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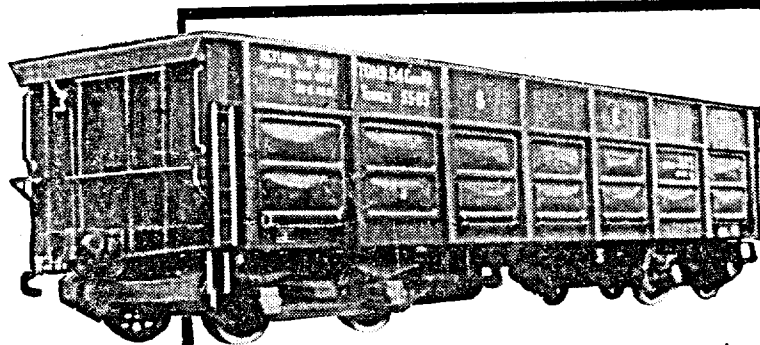
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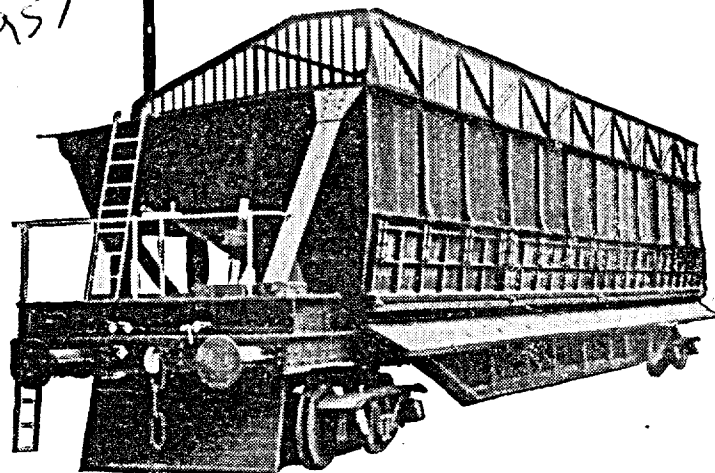
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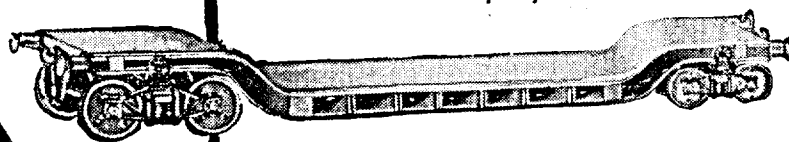


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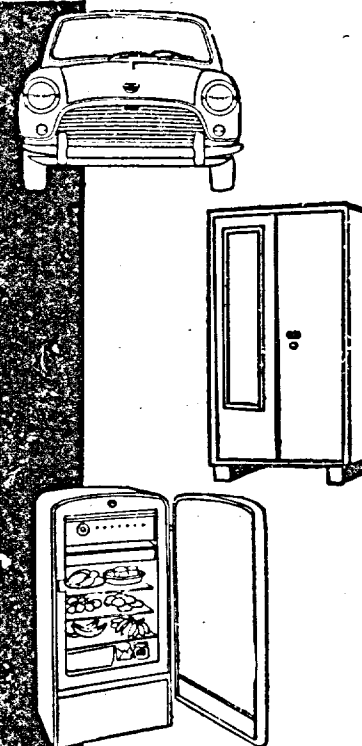
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CONTENTS

	PAGE
The Worker and Management	7
Visitors to the Factory	13
Contribution by the Bogie Shop, I.C.F.	17
From a Woodshed Laboratory	18
News from Switzerland	20
News and Views	22
The Romance of Petrochemicals	23
'Epoxy'—New—Wonder in the World of Plastics	25
Industrial News	26
The Bounty from the Sun	28
The Suggestion Jackpot	30
The Architect's Ally	31
Sports	33
Brain Teasers	34

ON THE COVER:

"The layout of I.C.F."



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THE
VOL. V, No. 9 **RAILCOACH** DECEMBER 1961

THE WORKER AND MANAGEMENT

BY
G. RAMANUJAM

Vice-President, Indian National Trade Union Congress

Labour will have to reject the theory of 'eternal conflict' with management. It must concede the legitimate rights of the employer. The conflict, if at all, can never be a conflict of interests; for, the prosperity of the concern leading in turn to the prosperity of the employer and the employees is a common interest. They, therefore, both work for a common objective. If at any time conflict arises, that can only be a conflict between two points of view of the partners wedded to a common objective. Labour must learn to open up a new chapter of understanding co-operation with management for the benefit of the industry, the people and itself.

Employers will have to stop thinking of workers in terms of mere tokens and ticket numbers. They must realise that a worker is a human being and must start dealing with him on that footing. They must understand that labour problem is essentially a human problem. The tendency to impersonalise the workers as labour force as if it were something comparable to the horse-power of the machines should be discouraged. The attempt to always link labour with any trouble in the plant, and call it invariably as labour-trouble, must also be given up. It is possible that such difficulties are also due to management-trouble. Management should cease putting themselves on an infallible plane, as if it is only labour that is all the time bound to be in the wrong. The management side too needs quite a lot of introspection and the courage to act up to its conviction.

While it is easy to define the term *worker*, it is not quite so easy to define the term *management*. Whereas the worker is an individual and intensely human, the term *management* merely represents a function; and the *functionary* in this respect need not be one person. It may as well consist of a group of persons, each operating at a different level. Even if we assume for the purpose of our present talk that *management* means not the management-function, but the management-organisation, it will still remain impersonalised—a sort of machine which tends to function in a mechanical manner; and the more mechanical it is in its functioning, the more it is praised as being thoroughly systematic. Of course, to be systematic is very good, but then rigidity is not always desirable.

Humanise Management-machine

The management-machine must therefore be humanised so as to make it fit enough to deal with workers who are human beings and expect to be treated as such. This is a very difficult process in the modern set-up of mechanised large-scale production. The management in these cases has to deal with both machines and men. And very often, they give the same treatment to both, which makes the treatment meted out to man lack the human touch. Sometimes it is even worse. Man is given even a worse treatment than the machine. The argument goes that *machines* are very costly, and they have got to be looked after carefully, but not so the man, who is to them *cheap*. Machines have no patience, no

elasticity and their demands must be met and are met. But not so the worker's. He is often not rigid. He is patient and elastic, and so his needs can wait, and sometimes has to wait eternally. For instance, if a motor car would give 30 miles per gallon, there can be no argument about increasing it, no negotiations, conciliation or arbitration or adjudication about it. At the end of the thirtieth mile it stops if you do not put in additional petrol. But not so far the worker. If his need-based minimum wage is Rs. X, he is always made to work even if he is paid less; and his elasticity in endurance is taxed, thus reducing him to a lowered treatment than the soul-less machines. Perhaps the fact that management itself has become a machine, accounts for machines being put up in importance over man! This seems to be rather upside-down; for it should be that machines are for men; and not men for machines!

If therefore substantial results are to be achieved, the management-machine must be fully humanised. This would call for a complete overhauling of the present attitude and approach to labour-management relations. It would call for a proper appreciation of the rights and obligations of the two parties in the process of production and distribution of wealth, and the consequent relationship that should be helped to flourish between them.

The two ways

There may be many theories concerning employer-employee relations; but two of them appear to me to be very important. The one is the Marxian Theory and the other, the Gandhian. The Marxian theory, for more than one reason, will be found to be rather out-moded against present-day conditions in the world, particularly in India. There is no Capitalist class flourishing today as Marx had defined. In fact, with the rapid expansion of the Public Joint Stock Companies, it is not necessary that the shareholders should belong to the Capitalist-class of the Marxian conception.

Similarly there has been a great change in the working class and lower-middle class. It is no more the proletariat of the Marxian conception. In advanced countries there has been some capital formation among the working class too, as a result of the workers enjoying a saving wage. These savings have been invested in Joint Stock Companies and Co-operatives. Increased productivity leading to increased wages have lifted the workers in those countries above the living-wage standard to the saving-wage standard. The same process too can help such surplus formation among labour in India.

The Marxian Theory of *class-conflict* and the inevitable annihilation of one class—which must be the capitalist class—cannot also hold the field now, for the mere reason that such classes do not exist now. This, however, is not to say that we have achieved a classless society. That in my opinion is definitely impossible. For, as long as there are men and women with different capacities and talents, classes are bound to exist. Even in communist countries, where they might have abolished the private capitalist class, it should not be forgotten that they have at the same time created a new class in which is concentrated political power, which is even more dangerous than the concentration of money power. There is thus no classless society even in countries which swear by Marx. That theory has not worked anywhere and will not work at any time.

The Gandhian approach

In contrast, the Gandhian thought and approach seem to me to be more rational and practical. Gandhiji also admits there are conflicts now between classes. But he does not say, that because there is conflict between classes, abolish the classes. He says, if there is conflict, abolish the conflict, and not the classes. It is not the existence of classes that is wrong. But it is the existence of conflict between the classes that is wrong. Therefore

correct the wrong. Substitute *conflict* by *co-operation*; and the result will be that instead of class-conflict we will have class co-operation. What is wrong in the existence of classes, if they exist only to co-operate with the other classes and not to come in conflict with them?

