavy-duty building cranes were determined in Czechoslovakia with regard to the present magnitude of civil and industrial building activities and to the expected development during the next few years. The analyses and dimensional studies were carried out by the Institute of Construction Engineering Research of the Ministry of Construction. The 40 ton/metre type

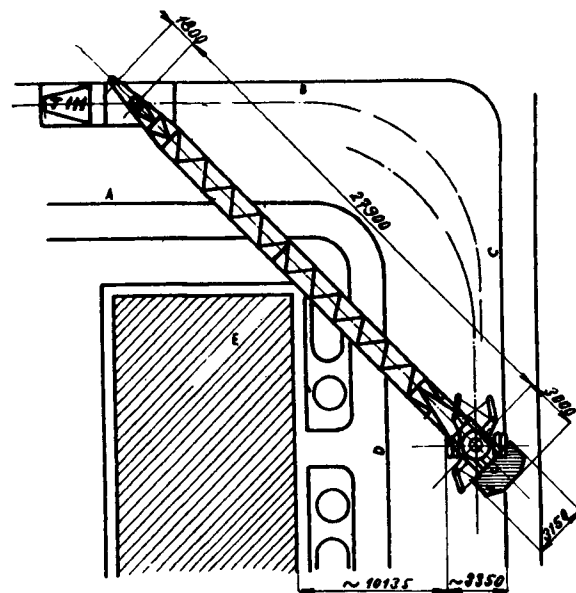


Fig. 3. Crane transport in a street with a 90° turning. A - D = street border, E = corner of building.

is intended for classical buildings with maximum use of prefabricated parts of up to 2000 kg, exceptionally up to 4000 kg. in weight. The 80 ton/metre crane is intended for large-panel construction and for industrial buildings entailing loads of 3200 to 5000 kg. Although there are only a few foreign made types with similar parameters which are transportable without dismantling, our crane models MB 40 and MB 80 (Fig. 2)

which are mobile on their own wheels have distinct technical and economical advantages over them.

To permit the reader to form an opinion on the questions of design and execution and in order to complete the general characteristics of both types, I shall deal briefly with some of the constructional problems which had to be solved during the course of development of these cranes. The fact in itself that the load is conveyed suspended from a rope and causes self-oscillation under positive and negative acceleration

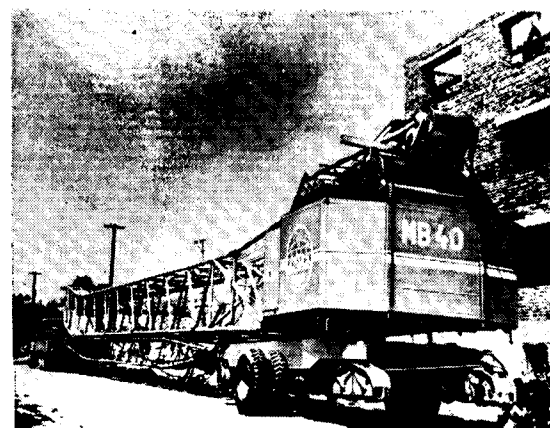


Fig. 4. Type MB 40 crane in position for transport.

limits an increase of working speeds in all motions. Theoretically it would require for a medium track length of every motion one half of acceleration and one half of deceleration, from which it should be possible to determine the appropriate speed. In actual practice, however, slight oscillation of the load is admissible because the considerable length of the oscillation period makes the settling down of the load comparatively easy. An increase of the motion speeds without provisions for a transmission would cause longish idle times before the load oscillations calmed down, not to mention the consequences of dangerous work. When using a greater mean speed, mainly when turning the undercarriage, the solution of fluent acceleration and deceleration becomes unconditionally necessary. An effective means are hydraulic clutches which, in conjunction with a semi-self-locking worm-gear transmission, guarantee the suitability of the applied speeds. The chosen design of drive units employing flange motors of the squirrel cage type with an enclosed hydraulic clutch offers advantages as regards production and assembly as well as operation and economy. The use of electric motors of a small output with squirrel cage rotor considerably simplifies the electric equipment and increases reliability of service. The drive of the revolving motion is solved

in a similar manner and the unit is, moreover, entirely cushioned on a rubber absorber.

The power unit for the load hoist and the boom hoist is mounted on the top frame of the counterweight housing. It consists of two similar winches, one of which (the boom hoist one) also operates the tower lift when setting up from transport position to working position. The system of sheaves in the pulley blocks, hoisting the boom as well as the tower, is apparent from the diagram. All the transmissions run in anti-friction bearings in oil baths. The transport of the crane on its own wheels and the system for lifting the tower required a perfectly elaborated design which resulted in an uncommonly low proper weight which is 20 to 30% lower than the world average. The tower and boom structure is latticed of steel tubes. The supporting parts of the mobile undercarriage consists of closed box-girders and frames of varying section. Distribution of the proper weight affords a low mass centre so that the dynamic stabilizing moment is figuratively conceivable by the fact that the crane returns to its initial position when the top of the tower deflects by 10 m. from the vertical. The considerable reduction of weight was also necessary for reason of reducing the pressure on the axles which is

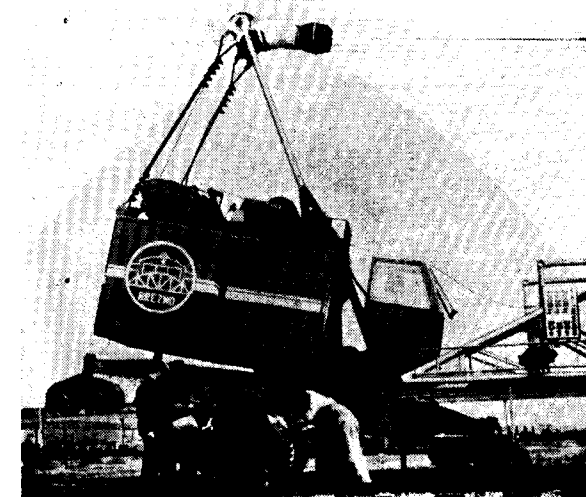


Fig. 5. Setting on track and releasing of axis for transport.

important when passing over provisional bridges as well as when travelling in soft terrain. In spite of the considerable reduction of weight the type MB cranes respect the requirement of reliable travel on rails on curves of a minimum inside radius of rail $r=3$ m. in both directions.

Although the transport of the crane between sites and without dismantling is solved on that certain principle which is also employed by foreign manufacturers, the design of several details deserves special mention. The transport accessories, mainly the axle and the mechanism for swivelling the rear axis, are designed in a simple way with a view to the shorter length of the transport track (from 50—200 km). After having started multiple production and transported cranes from the manufacturer's works to customers on their own wheels, it was verified that such transport is technically as well as economically advantages up to a distance of approx. 2000 km. The costs of rolling on the wheels of the cranes over a track of 1000 km. amount to only 30% of rail transport costs (incl. erection on the site). The prescribed limit of maximum speed was left by the maker at 20 km./hour in order not to hazard the safety of travel when all transport dimensions are exceeded. Permission for a

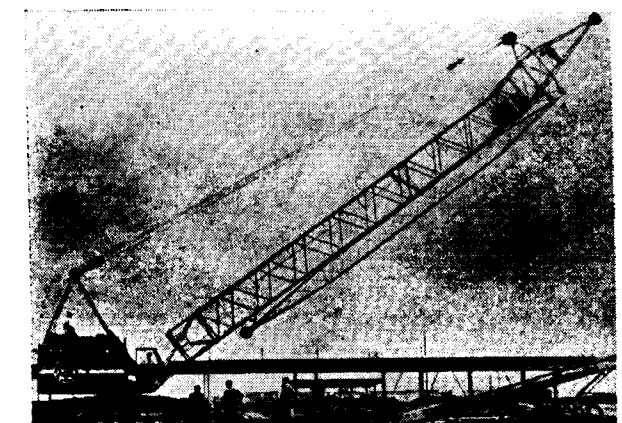


Fig. 6. Erecting of tower after having installed counterweight, takes 125 secs.

trip and fixing of the respective route are carried out in Czechoslovakia by the transport authorities. In view of the fact that the length of 28 m. between the swivelling axes and the rear axis was considered as maximal (Fig. 3), we had to choose a telescopic tower design for the type MB 80 crane. The tower is drawn-in very simply after having been collapsed on to the lorry platform. Any current type of lorry above 7 tons capacity may be used as traction vehicle (in Czechoslovakia we use the Tatra 10 t lorry of T 111 type). Due to it being possible to transport it without dismantling the time funds of the crane, when moving it 4—6 times per year, are augmented roughly by 20%, not to mention the simultaneous saving of costs and manpower.

