MACHINE TOOLS SOUVENIR

(A QUARTERLY TECHNICAL PUBLICATION OF A HIGHLY SPECIALISED NATURE DEVOTED TO MACHINE TOOLS AND GENERAL ENGINEERING INDUSTRIES)

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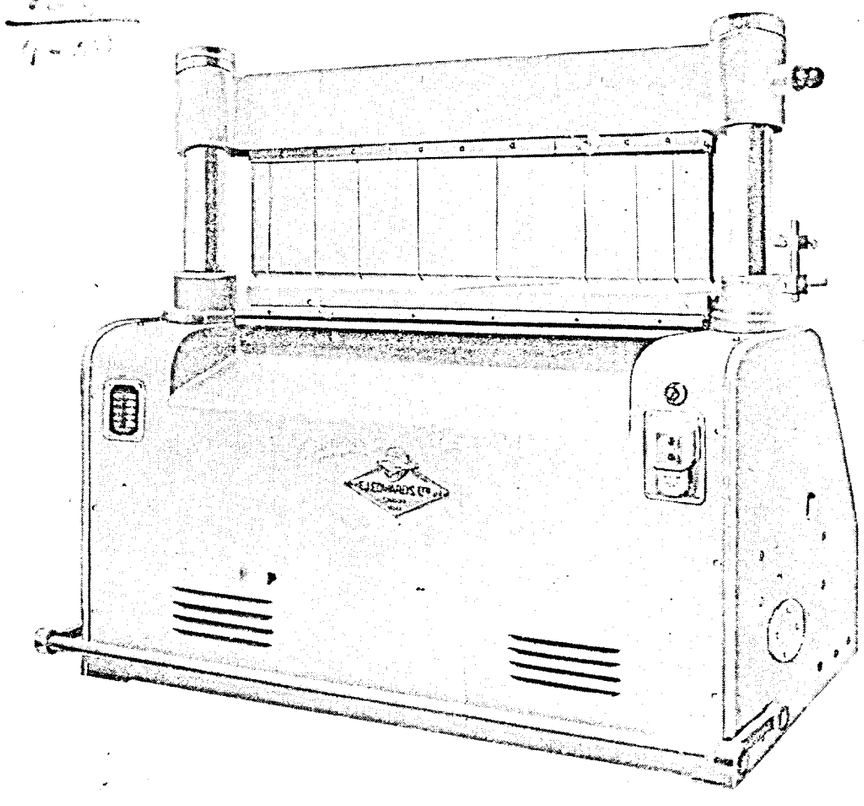

New Besco Production Motorised Swing Beam Box and Pan Press Brake, Model 36-10. *(see page 13)*

EDITORIAL NOTICE

Technical Contributions Invited.

TECHNICAL articles are invited for publication in this Journal from Production Managers, Works Superintendents, Foundry Managers and other Technicians engaged in various Machine Tools Factories in India and abroad and also from other allied Industrial Organisations.

Articles should be lengthy and supported by illustrations, photos (clear prints), graphs, drawings (on cloth or paper in India Ink) etc. suitable for block-making purposes, and should deal with the various processes of Machine Tools Manufacture, Heat Treatment, Steel, and other allied subjects of interest to the industry.

Abstracts of technical papers read before professional bodies or at meetings of the Engineers are also invited for publication.

All articles, papers etc., intended for publication in our Journal should reach the Editor 25 days prior to the date of release of the Journal.

Manuscripts should be typewritten on one side, double space order, and with wide margin on either sides to effect editorial corrections.

20 Reprints would be supplied free only to authors and quantities in excess of this would be charged at our rates. Unused manuscripts will not be returned unless postage for their return is enclosed. The Editor reserves the right to amend, add or delete any para/paragraphs to the contributions and no correspondence would be entertained on this score.

Accepted and published contributions would be paid for at our rates.

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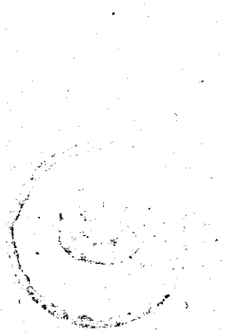


Role of Machine Tools in Railway Workshops

THE Workshops of the Indian State Railways are by far the largest users of machine tools in this country. It is very important that the machine tools in use for the maintenance of railway rolling stock should be of the best available types, ensuring modern methods of production and increased output. It is for this reason that the Government has authorised a programme of replacement of old maintenance plant and extensions to the capacities of many railway workshops, whereby some 3—4 crores of rupees worth of plant is added yearly to the production facilities of same.

It might be interesting, in this connection, to have a look at the latest developments of railway machine tools, as made by one of the largest Continental European Manufacturers of such specialized tools, who are now executing many orders of the Indian State Railways for Wheel turning Lathes, Axle journal turning and burnishing Lathes and other heavy machine tools.

Maschinen fabrik Deutschland of Dortmund, Germany, M. F. D. for short, was founded in 1872 for the purpose of manufacturing heavy railway machinery and have since taken a decisive part in developing heavy machinery for railways.

Perhaps the most important machine used in loco. carriage and wagon workshops is the Wheel turning Lathe. This machine, originally evolved from the ordinary heavy centre lathe, was suitable for turning and profiling only one tyre of the wheel at a time. The modern wheel lathe with four tool posts will rough and finish turn the tread and the flange of wheels mounted on their axles and simultaneously profile the same. The output on this type of modern wheel lathe, whether the universal—for all sizes and types of wheel—or the special purpose type—for specific types and sizes—has been greatly increased. Using carbide tipped tools, M. F. D. wheel lathes with four tool posts greatly exceed the older types of machines in output. The same applies to the axle journal turning and burnishing lathes, where output has been stepped up to more than three times the old figures. As an example it may be stated that two carriage & wagon journals are now finished machined in about thirty minutes only.

All M. F. D. Wheel Lathes are equipped with fully automatic electro-mechanical centering devices. The tailstock need not be moved for centering and clamping, but only if it is desired to change to another gauge. The use of carbide tipped tools allow for high speed turning and speed changes-on the M. F. D. High production special purpose lathes are provided by means of 4-pole change speed motors with a special "soft-switching" device for changing speeds during turning. With these lathes, clamping of the wheel sets and the release of the same is carried out within seconds.

In addition to the machines mentioned, Messrs. M. F. D. manufacture hydraulic wheel presses, crank pin hole quartering and boring machines, bending machines for rails and structural sections, large slotters and shapers, centre lathes and machines for the manufacture of springs of various types as used by railways. The Sole Agents in India of Messrs. M. F. D. are Messrs. Francis Klein & Co., 1 Royal Exchange Place, Calcutta.

INDIAN IRON AND STEEL SPECIALISTS START THEIR TRAINING IN THE USSR

The first group of specialists to be trained for the iron and steel mill going up in India with the help of the Soviet Union has arrived at the "Zaporozhstal" Works. It includes blast furnacemen, steel makers, rolling mill operators, electricians and railwaymen. They will undergo six months practical training and study the experience of Ukrainian metallurgists.

More than one hundred forty Indian specialists will receive practical training at Zaporozhstal this year.

A group of workers and specialists from the large iron and steel mill going up in India with the help of the Soviet Union arrived at the southern ore concentration plant. They will spend six months studying there the experience on iron ore extraction and its concentration.

A large group of young Indian engineers arrived at the Azovstal to visit chemical coking plants. The local iron and steelmakers warmly greeted the foreign specialists.

Archdale Radial Drilling Machine for use in Railway Workshops

THE complete range of Archdale Radial Drilling Machines are used in considerable numbers in the Railway Workshops, but for the purpose of this article it has been decided to devote the attention to the Heavy Duty Radial Drilling machines with hydraulic pre-selection of speeds and feeds. These machines are built in eight sizes with a 5 ft., 7 ft., 8 ft., 9 ft., 10 ft., 11 ft. and 12 ft. radius.

Designed for heavy duty high speed drilling up to $3\frac{1}{2}$" in mild steel, the machine has a wide range of speeds and feeds, for drilling, boring, reaming, facing and tapping operations. Both the speeds and feeds can be pre-selected whilst the machine is actually drilling which reduces to the minimum idle time between operations. The controls are conveniently placed low down on the saddle to relieve the operator of all arduous work when the arm is in the high position on the saddle.

The Machine is foolproof and cannot be damaged by incorrect use. Safety trips are provided to prevent over-traversing of the arm and the spindle. Moreover a special safety clutch stops the movement of the arm in either direction should any obstruction be encountered.

The speed and feed gears cannot be damaged by careless changing, as these changes are automatically effected. Clutches are provided to prevent overloading of the speed and feed drives. Should the motor which controls the locking mechanism be left running after the machine is fully locked, an electro-hydraulic locking device safeguards the locking mechanism against overload.

The machine is of the pillar-sleeve type, the sleeve being mounted on the pillar on ball and roller bearings. The sleeve is locked on the pillar by a conical ring, which moves in a vertical direction and thus prevents any displacement of the tool in the horizontal plane during locking.

The mechanism for locking the arm to the sleeve incorporates a long split bearing to obtain a secure lock. The locking or unlocking of the sleeve to the pillar and of the saddle on the arm is effected simultaneously by push-buttons is the centre of the transverse handwheel, controlling on electro-hydraulic motor.

The elevating arm is provided with a wide bearing face for supporting the saddle. A tensioned hardened steel strip on top of the guides on which the saddle traverses, minimises wear and maintains the original accuracy of traverse indefinitely. The arm is automatically locked to the sleeve upon release of the elevating switch lever on the saddle. This locking is independent of the simultaneous locking of the sleeve on the pillar and the saddle on the arm, and consequently the arm swings in the radial direction whilst it is locked to the sleeve. Vertical displacement of the tool during setting in the horizontal plane is eliminated and drilling with the arm unlocked is impossible.

When the elevating switch lever on the saddle is released the direction of rotation of the elevating screw is automatically reversed and the locking effected by a separate nut. The movement is automatically stopped when a full lock has been effected. Alternatively, when commencing to elevate the arm the special nut moves first, and unlocks the arm before the elevating nut comes into action. Should the elevating nut fail the arm will not drop as the special locking nut comes into operation and automatically locks the arm, which cannot then be lowered or raised until the elevating nut has been replaced by a new one.

The elevating nut is provided with an aperture to enable the wear of the thread to be checked.

The combined locking of the sleeve on the pillar and the saddle on the arm is effected by an electro-hydraulic device, which is fitted at the head of the column. The device is rapid in action, simple and free from trouble, and provides protection against over load.

Piping and consequently oil leaks are eliminated, as the oil pump piston motor and safety valves are carried in a totally enclosed housing. The locking or unlocking operates immediately the motor is started by the push-button control, the slightest pressure on the control button being sufficient to provide any degree of lock. Arrows on the base of the sleeve indicate the actual degree of lock and this is adjusted so that the sleeve can be locked on the pillar before the saddle on the arm, thereby permitting a slight movement of the saddle along the arm, whilst the radial movement is locked.

The required speeds and feeds are selected by turning two concentric direct reading dials on the saddle. The actual gear changes are not effective until the start and reverse lever is operated. This lever engages three actions in sequence :—

(1) The hydraulically operated gear change
(2) The delayed starting of rotation of the gears
(3) Engagement of the full drive

With this arrangement the pre-selected speed and feed is obtained whilst the motor is running, with ease and without clashing the gears.

By dialing 'O' the drilling spindle is set in neutral, and is free to be turned by hand for changing tools.

A multi-disc clutch is provided for smooth engagement and disengagement of the gears, to provide for sensitive control of the spindle, especially for tapping and rapid reverse. This clutch requires, no adjustment and is designed to pull smoothly and maintain its driving power under the severest test. A constant even pressure is compensated and distributed over the entire surface of the plates. When the clutch is disengaged the plates are separated by oil pressure and separately held on "Steps" so that opposite contact is eliminated.

Wide speed and feed ranges are provided, so that drilling, boring reaming, facing studding and tapping operations can be done. Fine boring as well as heavy drilling can be carried out and four automatic tapping feeds are available if required. The five feeds are available for boring work held in jigs and fixtures which is normally carried out an horizontal boring machines, a high degree of accuracy and surface finish being obtained. Particular care has been given to provide the low speeds frequently needed for boring. The twenty-two speeds and eighteen feeds available are as follows.

Speeds: 11, 14, 17, 22, 28, 35, 44, 55, 70, 90, 110, 140, 175, 220, 270, 350, 440, 560, 680, 880, 1100 and 1450 r. p. m.

Feeds: 8, 11, 14, 18, 25, 30, 36, 48, 62, 75, 100, 125, 160, 215, 270, 320, 425, 540 r. p. m. The Automatic tapping feeds are 8, 11, 14 and 18 r.p.m.

A precision depth trip is provided to ensure accurate drilling or facing of blind holes to the correct depth. The power feed is tripped by means of an integral dead stop which ensures a uniform accuracy of depth of hole without the necessity of other measuring devices. The required depth is set on a clearly graduated feed trip dial, which is provided with a micrometer screw the latter being adjusted after rapid setting of the dial.

The fine feed hand wheel is stationary when the power feed is in use. A lever adjacent to the fine feed handwheel engages either the hand or power feed.