Gandhiji wants the co-operation between the classes not merely for the benefit of the two classes co-operating, but he wants such co-operation for the benefit of the community as a whole. According to Gandhiji the real employers are the people! They are the employer of all employers; and if they go on strike, the so-called employer also becomes unemployed along with those whom he was boasting he was employing. Therefore Gandhiji advised both employers and employees to consider themselves as *co-servants* of the people. He wanted both labour and capital to consider themselves as Joint-Trustees to whose joint hands has been entrusted the welfare of the people. Their co-operation should therefore aim at not merely bettering their own respective interests, but also in ensuring better service to the community which is the real master.

Nothing but hatred, anger and destruction can result out of conflict. But out of co-operation can materialise all the positive things that sustain life and make life worth living. Such co-operation may be voluntary out of understanding or forced and wrested. Wherever such co-operation is not spontaneous, arising out of a sincere appreciation of others' rights and obligations, both to themselves and to the people, the pace of productivity is bound to be the poorest. Where, on the other hand, such co-operation is spontaneous based on a sincere conviction, productivity would easily go up to the optimum, without anybody driving the parties.

Needed a re-education

The problem therefore is how to make such understanding co-operation possible between

the worker and the management. Obviously it would require some education, rather re-education. Both the employer and his employees may have to unlearn a lot before beginning to learn a few things afresh.

Labour will have to reject the theory of *eternal conflict* with management. It must concede the legitimate rights of the employer. The conflict, if at all, can never be a conflict of interests; for, the prosperity of the concern leading in turn to the prosperity of the employer and the employees is a common interest. They therefore both work for a common objective. If at any time conflict arises, that can only be a conflict between two points of view of the partners wedded to a common objective. Labour must learn to open up a new chapter of understanding co-operation with management for the benefit of the industry, the people and itself.

Employers will have to stop thinking of workers in terms of mere tokens and ticket numbers. They must realise that a worker is a human being and must start dealing with him on that footing. They must understand that labour problem is essentially a human problem. The tendency to impersonalise the workers as *labour force* as if it were something comparable to the horse-power of the machines should be discouraged. The attempt to always link labour with any trouble in the plant, and call it invariably as *labour-trouble*, must also be given up. It is possible that such difficulties are also due to *management-trouble*. Management should cease putting themselves on an *Infalible plane*, as if it is only labour that is all the time bound to be in the wrong. I think the management side too needs quite a lot of introspection and the courage to act up to its conviction.

Management must realise that there is no use in trying to put down legitimate trade union activity. Trade union movement has come to stay; and it is too late in the day either to now attempt to suppress it or to give

an impression that the management does not like it. Managements must realise that a good trade union is as much an asset to the industry as its plant, machinery and building. Therefore it is as much the duty of the management to make the atmosphere conducive for the growth of a healthy trade union in the plant as the maintenance of the plant itself. This cannot be achieved by granting out-of-the-way favours to either the workers or their organisations. This can be achieved only by the management adopting a reasonable attitude in all matters connected with labour by making it possible for the workers to believe in the management's *bona fides* and by management readily sharing with the workers all information connected with the working of the plant and not forcing a fight to delay the justice that cannot be denied. Managements should learn to avoid too legalistic an approach in their dealings with their workers, and should always be guided by the requirements of a human approach giving broad and prompt justice.

Management should give up the old idea of *master-and-servant* relationship between itself and its workers. The entire personnel, i.e. management and workmen, should function as one team. Those in the management positions should develop qualities of leadership and must have the capacity to take along with them the rest. They should be able to inspire confidence among the workers whom they are required to lead towards fulfilment of production targets. Those in management should so conduct themselves that the idea of the *team* permeates the entire rank and file of workers resulting in a healthy team spirit pervading the entire plant.

Industrial relations machinery

However, even under ideal labour-management relations differences are bound to arise from time to time. The attempt should not be to see that no differences arise, but it should be to settle all those differences promptly, fairly and finally. This requires an effective

industrial relations machinery. Existence of facilities for settlement of disputes by the parties themselves sitting across the table and discussing problems would be ideal. But it is possible that in spite of the best intentions on both sides, there may be honest differences of opinion and the dispute may still survive. In all such cases there must be available an effective machinery for the prompt settlement of disputes. This requirement is met by the machinery of voluntary arbitration. Parties must agree in advance that all unresolved disputes shall be submitted voluntarily for arbitration by a person or persons already approved and his or their decision shall be final and binding on both.

It has been my unfortunate experience that invariably it is management that refuses to agree for arbitration. Management seem to prefer adjudication, with all its legal technicalities, appeals and the consequent delays. This means that disputes are allowed to remain unresolved for a considerable time, and all the time, the parties who are expected to co-operate and work as a team for increasing productivity, will be fighting in courts and tribunals as petitioners and respondents or complainants and opponents! It is this tendency in our country which is largely responsible for worker's discontent. It naturally damps the enthusiasm of the workers to co-operate with management in increasing productivity. It is high time that managements do a little bit of serious re-thinking and help to create a better climate, in the interest of productivity.

The progress of workers

The worker knows that his status in industry and society is fast changing and he is gradually coming into his own. Some thirteen years back, the employer had almost the unfettered right to hire and fire any worker as he liked. But now, if a worker is unjustly denied employment or is victimised, courts have been given powers to intervene and reinstate the worker. Formerly the employer had the last

word in the matter of fixing the wages of his worker. But now if the worker was found to be paid unjustifiably low wages, a tribunal has the right to enquire into it and compel the employer to pay a higher wage as fixed by it. Previously the worker was entitled to nothing more than his contractual wage, and whatever was left, after paying such contractual wage, went entirely into the coffers of the employers. But now labour's right to a share in the profits in addition to the contractual wage, has been recognised in the form of profit-sharing annual bonuses. Logically the progress registered by labour did not stop with this sharing of profits. It went a step further. Labour's right to participate in the management of industries has now been recognised in principle. This is indeed considerable progress.

Except for labour's right to participate in the management of industries, which is still in a nebulous state, the rest of the progress achieved was made possible not so much by any progressive attitude of the employers as a class, as by legislation, courts and trade unions. This unfortunate fact is making labour depend more and more on courts, tribunals and law than on bi-partite negotiations. Labour seems to have come to the conclusion that in this country, employers as a class, barring a few notable exceptions, have to be compelled by law before they can be made to concede even legitimate dues. It is very difficult to make any real progress in the field of productivity so long as this impression is allowed to persist. It is for employers to change the atmosphere and help to create a new impression. The earlier they make a beginning in this direction, the better for all concerned.

Problem of multiple unions

It cannot be said that employers have no difficulty to overcome in their efforts to create the new climate. I can well imagine employers' difficulties in this direction, particularly in the face of multiple unions. It is no doubt true that if the entire labour is organised under a single national centre, with no rival unions

either at the plant or national level, it will be easy for a good employer to deal with that single union and enter into negotiated settlements. But that possibility of one-union-for-one-industry seems to me as rather remote chance. It will take considerable time and we cannot afford to sit back and wait in a do-nothing attitude till that happens. It is primarily a task for labour and labour leadership to bring about such unity. But it is a gradual process of education, for by intelligent conviction alone can there be real unity brought about by labour consciously rejecting the spurious and rallying round the genuine. Labour must learn to lift the trade union movement above party politics. Trade union movement should cease to be a plaything in the hands of politicians. This is not possible unless labour is educated and made intelligent.

Even so managements are not quite so helpless as they would claim to be; particularly after the acceptance by all parties of the Code of Discipline in Industry. If only employers also individually accept the Code and scrupulously honour it fully, they will be setting the pace for labour and will be forcing labour and their organisations too to follow the Code. If the Code of Discipline becomes a live-factor in industrial relations, the evils arising from multiplicity of unions can be greatly mitigated. For whatever the number of unions operating at the plant level, there will be only one line of approach to all problems, viz. the Code Line. And in course of time when labour understands that approach to problems are the same by all unions, they will feel the superfluity of multiple unions and may well decide to be under one union. This will also help labour to see through the political machinations of the spurious unions and discard such unions. It is therefore to the advantage of industry, labour and the country that we make the Code of Discipline in industry the sheet anchor of Employer-Employee Relations. Employers have a duty

in this regard. They should erase the old impression and create a new one by themselves taking the lead and scrupulously following the Code and setting an example for labour.

Public sector—no exception

Whatever has been said above in regard to managements applies equally to private and public sector. There should be no distinction

between the two sectors and this has been conceded by the Second Plan also. In fact, the need for humanising the management-machine and the need for making labour participation in management a reality are even more pronounced in the public sector to avoid the tyranny of bureaucratic machinery and any tendency of the public sector degeneration into state bureaucratic capitalism.

(Courtesy—PRODUCTIVITY—N.P.C. Journal)

Management is the developing of people and not the direction of things. Management and personnel administration are one and the same. They should never be separated. Management is personnel administration.