The fact that any bulk material or piece material which happens to be available on the site and the

specific weight of which is not less than 1.5, may be used as counterweight greatly contributes to speedier re-adjustment of the crane from the transport to the working position (Fig. 4, 5, 6). The position of the counterweight is determined by weighing the required quantity automatically by tilting the transport carriage round the front undercarriages (CSR patent applied for under No PV 1129—59). As compared to standard types, we may also mention the advantage that the locating of the counterweight near the swivelling axis allows the crane-way to be mounted nearer the building, which increases the effective length of the boom.

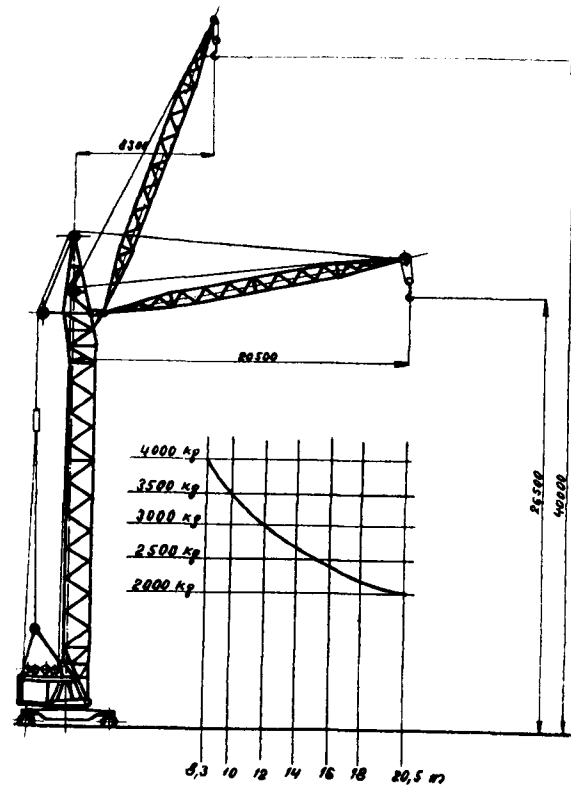


Fig. 7. Diagram of type MB 40 crane and capacity diagram.

The crane operator's comfort is enhanced by two electrically heated cabins (the top one at a height of 22 m., on the MB 80 28 m.), with manually blocked control circuits. The position of the control levers is adapted to physiological requirements to allow the crane operator to use all motions simultaneously and thus to utilize maximally the technical possibilities of the crane.

All movements are limited by means of end switches. The cranes are provided with a disconnecting switch

against overload which signals acoustically at 5% overload and disconnects the circuit of the circuit breaker when the overload exceeds 10%. Safety of operation is ensured by further means as, for inst., by hooting when travelling, by disconnecting when the voltage in the crane skeleton increases, by safety push-buttons, colour markings and numerous other devices.

For reliable bedding of prefabricated parts and panels, the type MB 80 crane is provided with a brake release unit for speed regulation. Safety of night work is afforded by lighting of the platforms and working areas by means of adjustable floodlights.

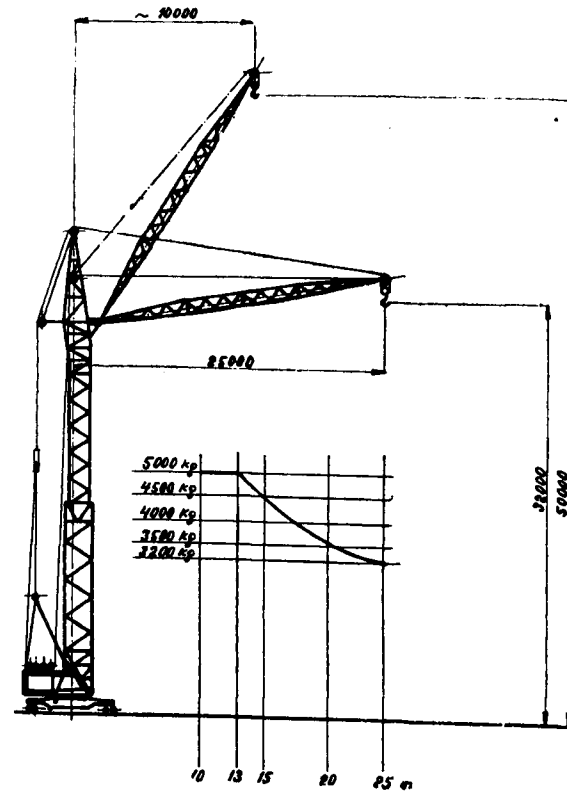


Fig. 8. Diagram of type MB 80 crane with capacity diagram.

The electric equipment of the cranes incorporating contactor controls is of up-to-date design and in special cases it will be possible to adapt it for remote control by radio. The conductors are partly laid in conduit tubes and partly we have utilized some inside spaces of the supporting tubes of the tower structure (Fig. 7, 8).



FOR FURTHER DETAILS CONTACT:

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Jamshedji Tata Road
Bombay-1

CALCUTTA
P-38, Mission Row Extension,
Calcutta-1

MADRAS
35/5, Mount Road,
Madras-2

TECHNICAL DATA	MB 40		MB 80	
	2000 kg.	4000 kg.	3200 kg.	5000 kg.
1. Hoisting capacity	20.5 m.	8.5 m.	25 m.	13 m.
2. Crane radius	26 m.	40 m.	32 m.	50 m.
3. Height of hoist	31.6	15.8	15.8 m/min.	
4. Speed of hoist	25.4 m/min.		21.5 m/min.	
5. Speed of travel	0.96 r.p.m.		0.68 r.p.m.	
6. Speed of turning	34.6 kW.		34.6 kW.	
7. Total installed motor output	3.8 m.		4.6 m.	
8. Rail gauge	7000 kg.		10000 kg.	
9. Max. load on 1 wheel	16000 kg.		23600 kg.	
10. Proper weight	11000 kg.		16000 kg.	
11. Weight of counterweight	125 secs.		260 secs.	
12. Duration of tower erection	50 secs.		70 secs.	
13. Re-adjustment of boom in all				

The circumstances that the transport of the crane from site to site is done without dismantling allowed advantageous employment of a lattice structure composed of tubes for the tower and boom. The other parts were also designed under consideration of the afore-mentioned condition so that the resulting creation of a serviceable mechanism fully meets the requirement for a modern building crane for work with classical materials as well as for extensive employment with prefabricated parts up to a weight of 2 tons. Although the transport of the crane is reliable, the operator must have higher qualification than those required of operators on cranes of former design.

Last year it was possible to check the technical advantages of the type MB 40 and MB 80 crane in the service of contractors and in the case of the MD 40 model, which since 1959 has been delivered from multiple production, we have been able to verify preliminarily also its economical efficiency. The latter is best seen in the case of 1 ton loads of hauled materials where the costs are, in spite of the relatively higher initial expenditure, by 7.1% lower than the best results yielded by the types hitherto employed in Czechoslovakia.

Since the cranes were developed in the manufacturer's works, which is equipped with all modern facilities, it may be expected with certainty that the further improvement of the effective parameters anticipated by the works' plan of technical development will be realized.