Ease and rapidity of control are outstanding for a machine of this size. The controls are simple and few in number and are located close together on the lower face of the saddle. As the speeds and feeds are pre-selected whilst drilling is in progress, gear changing time is eliminated, and as spindle setting, reverse and gear change are effected without stopping the motor, no second control movement is necessary.

An Automatic brake quickly stop the spindle and prevents " Creeping ". The free and easy action of all movable parts combined with the small area into which the controls are grouped, enables the operator to manipulate all movements of the machine from one convenient position which results in a remarkably high output rate without fatigue. All locks are obtained by finger-light pressure, and their ample rigidity is such as to ensure long tool life and also to safeguard against tool breakage. A tachometer is fitted which indicates the speed in use, and a circular scale enables the operator to find the appropriate speed and feed for different materials by direct reading.

In addition to a normal base plate the machine can be supplied with special bases to suit individual requirements. These include :—

(a) Small " Stub " base for operations where boilers or other bulky components have to be drilled, which can be accommodated in a pit adjacent to the base.

(b) Traverse base where it is necessary to drill large surfaces, the traverse of the machine on the slide is controlled from the saddle.

(c) Two-three or four-way bases to provide for continuous production whilst work is being drilled on the one base, other work may be set up or removed from the others.

The agents in India for James Archdale & Co. Ltd. are, Alfred Herbert (India) Ltd., Calcutta with branches at Bombay, Madras, Bangalore and Secunderabad.

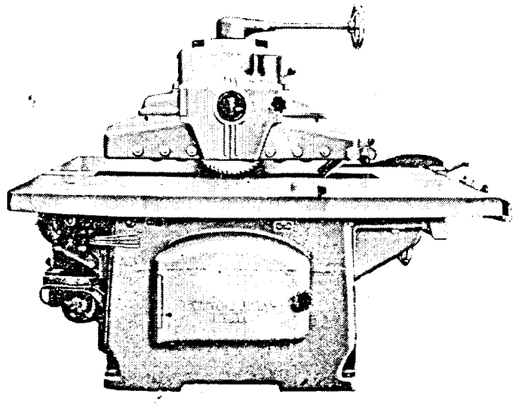
REVOLUTIONARY CHANGES IN THE DESIGN OF WOODWORKING MACHINERY

ALTHOUGH it is true to say that within the last ten or fifteen years there has been an increasing tendency to use metals and plastics for articles formerly made from wood, there is no danger of wood either in its natural form or in processed form, being completely replaced by these substitutes. Timber is readily available in most countries, is easily extracted, easily machined, has fairly good mechanical properties and has a natural beauty which defies imitation.

The economic manufacture of wood products calls for a high degree of mechanisation and today all cutting and abrading operations on wood can be carried out entirely by machinery, man only being required to control the machines and to feed them.

The basic cutting principles of Woodworking Machines have been established for many years. These basic cutting operations consist of sawing by means of Circular Saws, Bandsaws or Reciprocating Saws, planing or dressing the faces of the cut timber by means of rotating square or circular Cutterblocks carrying Planing Knives, mortising with chisels or cutter chains and surface finishing by means of abrasive coated paper or cloth applied to the timber either in the form of flat belts or rotating drums.

The main developments in recent years are in the application of these basic cutting principles. The designer's aim has been to combine quality of work produced from the machine with maximum output.

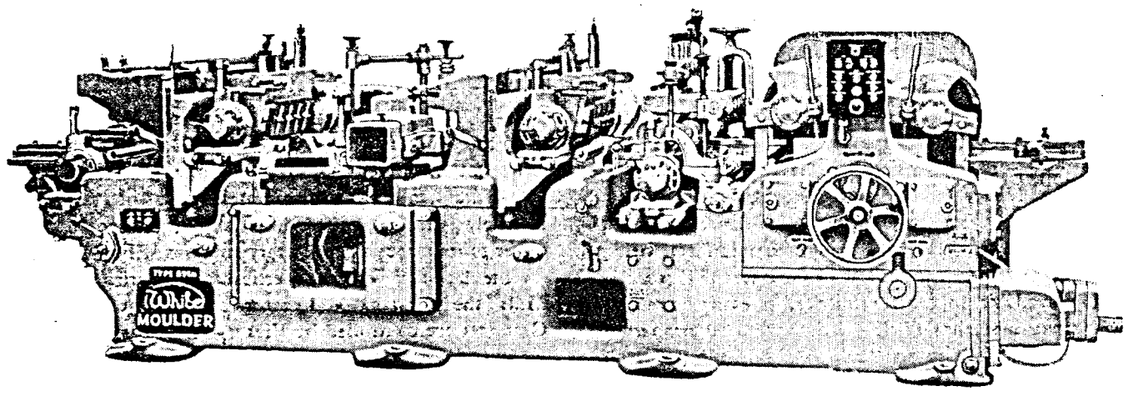


'Trufeed' Straight Line Edger Type SJB.

To achieve this end he has had to take advantage of the latest developments in pneumatics and hydraulics. Oil hydraulics provide a simple means of obtaining infinitely variable speeds over a wide range applied either to reciprocating or rotary motions. For example, on the latest " White " Vertical and Horizontal Band Mills the forward and return motions of the Log Carriages are controlled by Vickers-Armstrong hydraulic variable speed gear units. This unit enables the sawyer to select quickly any desired feed speed on the forward stroke up to 80 ft. per minute and on the return stroke up to 200 ft. per minute. An example of the application of hydraulics to a rotary motion is to be found on the " White " Trufeed Straight Line Edger, Type SJ/B, (see illustration). In this case a Carter type Self-Contained Hydraulic Pump and Motor is used for driving the feed chain that carries the work through the machine. When a conventional type of gear box is used with a Straight Line Edger the operator can only choose one of four or possibly six feeding speeds over the entire range. It is more than likely that the speed he selects will either be too fast to enable him to feed the wood through the machine end to end, or alternatively, too slow to ensure maximum output. With the Trufeed Edger, however, the operator can select the most suitable feed speed for each particular job and what is more, the actual feeding speed is clearly indicated on a Tachometer located at the operator's working position.

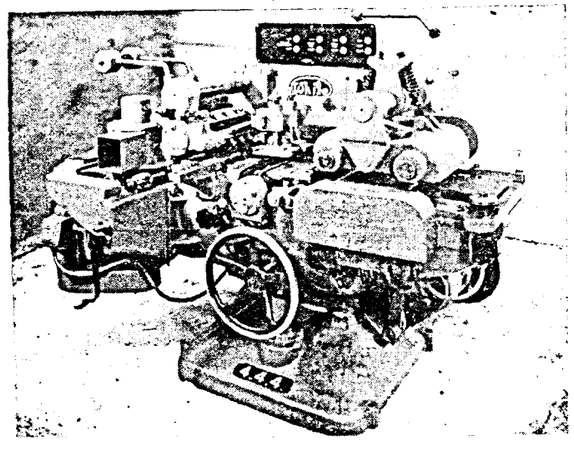
Pneumatics are now being used extensively for quick clamping of components as well as for the reciprocating motions on Crosscut Saws. Hydraulics are, of course, also used for Cramping Machines and for Straight line Crosscut Saws, but where compressed air is normally available in a factory it will usually be found to be initially less expensive to employ pneumatics for these purposes rather than hydraulics.

The electrical manufacturers are also playing their part in the development of Woodworking Machinery. Many types of Woodworking Machines now have the motors built directly on to the Cutter Spindles. On single and double end Tenoning Machines where the Cutter Spindles have to be tilted to different cutting angles any drive other than direct is most cumbersome. Even where the Cutter Spindle does not have to be tilted, it has been found advantageous to use built in motors. The latest " White " 12" × 5" fully motorised



12'×5" Fully Motorised Planing and Moulding Machine Type 555M.

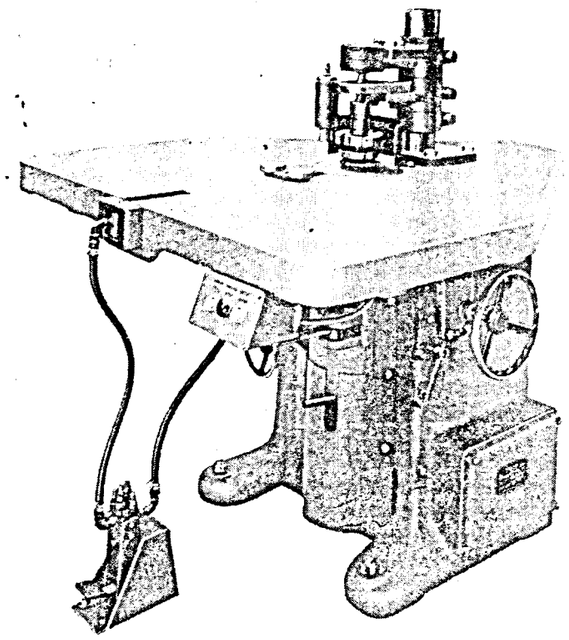
Planing and Moulding Machine, Type 555M is illustrated. On this machine all the Cutterhead Motors are built-in, a separate Motor being used for driving the feed gear and another Motor for quick raising of the Feed Rolls in case of emergency. Built-in two pole Motors rotate at a synchronous speed of 3,000 r.p.m. on a 50 cycle electrical supply and as this speed of rotation is too slow to guarantee good quality finish on the planed timber at high feed speeds, it is necessary to raise the cutter spindle speeds by using a Frequency Changer. Stepping up the frequency from 50 cycles per second to 75 cycles per second gives a Cutter speed of approximately 4500 r.p.m., which is adequate for most purposes. Although a Frequency Changer is a fairly expensive item of equipment, this cost spread over 20 years is negligible compared with the initial cost of laying down a countershaft or long belt drives and the annual replacement cost of the belts themselves.



12"×4" Planing and Moulding Machine Type 444.

The other popular method of drive is by means of individual motors mounted on the machine and driving the Cutter Spindles by means of short flat nylon plastic belts. An example of this type of machine is to be found in the 'White' 12" × 4" model "444" Planing and Moulding Machine (see illustration). This machine has certain novel features. On the conventional type of Planing and Moulding Machine the Table, over which the work passes, is immovable and the Cutterheads are adjusted relative to this fixed Table. On the model "444", however, the Top Feed Rollers, the Top Cutterhead and Top Pressure are all fixed and the Table which carries with it the Bottom Feed Rolls, the Bottom Cutterhead and the two Vertical Heads is adjustable up and down. All the Cutter Spindles are driven by high speed endless belts from motors forming an integral part of the machine. A Multiple Plate Clutch in the feed drive ensures smooth starting and instant stopping of the feed. The feed speeds are infinitely variable between 30 and 80 feet per minute and the actual feed speed is indicated on a Tachometer. In this case the variable feed speeds are obtained by means of Hainsworth type expanding pulley belt drive. With this type of drive the speed range is normally restricted to a maximum of 3 to 1.

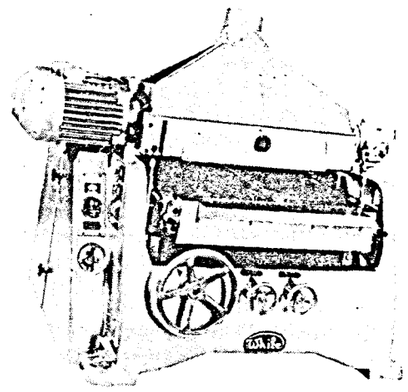
An interesting development in shaping is to be found in the "White" Automatic Spindle Shaper, Type M.P. As will be seen from the illustration this is basically the same as a conventional Spindle Moulder. Mounted concentrically with the Cutter Spindle, but independently driven is a sprocket and Guide Collar. The component, to be machined on the edge, which may be a Table Top,



Automatic Spindle Shaper Type MP.

a Chair Seat, a Window frame, a Kitchen Cabinet Door or similar shaped component, is placed on a Jig around the outside of which is fixed a chain. A pneumatic Ram holds the template of the Jig in contact with the Guide Collar and at the same time brings the chain into mesh with the sprocket. As the sprocket rotates it causes the Jig carrying the component to be moved past the rotating Cutters, thus automatically shaping the edge of the component without any effort on the part of the operator. Maximum output is achieved by using two of these Automatic Spindle Shapers controlled by one operator, the operator loading one machine while the other is cutting.

Drum Sanding is still the fastest and most satisfactory method of finished wood components. The output from a Drum Sander is very much greater than from a Belt Sander, because of the continuous feeding arrangement. An illustration of the new "White" Double Drum Sander, Type BDB is shown. The abrasive coated paper is wound onto the drums in the form of a spiral and is kept taught by a special tensioning device. Each drum is driven by its own built-in motor and the drums oscillate axially while rotating.