LAWRENCE APPLEY, *ex-President,*
American Management Association

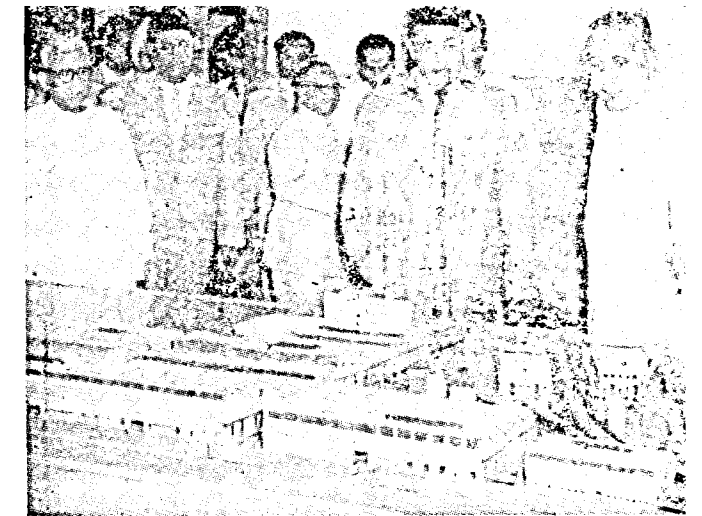


His Excellency Mr. L. I. Brezhnev, Chairman of the Presidium of the Supreme Soviet of U.S.S.R. who visited the Factory on 22-12-61 is being presented with a bouquet by a child during the drive around the staff colony.



His Majesty the Yang di Pertuan Agong of Malaya, coming out after seeing a worker's quarter, during his visit on 16-12-61.

VISITORS TO THE FACTORY



CAOR explaining the salient details of the factory to His Majesty the Yang di Pertuan Agong of Malaya, with the help of model.

The most important visit to the factory during the month was that of his Excellency Mr. L. I. Brezhnev, Chairman of the Presidium of the Supreme Soviet of the U.S.S.R. who visited us on the 22nd December 1961. Shri K. Swarup, Chief Administrative Officer of this Factory welcomed the distinguished visitor on arrival and garlanded him. After explaining the salient details, the CAOR took him round the factory. Inside the workshops His Excellency inspected a fully furnished First Class Coach manufactured in the factory. Later His Excellency visited the Staff Colony where he was accorded a reception and presented with a bouquet by children of the Colony School. Later His Excellency inspected the residential quarter of a worker of the factory in the staff colony. At the conclusion of the visit Mr. Swarup, Chief Administrative Officer of this Factory presented the distinguished visitor a model of the I.C.F. built coach. His Excellency was pleased to record his impression in the Visitors Book as follows:

"We wish the workers, Engineers and technicians of the factory new successes in production for the benefit of the Indian people. Long live friendship between Indian and Soviet people for the sake of peace."

His Majesty the Yang di Pertuan Agong of Malaya, visited the I.C.F. on the 16th December 1961. On arrival the royal guest was received and garlanded by Shri K. Swarup, Chief Administrative Officer. His Majesty was taken round the workshops where he inspected a fully furnished coach. His Majesty visited the staff colony where he was accorded a reception by children of the colony school who presented him a bouquet. His Majesty also inspected the quarter of a worker in the staff colony. At the conclusion of the visit Shri K. Swarup, the Chief Administrative Officer presented to His Majesty a model of an I.C.F. built coach as a memento of the visit.

A French Parliamentary Delegation paid a visit to the Integral Coach Factory on the afternoon of the 1st December 1961.

Mr. Hideo Nakayama, Deputy Manager, Industrial Bank of Japan Ltd., visited the Integral Coach Factory on the 1st December 1961. After going round the Factory he recorded his impressions in the visitors book as follows. "I am happy to have opportunity of seeing this factory. Your wonderful factory charmed me so much. I hope you and we co-operate with each other in the industrial fields of Asian market."

Mr. T.E. Potts, Managing Director of British Oxygen Co., Ltd., U.K., visited our Factory on the 2nd December 1961. After going round the factory he observed that the factory was "an outstanding achievement."

Mr. James Pollock, Mr. James Phillip and Mr. D. Campbell Reid, Senior British Personnel of M/s. Ashok Leyland Ltd., Madras, visited the I.C.F. on the 8th December 1961.

Prof. A.M. Riachikov and Dr. V.A. Nickalove, Geographers at the University of Moscow, paid a visit to I.C.F. on the afternoon of the 8th December 1961.

The Hon'ble Shri B.P. Sinha, Chief Justice of the Supreme Court of India visited the I.C.F. on the 19th December 1961. The distinguished visitor was received by Shri K. Swarup, Chief Administrative Officer of this factory. After going round the factory the Hon'ble Chief Justice was pleased to record the following lines in the Visitor's Book of this factory. "An exhilarating experience which makes me proud that India can do it."



H.E. Mr. Brezhnev talking to Sri S. A. Gani, Machinist, Tool Room, I.C.F.



H.E. Mr. Brezhnev being profusely garlanded on arrival by Sri Swarup, CAOR.

Mr. Wladyslaw Grzedzielski, Secretary-General, Polish National Commission for UNESCO paid a visit to the I.C.F. on the 20th December 1961. At the conclusion of the visit he recorded the following lines in the Visitors' Book of this factory.

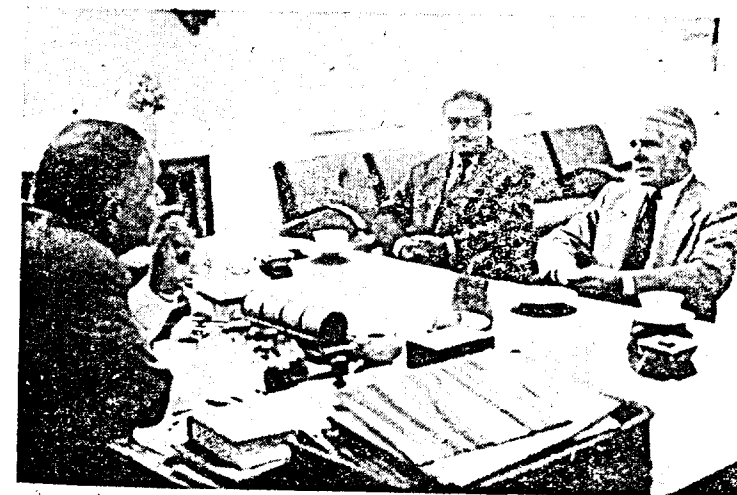
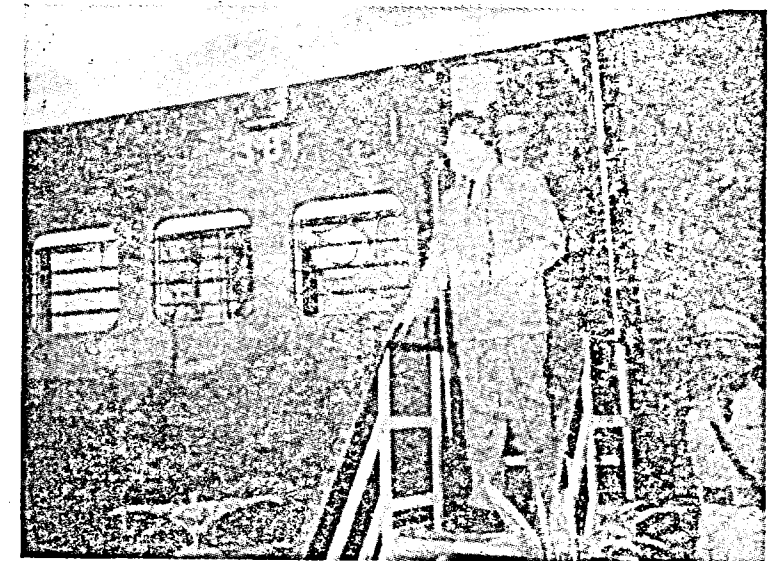
"I find here same enthusiasm in the workers aid for industrializing India as in Poland and my best wishes to you."

Fourteen members of the Maharashtra Assembly visited the I.C.F. on the 21st December 1961. After going round the factory they recorded the following impressions in the Visitors' Book of this factory.

"The Estimates Committee of the Maharashtra Legislature was taken round the whole factory and saw its working for nearly two and half hours. It was a revelation to watch the various sections of the factory and see the manufacture of small parts brought up to the ultimate assembly of the coach."

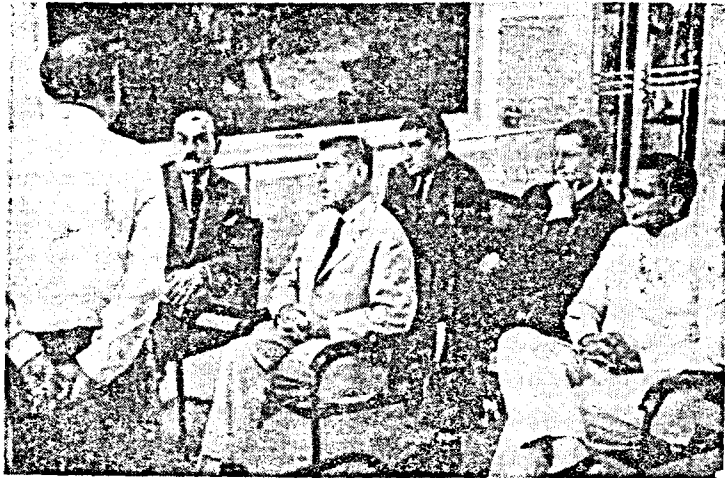
DECEMBER 1961

H.E. Mr. Brezhnev, stepping out of an I.C.F. built First Class Coach, after inspecting the same.