CZECHOSLOVAK PORT CRANES IN INDIA

The sole exporter of Czechoslovak cranes, Strojexport, Praha, took part in a competition in 1957 for

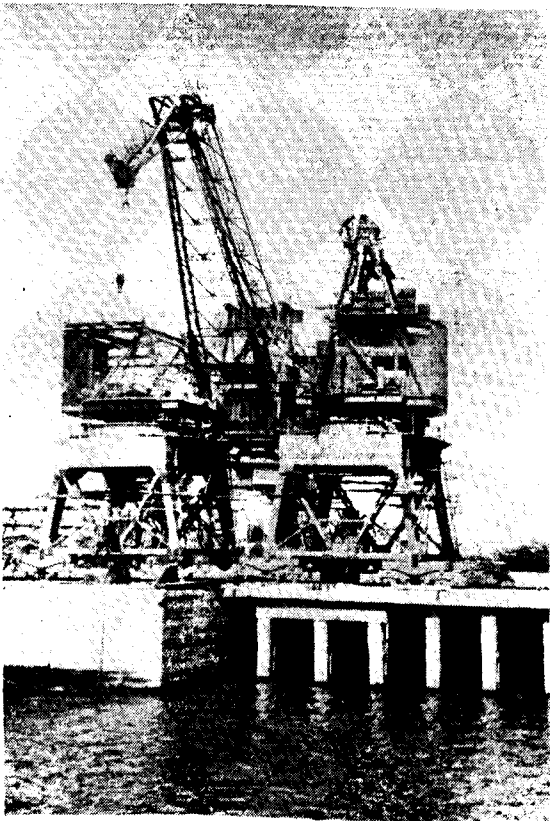


Fig. 9. A Grab Crane installed at the Madras Harbour.

the supply of three grab cranes with a loading capacity of 13 tons for transloading of ore, and three grab cranes with a loading capacity of 8 tons for transloading of coal, organized by the port authorities in Madras, India. Strojexport succeeded in obtaining the order in heavy international competition of the foremost crane-producing works in the world particularly due to the robust technical design by which the SKODA port cranes operating in many ports all over the world are distinguished (Gent, Montevideo, Buenos Aires, Stockholm, Goteborg, Helsingborg, Szezesin, Lisbon, Dairen, etc.).

The project, manufacture and test assembly of these cranes in the works were inspected by the technically very exacting British firm of Rendel, Palmer and Tritton, London, the representative of which spoke very favourably of the technical design

and the manufacture of the cranes proper. A positive result of the talks held with the British acceptance firm was, in addition to others, also the favourable evaluation of the Czechoslovak standard specifications which were used for the first time as a basis for projection and manufacture of port cranes for India, where formerly British standard specifications were accepted exclusively.

At present the erection of the port cranes in Madras is being finished to the full satisfaction of the buyer.

The Czechoslovak engineering industry manufactures port cranes of the SKODA trade-mark in various designs, according to the customers' requirements, with load bearing capacities of 3, 5, 8, 13 and 15 tons.

22 Power Stations to be Commissioned Next Year

In 1962 10.5 million kilowatt power generating capacities are to be launched at the power stations now under construction in the Soviet Union, that is approximately 25 per cent more than this year. This means that generators exceeding the capacity of four such power stations as the Stalingrad Station which is the largest in the world or five such stations as Grand Coulee in the United States will be put into operation within one year.

This was announced by Ignaty Novikov, Minister of Construction of Power Stations of the USSR, at a three-day conference of specialists which had been discussing the plan for the next year. Novikov said, among other things, that 22 power stations will start generating electricity in 1962.

The scope of Soviet power engineering construction in 1962 will be almost double the level of 1959—the first year of the Seven-Year Plan period. The Minister pointed out that power stations with aggregate capacities of 14,500,000 kilowatts are to be commissioned in the USSR in 1965.

Novikov stressed that the emphasis was still laid on the construction of thermal power stations, which would account next year for about three quarters of new power capacities. Most of these stations are being built according to economical standard designs providing for the large-scale application of prefabricated

cated reinforced concrete components made at specialised works.

AUTOMATIC FRICTION WELDING

A programmed semi-automatic machine for friction welding has been built by the Soviet Union's only friction welding laboratory at the USSR Electric-Welding Equipment Research Institute, Leningrad.

The new machine, "MST-35", can be used for butt welding of round steel parts of 14 to 36 millimetres in diameter. It is easy to handle. The worker only has to fix the parts in place and press the starting button. This actuates the programming device which ensures the needed welding regime.

The welding takes but a few seconds and the machine is then switched off automatically. The worker removes the finished part and replaces it with the next pair. Some 100 welded articles can be produced by this method in a matter of one hour. Leningrad specialists have developed during the past few years several models of machines for butt friction welding of various-size parts. This method of welding requires 10—15 times less electricity than the usual one. The Friction-Welding Laboratory has conducted successful experiments in friction welding of steel parts up to 120 millimetres in diameter. Models of friction welding units have been produced, where auxiliary operations—the fixing and removing of parts—is automated.

K 58 Automatic Loom without Superstructure

By An Engineering Correspondent

(Specially contributed to J.O.I.E.)

AUTOMATIC looms type F 44/1 of Czechoslovak make have found highest appreciation the world over due to their simple design, reliable operation, and high efficiency. Further development of this approved type, with the aim to obtain a still higher productivity, has brought forth the new automatic loom model K 58.

A systematic research of both the home and foreign markets and a technical analysis of advanced designs of weaving looms at present produced abroad preceded the development of the new type. The compiled knowledge then served for fixing the parameters which the new type of loom had to attain. The special task of the designers was to maintain the traditional simplicity of design of the Czechoslovak looms.

This simplicity of design, obtained by consistent

solving of all technical details of the machine, reduces faults and breakdowns in operation and facilitates attendance, maintenance, and setting of the loom. When automatic looms are newly introduced into a mill the simplicity of design also allows a short training of the mill personnel.

Prototypes of the K 58 loom were already built in 1957 and put into a twoshift test operation in an ordinary mill. During this test period the machine underwent several improvements in detail so that the test series produced later gave excellent results immediately after its putting into operation.

DESCRIPTION AND TECHNICAL DATA OF THE K 58 LOOM

The total view of the K 58 loom from the front is shown in Fig. 1, and the rear section of the loom in