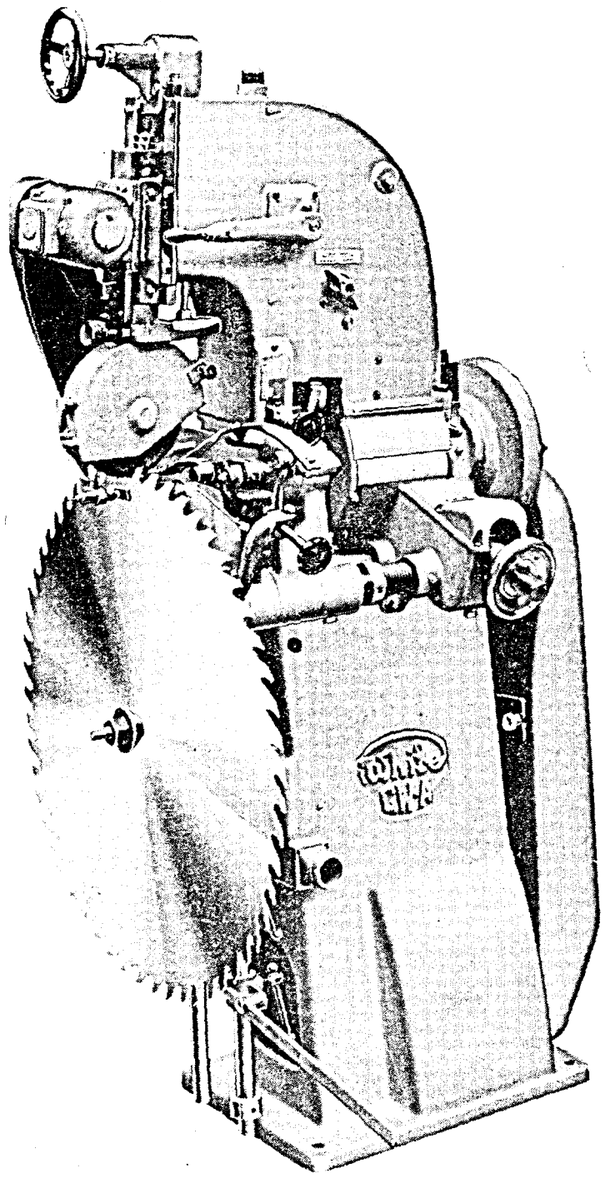


Double Drum Sander Type BDB.

The conveyor bed is mounted on knife edges and the platens against which the work is held are specially ground to ensure extreme accuracy. The feeding speeds are infinitely variable between 14 and 35 ft. per minute, the actual feed speeds again being clearly indicated on a prominently placed Tachometer. The Exhaust Hood is hinged to enable it to be swung clear when access is required for changing the abrasive paper.

Apart from the Production Shops the designers have also given attention to the Toolroom and Machines are now available for sharpening all types of Saws and Cutters automatically. For example the "White" Automatic Saw Sharpener, Type G. W. A. illustrated will sharpen Circular Saws up to 60" dia., Bandsaws up to 10" width and, of course, will also sharpen Frame Saws. By adjusting cams built into the machine any normal tooth shape can be reproduced. The sharpening is done by means of a Grinding Wheel and the Head carrying the Wheel moves up and down on machined slides and also swivels to the left and to the right to give the correct alternate bevels on the Saw Teeth. This type of machine guarantees the proper spacing and shape of the teeth which is so important for accurate and efficient cutting.

In this article it has only been possible to touch lightly on some of the more important recent developments in the design of Woodworking Machinery. There have, however, been many other developments which, although not spectacular in themselves, have nevertheless represented another step forwad on the road to



Automatic Saw Sharpener, Type GWA.

progress. It is difficult to forecast future developments, but as we are on the threshold of the age of Atomic Energy and Automation, it is only to be expected that the next decade will produce some revolutionary changes in the Woodworking Industry.

EVOLUTION OF DROP HAMMERS

By A Correspondent

It would be true to say that until the middle of the thirteenth century, the forging of metals into specified shapes was a practice which not only requires skilled workman, but also patience coupled in many cases with a certain amount of physical strength. About this time, the water-power Halve Hammer was developed to reproduce as near as possible the action of the blacksmith, using his sledge hammer. A water wheel connected to the arm of the hammer was rotated by water, thus lifting the arm which then fell by gravity as the wheel completed its cycle. This type of hammer was in use up till the beginning of the nineteenth century, when the streem engine was then developed to rotate the wheel or cam of the Halve Hammer.

In 1838, James Naysmith, a Scottish Engineer, completed his design of the first direct acting steam hammer, the first machine being made a few years later. With the advent of the Naysmith hammer, also came the first Impression Dies, that is, instead of forging the metal by flat faces on the Dies, impressions were made in the Die faces into which the hot metal was worked by the blow of the hammer.

In the latter half of the nineteenth century, the method of stamping in Dies, having Impressions cut in them, received much impetus due to the demand for components for such articles as bicycles, sewing machines, agricultural implements, machine tools and engineers tools. Added to this, in America the Civil War made heavy demands on the new drop forging era, by its requirements of revolver and guns. At this period also, the free fall drop hammer was being developed on mechanical lines. Initially these hammers consisted of a Tup connected by a strap to a Pulley or revolving shaft, mounted well above the Anvil. The Pulley or Shaft would raise the Tup and in turn, the Tup would be allowed to fall by gravity to deliver its blow.

In England about 1990, the late Mr. E. S. Brett devoted much thought and energy to the making of a mechanical drop hammer and the first machine he built at this time had a Tup weighing 20 cwt. The introduction of this mechanised hammer created new possibilities for increased production, coupled with the use of less physical effort. As a result of the demand for the Brett Drop Hammer, Mr. Brett founded a new company, Brett's Patent Lifter Company, solely to produce Drop Forging equipment. In 1897, Brett's Patent Lifter Company supplied the first battery of mechanical Drop Hammers ever supplied to a Railway Company. These were supplied to what was then the North Western Railway works at Crewe, England, to the order of the late Mr. F. W. Webb.

Since that time, railway companies throughout the world have realised that the day of hand forging has passed, and that drop hammers must form a very essential and vital part of their equipment for production of both carriage and wagon and locomotive components. Draw Bar Hooks, Hangers, Draw Bar Plates, Buffers, Hinges etc., are but a few of the numerous components now so successfully and economically produced under drop hammers.

Railway companies throughout the world have benefited considerably by the foresight shown by Mr. E. S. Brett, when he mechanised the Drop Hammer and tribute to the Hammers produced by Brett's Patent Lifter Company Limited must surely be in the fact that machines of their manufacture are installed in Railway Workshops in such places so distant from England as China, Manchuria, Japan, India, North and South Africa, and a number of South American countries.

Throughout India in the many railway workshops, Brett Drop Hammers and Trimming Presses have been installed since the beginning of this century, and the progress which is now being made in Drop Forging technique augurs well for the future in these workshops. Many new hammers and presses of modern design are being installed and the capacity of the drop forging shops is being brought into line with that of the other departments.

Perhaps worth mentioning is the recent installation of a three ton Brett Friction Operating Drop Hammer at the Chittaranjan locomotive works, because in this case the massive Cast Iron Base block for the Hammer was actually cast by the Railway workshops themselves. This casting was made to the design of Brett's Patent Lifter Company Limited and cast and machined in the Railway Workshops at Jamalpur, and finally installed at Chittaranjan. It will be appreciated that the casting and

(Continued on page 10)

MACHINE FOR PACKAGING STOCKINGS

SPEED, ECONOMY, REDUCED HANDLING

SOME of the leading hosiery manufacturers in England are introducing to their factories a new machine, the Whitehall Stocking Packer, which encloses and seals the stocking in cellophane bags automatically.

The machine fulfils a twofold purpose, it helps in the labour shortage in the hosiery trade and also reduces the cost to manufacturers. Of attractive appearance with the working parts highly protected a prototype has been in use in the works of a well known hosiery manufacturer and has proved convenient and popular to operate.

Damage to the stocking as they pass through the machine is prevented by ensuring that only a few highly polished parts come into contact with the stockings.

Although completely enclosed, lighting inside the transparent covers ensures a clear view of the machine in operation.

All the operations of the machine are controlled and in the event of faulty operation the machine immediately stops.

When in production the stockings are brought to the machine folded in the usual manner and the operator places them one pair at a time on a feed belt which moves forward intermittently. The bags are placed on edge in a renewable magazine and this in turn supplies the feed hopper of the machine as required. Agreement has been made by automatic check that bags are not fed unless stockings have been fed.

The machine inserts the stockings into the bag, folds the top of the bag and secures it with a self-adhesive tape so as to produce a package of about 7 x 5 inches. This can be performed at the rate of 20 or 30 packages a minute according to the type of stocking being packed and the skill of the operator. The packets are then delivered in piles of six on a slow running belt.

Yet another point of interest is that the method of sealing can be arranged so that handling of stockings after being packed can be allowed for or prevented as required.

The speed of running can be pre-set so that when the machine has been stopped the pressing of start button will cause it to rise automatically to the required speed without further manipulation, so ensuring maximum production and minimum attention. The electrical control gear is built into the machine, the main panel being conveniently sited under the delivery table.

Many movements concerned with the handling of the bags require suction and this is provided by a pump with separate motor drive situated on the base of the machine.

The machine has been designed and built by the development department of Strachan and Henshaw Ltd., packaging machinery builders, of Whitehall, Bristol, in collaboration with Atkins Bros. Ltd., hosiery manufacturers, of Hinckley.

(Continued from page 9)

machining of this component weighing 60 tons is no mean feat, and the saving in freightage from the United Kingdom to Chittaranjan was undoubtedly considerable. This is an instance which illustrates the close co-operation and friendly relationship which has been built up over a period of more than half-a-century of business connection between the Indian Railways Executive and Brett's Patent Lifter Company Limited, resulting in such economical consideration being agreed to the mutual advantage of both parties.

It will not be out of place to mention here that Messrs. Heatly and Gresham Ltd., have been the sole selling agents in India for Messrs. Brett's Patent Lifter Co., Ltd. since 1912.

THE MAN AT THE LATHE

SEVENTEEN years ago, Nikolai Kuzmin, quite a young boy, came to Moscow to stay with his married sister. Chance led him to the "Krasny Proletary" Machine-Tool Plant, where apprentices were just being enrolled. The boy was sent to the machine shop to foreman Pyotr Crechishnikov.

"So you want to become a turner?" the foreman asked, looking at the youth keenly over his spectacles. "Well, that's an important job. Let's go to the machines...."

Seventeen years have passed since then, and Nikolai Kuzmin is still working in the same machine shop. In these years, he has become an experienced turner. And, almost imperceptibly, his skill, his thoughtful, truly creative work began to draw the attention of his neighbours, at first, his comrades in the bay, the shop, the plant, and then of many people outside the plant.

Kuzmin, entering into an argument with venerable engineers, did not consider his machine-tool to be out-of-date. On the contrary, he was firmly convinced that he had not yet mastered all its potentialities. And jointly with the mechanic, technologist and foreman, a plan for its modernisation was drawn up.

Kuzmin not only modernised his machine-tool but also designed a whole set of new cutting tools. A large item is placed on the table of the lathe. The table revolves and the cutting tools trim the work. The speed and quality of their performance depends upon the life of the cutting tools, the angle at which they have been sharpened, their design in general. In the designing offices of machine-building plants all over the world engineers have been working on the improvement of these cutting tools for many years.

Nikolai Kuzmin also worked persistently on this. And here are the cutting tools of his own design—roughing tools, finishing tools, and a dozen others.

"Why are you working on this?" was the question put to Kuzmin on a certain occasion by a group of Chinese workers who were training at the "Krasny Proletary" Plant. "Have you no engineers? After all, that is their job".

"We have many engineers", answered Kuzmin smilingly. "And, of course, they are educated people. But isn't the practical knowledge of a turner of some value in this? That is why our workers elaborate designs together with engineers, foremen and technologists. I, for instance, proposed new cutting tools. Engineer A. Belov helped me to draw the plans, and the chief of the shop to increase the power of the cutting tools. Thus, a new cutting tool was created. It seems simple, but now I handle my work five to six times as quickly. That means it was worth-while".

We have shown how the turner "Interfered" with the design. Kuzmin does not leave the technology unminded either. Once, he was given the job of machining the gear wheels for a new series of machine-tools. The turner had three days at his disposal. In the course of these, he submitted a proposal for a change in the technology of the machining process: not to bore each item separately, but to handle five pieces at once in a "package". At the same time, Kuzmin elaborated a simple fixture, and this new technology enabled him to handle the work in half the time formerly required.

Seven hundred and fifty machine-tool operators now machine metal at high speed at this plant. Kuzmin knows many of these workers well. Indeed, how can he help it when he has grown up, lives and works side by side with them, when he shares all joys and sorrows with them.

"In this house, above me, on the third floor lives Alexei Markov..an Artist, not a turner!" says Kuzmin. "I was still afraid to touch my lathe when he was already a famous turner. Markov has been with the plant for 25 years, and in the whole of this period has not known one minute's standstill. Markov, probably, earns more than all the other turners of the plant.."

I listened with interest to Kuzmin, to his sincere, warm words about his worker-friends, but I could not get an answer to my question: How had he, Kuzmin, succeeded in 1950–55 in fulfilling his quota 25 times, i. e. in doing the work of five turners every day? Perhaps this had required great physical effort?