Mr. T. E. Potts, Managing Director of the British Oxygen Company, who visited the Factory on 2-12-61, seen with the CAOR.

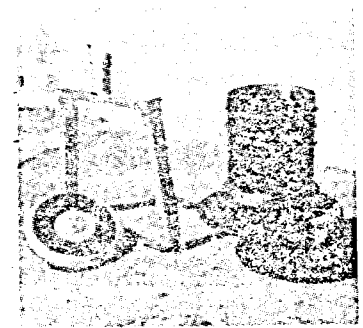
RAILCOACH



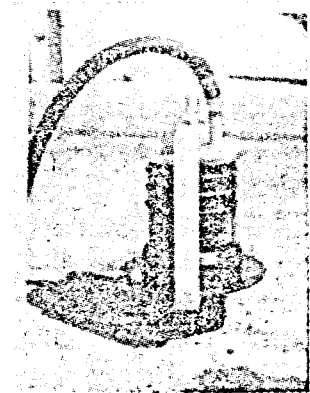
The French Parliamentary delegation who visited I.C.F. on 1-12-61, being explained the salient details of the I.C.F. by Sri K. T. Jethmalani, Secretary to CAOR

CONTRIBUTION BY THE BOGIE SHOP ICF

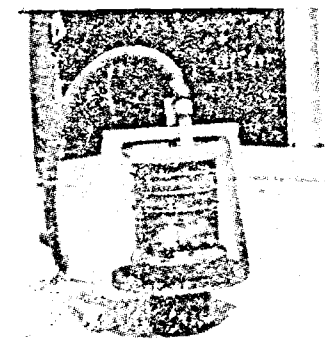
The Lower Spring Seat Tube of the axle box guide arrangement is now being fabricated in our shops to save the purchase of complete tubes, which involve foreign exchange. The fabrication involves two welding seams along the length of the tube, which is in addition to the welding between the tube and the spring seat.



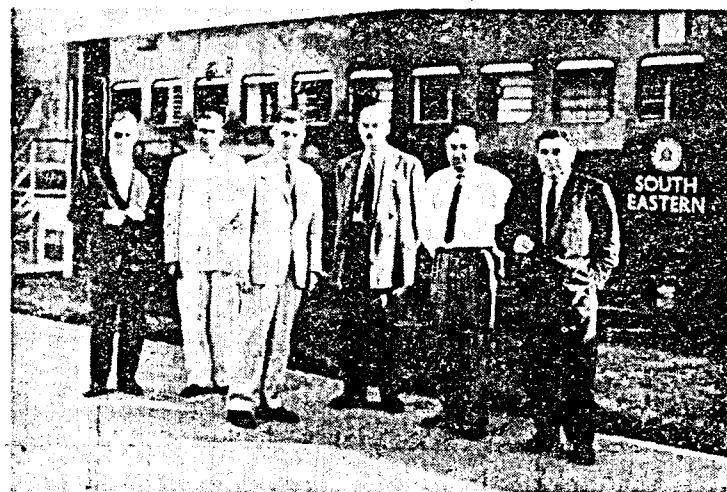
The lower spring seat has to carry oil required for the hydraulic damper arrangement. To ensure that the oil does not leak out through the welds, (if faulty) a testing equipment was designed and manufactured by the bogie shop, particulars of which can be seen in the photographs.



The lower spring seat is filled with oil to the correct level and a cover placed over it. The cover is held firmly down by means of a clamp, and air under pressure is forced into the now enclosed lower spring seat. Under the pneumatic pressure of 80 tons per square inch faults if any in the welds are immediately revealed.



The French Parliamentary delegation seen in front of an I.C.F. built First Class Coach.



FROM A WOODSHED LABORATORY

The Story of Aluminium's Rise

"Julia, Julia, I've found it at last!"

These words from Charles Martin Hall, in 1886, to his sister Julia, his assistant in his woodshed laboratory, signalled the discovery of a process to separate aluminium from bauxite.

From its status as a metallurgical rarity, aluminium has become the second most widely used metal in modern U.S. living, thanks to Hall's discovery.

Hall's success in producing aluminium through an electrolytic process climaxed attempts of men for thousands of years to separate this 'metal of clay' from its association with other elements of earth.

About this time that Hall made his discovery, a Frenchman, Paul Heroult, also succeeded in separating the metal through the same process. What is more remarkable is that both were of the same age when they made their discovery, 23 years old, and both died in the same year, 1914.

The Discovery

Significant advances in science seldom come by chance, and it was Hall's perseverance that brought him success. From his earliest years he had shown unusual interest and ability in chemistry. The observation in a book that "every clay bank is a mine of aluminium" fired his imagination. Because at that time the price of aluminium exceeded that of silver, he dreamed of turning the clay banks of the world into mines of "silver."

He began his experiments while attending Oberlin College and improvised a laboratory in a woodshed at the back of his house.

He went through the painstaking process of experimenting with different solvents. On his tenth try, he used cryolite. With mounting

curiosity he and his sister watched the process. Finally, unable to restrain his impatience longer, he poured the hot liquid into an old skillet to cool. When he broke up the pieces with a hammer, he discovered the small silvery buttons that were aluminium.

Hall patented his process and it was then that he found Paul Heroult had made a similar discovery. But since Heroult's patents were not filed until April 23, 1886, and Charles Hall had documentary proof that his discovery was made on February 23, 1886, he was credited with the original discovery. Recognising the 'almost simultaneous discoveries, however, the process is known as the Hall-Heroult process.

Because the process is continuous, aluminium producers can operate 24-hours a day, seven days a week, on an almost completely automated basis.

The effect of Hall's discovery on the aluminium industry can best be told in terms of the amount of the metal used today and at the time of his discovery. In 1886, world production of aluminium was only 16 metric tons; in 1960 production in the United States alone totalled well over 2,000,000 tons.

Manifold Uses

Aluminium, combining light weight with greater and greater strength, plus such other desirable properties as resistance to rust and corrosion, has successfully invaded almost every field belonging to the older metals.

The first significant development for aluminium as a common commercial metal came in 1890 when it was found that the metal possessed a combination of properties ideally suited for the manufacture of cooking utensils. The use of aluminium conductors for the transmission of electricity followed closely thereafter.

When the Washington Monument was being completed in 1884, a one hundred-ounce pyramidal casting was placed on top of the capstone. Made of aluminium and casting 225, it was at that time the largest casting ever produced in that metal. A half-century later when the monument was cleaned, the capstone casting was examined by metallurgists from the Bureau of Standards, who found it had been substantially unaffected by its 50 years of weathering.

The lightness of the metal, its high resistance to corrosion, its non-staining qualities, its excellent workability, as well as its colour, offered the architect a number of interesting possibilities, which are today exemplified in such applications as entire curtain walls for public buildings, prefabricated house panels, roofing and siding for agricultural and industrial buildings, marine architectural uses, window frames and sills, ornamental grilles and statuary, store fronts, and skylights.

One of the largest single users of aluminium is the transportation industry, the metal being employed in the construction of aeroplanes, tramway cars, railway passenger and freight cars, locomotives, trucks, buses, trailers, small pleasure craft, and bicycles and motor cycles.

The low specific gravity of the metal proves a distinct asset, for it helps to reduce the deadweight of the vehicle, resulting in economies in energy used up. The same quality found its use in bridge construction. In a long span bridge, approximately 80 per cent of the weight of the bridge is necessary to support the deadweight of the bridge itself. Lighten the floor system and the stress on the trusses can be reduced.

Literally hundreds of items common to everyday life are packaged in aluminium foils. Thermoplastic heat-sealed foil envelopes are used to package powdered coffee, dehydrated fruit juices, and some drugs where climatic conditions are likely to be severe.

Collapsible aluminium tubes are used for toothpaste, shaving cream, paint, and petroleum products. And aluminium caps and seals are manufactured by the millions for the use of the food, drug, cosmetic, and dairy industries.

Aluminium powder has many uses besides its application as the pigment portion in paints. For example, it is an essential ingredient in many pyrotechnic and explosive compounds.

Both Hall and Heroult died in 1914, before the aluminium era had come into its own. Were they alive today, they would see that practically every branch of industry is making use of aluminium in one form or another. Aluminium-stream-lined trains are speeding across the country; strong aluminium-alloy shovel dippers and dragline booms are at work in the coal fields; aluminium cooking utensils are known to every housewife; in fact the application for aluminium range from tiny nails and shoe eyelets to large moving vans and seagoing ships.

(USIS)



Niagara Falls is partially "shut off" late at night and in winter when there are few sightseers around. The feat is accomplished by diverting waters of the Niagara River away from the Falls and into power plants.