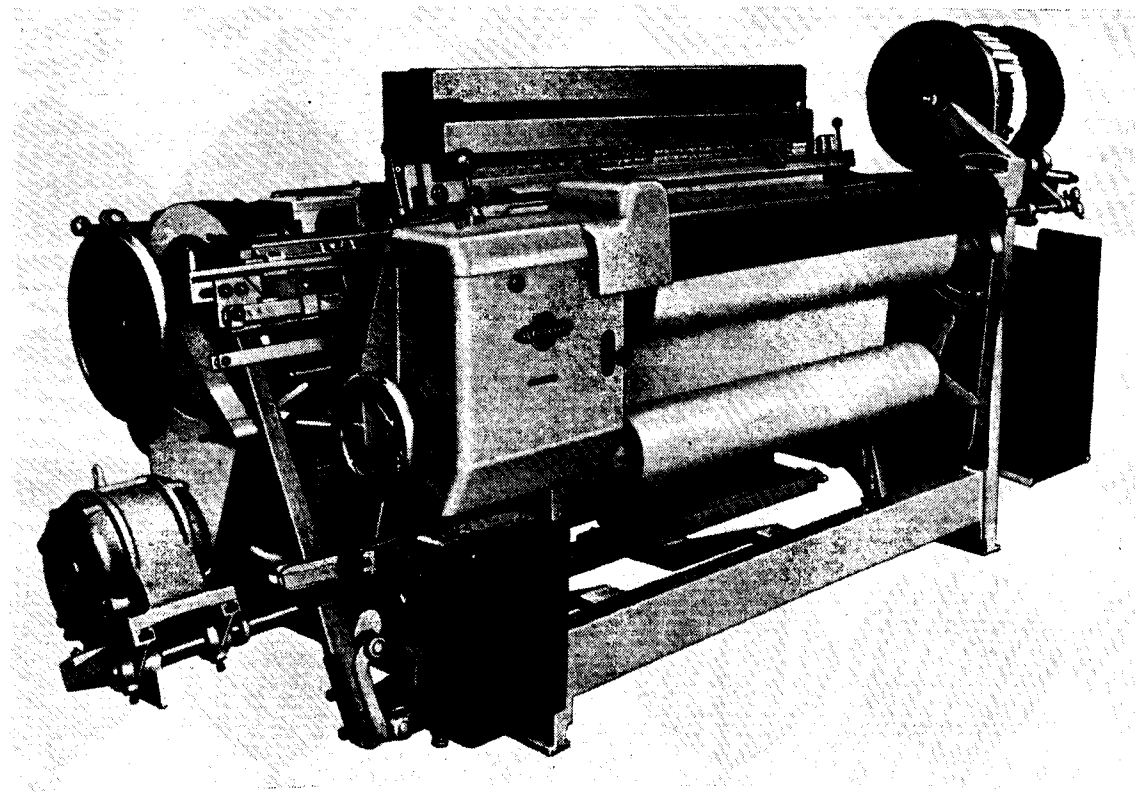
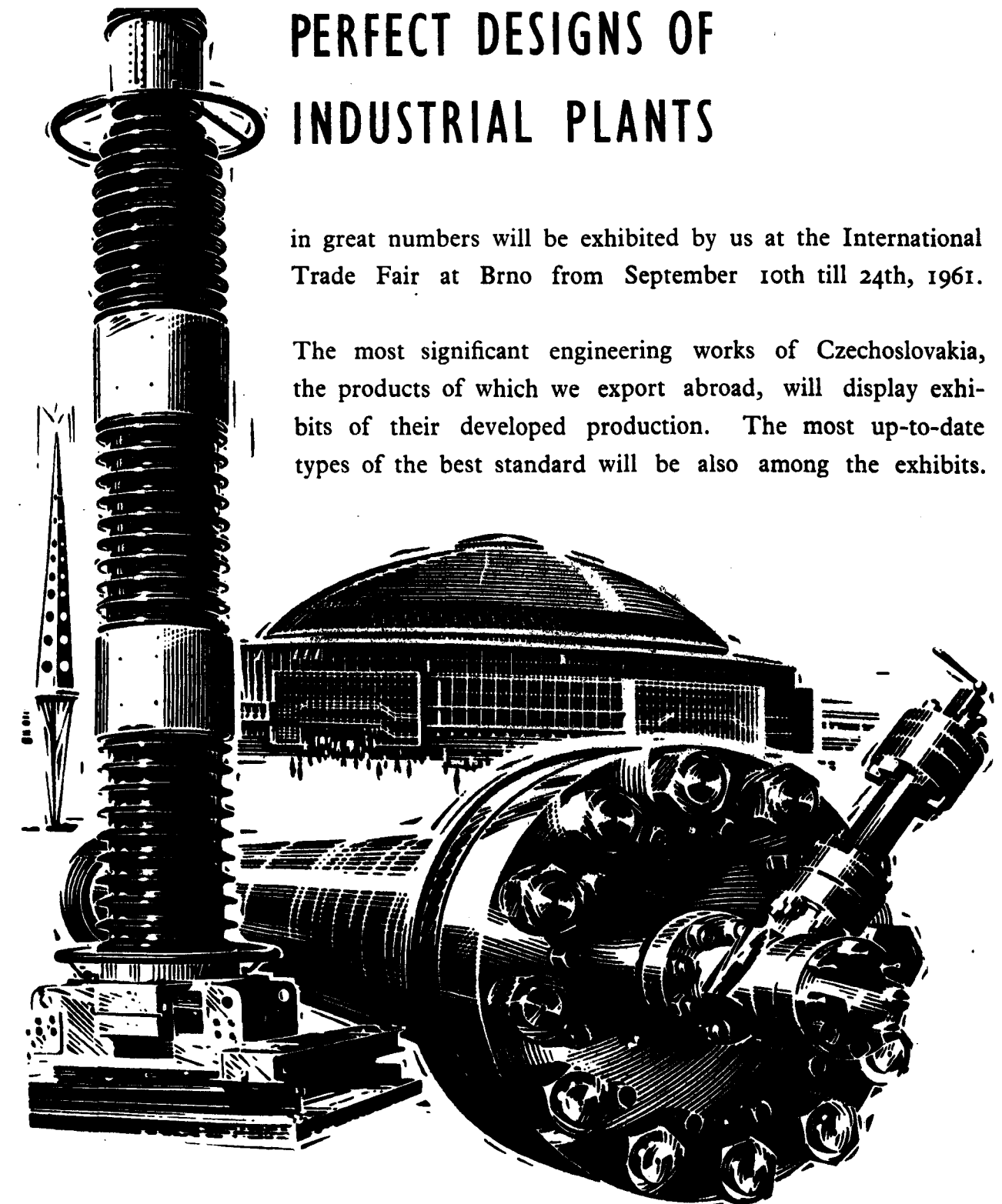


Fig. 1. Simple and purposeful design characterises ELITEX looms. The K 58 loom without crown keeps up this tradition. 480 metres of fabric are wound on the cloth beam.

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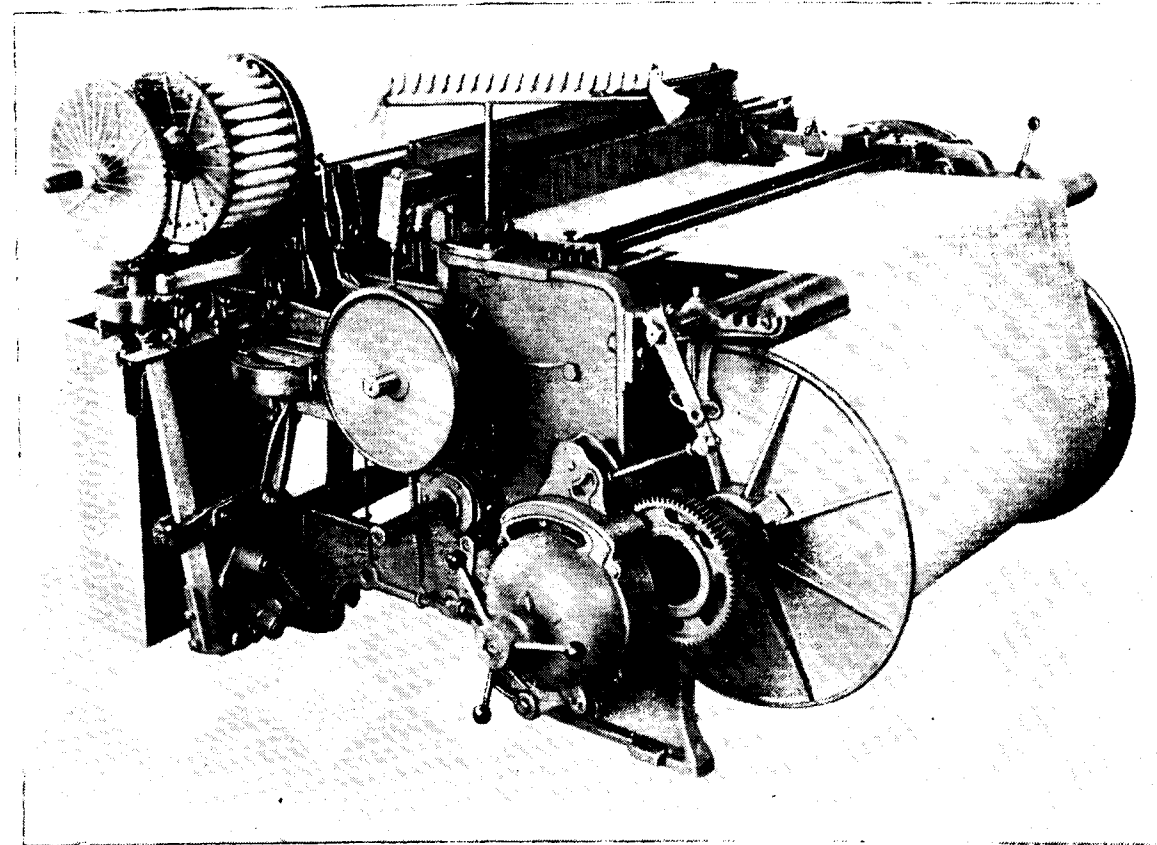


Fig. 2. The large diameter warp beam is of special advantage for weaving from low count yarn and for mass production. The reliable let-off motion safeguards uniform warp tension during the entire weaving.