"You know", replied Kuzmin, finally, "I once had a talk on this subject with a foreigner....He probably thought that I spent my days and nights at the plant and that I had no other interests or desires than cutting-tools and shavings. I had to show the record of my earnings to the gentleman: 2,000–3,000 rubles a month! I had to show him the photographs of my sons and tell him how we go skiing in winter and bathing in summer. I even had to tell him that I sometimes go to a footbali

(Continued on page 12)

"FIELDING" EXTRUSION PRESSES

THE name of "Fielding" has been associated with Hydraulic Presses for the Extrusion of Metals for many years, and we have built up a reputation for quality and service in this branch of the Engineering Industry.

Since the early days of Extrusion process, Fielding & Platt Ltd. have specialised in the design and manufacture of Hydraulic Extrusion Presses, and continuous research and development have resulted in great advancement in this particular branch of Engineering.

"Fielding" Extrusion Presses designed and built in our Works at Gloucester, cover a wide range and are of the horizontal or vertical types suitable for the direct or indirect process of extrusion. Presses have also been designed to combine both direct and indirect extrusion. A high rate of production combined with ease of operation and low maintenance costs are distinctive features of these presses.

Extruded products may be tubes, rods, bars, wire, slip, and irregular sections in copper, brass, light alloys, aluminium and other non-ferrous alloys, also lead and carbon. Special designs can be supplied for lead piping and lead covering of cables, also the coating of electrodes.

To the accumulated wealth of experience of our Engineers and Technicians on all types of Extrusion Presses, must be coupled the workshop capacities and machine tool facilities which enable us to produce equipment of the finest quality to meet the exacting requirements of our customers.

The wide and specialised experience we possess enables us to give expert advice and guidance in the selection of the most suitable types of equipment to meet customer's requirements. Designs and layouts for complete plant can be prepared to suit local conditions.

The fullest information regarding other features, devices and materials used in the manufacture of "Fielding" Extrusion Presses will be gladly provided with all the essential information regarding pressures, speeds and output, pressure water plant and pumping units, also ancillary equipment which may be required for the complete installation.

"FIELDING" 3500 TONS HORIZONTAL TUBE EXTRUSION PRESS WITH 150 TONS HYDRAULIC SHEAR

The application of our handling devices will greatly assist in cutting down time losses to a minimum. Handling gear can be either hand or mechanically operated billet conveyors, and roller tables for feeding billets from the furnace to the press. Hydraulic billet lifters, wedge operating devices, container sealing cylinders, die shifting arrangements etc. are embodied in the press designs, depending upon the size and type of press.

Hydraulic control valves are of the fully balanced type permitting easy operation and sensitive adjustment. All parts are made of suitable wear resisting material to keep maintenance costs as low as possible.

Recording devices of approved designs that register speed and measurement can be fitted to presses in order to assist the operator in keeping extrusion speeds under close control during operation of the press. For powering Extrusion Presses we can offer "Fielding" Variable Delivery or Horizontal Type Pumps, also "Fielding" Air Hydraulic Accumulators of modern design fitted with dual electro-hydraulic control tube system, working in conjunction with "Fielding" Three Throw Pressure Pumps that are of special robust construction to ensure long service and continuous operation.

(Continued from page 11)

match.... And yet, he, the foreigner, apparently hardly believed me....A strange man!"

Recently, on a Sunday, I called on Kuzmin at his home. A group of electors had come to see the turner as their deputy to the Supreme Soviet of the RSFSR. Once a week, he receives them in the building of the district executive committee. But here an important question had been raised and Kuzmin had asked his electors, by telephone, to come to his home. On the couch in a tidy, modestly furnished room, sat three girls —workers from a neighbouring plant. They had come to their deputy to tell him how bad the food at the plant's dining room had become?

"Yet only a month ago the food was very good. We can't think what has happened to the cook. This must be seen to, otherwise, if we have to go shopping and cook at home, we shall have no time left for our studies at the evening school".

"All right, girls. Tomorrow evening I'll look in at your dining room and have a talk with the manager. And don't give up your studies".

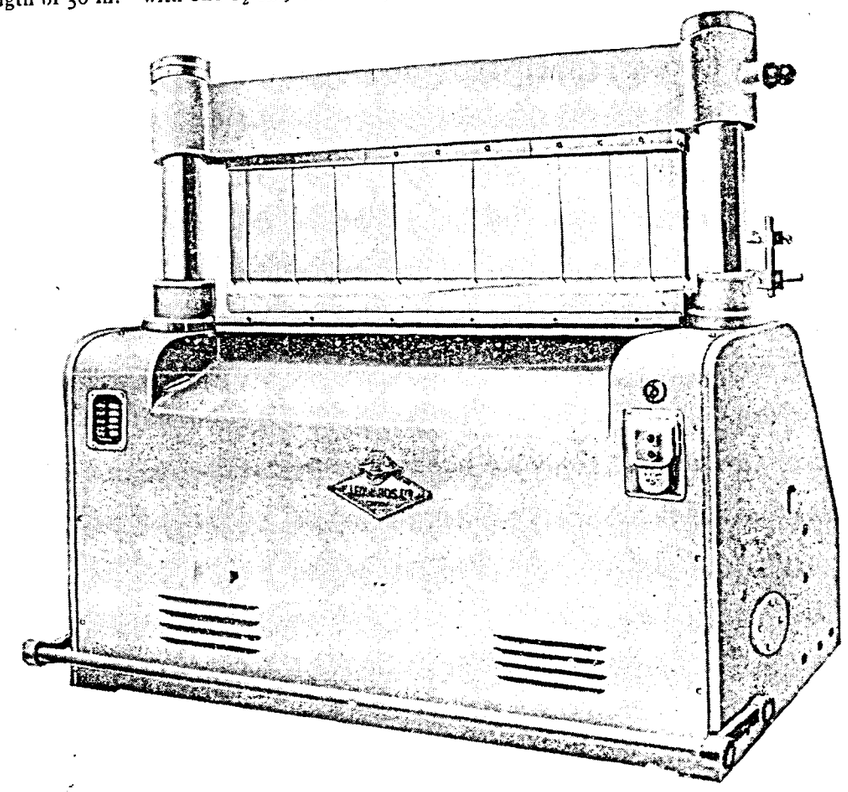
New Besco Production Motorised Swing Beam Box and Pan Press Brake, Model 36/10

PRESSURE EXERTED 10 TONS BENDING
CAPACITY 36 in. LONG

TWO special features that have increased the range of operations performed by folding and bending machines are incorporated in this entirely new press brake. Firstly the top beam is arranged to swing out, thus enabling trunk sections which have been formed round the beam to be withdrawn complete. Also, pan, box and tray work may be performed, by the use of the segmental blade supplied, which can quickly be attached when the ordinary angle bending blade is removed.

The segmental blade consists of detachable fingers which can be assembled at any point along the beam and with them boxes can be formed to a maximum depth of 6 in. These fingers are of various widths, making up the bending length of 36 in. with one 1½ in., one 2 in., one 2½ in., two 3 in., two 4 in., two 5 in., and one 6 in. blades. 14 gauge material is the maximum thickness handled, vee die opening ¾ in. wide; 16 gauge, vee die opening ½ in. wide; 18 gauge, vee die opening ⅜ in. wide.

The top beam, machined from steel plate, is 8 in. deep × 2 in. thick, swings out in double thrust bearings, and is locked in the operating position by a spring plunger. It is adjustable up to 8 in. high by a side handle, through an enclosed worm and worm-wheel, running in oil, so that blades of various heights can be accommodated, either for production angle bending with the narrow blade which is 2 in. deep, when the beam is in the low position, or for open topped boxes or trays with the 10 in. deep segmental blade. The minimum size of a trunk section formed is 8½ in. × 8½ in. Length of stroke is 1 in. With the stroke up, the maximum distance of the ram to the bed is 12 in., the minimum 4 in.



New Besco Production Motorised Swing Beam Box and Pan Press Brake, Model 36-10

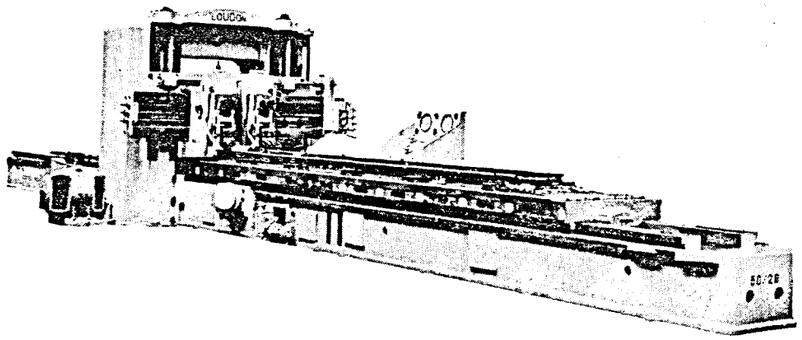
A WIDE RANGE OF SCOTTISH MACHINE TOOLS

THE Scottish Machine Tools Corp. Ltd., Glasgow, is a combination of four well-known Scottish machine tool makers, all of which have been established for many years. It includes Craig and Donald Ltd., James Bennie and Sons Ltd., G. & A. Harvey Ltd., and Loudon Bros. Ltd., and the machines produced by the Corporation still bear these names as they are so well-known throughout the world. Craig and Donald Ltd., in fact, are amongst the oldest established firms who have been consistently making machine tools, as the firm was founded in 1815.

All the firms in the corporation have specialised in machines which are commonly used in Railway workshops. Their range is extremely wide and their machines are to be found not only in the machine shops where components are being turned and bored, but in the Plate shops, Forging Shops and Press Shops as well.

The early Wheel Lathes produced by Loudon Bros. all ran at exceedingly slow speeds and were driven by belts from overhead shafting. The belts pulleys drove the remaining gear in each headstock and all the gears were open. The feed motion was obtained by a ratchet system and was transmitted by chains to the saddle and slide rests. The loose headstock was traversed by hand and few facilities seem to have been provided for handling the wheel set in and out of the machine.

Fig. 1 shows one of the latest "Loudon" Wheel Lathes of the through type. This machine is intended for high production, combined with particularly easy handling of the wheel sets on a flow system, the wheel coming in at the back of the machine and rolling out the front after machining has been completed. This arrangement avoids congestion in the wheel shop and is a great advantage where modern machines are being used

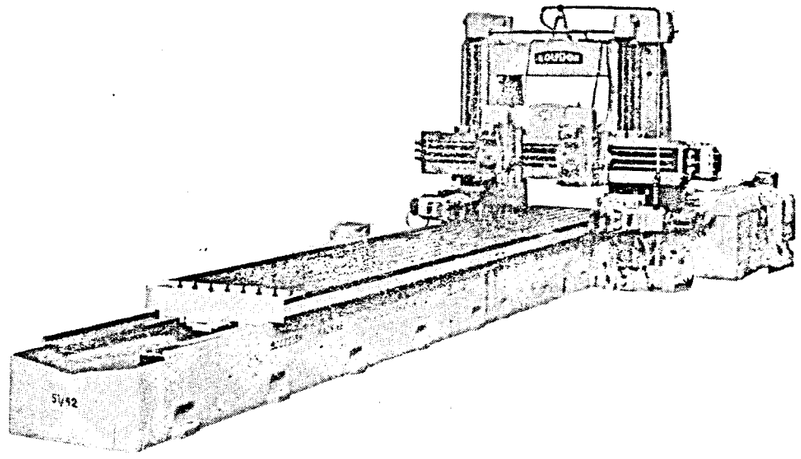


(Continued from page 13)

The main frame is fabricated from steel plate, adequately ribbed and braced, and maintains strict rigidity during operation. In conjunction with the deep bed, the lower frame effectively ties together the side frames. The lower frame also serves as a base for and completely encloses the squirrel cage motor, which is of 1¾ h. p. × 1500 r. p. m., situated between the frames. Drive is through vee ropes to the heavy-speed flywheel mounted on double roller bearings. An indication light shows when the motor is running. The machine is capable of running at 40 continuous strokes per minute.

Through an enclosed worm and worm-wheel gearbox and a bevel drive, a Matrix double-duty combined clutch and brake gives smooth and light control to the crankshaft and top beam couplings, all of which are mounted on replaceable phosphor-bronze bearings. Standard equipment includes, one straight bending blade; one set of finger blades; one bottom die with two grooves; motor and starter; winding handle and gauges. These gauges, one front and one back, have an adjustment of 24 in.

The machine occupies 56 in. × 56 in. of floor space, stands 57 in. high, and weighs 19 cwts. net. (Patent pending). This firm is represented in Madras by Messrs. William Jacks & Co., Ltd.



owing to the short time spent actually cutting the wheels. The lathe illustrated is provided with power traverse to each head so that they may be withdrawn and brought forward as each wheel set is introduced. A hydraulic jack, in the middle of the bed, lifts the wheel set from the rails which have been built into the machine and elevates it to the right height for matching the centres of the Lathe. The lathe itself is provided with a very wide range of speeds and feeds which enable the machine to be used with either carbide tools or high speed steel tools. All the controls for the auxiliary motions and the main driving motor are grouped in an electrical control panel which is mounted beside the operator as he stands watching the machine turning the wheels. The lathe, of course, is equally suitable for turning both the trades and flanges of the wheels, and by using tungsten carbide tools it is generally possible to effect considerable savings in tyre steel as it is not necessary to undercut the break hardened spots which are to be found on the wheel's surface. The use of such tools, however, has meant a great increase in the speeds of these machines and in their weight, as can be seen from the illustration.