NEWS FROM SWITZERLAND

Compulsory testing of Swiss watches

Over 40 million is the figure quoted for the annual production of watches capable of being checked by statistically governed sampling at the thirteen offices set up by the Federation of Swiss Associations of Watch Manufacturers (FH) for the compulsory testing of the quality of Swiss watches. The main administrative centre of the testing organisation is equipped with an electronic ordinator, which calculates the final appreciations from the technical results fed to it, makes out the tables of statistics and prepares the monthly reports for the manufacturers concerned.

It is interesting to note that it is 75 years since the introduction of the first Swiss watch test, which was restricted to the optional and competitive testing of chronometers, carried out in two observatories and seven official timing stations. Since then, the FH has introduced a scheme for the general testing of watches, which became compulsory a few months ago for all members of the Federation and is now carried out in thirteen offices situated in the main watch making regions. This system of compulsory testing has been introduced to help industrialists perfect their production and to enable them to equal and even exceed the standards of workmanship and quality laid down. Since this system came into force, the average level of quality has risen even higher than it was, thus contributing to strengthening the position the Swiss watch has won for itself on the markets of the world.

An Interesting Invention : Perpetual Running Radio or Other Electronic Apparatuses

The use of photoelectric cells for supplying current to transistor radio sets and other small electronic appliances was hitherto only possible in the light, without it being possible to store the energy thus obtained. Thanks to

the patent recently taken out by an inventor domiciled in Switzerland, it is now possible to make transistor radios work without batteries, even in the dark. This result has been achieved by the permanent or alternating stabilisation of the voltage by means of an electronic valve, which makes it possible to store energy even under very feeble light conditions and prevents accumulators fed by photoelectric cells from discharging in the dark. One of the first uses to which this invention was put was to make a transistor radio set without battery or external source of current, which will run practically for ever. Placed in ordinary daylight for a few hours only, this apparatus will have a reserve of running time of over a hundred hours even in total darkness. No change is needed in the standard methods of manufacture to replace the battery by this new device, which can easily be made from components readily available in the trade. The new invention has already been used on the industrial scale in Switzerland for the perpetual transistor radio as well as for other electronic appliances. The patent, which may be worked under license, can be adapted to various other purposes: transistor tape recorders, perpetual clocks, automatic stop setting on cameras, electronic appliances for the hard of hearing, etc.

Tibet in Switzerland

A first group of twenty-three Tibetans are being trained for permanent settlement in the Toggenburg mountain area of North-Eastern Switzerland. More groups will follow. The newcomers, refugees from the "Roof of the World" seem to feel perfectly at home in the chilly climate of this "Roof of Europe." The Society for Tibetan Homesteads in Switzerland which, in co-operation with the Red Cross, is responsible for this generous resettlement operation, is confident that the experiment of bringing together to mountain peoples will be a full success.

Back to Nature in 1962 as 250 years ago

"I have closed all books, one only remains open for all eyes to see—the Book of Nature." These words were written more than two centuries ago by the man who was a discoverer and ardent admirer of Swiss scenic beauty and rustic life and may therefore be described as a fore-runner of tourist promotion—the poet educator and philosopher Jean-Jacques Rousseau of Geneva (1712-1778). His famous appeal to return to the bosom of Nature is to be renewed in a modern version in 1962 on the occasion of Rousseau's 250th birthday. Cultural and tourist circles in Switzerland intend to add a 20th century touch to the 18th century cry "Back to Nature" by urging the public also to return to "travel culture." "Don't race, relax!" will be the pass-word. The nation-wide programme of the Rousseau Year 1962 provides for special events in all parts of Switzerland, including the revival of 18th century - style folk - festivals. One of

the focal points of folklore and other activities will be, between June and September, St. Peter's Island in the lake of Bienne, which is one of the scenic jewels discovered by Rousseau. Several Swiss cities, including Geneva, Neuchatel, Montreux, Berne, Lucerne and Zurich, are preparing special exhibitions, festival performances and concert series in the honour of Jean-Jacques Rousseau.

The Swiss Gymnastics and Sports Museum has found a new home at 28 Missionsstrasse, Basle. It affords an interesting cross-section of the world of sports and its history with a special accent on gymnastics, one of the national pastimes of the Swiss.

The last tramway car, under garlands of flowers, has just made its round of honour through the City of Lucerne before being sent to the junk-yard. There will be no more rail traffic the streets of the city. All public transportation will be by bus or trolley bus.

LAUGHS

Census Officer : How many persons in this house ?

Small Girl : None, they are all out.

Census Officer : I mean how many persons slept here last night ?

Small Girl : None. Mother had a tooth-ache and kept all awake.

* * *

"What is your favourite sport, Doctor?"

"Sleighing."

"I mean, apart from business."

* * *

Junior : "Say—Mother, how much am I worth?"

Mother : Why, you're worth a million to me, dear."

Junior : "Well then, could you please advance me a rupee?"

* * *

NEWS AND VIEWS

"Free Uniforms for School Children"

A scheme for free issue of uniforms to primary school children of the railway employees receiving upto Rs. 225 per mensem as salary had been introduced. The number of children being benefited under the scheme annually was nearly 40,000 but the number was likely to vary from year to year.

This information was given by Shri S. V. Ramaswamy, Deputy Minister for Railways, in the Lok Sabha on December 4.

The amount to be spent on the scheme annually was approximately Rs. 9.5 lakhs but it was likely to vary from year to year. Each child was supplied three sets of cotton uniforms and in winter areas a full sleeved pull-over as an extra garment once in two years.

Chief Personnel Officers Discuss Amenities for Railway Men

Measures for the improvement of holiday homes and subsidised students' hostels, quick settlement of Provident Fund and Pension dues and redressal of grievances of the staff were some of the important subjects discussed at the two-day conference of the Chief Personnel Officers of the Zonal Railways which ended recently in New Delhi.

Set up at various hill stations and health resorts like Pahalgam, Simla, Puri, Courtallam, the holiday homes, 15 in number, provide Class III & Class IV railway staff with facilities for spending their holidays in comfort at a nominal charge.

There are at present 12 subsidised hostels run by the Railways in different linguistic areas where the children of railwaymen with pay upto a specified limit are allowed board and lodging at concessional rates. These hostels at present have a total capacity of over 500 students.

Views were also exchanged on the need for

strengthening the welfare organisation of the railways.

The Railway Minister, Shri Jagjivan Ram, in his address emphasised on the need for a close and personal relationship between the Railway Administration and its employees.

Deceased Employee's Son Shows Magnanimity of Heart

An unusual event stirred the minds of the employees of the Statistical Office of the South Eastern Railway when the son of a deceased co-worker came to pay off the debts of his late father, who had died 24 years ago.

Late Beni Madhab Das, a Clerk of the Statistical Office, while in service suddenly died in 1937, leaving his family in an extremely precarious financial position. The widow, with her eldest son still a minor, was put into serious hardship and could not pay the balance amount of a loan taken by her husband from the Co-operative Urban Bank of the Railway. Four colleagues of late Das, who stood sureties, had to pay off the unpaid balance of the loan.

Braving the vicissitudes of life, that minor boy is today running a business of his own and looking after the family in a much better way. When this honest man came to learn of his father's uncleared debts, he found out the sureties with the help of the Statistical Officer, three of whom are still living while the widow of the fourth is alive. On July 24 last, the son paid to the sureties their dues amounting to Rs. 614.88 NP.

The son is by no means a big gun in the business community. But he also contributed Rs. 25 to the fund created by the Statistical employees to help co-workers suffering from difficult diseases and said that they could not treat well their father who died a premature death. He wished that if his humble contribution came to the succour of any of his father's colleagues, he would feel happy.

THE ROMANCE OF PETROCHEMICALS

Just a few years ago a motorist thought of petroleum only as a fuel or a lubricant for his car—and he was more or less right. Today most people think the same, but they are mistaken. Today's motorist would find that the paint, upholstery, tyres, plastic fittings, and, if he lives in a cold climate, the anti-freeze for his car also contain petroleum products. He will also find petroleum in the detergent he uses to wash his car and even in the drug his doctor may prescribe if he has an accident!

All this is made possible by the growing young industry known as petrochemicals.

The term petrochemicals has come into wide usage recently as a convenient expression to denote a large and very complex chemical industry based on petroleum or natural gas. The products range in their ultimate forms, through numerous plastics, synthetic fibres, rubber, detergents, ingredients of paints, anti-freeze mixtures, pesticides, drugs, and hundred of other commonly used items.

The petrochemicals industry had its inception just over three decades ago. During this brief period both petroleum and natural gas have become the raw material for the production of an amazing range of items, and chemists think that thousands of other uses for petrochemicals have yet to be discovered. The present rate of discovery is 400 a year; as further research bears fruits, hosts of new products will be developed, scores of new factories built, and new scope added to industrial growth.

The rapid development of this branch of the chemical industry comes into clear focus when it is recalled that thirty years ago very few petrochemicals were commercially produced whereas today 25 per cent of the chemi-

cals in the United States come from this group. In the next decade, it is estimated, the share of petrochemicals in the chemical industry of the U. S. will be one half. In the last ten years, plant capacity and sales have quadrupled. The expansion programme now under way will double both these in the next couple of years.