Fig. 2. Attendance of the loom is very simple. All its mechanisms are easily accessible for the setting, repairing, as well as for lubricating.

MAIN TECHNICAL DATA

Range of use: The loom is built for weaving light and medium heavy fabrics up to 250 g per sq. metre. Weaving of rayon is possible after special adjustment.

Reed space 120 cm

The loom will be produced in three further reed spaces.

Number of picks max. 240 per min.

Density of wefts per 1 cm 10 to 60

Maximum diameter of warp beam 700 mm

Maximum diameter of wound cloth beam 420 mm

DESCRIPTION OF INDIVIDUAL MECHANISMS

1. Frame of the Loom

The frame of the machine is built of cast side walls, three welded steel connecting beams and a cast breast beam. Ample bracing of the beam safeguards stability and smooth operation of the machine even at the highest speeds.

2. Slay

(a) *Mechanism of the slay*: The throw radius of the crank shaft is 65 mm, the stroke of the slay on the reed 142 mm. The connecting rods are of the motorcar type. Play adjustment in the big end bush is possible by removing the sheet iron shims between the two sections of the split bearing.

The beat-up position of the slay can be adjusted by the eccentric pins of the connecting rod. The slay itself is assembled as follows: the cast plates of the

shuttle boxes are screwed to the L shaped steel supporting piece. The shuttle race is of wood.

(b) *The braking mechanism* of the shuttle is on the shuttle box rear wall, Fig. 3. The shuttle is first caught by the light braking swell, which consists of a welded steel pressing. During further movement the shuttle is intensively braked by a finger, which is provided with a rubber lining and covered with leather. This arrangement safeguards minimum wear of the shuttle. The shuttle is released in the shuttlebox before each new pick.

(c) *Warp protector*: The locks are cushioned with a rubber insert. This helps damping the kinetic energy of the slay. The formerly used steel springs returned the energy absorbed after the buffing and often caused damage to the warp during the reverse motion of the loom.

The stop rod shaft is of light weight design, so as

not to be influenced by the dynamic forces, and in order to improve operation at high speeds.

3. Picking Mechanism

The K 58 loom is built for underpick and with a rigid picker. The picking eccentrics are of grey cast iron with hardened working surfaces. The picking eccentric tips are chillcast with a glassy hard surface which resists all wear. The pin of the picking hand is horizontally shifted as against the bottom shaft in order to limit the axial pressures. This adjustment achieves maximum utilization of the loom energy for the shuttle propulsion without undesirable impacts. The picker guiding mechanism is quadruple, jointed. Its operation is smooth and flexible, it allows efficient adjustment of the picking force and easy setting of the picker motion. With this purposeful design the minimum of straining has been achieved, and as a result the wear of the individual parts is very low. The picking motion tie-rod is made of "umatex" or pressed sheet iron. It has a jointed seating and a single leather sleeve. This design ensures lasting adjustment of the pick.

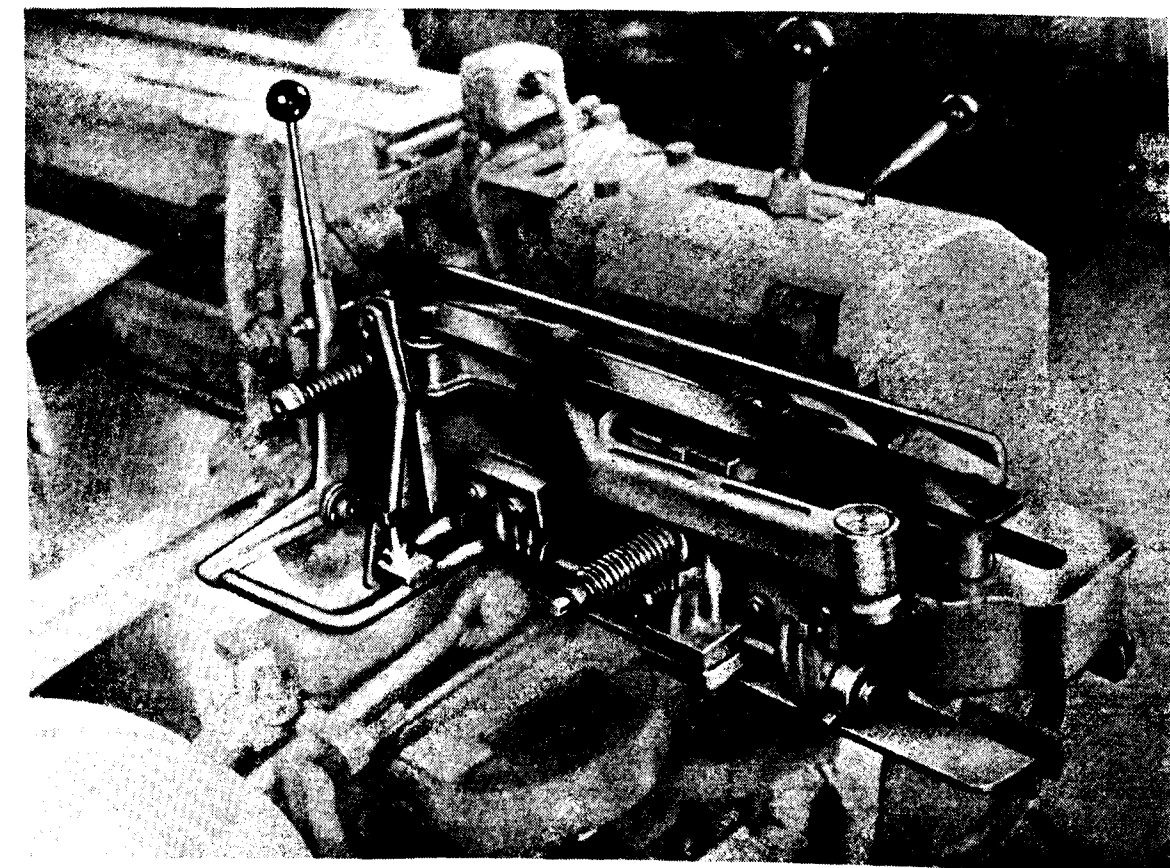


Fig. 3. Shuttle braking at high loom speeds requires precise execution of individual parts, in order to ensure that the shuttle wear is the lowest possible.

4. Drive and Brake (Fig. 5)

The weight of the parts fixed to the crankshaft has been reduced in order to improve the starting and stopping of the loom. The flywheel on the right-hand side of the loom has been replaced by a light hand-wheel. The clutch belt-pulley, the purpose of which is to accumulate the energy required for the starting has been provided with a large rim in order to increase the flywheel effect from the original 4000 gcm sec² to 7000 gcm sec². This arrangement permits starting of the loom from the drawing-in position so that the time required for repairing a warp breakage is greatly reduced. For easier attendance the loom is provided with another starting lever at the rear. The loom can be stopped in the drawing-in position from the rear by means of the warstop-motion lever. The shuttle being then in the shuttlebox the loom can



Fig. 5. The sufficiently sized friction clutch and the efficient brake allow high loom speeds. The starting lever at the rear simplifies attendance.

be re-started by the rear lever without any turning into position.

BRAKE

The single shoe brake so far used in these looms

has been replaced by a highly efficient band brake. This reduces the braking distance to 100 to 120° of the crank-shaft rotation and enables a stopping of the loom in working position.