The early Planing Machines, which were supplied to Railway Companies a century ago, were all of the belt driven kind with ratchet feed motions, but these were slow and inefficient machines, especially by comparison with modern Planers today. The latest design of Planing Machine, whether for rails or for general purpose work incorporates a Ward Leonard drive to given infinite speed variation over a wide range of speeds and electronic feed control with solenoid operated tools lifts on each tool box. Loudon Bros. were the first company in Britain to introduce the spiral drive combined with rack and worm, an arrangement which produces a particularly efficient drive as all the rotating members are kept to a very small diameter so that the kinetic energy losses at reversal are reduced to a minimum. In addition to this, Loudon Planers, which are so well-known for the heavy roughing cuts they can take, all incorporate a two speed gearbox in the main drive so that the flexibility of the Ward Leonard set can be extended to the lower speed range where the heaviest cutting is possible, consistent with long tool life.

In the production of leaf springs of the laminated type it is necessary to cut bars to lengths and nib and punch various holes and slots in them. This was often

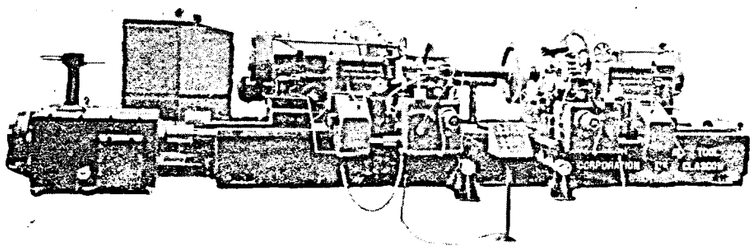


Fig. 1

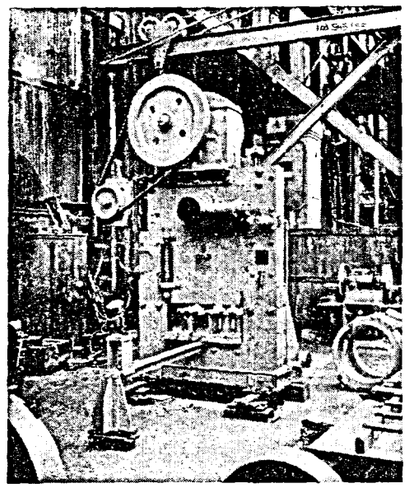


Fig. 2

done hot in early Railway Shop practice, but modern machines of the kind in Fig. 2 are capable of doing all these operations cold. This represents a great saving in production costs as the furnace is eliminated completely and allows the operator to achieve higher rates of production owing to the greater facility with which we can handle cold bars. The machine is of all steel construction and various gauges at the back and front facilitate rapid setting up.

Fig. 3 shows an up to date Plate Bending Rolls such as is often used in the making of oil tanks for railway wagons. In addition to the main driving motor this machine features power clamping for the end of the roller when the bearing at the other end is turned down for the removal of the tube and also another motor to turn down the bearing when required. All the remaining controls for the rolls are grouped outside the gear box which includes a double clutch arrangement for reversing both the main drive to the rolls and the power adjustment to the setting of the top roller. This clutch arrangement makes much greater flexibility in the control of the machine as it allows the operator to inch the machine delicately until it has rolled as a close to the edge of the plate as possible and to achieve very quick reversals without momentary delays while the motor picks up speed and without the attendant current surge. These machines which are built by the Bennie Works of the Corporation have been supplied to many Railway Companies through the world.

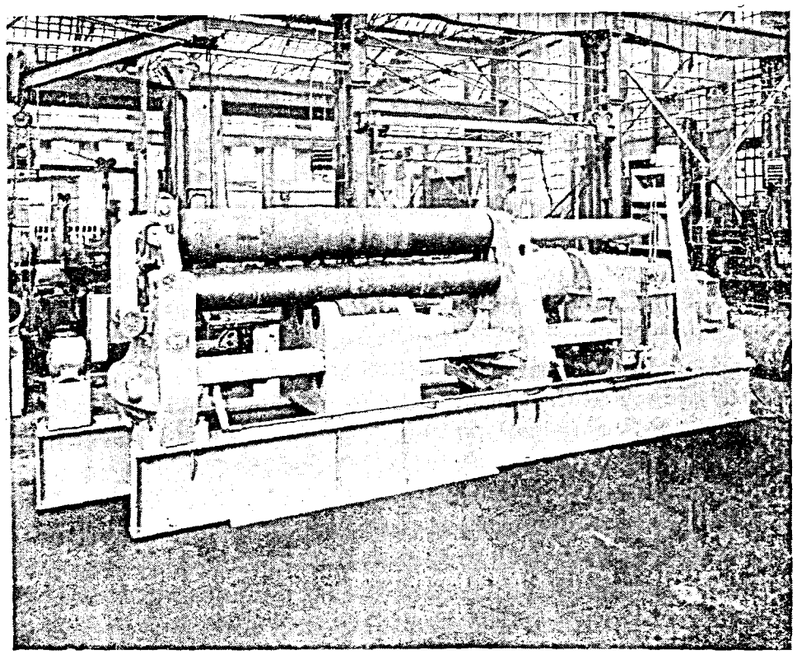


Fig. 3

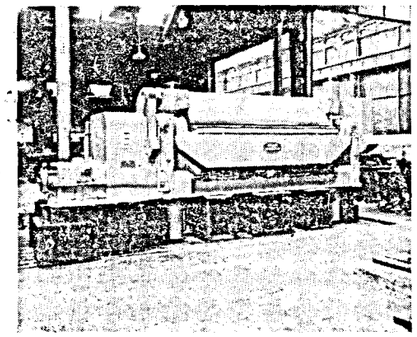


Fig. 4

Allied with the problem of producing circles in plates is the problem of producing various bends in these plates for making boxes or similar shapes. One machine which has become very popular in Railway Workshops during the last 20 years, for work of this kind is a power operated Folding Machine similar to the kind shown in Fig. 4. This machine, in some ways, resembles the hand operated Folder which is so well known for work on light gauge material, but it has a number of special features which make it a much more versatile machine. The top beam clamps the plate under power prior to folding and the operation of the front folding beam is controlled by a lever outside the gearbox which contains two friction clutches. This type of drive makes for very delicate control of the folding beam which is a most important feature if accurate bends are constantly to be produced, as it is necessary for the operator always to bend the plate to a greater angle than is necessary to allow for a certain amount of spring back after the pressure has been released. It is assessing the amount of the spring back which calls for care on the part of the operator and his performance is much improved by a sensitive control. The machine also incorporates a special cam knock-off arrangement which insures that the beam consistently rises to the same angle when producing report folds. The top clamping beam can be adjusted vertically so that it rises to a height at least equal to its own depth. This is necessary for the production of small boxes or other more complicated shapes which the machine easily manufactures, but where large boxes are being produced these are usually formed around the clamping beam itself. The beam is so arranged that it can be detached at one end and swung out, pivoting about the other end so that the box can be drawn off. This is one of the most versatile machines a fabricating shop can have and it is particularly suitable for short run work as there are no complicated tooling problems involved. The same set of tools combined with a suitable range of packing pieces allow this machine to make almost every shape that is required for fabricating work.

Where a great many parts have to be bent in exactly the same way it is very common practice to use Presses for this work, and many Railway Shops are installing very large machines such as the kind shown in Fig. 5 for

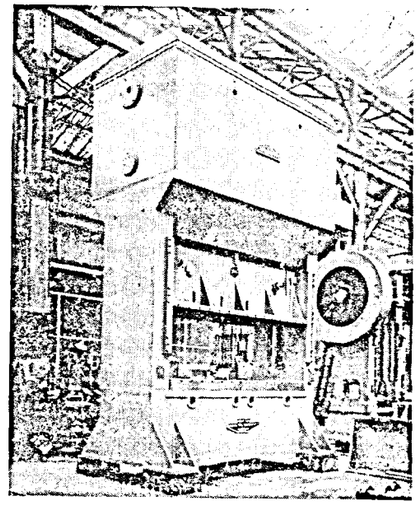


Fig. 5

the pressing of entire side frames for wagons. Machines of this size usually have a fixed stroke, but have a long slide adjustment available which allows them to suit a wide range of tools which require different shut heights. In the machine illustrated the drive is through two large gear wheels which have eccentrics cast onto the side of them. The wheel and eccentric units rotate about individual studs so that the various forces set up during the pressing operation are distributed partly on the stud and partly over the eccentric thereby making the arrangement more rigid and better suited to withstanding wear. The press is controlled by an electrically operated air friction clutch which allows rapid engagement to be achieved when the push-buttons, beside the operating station, are pressed. The clutch is combined with a brake so that whenever the air pressure is withdrawn from the clutch the brake is automatically applied. An interesting feature of the press shown is that the gibs which guide the slide are recessed into the housing so that the slide face is the same size as the bolster. This is particularly advantageous when the machine is working with die-cushions, but is also an advantage when several tools are being ganged up along the length of the bolster for quick production of small parts.

EXPORT OFFERS OF MACHINE TOOLS

*By Willi Kupper **

AS a highly industrialised country, the German Democratic Republic has the capacity to supply machinery and complete production plant to other countries, about to build up their own industry.

The machine tool industry was always a typical industry in the eastern part of Germany, now called the German Democratic Republic. It has now reached a level of efficiency that surpasses by far its former standing which has always been an important one. Thanks to the knowledge and industrial efficiency of our scientists, engineers and expert craftsmen, machine tool designs have been developed which enjoy international reputation.

The wish of expanding our exports and imports to all countries of the globe is born of the natural desire to exchange our industrial production for the home products of other countries. While individual factories may at anytime export their own products, the export programme of the machine tool industry in its entirety is taken care of by the foreign trade organisation, WMW-Export, Berlin W 8, Mohrenstrasse 61.

To facilitate work in this big export organisation, the vast range of machine tools is grouped under the following subsections: 01 Lathes, automatics, milling machines; 02 Parellel planing machines, grinders, lapping and honing machines, drilling machines, metal cutting and filing machines; 09 Generating planes, all gear cutting machines, horizontal drilling and boring machines, jig boring and fine boring machines; 03 Toggle lever presses, hydraulic presses, multiple disc presses, special-purpose presses; combination shears, drop shears, shape shears, and riveters: 04 Single-purpose machines and complete equipment for the production of folding boxes and preserve tins, all wire-working machinery; 05 All wood-working machinery such as wood moulding machinery, milling machines, sawing machines, drilling machines, veneer planing and plywood machines and special-purpose machinery. Some new developments from the wide export programme deserve special mention. The vast range of engine lathes has been extended by the addition of the models DLZ 355 and DLZ 450, which are special high-efficiency lathes incorporating all the latest worthwhile refinements in lathe design with regard to productive efficiency and operation. The application of hydraulic copying attachments is a decisive step forward towards automatisation of factory work when changing over to serial manufacture. The copying lathe "Magkomat", coming in three sizes, is the almost ideal solution to this problem.

The standard range of drilling attachments has been completed by the development of milling attachments for the composition of special-purpose machines and fully mechanised production lines for mass production. A new developed range of bracket type milling machines, included in the export programme in special purpose designs as well as universal types, is remarkable for their simplicity of operation of all operating elements, thus effecting maximum economy in handling and tooling time. Other novelties are a gear cutter for cylindrical toothing and bevel gears (rough cutter) and a gear shaper for 355 mm. maximum diameter of workpieces. They are unsurpassed efficiency for the precision finished of straight and helical spur gears.

In the vast field of grinding machines there are also a number of newcomers demonstrating the great strides forward in this line. There are the external and internal cylindrical grinding machines, centreless grinding machines, and a spline shaft grinding machine. An outstanding design is the portal type vertical honing machine with a 80/355 mm. diameter working range. The section non-cutting shaping presents several new designs of mechanical and hydraulic presses of different capacities, of shears, beading machines, straightening machines, hammer machines and wire-working machines.—By Courtesy: "THE HINDU"

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* *Managing Director,* WMW-*Export.*

THE DIE SINKER NASSOVIA V 11

BY A CORRESPONDENT

THE Die Sinker NASSOVIA V11 is a high efficiency machine, the outstanding features of which are economy in operation and accuracy of work. Its range of application is a very large one. The prompt adaptability is obtained by new control devices. The control movements, made by hand, are transmitted to the milling tool with increased force by hydraulic means. Hence the consumption of the operator's energy is reduced but the production output is increased.

Mass production goods made of steel, metal, rubber, glass, plastics, etc. are made in an increasing measure by non-cutting methods, in the same measure grow the requirements as to economy in production and accuracy of the forming tools, needed for their manufacture. These requirements are met by the Die Sinker Nassovia V11. In addition to this, the machine is suitable for processing all kinds of pieces which demand metal cutting operations by the form milling method and also for deep and complicated engravings.

Our experienced specialists are always available to give practical explanations regarding the characteristics of the form milling method and to demonstrate its great advantages.