Ethyl Alcohol

By its ability to wring valuable chemicals from oil and gas, the petrochemicals industry has already transformed the nation's manufacturing processes, products, and markets. A good example of a petrochemical is ethyl alcohol. Ethyl or grain alcohol, a chemical having many industrial and medicinal uses, used to be made exclusively by the fermentation of grains or of molasses. At present, probably 85 per cent of industrial alcohol production is petrochemical, and this synthetic variety is cheaper than fermented alcohol.

Benzene

Until 1950, benzene, another important industrial chemical, used to be made exclusively from coal tar. Since then petrochemical production of benzene was begun and now accounts for about a quarter of the U. S. output. Conditions are constantly changing in the industry, and a substance that is not a petrochemical today may become one tomorrow.

Nylon

The evolution of nylon is an example. In 1930 Dr. Wallace Carruthers, a research chemist in the Du Pont laboratory, revealed the progress of his work in high polymers (polymers are certain combinations of organic compounds). Du Pont's applied research

scientists pursued Carruther's theories and discovered that a potential fibre existed in some of the polymers and, four years later, came up with nylon.

At first coal tar was used exclusively to provide the raw material for the production of nylon. Now this synthetic fibre is manufactured almost exclusively from petrochemicals, as are the other major synthetic fibres—Dacron, Acrilon, and Orlon.

Synthetic fibres are being used more and more as substitutes for natural fibres not only because of their special qualities but also because their price is competitive with cotton and wool. Lower production costs, the result of increasing automation in the petrochemicals industry, has made this possible.

The average petrochemical plant consists of many miles of pipes and hundreds of tanks through which liquids flow. Pressure, temperature, flow rate, and composition are all adjusted and controlled by instruments at various points. When chemical companies began manufacturing petrochemicals, they adapted many of the refining industry's continuous, automatic techniques and added some of their own. As in the petroleum industry, automation in the petrochemicals industry has enabled continuous production at lower cost.

Detergents

A typical development of the 1940's and the early '50's has been the spectacular success of synthetic detergents which now exceed soap production in the United States. The molecule of a detergent consists of two parts, a water-soluble group at one end and a long water-insoluble "tail." This structure makes the removal of dirt from clothing speedier and more effective than with soluble soaps.

Plastics

Among plastics, it is difficult to say which are petrochemicals and which are not. Formaldehyde, from which one group of plastics is

made, is derived from menthol. And menthol itself can be made by synthesis either from coal or from natural gas.

Polyethylene plastics, almost entirely made from petrochemicals, were unknown to the average consumer ten years ago. Today this tough rosin is used in "squeeze" bottles, noiseless garbage cans and other housewares, electrical insulation, toys - a myriad of products.

Paints

In the field of paints, some of the materials, although derived from petroleum, may not be wholly petrochemical. The blackest of black pigment is carbon black from natural gas, and this form of the element carbon is also used in enormous quantities in compounding rubber products. The thinner in conventional paints is a petroleum product which, incidentally, is also used in dry cleaning. The new emulsion paints, waterbased paints that dry to a water-proof coating, also contain petrochemicals.

Paints have been improved by the addition of petrochemicals which provide quick-drying, long-lasting qualities. And the drug industry has been spreading tranquillity through the nation with its new tranquillising drugs, derived from petrochemicals.

Today the petrochemicals industry has some 200 companies. The industry has been a paying proposition. A vice-president of one of the leading firms in the petrochemicals industry recently observed that "for every dollar spent for research, development, and other experimental costs, new sales of at least 5.60 result after five years."

There is hardly an industry in the country that has not been affected by the advance of petrochemicals. In the food industry, petrochemicals supply fertilizer, pesticides, and additives used in processing plastics for packaging. In the home, in clothing, in recreation, in health, petrochemicals are having an ever-increasing effect.

"EPOXY"—NEW—WONDER IN THE WORLD OF PLASTICS

What can be poured from a pitcher, spread with a brush, is lighter than wood, has tough as steel, and can support an elephant on a square inch? The answer—epoxy, one of the amazing new products in the wonderful world of plastics.

The story of modern plastics began in an unusual way almost 100 years ago. A New York firm offered a 10,000 prize for the discovery of a substitute for the ivory used in the manufacture of billiard balls. John Wesley Hyatt, son of an American blacksmith, entered the contest. Hyatt failed to get the prize, but he succeeded in creating celluloid—the basic material for photographic negative and motion picture films. Epoxy is one of the newest of these resins.

After the birth of celluloid, intensive research was undertaken to find new uses for other cellulose products. When a suitable solvent for nitro-cellulose was discovered, the way was paved for fast drying lacquers and paints, aeroplane "dope" (the lacquer coating for cloth wings of aeroplanes), artificial leathers, and even the finger-nail polish worn by women.

The quick-drying lacquers helped revolutionise the automobile industry. Before these lacquers were introduced in the 1920's, automobile production was held up while coat after coat of paint waited to dry. Aeroplane dope had a similar influence on the aircraft industry. Coated textiles, to take the place of expensive leather, thus had their beginnings and since have been developed so that today there are a great many plastic coatings that have wide use. And the new paints and lacquers brought more colour, freshness, and beauty to homes and personal possessions.

Hundreds of specific coatings derived from both the cellulose and synthetic resins have

been devised for use inside and outside homes and other buildings, as well as for automobiles, furniture, luggage, stoves, refrigerators, and the like—finishes that resist marring, are tough and long-lasting, with many of them resistant to fire, weather, other chemicals, and corrosion.

Now modern research has created a new resin named epoxy. Developed independently by Swiss and American chemists, the epoxies are now widely used in such fields as laminating, adhesives, and industrial castings and in making clear varnishes and corrosion-resistant pipes. Their adhesive qualities are unique. An epoxy glue made recently by the United States National Bureau of Standards has a strength of 8,000 pounds per square inch at 450°F below zero, yet is effective at room temperature.

Epoxy plastics are rapidly taking the place of materials such as steel and other metals in tooling operations for making patterns, moulds, gauge tools, dies and models, jigs, etc. In most castings they can be poured, brushed, or applied with a putty knife without the use of heat or pressure.

Epoxy plastics can be treated so that they take on qualities which either match or excel those of forged steel. The use of these resins speeds up tooling operations, expedites production, and reduces overall costs, thus filling a critical function in today's rapidly advancing industrial technology.

Because these plastics can be bonded to practically any other material, including wood and steel, they are also used in the repair and modification of obsolete tools or broken dies, which would otherwise have to be thrown away.

Substituted extensively for plaster applications in the aircraft industry, epoxy plastics

provide more dimensional stability, better adhesion, and greater rigidity. The use of the plastics also extends the life of the steel, allowing numerous duplicates to be easily taken off without damage to the tool.

Epoxy is but one of the many new wonder plastics that have been produced in recent years. Modern industrial research which makes these new materials possible also finds seemingly countless uses for them. Today hundreds of attractive, durable plastics products

are in use in every country. In the future it seems certain that the demands of a growing world population for consumer products will be answered to a large degree by the plastics industry.

When John Wesley Hyatt set out to change a billiard ball almost 100 years ago, he could not have known that he was in fact beginning a new industry that would change the world!

(USIS)

INDUSTRIAL NEWS

Completely automatic forging of steel by pre-calculated programme has just been successfully demonstrated in the experimental forge of the British Iron and Steel Research Association in Sheffield.

The forging was carried out by a precision controlled 200-ton press interlocked with a fast, remote-controlled, experimental manipulator capable of longitudinal, rotational and lifting movements. Electric controls had been developed for both press and manipulator to ensure fast, accurate, operation and to synchronise the movements of the two machines. During the forging, the press and manipulator were controlled by a programme control unit on which every detail of the schedule of forging operations had been set up. In this schedule, the upper and lower limit of the squeeze for every pass were given, the manipulator feed between strokes was selected and the manipulation necessary between passes was also stored. The control unit signalled instructions to the press and manipulator in the appropriate sequence.

As a consequence, the finished forging in some respects exceeded the best current industrial standards as regards dimensional preci-

sion, and even so the job was accomplished twice as fast as the best skilled forging crew would be capable of doing. Even faster working will shortly be practicable.

The forging schedule was calculated in advance, from a theory of the change in shape during forging which had been worked out in the laboratory.

This advance in forging technique comes when many firms are already planning to re-equip their forges. At the moment there are probably more forging presses on order in Britain than at any previous time.

A British firm has developed a mechanical pen for the speedy and accurate drawing of instrument scales. It has been produced to overcome the many problems associated with the conventional method of drawing the scales by hand—including human error, fatigue, time consumption and the difficulty of obtaining the right calibre of worker.

It was essential that any automatic method should provide a means of applying the pen to the scale face with a consistently even pressure, avoiding bending and breakage of all pen tips.

Blobbing of ink and biting into the surface due to weight and rigidity also had to be avoided.

It comprises a quill which incorporates a plunger unit, the weight of which is counter balanced by a coil spring. Each size of pen has its own cartridge, with the correct size of guide hole in the tip. This makes the pen interchangeable. It also maintains the accuracy when pens are interchanged. Not more than 1,000th of an inch error results between any two graduations of scale. The unit is mounted on the engraving machine in place of the cutter spindle. The unit is then fed down to the scale face by means of the screw or lever feed. It can be used in two ways: by employing a master copy of the scale face or by picking the calibrated markings previously sketched on the scale face.