BEARINGS OF THE CRANKSHAFT AND OF THE LOOM BOTTOM SHAFT

With the rising of the loom speed also the torsional strain and the vibration of the crankshaft will rise. In accordance with the experience gained with high speed looms, the crankshaft bearings of the K 58 loom have been amply dimensioned. The crankshaft is therefore seated in four radial ball bearings, and in the middle in one plain bearing with a bronze bush. Apart from this a thrust ball bearing takes up the thrust occasioned by the starting lever engaging the clutch. To prevent axial loading of the crankshaft the thrust from the clutch is transferred to the frame by a second thrust bearing.

The clutch belt-pulley which continues rotating when the loom has stopped runs on the crank shaft in two ball bearings.

The bottom tappet shaft runs in two ball bearings, and in one plain bearing in the middle.

The use of ball bearings on the main shafts instead of the plain bearings has the following advantages:

1. Easy operation of the loom and therefore reduced power consumption and easy handling.
2. The minimum of maintenance work, and reduced lubricant consumption.
3. Easy starting of the looms after a longer standstill, especially after the week-end.

5. Shedding Motion

- (a) The plain weave shedding motion has grooved eccentrics as shown in Fig. 6. This system has proved very successful in the looms without crown, type B 47 of Czechoslovak make, and has been further improved in the new loom type K 58. The eccentrics are seated on the flanged bush so that adjustment is very simple. Vertical adjustment of the healdshafts is possible by means of the screws with

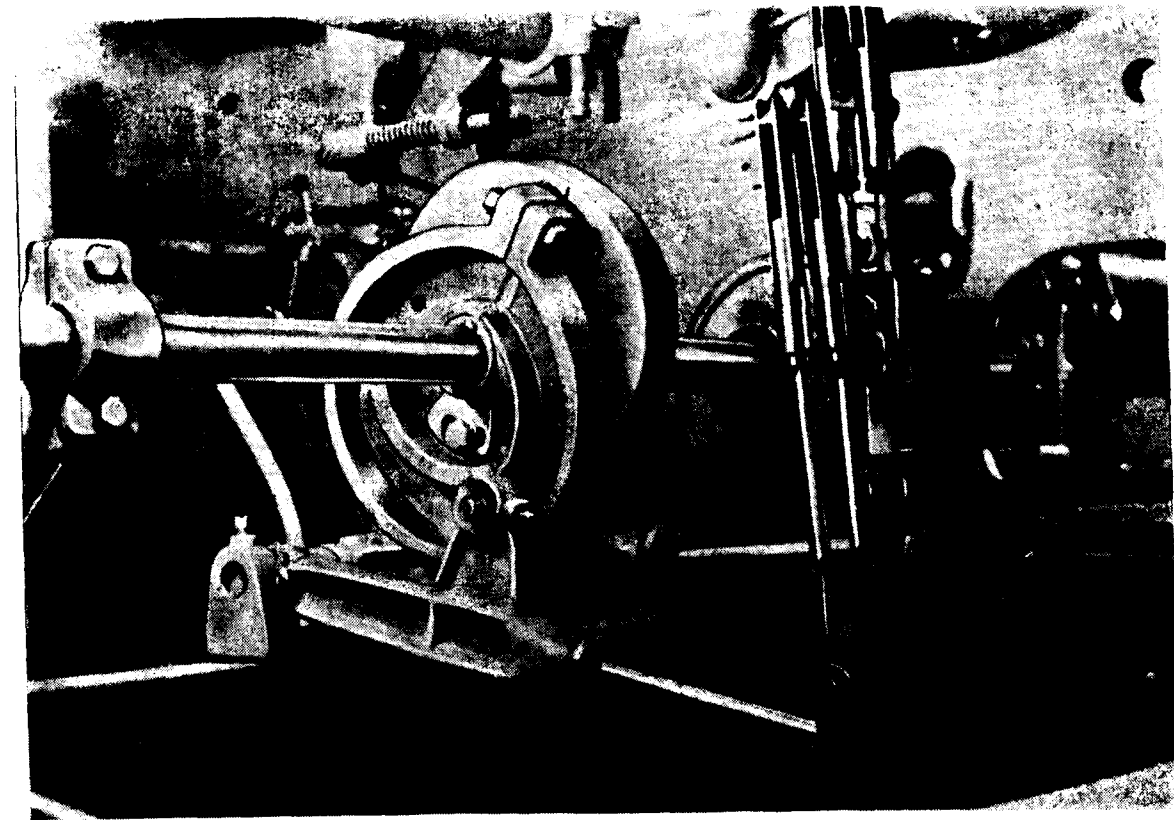


Fig. 6. The picking motion with its milled grooved tappets ensures smooth movement of the healdshafts even at the highest speed. This reduces the amount of warp breakages.

right-hand and left-hand threads, on the heald-shaft motion. The shafts are guided by guides fitted to the side walls of the loom. There is no crown top rail for the heald-shaft motion.

- (b) The shedding motion by means of eccentrics for the strengthened plain weaves, the twill and the sateen weaves in on the right-hand side of the loom. It allows the use of up to five shafts including two selvedge shafts. Changing of the weave is effected by an exchange of the eccentrics. The shafts are operated from the bottom by means of levers, similarly as with a side-fitted dobby.
- (c) *High-speed dobby Type RBH as per Fig. 7.* This is arranged on the right-hand side of the machine below the magazine. The lifting and lowering of the shafts is by a forced control. This dobby is produced for the K 58 loom with 16 shafts and 12 mm. gauge, and with paper cards system Verdol.

6. Take-up Motion

The loom is equipped with a positive take-up motion with change wheels for a weft fining ranging from 10 to 60 wefts per 1 cm. The number of wefts equals the number of teeth on the change wheel multiplied by 1.5.

When the loom is stopped by the weft stop motion after breakage of the weft thread the fabric is shifted back automatically by one to three wefts, according to the setting of the motion. Winding of Fabric (Fig. 8).

The drive of the cloth roller is derived from the sand roller by a chain gear and friction clutch. To enable removal of the fabric during operation of the loom the fabric is pressed to the sand roller by a second roller which is felt-covered. The pins of the felt-covered roller are guided in a rocker arm of the desired deflection.

8. Let-off Motion

The let-off is controlled by a motion pictured in sketch of Fig. 9. The let-off motion is driven by

tie-rod 4 from slayarm 1 actuating toggle lever 19 with pawls 17. The movement of ratchet 18 is transmitted to warp beam 26. The amount of let-off is controlled by the tension of the warp threads and warp beam diameter.

REGULATION BY WARP TENSION

When the warp tension increases the backrest goes down and a leverage turns rocker arm 15. The lower part of toggle lever 19 turns farther against the motion of tie-rod 4 by means of pin A and in consequence the let-off motion lets off more warp. When the warp in the loom slackens the let-off motion operates in the reverse.

REGULATION ACCORDING TO THE WARP DIAMETER ON THE BEAM

is effected by the contact lever 24. With the aid of the leverage pin A is lowered with the dwindling of the warp on the beam. As a result the lever trans-

mission between the rocker arm 15 and to toggle lever 19 changes so that the let-off motion turns the beam faster while its diameter becomes smaller.

The let-off motion in on the right-hand side of the machine. Hand tensioning or slackening of the warp is possible by a claw clutch and by three levers on the right-hand side of the loom (Fig. 2).

9. Back-Rest

The back-rest of the K 58 loom has one roller, cushioned by two springs. The roller is adjustable horizontally, as well as vertically. The mutual position of axis B and back-rest roller C, and axis D of the warp beam is such that the equation 4 applies for each radius R of wound warp on the beam.