1. Rigid connection between tracer—and milling-slide.
2. Hydraulic feed by movement of control-stick (Novel hydraulic control arrangement).
3. Direction of feed in the same sense as that of the control lever.
4. Stepless variability of speeds and feeds.
5. Manifold possibilities of application and adaptation.
6. Unrestricted possibility of clamping and controlling.
7. Wide range of work.
8. High copying accuracy and good surface quality.
9. Easy operation.
10. Quick change of tools.

THE CONSTRUCTION

The NASSOVIA V11 consists of a solid two-part frame built upon a strong base-plate. The model and the work table are arranged on the frame in such a way as to provide on all sides unrestricted facilities of clamping and controlling for the performance of work. Apart from this, special devices of many kinds may be used. The tracer and milling slides are rigidly connected together. They move in all directions in hardened and ground roller-ways and in ball guidings respectively which can be adjusted free from play.

The novel control-arrangement for the hydraulic feed is fixed in a handy fashion between the model and the work table.

The switches for the electric equipment are built into the side of the frame and are easily accessible.

CUTTER SPINDLE DRIVE

The cutter spindle is driven by an endless belt. Spring-loaded and adjustable guide pulleys ensure the requisite belt tension. By means of the *stepless variable speed unit*, any speed required within the large speed range can easily and swiftly be chosen during work. The solid working spindle turns in special roller bearings. It is chatter-free at all speeds within the range of the machine and requires very little maintenance.

TOOL HOLDER

The cutter and tracer spindles are equipped with ISA-steep taper and quick-acting nut locking. The steep taper holders are provided with Morse taper or collet chuck. Cutters with Morse tapers or cylindrical shafts can be changed with equal swiftness and ease.

FEED MOTION

The longitudinal and cross movements of the tracer and the cutter are hydraulic. The controlling is done manually by operating the control-lever and a knurled ring attached to it. By this practical device the feed is set in motion or stopped, and its direction and extent determined. The position of the control stick shows

always the direction of the feed at any moment. Within reach of the hand there is a hand wheel which regulates the cutting pressure. A pressure-gauge located in the range of sight permits the supervision of the cutting pressure. The vertical motion is obtained by the hand wheel on the tracer head. All the motions together permit the tracing of the shape of the model. The operator can easily follow the particular shapes of the model, without being subjected to bodily strain.

METHOD OF OPERATION

The NASSOVIA V 11 transmits from the model to the work piece only in the relation of 1:1. The model and work tables can be adjusted independently from each other. In the case of low models or workpieces supplementary tables are used as intermediate tables. The tracer is operated in such a way that it slides along or upon the model. Owing to the rigid connection of the tracer and milling slides, the milling cutter executes the same motion.

The NASSOVIA V 11 works in the parallel-stroke (scanning) milling method and in the contour milling method without resetting of tools and without readjustment of machine.

Circular forms are milled with advantage on the rotary table, with the milling slide blocked.

In special cases even normal vertical milling work can be performed.

To trace and mill vertical walls, the tracer and cutter heads can be swivelled independently from each other up to 45° in the longitudinal direction. At the same time the vertical guiding of the heads is maintained, and distortions while copying are out of question. The work is really facilitated, *particularly with special devices*, by the additional depth adjustment of the tracer head.

The *stepless variation of the cutting speed and of the feeds* permits every combination between a great cutting depth and a small feed, and vice versa. The cutting speed depends in every case on the material used. The maximum feed which can quickly and easily be selected, shows its advantageous effect when cases of free travel and other special circumstances arise.

The rigid connection between the tracer and the milling carriage insures a high copying accuracy. The quality of the milled surface renders subsequent hand working, to a great extent, superfluous.

THE MODEL

The importance of a good model is obvious. Upon it depends to a high degree the accurate and economical manufacture of the work piece. It must be easy to manufacture, form-proof and must remain unaffected by the tracing pressure. The best solution is a model made of the material to be machined. In many cases, it is true, the model will be made of cast iron, light or non-ferrous metal, plastics, hard wood or similar substances. There are, however, many possibilities for the manufacture of models. With plain and symmetrical forms, templets, solid or hollow sections of cylindrical parts, partial pieces of models, or the like will suffice.

A new, very economic procedure of making models with metal-hard surface is the Lurgi-Grill process.

SUPPLEMENTARY DEVICES

The Supplementary table "NASSOVIA VAT 1." The normal design of the Die Sinker permits the reception of very high die-blocks. If, however, flat work is in the main to be executed, and the work pieces are consequently rather low, it is advisable to use a supplementary table. *The rotary table* "NASSOVIA VR 11 ". Circular molds are best machined by using a rotary table. In some instances it will be sufficient to employ as a model plain sheet templets or a model segment, in which case the repetition of the same form to be transmitted is attained by a corresponding adjustment of the rotary table carrying the work piece.

SPECIAL DEVICES

This field offers vast possibilities for the NASSOVIA V 11 to be put to an economical use. Big work pieces and complicated forms, are in some cases easily machined by means of special devices, for which we will make specific proposals on receipt of customers drawings or sample of work pieces.

THE MACHINE TOOL SHOW

By M. A. Hollengreen, President and General Manager,
Landis Tool Company, Waynesboro, Pa.,
President, National Machine Tool Builders' Association

ONLY within the last few years have such rapid technological advances in the art of cutting and shaping metal taken place. In that time, product design and development have accelerated throughout the whole machine-tool industry.

Today's new models have one feature in common—increased productivity per man, per hour. But in many respects they exhibit an amazing diversity of ingenuity. Some have features that are brand new, so new that many production men are not even aware that they exist. Of particular interest are developments in hydraulic control of the activation of machine-tool elements and progress in the field of electronics. Some machines show the application of proved techniques to new purposes; others embody entirely new methods of performing familiar operations.

From the technical standpoint, probably the most remarkable progress in recent years has been made in the direction of even greater accuracy and the extension of automatic controls. We are entering a period in which men will talk of millionths of an inch as casually as they used to take of thousandths—with not only machining skills, but also actual rate of productivity built into the machines themselves.

Meanwhile, if you were to pay a visit to the metal-working plants of the country where, right now, reduction in manufacturing costs in such an urgent problem, you would see thousands upon thousands of machines 10 or more years old. Many were built to designs of World War II or earlier, and they are

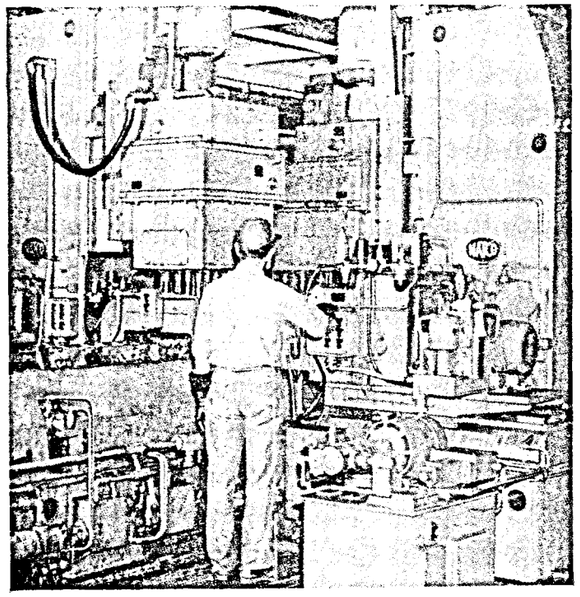
Mr. M. A. Hollengreen

completely obsolete by comparison to the potentials of today's new machine tools.

These old machines are inevitably due for replacement. By comparison to the latest machine-tool models, they represent high-cost operation which, in the face of competition, no company can afford to continue indefinitely. The men who manage America's metal-

The Department of Commerce classifies machine tools into 441 different types. These do not include their various sizes or combinations. Some are as small as a desk, others are as large as two-storey house. In weight, they vary from a few hundred pounds to well over 50 tons.

To provide opportunity to see and study the latest machine-tool models in actual operation, the National Machine Tool Builders' Association for the fifth time sponsored a show at the International Amphitheatre in Chicago in September 6 to 17. Here, occupying a total floor space of 428,000 sq. ft., were operating demonstration to interest America's key executives and those from other parts of the world as well. Attendance included vice-presidents in charge of operations, plant managers, engineers, designers, men engaged in research and product development, production experts, and financial executives concerned with problems of increased accuracy and production. Two hundred thousand visitors attended the show.—Editor



This Machine is used to drill, ream, and chamfer the holes in automobile engine blocks.

working plants know this. Their problem is how to proceed with replacements. Which machines should be replaced first? which second? and which third? And finally—what is more to the point—what machines should replace those now in use? Answering that last question is not simple, for the difficulty is both physical and geographical.

A manufacturer in search of exactly the right type of machine to fulfill this replacement requirements cannot visit all the machine-tools plants in the country. But neither can machine-tool salesmen from all the different companies visit every manufacturer. Even if they could, they could not tell the whole story, for the simple reason that, in order for the potentialities of a new machine tool to be properly understood, it must be seen in operation.

The solution is to have a Machine Tool Show where all new machines are on display, and all people with cost-reduction and replacement problems can come to see them.

At our Show the production expert from your plant will find arranged for personal inspection, the entire range of the newest products of the whole American machine-tool Industry. He can compare one type of product with another, one make with another. He can explore every conceivable possibility. He can then select what he considers most appropriate to his own particular requirements.

All modern machine tools function basically in one of six major groups, the "six basic arts of shaping metal." These are drilling and boring, planing and shaping, milling, turning, grinding and shearing and pressing. Actual removal of the metal occurs in the first five of these. In the sixth group, pressure is used to push the metal into shape, to punch holes through it, or to shear it.

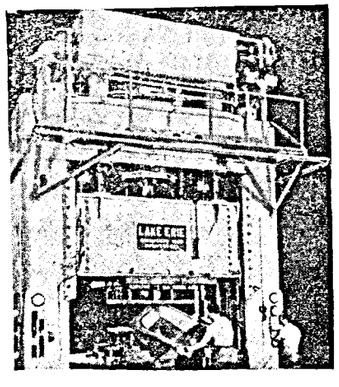
DRILLING AND BORING

A round hole is cut by a rotating drill. The hole may be finished to finer tolerances by boring or reaming, and may be tapped to take a machine screw.

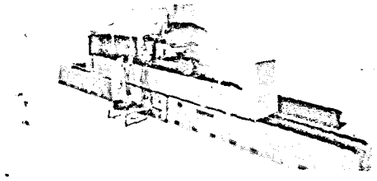
PLANING AND SHAPING

Metal is peeled from a flat surface by reciprocating the work under a sharp-edged tool, or passing the tool back and forth over the work. Planers which use stationary cutting tools and reciprocate the work, may be

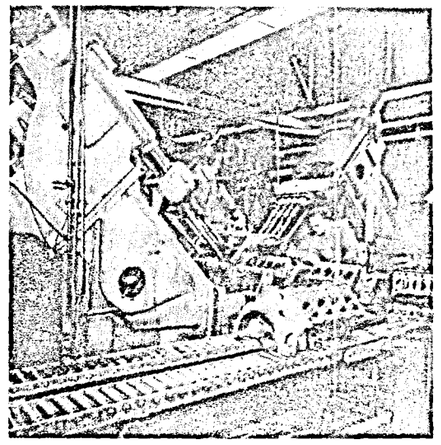
Hydraulic roll lathe, first commercial unit of newly developed design used in steel mill.



Giant 1,000-ton housing-type drawing press turns out 225 wheelbarrow trays per hour.



Grinding machine is so massive that it dwarfs the lathe it is working on.



Cylinder blocks pass into transfer machine for rough and finish hone operations on bore.

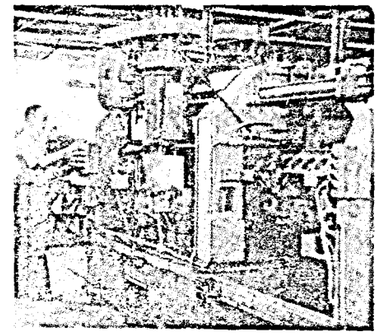
sufficiently large to plane slabs of metal two or three times the size of the area of a small room.

MILLING

A flat surface is produced by chipping off metal with a rotating tool that has multiple cutting edges. Milling machines may work vertically or horizontally, and they can become very complex when adapted to handle various work configurations.

TURNING

The art of turning has been known since earliest times—the potter's wheel, for example—and the lathe has been termed the father of the machine-tool family. In turning, the metal is rotated against the cutting tool, which rides down the lathe bed on a carriage so that a round or cylindrical shape is produced. Turret lathes equipped with rotating tool holders have multiple cutting tools, each pre-set for a given operation, which can be swung into action for any number of work pieces without resetting.

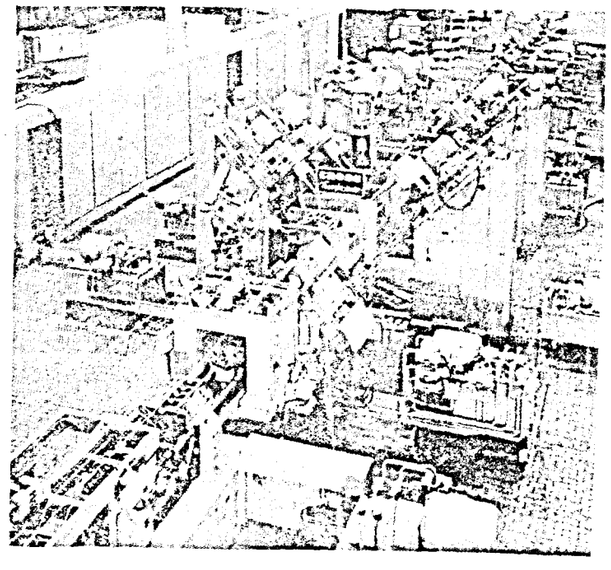


Initial milling operation on an 800-ft. line used in machining V-8 cylinder blocks.