* * *

A pneumatic-tyred push-and-pull diesel shuttle minicar designed specifically for the most arduous conditions to be met with in deep mining and tunnelling, has been developed by a Lincolnshire engineering firm.

The basic machine is a 113 b. h. p. 10-ton payload dumper in which the body, operator's seat and controls are exceptionally low slung to provide the very substantial reduction in overall height, compared with the conventional dumper, so necessary underground.

The body design also includes an unusually low scow and to facilitate working with the special types of mechanical loader used in deep mines. Of particular value in the minicar is the reversible seat and dual controls that enable the operator always to face the direction of travel—turning the machine around in narrow tunnels is therefore obviated.

* * *

A new measuring instrument has been announced in which an electric pick-up is guided over a maximum length of 4-in. (100 mm) to provide an assessment of form

errors by reference to a straight datum surface contained within the instrument. Accuracy of movement is such that departure from the main straight line does not exceed 0.25 microns in 100 mm.

The speed of traverse and shape of stylus are selected to allow study in graph form of the lower frequency surface errors without being masked by the smaller irregularities.

The instrument (the Talylin) operates with the amplifier and recorder of the Model 3 'Talysurf' so that users of this instrument will find the new instrument to be a valuable addition to extend the range of surface measurements. A support plate enables the Talylin to be mounted on the model 3 stand in place of the gearbox and pick-up, to measure components such as rollers, inner and outer race tracks, and large radius cam plates.

An alternative support permits the instrument to be placed on, or adjacent to larger surfaces which cannot be accommodated on the stand. Such components as large rolls and machine slideways can be checked in this way.

RAILCOACH

Invites contributions from staff of the I.C.F. for publication. Photographs of their children and family may also be sent. Articles should be typewritten on one side of the page in double space.

RAILCOACH

THE BOUNTY FROM THE SUN

The sun indeed has been behind every form of life known to this planet from the very beginning. If suddenly the sun were to be shut off from the earth, all life would become extinct in a matter of days.

The amount of solar energy streaming to earth each day is 32,000 times greater than the power presently utilised by the world's population during the same 24 hours.

Scientists who are trying to harness the power of the sun know it is only a matter of time before the fossil fuels—oil, gas, and coal—are exhausted. They know too that even atomic energy is not the answer to man's long-range power needs, for its essential element, uranium, is also exhaustible.

Man can use these sources of power, provided by nature during millions of years, but he cannot replace them. Eventually the world must depend on other sources of power. Because solar energy could serve mankind as long as life continues on this planet, scientific investigators in some thirty nations are searching for economical methods to trap the sun's rays and put them to work.

Solar Cooker

In India, the solar cooker has demonstrated that family meals can be cooked in the heat of the sun's rays concentrated by a curved reflector. If inexpensive solar cookers were made available widely in Indian villages, the traditional fuel, dried cow-dung, could be more efficiently used as fertiliser.

In the United States methods and mechanisms have also been devised for harnessing solar energy. The United States has developed two basic types of solar cookers. One is a simple reflector which concentrates the sun's rays on a cooking pan (similar to the Indian one); the other is a solar oven—an insulated metal box with a glass window surrounded by reflectors. It reaches temperatures of 200°C

—enough to bake bread in the same time required for conventional ovens.

In the United States, research on solar energy, so far sponsored by individuals and private organisations, is directed to secure first a concentration of the sun's heat to produce electricity at an economic rate; secondly, to devise a method by which solar heat can be stored for use when needed; and thirdly, to unravel the deepest mystery of nature—photosynthesis, or the chemical reaction which sunlight has on plants.

Solar Generator

Under the influence of sunlight, plants combine carbon dioxide and water, with chlorophyll acting as a catalyst, into carbohydrates of many forms, all of which have the advantage to man that they can be "burned," either as food in the stomach or as fuel in other converters, for the production of energy.

Mechanical devices to secure enough concentration of the sun's heat have generally been found prohibitively costly; but scientists argue that, if solar energy cannot be immediately made available to power-consuming urban areas and factories, it can be tapped to serve small communities.

The first application of power derived from the sun's rays may be on the farm and in the home and for spreading more usable energy into the hitherto under-powered areas of the world via machines operating at lower temperatures and slower speeds and perhaps producing lower voltages of old-fashioned direct current. These power generators will be comparatively cheap and simple to operate and will be found most useful where the sun is bright and water scarce.

A solar generator recently developed by a leading American firm employs a parabolic reflector to concentrate the heat of the sun or

a series of thermocouples, i.e., a combination of two dissimilar metals in contact with each other. When heated, they produce an electric current, and this is enough to run a water pump. The pump is strong enough to raise water from a depth of 20 feet and can pump enough water to irrigate 40 acres.

Solar Battery

One of the most significant American contributions in the field of solar power research was the development, in 1954, of a solar battery. It resembles a large tray and is filled with wafers of purified silicon, treated with arsenic and boron. Each disk-like cell acts as a tiny electric generator. Light striking the wafers sets up an electric-static charge which creates a flow of direct current. This current energises dry cells for operation at night or during cloudy periods. One of these batteries, mounted on a pole, has been used for over six months to power an eight-family rural telephone system in Georgia.

Similar batteries have been used in solar-powered radios and in hearing aids.

Refined silicon is still worth its weight in gold, and solar batteries are too costly to be commercially practical. However, they have been found extremely useful in space vehicles, where power has to be generated with the minimum load of equipment. The Explorer VI reported its scientific findings to the earth by means of recording devices and radio equipment powered by the energy of the sun.

Solar Furnaces

Experimental solar furnaces have also been constructed in the United States to aid scientific research. One of the largest, in San Diego, California, uses a huge curved aluminium mirror to gather and reflect the heat of the sun to a focal point.

At midday the furnace can reach temperatures of 4000°C—enough to melt a steel bolt in seconds. Because solar furnaces generate extreme heat without the associated contamination

of fuels used in conventional industrial furnaces, it is a particularly valuable research tool.

Although the solar cooker, the solar generator, the solar battery, and the solar furnace promise enormous benefits, the solar still—which converts salt water into fresh—many have the greatest potential of all.

The sun offers to the earth a bounty, sixty per cent of which is not utilised. Most of this energy is absorbed by the heavy cloud envelope around the earth; both land and sea also radiate the heat striking on them. Many American scientists believe that in the long run, when this wastage is eliminated and methods found to store it, solar energy will beat out atomic energy as the prime mover of the future world.

(USIS)



The young of many creatures do not naturally adopt the life habits of their parents. The baby seal, for instance, is afraid to enter the water which will become its native element. It must be taught by its parents to swim and to breathe for long submersion.

THE SUGGESTION JACKPOT

Rapid changes in industrial technology in the United States have brought about major shifts in the skills required of workers. Today there is an increasingly higher proportion of skilled and semi-skilled workers in every plant. The role of the manual labourer is diminishing as factories become more highly mechanised and automation is introduced.

In the old days the industrial worker did as he was told and usually kept his opinions to himself. Today with improvement in the education and skills of workers and the rapid growth of progressive trade unions, they have gained not only in wages, but also in status. The skilled worker is an intelligent partner in every manufacturing firm. This is evident from the increasing importance attached to workers' suggestions to improve production techniques and effect economies in plant operations.

Suggestion systems are in operation in most private business and government offices, not only as an inducement to greater productivity but as part of the effort to stimulate good human relations in industry.

As early as 1880 the suggestion system had been adopted by some large manufacturers like the National Cash Register Co. and the Eastman Kodak Co.

The most commonly accepted definition of a suggestion system is: a formal procedure established by employers in co-operation with employees, to solicit, appraise, and reward ideas from employees. There are tangible suggestions whose adoption will result in measurable savings in labour, materials, or both; there are also intangible suggestions that cannot be readily measured, such as those improving working conditions, safety, quality of production, or plant housekeeping.

Rewards for suggestions are generally paid in cash, usually at the rate of ten per cent of the estimated labour and materials saved in the first year, though 15 per cent or 25 per cent is becoming more common. A firm

in the state of Michigan pays at the rate of 50 per cent.

Intangible suggestions usually bring a fixed minimum of about Rs. 50. Supplementary rewards are frequently given if the suggestion saves more than was anticipated or is adapted to more than one of the company's factories.

In the first nine months of 1953, General Motors Corporation, for example, paid out Rs. 88,35,000 for employee suggestions, at the rate of 17 per cent of the estimated savings. The average was Rs. 123.50 nP., the largest award was Rs. 1,33,000, to a foundry worker. In one recent year, the U.S. Government paid Rs. 27,36,000 for 13,721 acceptable suggestions from federal employees, an average of Rs. 199.50 nP. per suggestion. The total savings were estimated at Rs. 8,78,75,000. Among suggestions found useful were those relating to time and motion study, more economic use of raw materials, and short-cuts in some processes of manufacture.

When Henry Ford II reorganised the Ford Motor Company, the management freely discussed its plans and problems with all employees in newly established plant newspapers and information bulletins which had never existed before in the company. The workers were not only encouraged to get their grievances off their chests; they were also invited to give out, like the vice-presidents and production managers, with original ideas for improving Ford's manufacturing and management methods.