Angle 2a also decreases with the reduction of the radius, but the resulting force P pressing the back-rest rises according to equation (1). The increasing of force P is eliminated by shortening of arm P of the

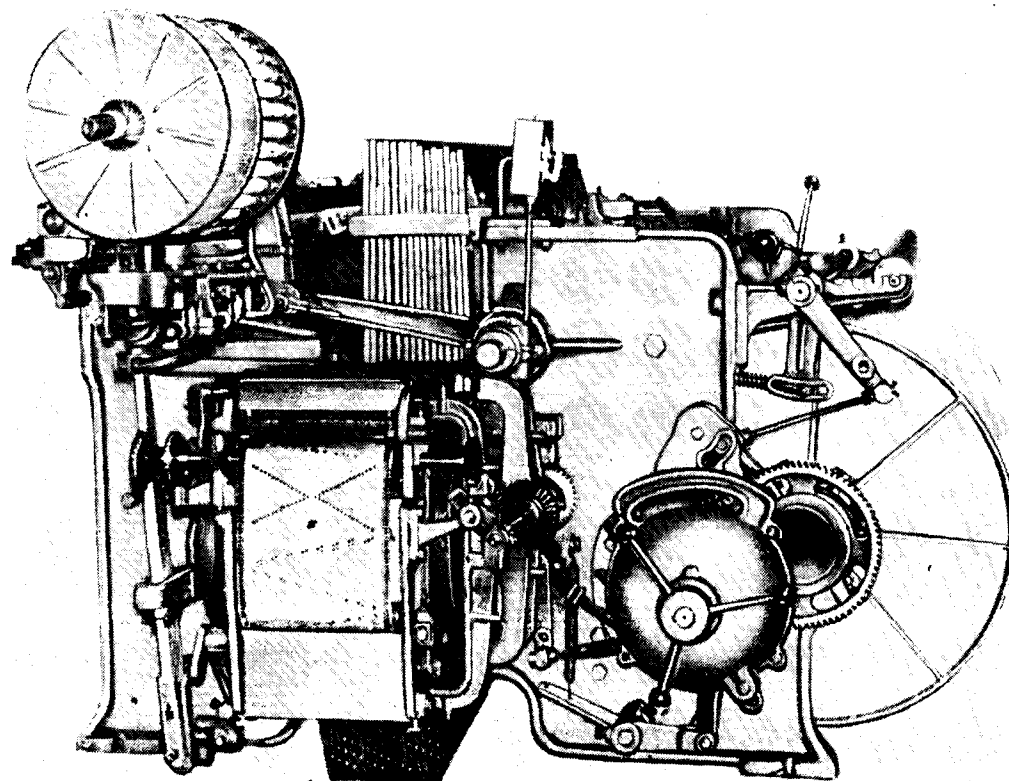


Fig. 7. The dobby type RBH has been specially designed for high speeds. The lowering and lifting of the shafts being forced, it is possible to run this dobby at speeds of up to 350 r.p.m. Arrangement of the dobby on the side of the loom is advantageous because of a better view, cleanliness, efficient lighting, and easy maintenance.

moment $M = P \cdot p$ to which the back-rest spindle reacts. Because the moment M remains constant for any warp radius, uniform warp tensioning is ensured during the weaving of the whole piece.

$$P = 2A \cos a \quad (1)$$

$$P \cdot p = S \cdot s \quad (2)$$

$$A = \frac{S \cdot s}{2} \cdot \frac{1}{p \cos a} \quad (3)$$

$$\frac{1}{p \cos a} = \text{const.} \quad (4)$$

10. Pirn Magazine (Fig. 11)

The K 58 loom is equipped with an automatic pirn replacement motion which exchanges the pirns during the operation of the loom. It is of new design and is adjusted to high loom speeds.

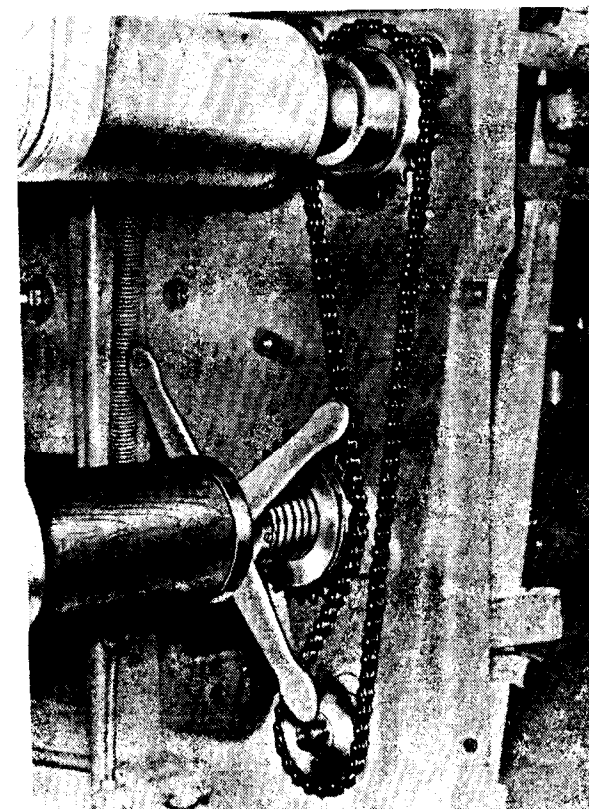


Fig. 8. The picture shows the drive of the cloth beam after removal of the cover. The tightness of the winding can be regulated by means of the nut on the friction clutch.

The shuttle position before the pirn replacement is checked by a telescopic fork which enters into the opening in the front wall of the shuttlebox. The

checking of the shuttle position operates in two directions. The fork checks insufficient landing of the shuttle in the shuttle-box, as well as shuttle position too far inside. If the shuttle is not in correct position no pirn replacement takes place. This protects the shuttle, as well as the shuttlebox from damage. In competing looms the shuttle is checked only in one direction.

The magazine drum turning mechanism has two pawls. The fixing and the movement of the pawls is such that impacts due to the turning of the drum are reduced to the minimum.

The magazine is supplemented with an outer weft cutter which cuts the weft off the empty pirn close to the shuttle threader. The remainder of the weft thread is kept tensioned from the fabric edge to the shuttle, and the cutter holds and draws out the thread from the shuttlebox. Therefore the thread cannot be carried into the fabric.

11. Weft Stop Motion

- (a) The weft stop motions is mechanical, located on the left-hand side of the machine. The fork-shaped eccentric is designed in such a way that the loom is stopped with the shed open in the event of weft breakage.
- (b) *Weft Feeler*. As a standard the K 58 loom is equipped with an electric weft feeler. At the customer's request the loom may also be supplied with a mechanical weft feeler, or with a combined mechanical and electric feeler.

12. Warp Stop Motion

As a standard the K 58 loom is equipped with an electromechanical warp stop motion. This is a mechanical stop motion with moving saws. In the event of a warp thread breaking the drop wire stops the movement of the saws thus closing a low tension circuit which disengages the starting lever and stops the loom by means of a magnet, the buffer on the slay, and a lever transmission gear. The disengagement of the starting lever takes place when the slay is in the rear dead point. The braking path of the K 58 loom amounts to 100 to 120° of a crank-shaft revolution so that the loom is stopped in working (drawing-in) position when a warp thread breaks. The weaver can see from the position of the slay the

reason of the stoppage, and can immediately proceed to remove the fault, without turning the loom. It is also possible to start the loom from the drawing-in position.

13. Temples and Cutters

The temple bar is of the usual design and sprung with two volute springs. The temple cutters are also of the usual design, but their drive is effected by a tie-rod connected with the sub-slay. The cutters engage with every loom revolution, but while the slay is in the rear dead point, so that no working weft can be cut.

14. Electrical Installation

The motor is switched on by a simple mechanical switch fitted in the box below the starting lever. The switchbox further accommodates fuses for the motor, cut-outs for the primary and the secondary winding of the transformer, a 70 Watt unit transformer, and the terminal board. The switchbox is dustproof and

conforms to regulations. The power distribution on the loom consists of autocables sheathed in a flexible armoured hose.

The enclosed motor with inside cooling, increased starting torque type PWR has an input of 1.1 kW.