GRINDING

Metal is removed by use of an abrasive wheel; final finishing is produced to close dimensions.

Grinding is particularly useful in finishing heat-treated, extremely hard metals. External grinding may be performed on flat or curved surfaces and screw threads, while internal grinders are used to finish holes. Precision finishes using finer abrasives are produced by the related operations of honing, buffing, lapping, and polishing.



Section of line for producing automotive cylinder blocks. Section uses 60 hydraulic-power units in machining and transfer operations.

SHEARING AND PRESSING

The sixth art utilizes pressure to shape metal. Presses bending machines, shears, punch presses, and piercing machines are in this group. Some of the giants of industry fall into this category. These are the largest individual machine tools in the world, those in which thousands of tons of force press outsize sheets of metal into complete airplane wing sections.

TRANSFER MACHINES

Presses, lathes, and grinders are used separately. Modern high-production operations have been enormously speeded, however, by combining drilling, boring, reaming, and tapping as well as milling and planing operations into multi-purpose units known as transfer machines. The work pieces—for example, automotive engine cylinder-block castings—are transferred automatically through a series of machining operations and in the process are pushed, rotated, and turned to required positions in an exactly timed cycle. Transfer machines are usually adapted to produce one part and are used only where the number of identical pieces required is great enough to justify their cost.

The latest step in the evolution of the mechanization process which began with the Industrial Revolution is the connection of successive line-type transfer machines into a continuous production line. The work is handled automatically, not only the through the transfer machines but also between them as well. Is the next step the automatic factory, one in which the work enters the line as castings, bar stock, or sheet metal and emerges as finished parts?

LATHES IN RAILWAY WORKSHOPS

By A. C. Bhattacharya, A. M. I. Prod. E.

MODERN Specifications covering the construction and upkeep of Railway rolling stock call for a high grade of finish on all constructional parts, corresponding to the latest advance in technical knowledge. The man in the Workshop is only capable of meeting the ever-increasing demands made by the designer if the machine—tool industry produces suitable machinery which will enable him to machine the parts in question in a practical and economical manner.

Probably the most primitive form of machine tool was a sort of lathe which has been in use for centuries past by the brass and wood workers of India. This lathe has the head and tail stocks consisting of wooden stakes driven into the ground at the required distance to take the work, and a bar of wood lashed to them to support the tool. The spindle was driven by a kind of bow, made from a stick about a yard long with a cord attached to its end, the cord making one or two turns round the spindle, which was caused to rotate, first in one direction and then in the other, by alternately pulling and pushing the stick, the work being turned during the forward stroke by means of hand tools, just as was common practice in brass finishing shops until quite recently.

Though it was of a very simple form, but the human skill and pride of craftsmanship enabled excellent work to be turned out. Development from this crude tool to the highly comflex machine tool of present times is comparatively recent and may generally be considered to have commenced towards the end of the 18th century.

HISTORICAL RESUME

Although the boring machine, built by John Wilkinson in 1775, is considered the first "modern" tool, this machine was, after all, only a special adaption of the lathe, the latter being considered as the parent of all machine tools, as from it have been derived the drilling, milling, screwing, sawing and grinding machines, in addition to the boring machine.

Till 1680, the lathe was developed to an extent whereby only high class wood work could be turned out of it very easily. In 1741, Hindley, a clockmaker of York, produced a small screw-cutting lathe, having change gears.

The real foundation of the modern lathe was laid by Henry Maudslay, who designed the first slide rest to receive general practical application in about 1794. In his own works in London in 1800, he produced his first screw-cutting lathe with 28 change wheels embodying the feature of the self-acting slide rest. Commenting on this invention, James Nasmyth, who is famous for his association with the development of Steam hammer, stated—"it is not at all saying too much that its influence in improving and extending the use of machinery has been as great as that produced by the Steam Engine". In fact this invention paved the way for the rapid and continuous development of the lathe along the familiar modern lines.

TYPES OF LATHES

The lathe is undoubtedly the most widely used of all machines in all workshops including railway workshops and is regarded as essential for certain types of work. For mass production, the plain lathe has been supplanted by specially developed turning machines, such as the multi-tool production type, the automatic, capstan and turret lathes, screw-cutting or threading machines, etc.

Among the special purpose lathes used in railway workshops are the wheel lathe, axle journal returning and burnishing lathe and axle turning lathe. Most of these more or less complicated types have been developed from the plain metal turning lathe of the past.

Multiple-tool lathes are used for machining a large number of identical parts in greater speed and is suitable for mass-production purpose. As the name implies, in place of a single tool that has to be changed for each individual turning operation, a number of fixed tools are provided in the multiple-tool lathe. A front set, mounted on the saddle tool rest for turning parallel diameters is usually incorporated in this type of lathe so that when these tools are fed along the bed, towards the headstock, all the different diameters can be turned at a single operation.

For producing corners, radii, shouldering, bevelling, forming etc., another set of tools, which are fed towards the work together, is provided at the back of the saddle. The single feeding operation does all this work at once. Thus in two operations, viz: a bed feed and a traverse, the complete machining is accomplished.

In the automatic machine, the machine itself need only be started and it then operates automatically. The work piece, is fed into the headstock chuck and after machining ejected automatically through a guide or

conveyer to a hopper. The machine needs no attention until all of the work stock is used up. Mud plugs and fusible plugs of locomotives are usually manufactured in this type of machine.

CAPSTAN AND TURRET LATHES

Capstan lathe is a very popular type of lathe for quick production of similar parts and is very widely used for production of studs, machined bolts etc. in railway workshops. Operating on the same principle as the plain type, it is provided with special facilities for rapidly changing over from one tool to another. Further the tools may be fed on to the work by hand in a convenient manner, stops being provided to limit their movement.

The special tool-holding arrangement, known as the Capstan, consists of a substantially designed circular or hexagonal block mounted on a vertical bearing. Holes located in each of the hexagon sides carry a separate machining tool. The capstan unit is mounted on a long dovetailed sliding member working in corresponding guides in a similar direction to that of the ordinary lathe saddle on the lathe bed. In some capstan lathes there is an automatic feed for the capstan unit, a special lead screw being provided for this purpose.

Possibly the machine tool which has been developed to a greater extent than any other and which is most certainly indispensable in the locomotive workshops, is the turret lathe. This lathe is in fact a development of the Capstan lathe and designed mainly for a longer and heavier class of work than in the case of capstan lathes.

In turret lathes, the saddle moves directly on the bed being fed from a lead shaft with a range of different feeds. Usually two types of turret lathes are used in railway Workshops viz: one for producing finished articles from the bar, which is held on a special bar-feed device behind the headstock and fed in through the hollow spindle of the latter, and the other, the combination turret lathe which is suitable for both bar and chuck work. Items like piston valve port bushes, cylinder liners, crown stays, stay bolts etc., are turned, bored or screwed as necessary at a high production rate, utilising tungsten — carbide tipped tools on combination turret lathes.

SURFACING AND BORING LATHES

For work of general nature in railway workshops, the surfacing and boring lathes are increasingly favoured. The work piece in this case is machined while being held in a chuck. They are extremely economical and the standard tooling can be easily and cheaply adapted to suit varying types of workpiece.

Fig. 1 Illustrates a 36″ swing surfacing and boring lathe, manufactured by John Lang & Sons Ltd., machining a typical chucking job. Amongst the many noteworthy features incorporated in this machine and

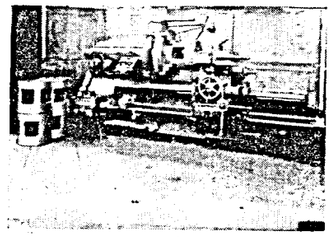


Fig. 1. Lang 36″ swing Surfacing and Boring Lathe.

explained below, are that it has a spindle speed numbering 12 with a range of feeds (cuts per inch) from 12 to 168 (normal) and 3 to 42 coarse.

The machine has the centre height from the floor as low as possible, consistent with strength, in order to give the operator an uninterrupted view of the cutting tool and facilitate gauging of large diameters.

The clearance of cuttings is well catered for in the form of a chute which conveys swarf to the rear of the bed. The tool holders in the hexagon turret are designed to suit most work of small batches and to take standard lathe tools.

The saddle is provided with quick power traverse motion in both directions along the bed, this being engaged by the normal sliding handwheel being pulled outwards towards the operator and given a part turn in the direction in which the saddle is to travel. Release of this handwheel automatically disengages the motion and stops the saddle traverse.

The gearbox is of the multi-change type giving a choice of 28 changes of feed in the normal range; by movement of a lever on the headstock a second range of 28 feeds, four times coarser than normal, can be obtained. The apron is arranged to give easy control to the operator, all levers being grouped for convenience. Provision is, of course, also made for an adequate coolant supply.

This machine is specially suitable for dealing with locomotive eccentric straps and sheaves and white metal liners.

Illustrated in Fig. 2 is a Lang 17″ in Swing special precision tool room lathe to cater for light high speed turning. As a tool room is indispensable for any modern machine shop, similarly a lathe of this type is absolutely essential for a tool room.

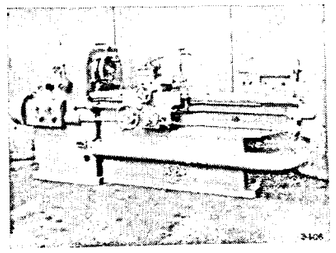


Fig. 2. Lang 17″ swing precision centre lathe.

The bed of this machine is made of close grained cast iron containing a high percentage of steel to ensure the greatest possible rigidity under cut. The limits of error to which the machine is built, are of an exceptionally fine degree.

These lathes are on special demands supplied with a Monobloc Hydraulic Profiling Attachment enabling a batch of work to be copied from a model held between centres at the rear of the machine. Complete accuracy is ensured and very high rates of production are obtained owing to the elimination of non-machining time.

WHEEL LATHE

The machining of the outsides of the mounted wheels with their tyres represents one of the most difficult turning operations that are encountered by railway workshops. To get over this difficulty, the wheel set lathe, often called wheel lathe only, has been designed.

The wheel set lathes are in fact centre lathes with special contrivances for turning the tyres, both treads and flanges, of wheels mounted on axles. To shorten the operation time both wheels are turned simultaneously. Two carriages are therefore adopted for each wheel with chucking and driving arrangements on both sides of the machine, on the headstock and on the tail stock. Both are connected to the same driving device.

Fig. 3 depicts a wheel lathe manufactured by Maschinenfabrik Deutschland, Germany for dealing with carriage and Wagon Wheel sets with outside axle journal.

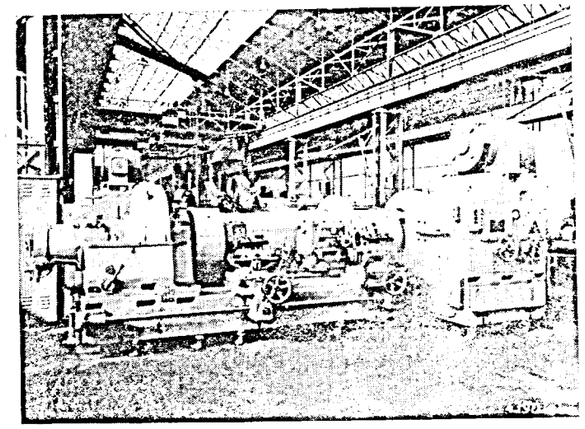


Fig. 3. MFD Wheel lathe for wheel sets with outside ournals.

The placing of the wheel set between the centres and the performance of gripping in this machine is effected by two synchronised pendulam clamping devices with electro-mechanical control. This arrangement provides automatic, rapid centering and clamping as well as positive driving of the wheel sets. The pendulams are equipped with adjustable friction drives to compensate variable clamping diameters.

The roughing tool posts are for turning the treads and flanges of tyres in their main inclination whereas the final shape is given by the profiling tool post. The roughing tool posts also carry tools to plane new tyres at the faces to exact dimensions and gauge distance. The profiling tool posts operate on cam principle, one cam being provided for the shape of the flange and one cam for the taper of the tread. Each of these cams is controlling a traverse of one tool, thus dividing the total length of the profile to be machined into two parts.

The variety of wheel sets, regarding the diameter of wheels and gauges, as well as the possibility of centering and driving call for different types of machines and different manufacturers have placed in the market different types, each having its own distinguishable features, so as to offer a wider scope of selection. Illustrated in Fig. 4, is a CRAVEN 4′-0″ faceplate double railway wheel lathe in operation. The tool rests in this case are fitted with turrets of 4-position type and arranged to take both high speed and carbide tipped tools. They are, as may be seen in the photograph, are mounted on a turret slide which is fitted on a swivel slide to be set at the correct angle for the tread. The tool slides have longitudinal and transverse continuous feed traverse in both direction.

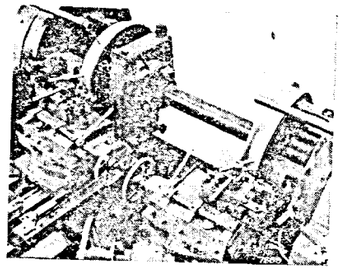


Fig. 4. 4'-0" Face plate C & W wheel lathe of craven make with turret type tool rests.

AXLE JOURNAL RETURNING AND BURNISHING LATHE

Fig. 5, illustrates the friction roller drive type axle journal re-turning and burnishing lathe to deal with outside journals of carriage and Wagon axles with the wheels mounted.

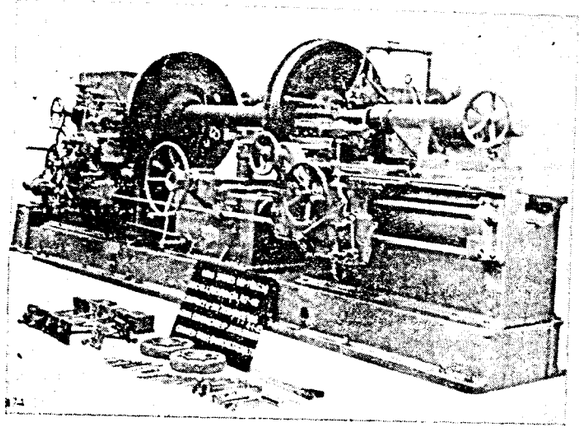


Fig. 5. Friction roller Type axle journal returning & Burnishing lathe. (craven make)

The lathe consists of a straight main bed with short members mounted on each end forming a double gap to take the wheel sets. The short members are provided with slideways on the upper surface upon which are mounted the saddles and the fast and loose headstocks.

The two live friction rollers acting on the treads of the wheels are driven by a shaft along the bed, from a constant speed motor and change speed gear box at the end.

The burnishing is effected by means of three rollers. A device is incorporated in the arrangement to bring the rollers readily into position against the journals, the frame carrying the top roller being balanced. A four-position turret tool rest, having variable self-acting transverse feed traverse, with adjustable stops for tripping the feed, and hand operated transverse and longitudinal adjustment is mounted at the front of each saddle for returning and radiusing the journals, and facing the outside bosses of the wheels.

Fig. 6 shows the special type of sliding bed lathe arranged for the re-turning of railway axle journals. The machine is arranged with a double sliding bed so

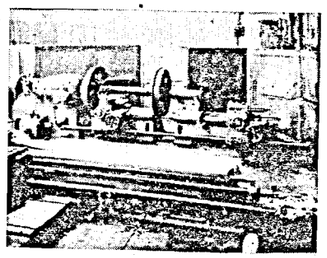


Fig. 6. Lang Axle journal re-turning break lathe.

that two gaps may be formed to take the wheels while the axle journals are being machined. Two saddles are fitted at each piece of sliding bed.

The lathe is suitable for returning journals which are inside or outside the wheels. The width of the gap can be varied to suit different lengths of axle.

AXLE TURNING LATHE

The typical arrangement of a lathe suitable for axle turning is shown in Fig. 7. The machine is arranged

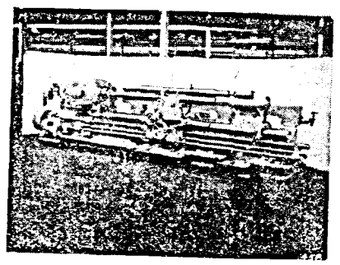


Fig. 7. Axle turning lathe.

with a special two-speed drive to the fasthead giving two speed ranges as follows :—

Fast : 12 speeds, 12.8 to 630 r. p. m.
Slow : 12 speeds, 4.4 to 219 r. p. m.

The slow range of speeds is intended for finish turning the radii of the journals and water scraping the journals. The fast range enables full use to be made of tungsten carbide tools on high speed cuts giving a fine finish.

The saddle is arranged with two mild steel square turrets one at the front and one at the rear of the machine. This enables the tools for machining the radii of the journals to be drawn into the work without any indexing of the turret. The saddle is arranged with a clock and brackets for length rods which can be used for accurate sizing if required.

The lathe is arranged with taper turning attachment with capacity of $4\frac{1}{2}$ deg. at either side of the centre line with a maximum length of taper of 30", enabling the taper in the centre of the axle and the taper on the wheel seat to be machined.

AXLE TURNING BY PROFILING

A recent advance has been made from the above method of axle turning whereby the axle is machined by profiling from a master carried at the rear of the lathe as shown in Fig. 8.

Many different means of operations have been developed for profiling. They are electronic, hydraulic, pneumatic, electronic-hydraulic and pneumatic hydraulic. Each method has its own peculiar advantages and disadvantages, but for economy and reliability, the simple hydraulic methods are generally preferred.

It is however emphasized that all methods are essentially error-operated that is, the following stylus

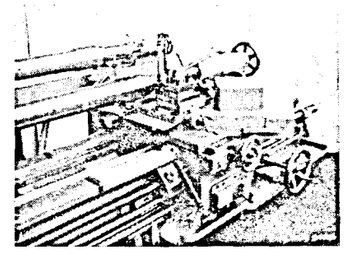


Fig. 8. Axle turning by hydraulic profiling.

must be displaced to produce movement of the tool slide. The electronic methods are the most sensitive from this point of view and are therefore more accurate. Nevertheless, for normal machining purposes ample accuracy can be obtained hydraulically and this method has now been generally adopted for profiling on lathes.

In the machine illustrated, which incorporates a hydraulic profiling arrangement, the action of the profiling is as follows :—

A 45 deg. tool slide is operated by a hydraulic cylinder which is controlled by a stylus bearing on a master. As the saddle traverses the stylus causes the cylinder to move the tool in such a way as to reproduce the profile of the model on the work. An adjustment is provided to allow the tool to be moved relative to the stylus to adjust for diameter and shoulder position. The arrangement ensures consistent accuracy between each axle and also produces faster production times owing to the elimination of non-cutting time.

Before concluding the writer wants to emphasize that the machines illustrated and described are by no means the only suitable examples of their kind rather it has been his endeavour to select some typical and present day models from along the impressive array turned out by the machine-tool builders of to-day with a view to showing the progress so far made in this direction.

RUSTPROOF ALLOY

A large manufacturer of watches in Elgin, Illinois, announces the development of a non-corrosive alloy escape wheel that is superior to conventional wheels made of the finest steel. An escape wheel is a sharp-toothed gear that controls the movements of the watch hands by transmitting a pulse of energy through the pallet fork to the balance.

The new development is reported to be one of the most important achievements by the industry since World War II. It was necessary to develop non-magnetic alloys that would not affect time-keeping qualities and to devise ways of fabricating hard alloys to the microscopic tolerances required in the industry. The new alloy is strong, tough and rustproof, and its ability to take a mirror finish reduces friction. These factors make it superior in all respects to steel for this purpose.

GANG SLITTING MACHINE

BUILT to give absolute precision in operation, the Besco Model No. 36 Gang Slitter provides the Tin Box Making and Light Sheet Metal Industries with a fine product and first class cutting service. It embodies the essential modern features, necessary to mass production technique, of faster and more efficient feeding, with accurate cutter maintenance. The machine has been designed with practical forethought for introduction into existing production lines and the grinding attachment, cutters and hubs are interchangeable in some cases with similar equipment produced by other well known machinery manufacturers.

Simple to operate, this machine will slit lithographed and other tin plate, with accurate parallel cuts, up to 60 sheets per minute, according to the operator's skill. Its speedy performance and ease of adaptability for the cutting of blanks for all kinds of metal packs makes it eminently suitable for installation in can making lines where frequent changes in size are required. Mild steel sheet up to a maximum thickness of .0375 inches can also be cut with less cuts per operation.

Constructed to endure long working periods at high out-put rates, the machine is manufactured with the table, a heavily ribbed casting with a precisely machined flat top surface, superimposed upon a rigid box section cast iron stand of ample strength for complete steadiness while running. The machine is arranged so that it can be driven by belt from a line shaft or by self-contained motor for 400-440 volts, 3 phase, 50 cycles supply, with drive and machine cut gears adequately guarded by sheet metal covers.

All working parts, drive gears, clutch, etc., with the exception of the gears for driving the feed-in rolls are positioned on the left hand side of the machine.

The machine will also cut paper and card, thin wire mesh, sheet celluloid, plastics and other similar light materials.

Cutters : Shearing cutters are of high grade alloy steel, with double edges, ground with uniform accuracy, to an angle of 1½° to 3°, from the outside edge towards the centre, the variation of grinding angle depending upon the hardness of the material which is to be cut. These cutters are attached by countersunk screws to the hub, this being locked on the shaft by a method which ensures long cutter life and accurate cutting. Should one side of the cutters become dulled they can be mated with either the inside or outside cutting edge, thus providing a double life for each cutter and a ready answer should one edge become dull. Standard or narrow width hubs can be supplied as required. The cutters are mounted on heat treated precision ground alloy steel shafts.

Grinding attachment : An electrical grinding attachment can be supplied, this may be said to be essential equipment because the cutters must be ground with uniform accuracy and this can only be achieved on the machine. The grinding apparatus fits to the rear of the machine after removal of the feed-out rolls and the grinding of the cutters takes place *in situ.*

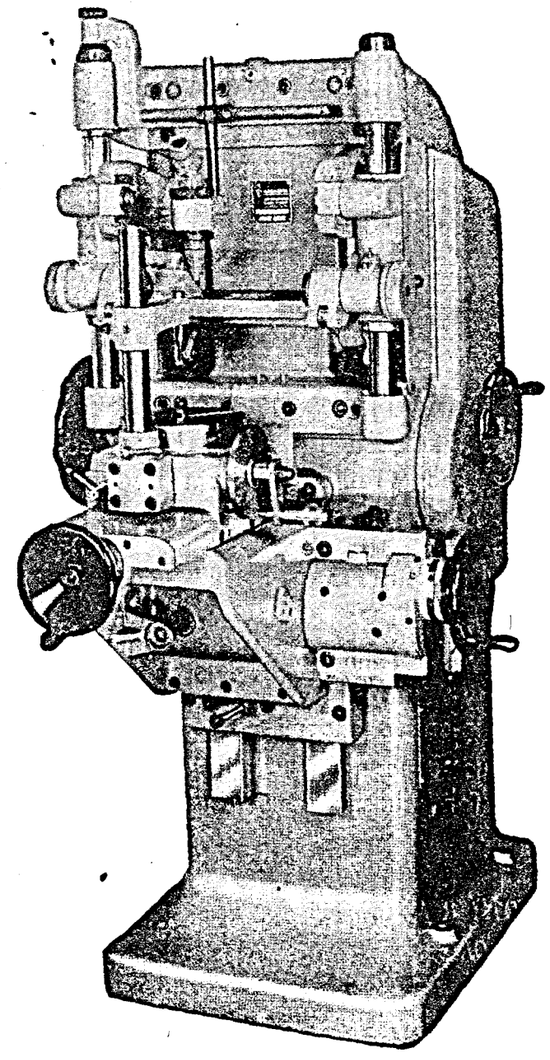
Front feed Rolls, for fixing in front of the cutters, can be supplied if required. These are a special feature of the machine and greatly increase feeding efficiency in slitting, preventing twisting of the metal during cutting operations, particularly while cutting very narrow strips. Guide fingers with finger bars can be supplied for supporting the metal in position while slitting. These are not necessary if front feed rolls are used.

Feed out Rolls are supplied as standard equipment. These are fitted to the rear of the machine and easy access is provided to the fixing screws of the bearings when the necessity of grinding the cutters makes removal of the rolls essential.

All rolls are of high grade alloy steel, heat treated and precision ground, and ample means of lubrication are provided.

The Clutch is of the internal expansion type with a smooth positive action and non-slip operation. Control is by hand lever with a lateral movement, situated on the left hand side of the machine.

The machine is supplied fitted with table, feed out rolls and provision for grinding attachment. *Extra Equipment* includes feed finger bars, feed fingers, front feed rolls, cutters, wide hubs, narrow hubs, grinding attachment, and self-contained motor 400–440 volts, 3 phase, 50 cycles and starter. The motor mounts on a base plate, adjustable for varying tension in the vee belt drive.



DRIVE

Flanged motor to drive the hydraulic gear unit. Switching on and off through the medium of a motor protection switch.

HYDRAULIC GEAR UNIT

Hydraulic gear unit for lifting and swinging movement of the shaping tool (slotting tool)

LIFT STROKE MOVEMENT

Lever gear produces the straight-line lift movement of the shaping tool; adjustability of stroke: 50 – 150 mm. at the adjustment spindle.

SWING-OVER MOVEMENT

Lever gear produces the swing-over movement of the shaping tool after complection of the straightline lift movement; the swing-over movement can be set as required 0—90° at the adjustment spindle even when the foot does not require a radius.

PUNCH FORMING AND SHAPING MACHINE WITH SLOTTING ATTACHMENT

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OR

THE SUPDT., MACHINE TOOL PROTOTYPE FACTORY, AMBARNATH.