ADVANTAGES OF THE NEW K 58 LOOM

The K 58 automatic loom meets all the demands made on a modern automatic loom. Its main advantages are :

1. The design without crown conforms to the requirements of an up-to-date workshop, these being easy control, cleanliness and efficient lighting in the mill.
2. The high loom speed ensures a higher productivity.
3. The purposeful and simple design of the

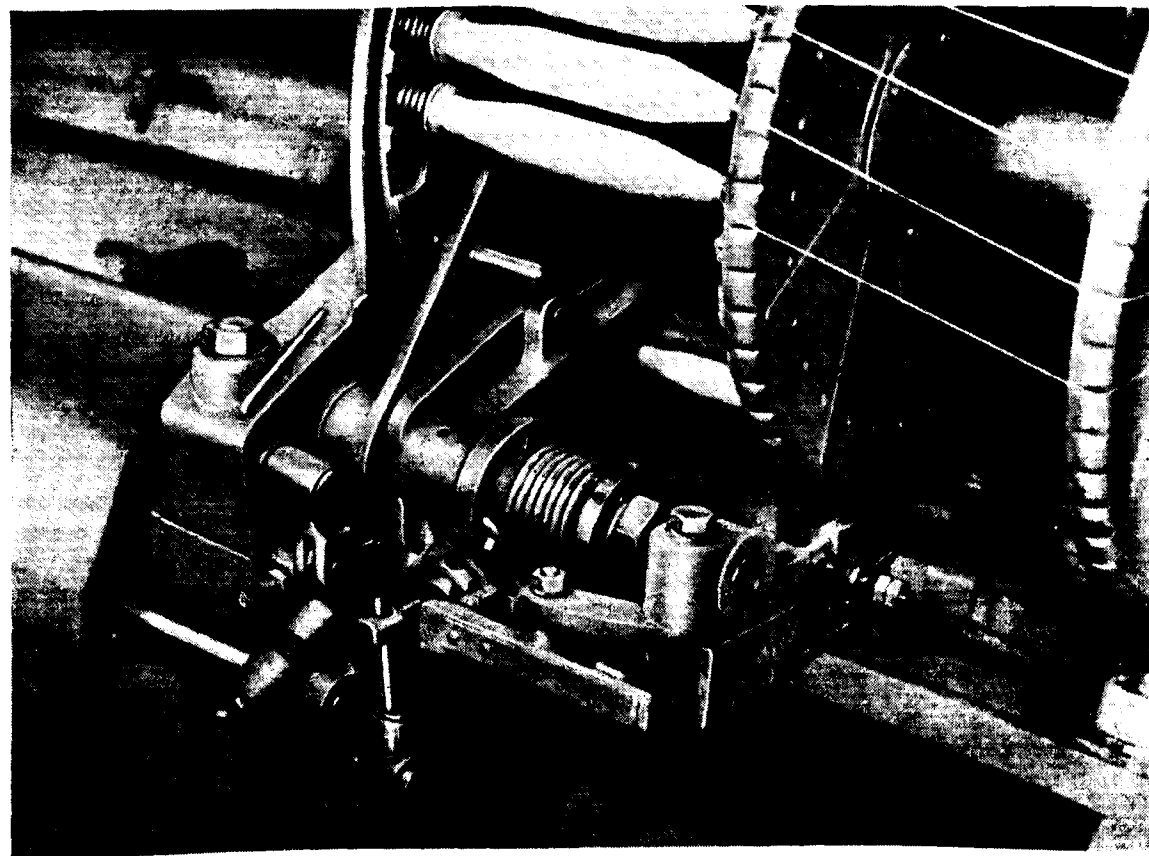


Fig. 11. The pirn magazine is the real heart of the automatic loom for its faultless operation has a direct bearing on the efficiency of the loom. The simple and purposeful design of the pirn replacement motion allows inspection of its function during operation of the loom.



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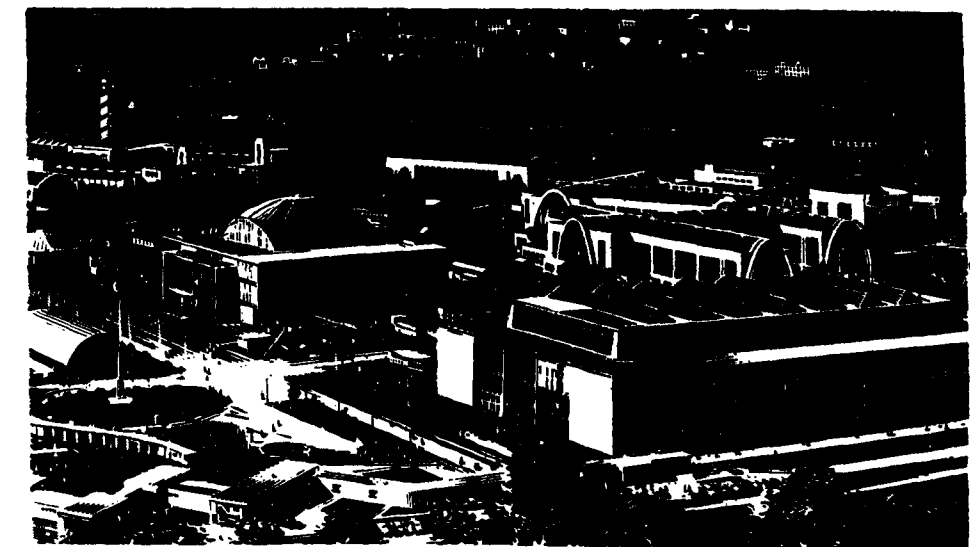
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loom facilitates simple attendance, setting and maintenance of the loom.

4. Low wear of spare parts, economical lubrication and power consumption reduce operating costs.
5. The large warp beam diameter cuts down the idle times.
6. The large diameter of the wound cloth and the possibility to remove the woven cloth while the loom is working, completely eliminate standstills for the purpose of taking out the cloth roll.
7. The outer weft cutters reliably prevent weft

ends being woven into the fabric with resulting faults.

8. The seating of the main shafts in ball bearings ensures smooth operation of the loom, the minimum of maintenance work, and a low lubricant consumption. The powerfully sized seating of the crankshaft prevents vibration of the loom.
9. Stopping of the loom in working positions considerably simplifies attendance and the organization of weaver's work.
10. Adaptability for weaving rayon extends the range of use of this loom.

The reorganization of U.K.'s National Chemical Laboratory

The current research programme of the National Chemical Laboratory in the U. K.'s Department of Scientific and Industrial Research is still being developed and some material changes in the work of several research groups have been made during the year, it is announced in the laboratory's annual report. The conversion of the former work on physicochemical properties into a more comprehensive programme of chemical thermodynamics has continued and study on hydrometallurgy is being extended to include some fundamental work on the more familiar metals of industry.

Staff formerly employed on the extreme purification of semi-conductor materials are turning their attention to use for the very substantial quantities of rare earth elements now becoming available.

Some of the most important work of the National Chemical Laboratory is being undertaken by the Chemical Thermodynamics Group. This group is concerned with the accurate and precise determination of the energy changes accompanying chemical reactions over a wide range of temperatures.

The Inorganic Group has worked on two new series of experiments concerned with the separation of rare earth elements. A continuous sodium-amalgam process for removing samarium, europium, and ytterbium from concentrates has been operated.

The New Material Group describes developments in organoboron compounds and on polymer fraction-

ation and the Corrosion of Metals Group describes studies on the prevention of corrosion in water, and on the connection between corrosion in soils and the biochemistry of the bacteria responsible for it.

Another research group has started on the study of physical processes and chemical reactions on absolutely uncontaminated metallic surfaces, which can only be obtained under ultra-high vacuum.

** ** **

PLANT AND FACTORY MAINTENANCE CONFERENCE

The maintenance of industrial plant has now become so important that a four-day National Maintenance Conference and Exhibition, the first ever in Britain, has been organised by the journal PLANT AND FACTORY MAINTENANCE. The Conference and Exhibition will take place at the Central Hall, Westminster, London, from November 13 to 16.

The Conference will ensure adequate coverage of the many facets of the maintenance manager's work, which includes plant equipment, building and instrument maintenance, as well as the installation of new and the moving of established machinery, while discussion groups will give the opportunity for frank exchange of views on problems in various industries and their solution.

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