Between 1947 and 1953 the company paid well over a million dollars in awards to workers for suggestions, and more than 100 winners have collected the maximum prize of Rs. 7,125. Suggestions have paid off mortgages, bought new cars and TV sets.

The suggestion jackpot provides the incentive to the worker to think of the requirements of his plant; it rewards useful ideas and brings a sense of participation to the clever and skilled workmen.

THE ARCHITECT'S ALLY

Aluminium in Building

The small aluminium pyramid which has capped the Washington Monument in Washington, D. C. for over 70 years probably represents the first architectural use of aluminium in the United States. It was not until a good many years later that further experiments were made with aluminium in architectural design.

Before 1941, aluminium was produced for making relatively small articles—chiefly household items. With the wartime demand for the metal, particularly for aeroplanes, aluminium production increased tremendously. Techniques were developed for extruding and bonding it to create air frames quickly.

After the war, the first products for the building industry were aluminium roofing, siding, shingles, windows, rails, hardware, and fixtures. From there, it was only a step to recognition by architects of aluminium's application as a structural building material offering infinite variety.

Aluminium and aluminium alloys are among the most versatile of all building materials. Aluminium is attractive, strong, and durable. Aluminium alloys are even stronger than structural steel. In certain alloys the strength can be varied by heat treatment. It can be annealed to make it extremely soft and pliable during drawing and forming. Another heat treatment makes it extremely strong.

It offers architects more opportunity for creative expression in building construction than the more rigid materials. The aluminium extrusions widely used replace a complex assembly of other metal shapes. They had to be joined by welding or riveting, while aluminium can be die-cast in one piece. Extrusions are used in arches, for door and window parts, and for framing grid parts in curtain walls. They are also used for struc-

tural parts and other ornamental or functional sections.

Aluminium readily conducts heat. It also will reflect heat and thus can reduce by as much as 15° F the under-roof temperatures caused by infra-red sun rays. At the same time, in ducts and radiators aluminium emits more heat; in a condenser tube, it is a heat conductor.

The metal and its alloys are non-magnetic, resist corrosion, and require a minimum of maintenance. Aluminium is also about one-third the weight of an equal volume of steel or copper.

Because of these many qualities, aluminium has been used increasingly in building. Aluminium "curtain walls" have become a preferred type of construction for institutional, industrial, and commercial buildings over the past decade. It is estimated that in 1958, exclusive of factory buildings, 35 million square feet of aluminium curtain-wall panels were used on buildings in the United States.

This construction has several economic and practical advantages. Because such walls are non-lead-bearing, the structural framing of the outer walls can be lighter and less costly. The walls are thinner yet resist the passage of heat. Being thinner, they also provide increased floor space. A great advantage is that these walls can be made at the factory and delivered to the construction site ready for erection.

Through the use of aluminium, architects are also moving away from the old concept that heavy roof structures are necessary to buildings. Professor Buckminster Fuller, University of Michigan, demonstrated in 1953 that an octet truss, constructed of 170 slender, 33-inch aluminium struts, each weighing only

one-third of a pound, could support a load of six tons.

Construction of all-aluminium homes was somewhat delayed by the strict building codes in many communities which did not consider aluminium and had to be revised to include the use of this material.

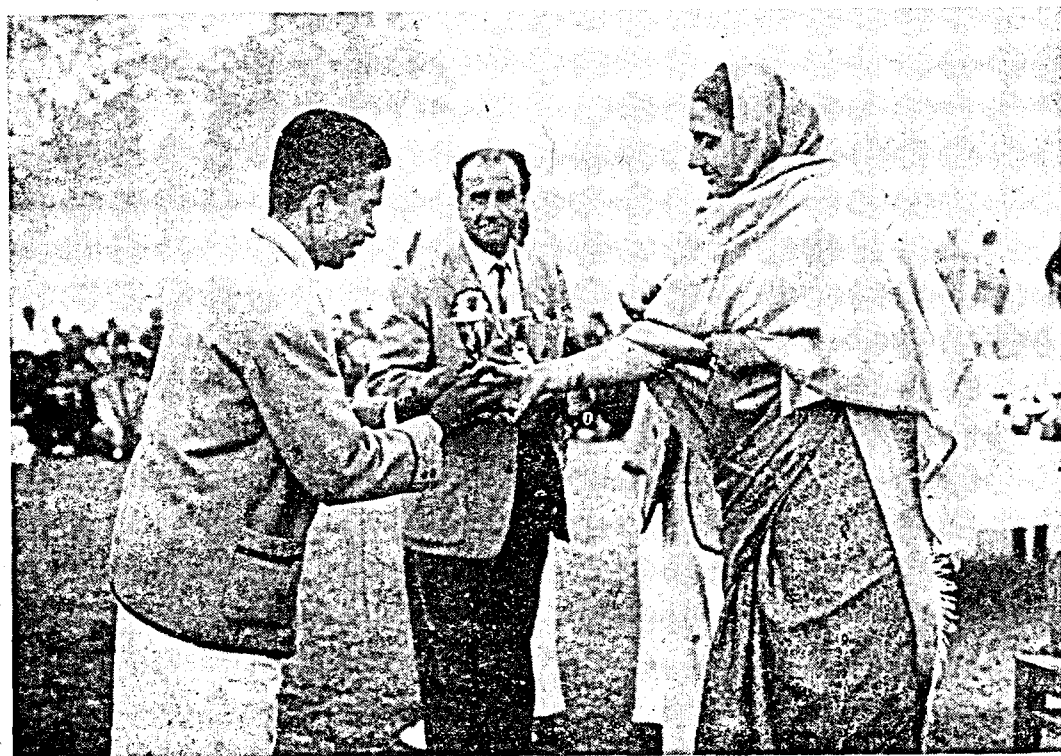
In 1957, the Reynolds Aluminium Company began the first quantity construction of homes with all-aluminium exteriors. They have also sponsored several projects in aluminium housing as testing grounds for further development of new aluminium building products.

In a community of 2,000 town houses in north-east Philadelphia, 650,000 pounds of aluminium were used—one of the largest orders for the metal in a single residential

development. In another example, 1,236 model homes, made of aluminium and displayed in 16 communities throughout the United States, were forerunners of 30,000 to be built in the same communities during 1960.

Aluminium takes many finishes. It can be ground, polished, buffed, burnished, embossed, highlighted, hammered, fluted. Other finishes can be produced by chemical treatments. It can be colour-anodised, electrolytically polished, or take a baked enamel finish. It can be electroplated with brass, copper, silver, gold, and nickel.

Thus, aluminium lends itself to such variation in finish, colour, design, and shape that buildings and houses may be more individual than ever before. Designers and architects feel that they have not even begun to explore its possibilities.



Sri C. Sankaran of I.C.F., who won the Running Broad Jump in the Inter-Railway Athletics, receiving the prize from Mrs. Karnail Singh

SPORTS

Badminton :

The I. C. F. Badminton pair, Kareem and Yuvarangam, brought home the Mandya Cup. In the semi-finals they beat T. Ganapathy and Shabeer, and in the finals Govindan and Balu.

They again showed their excellent form in winning the Inter-Railway Tournament by beating Southern Railway. Thus it came as no surprise when our players Yuvarangam and Kareem were selected to don the Indian Railway colours for the Nationals. Shri Kareem played a major role, in the Nationals and enabled the Indian Railways to annex the championship by beating Madras in the deciding match.

The I. C. F. Fives came as runners-up in the Inter-Railway Tournament.

Cricket :

The I. C. F. Cricket Team have so far played five matches in the League, in which they won two and the rest resulting in draw. They created a sensation by defeating an undefeated side and that too the league champions, the Madras Cricket Club. The last wicket of the M. C. C. fell in the last minute of the day and the match was throughout exciting. Major credit should go to Prakash Bangara (Captain) and James Velu, for this excellent victory.

Volleyball :

The Volleyball Team made much headway in 1961. They have now established themselves as a strong team and they are now a hard team to beat.

In the League, they created a major upset by

defeating the Southern Railway—the champions. Since I. C. F., Southern Railway and the Indian Air Force, Tambaram are on level terms, I. C. F. has to meet Southern Railway again and the winners will meet the I. A. F. for the League title.

In the Inter-Railway Volleyball Tournament held at Pandu, the I. C. F. came to the finals, but were very unlucky to loose to the Southern Railway. This was the first time that the I. C. F. came to the finals stage, and this was a very creditable effort. Skipper and the international player Adhikannu no doubt deserves all praise.

In the Madras State Championship held at Tiruchi, I. C. F. came as runners-up.

Athletics

This year in the Inter-Railway Meet, the I. C. F. Team, though five in number, scored 13 points. Shri C. Sankaran, Hostel Superintendent, secured the first place in running broad jump.

Hockey :

The Hockey Team, last year's record holders, brought home the beautiful cup from Gadag. They defeated the Hindustan Aircraft and the L. R. D. E. in the semi-finals and finals respectively.

Shri M. P. Murugesu was presented with a shield and Jabbar and Ataulah Khan with special cups for their outstanding performance.

Football :

The I. C. F. has made a good start in the season by annexing the Madras Gymkhana Cup.

A R. VENKAT

BRAIN TEASERS

How much do you know ?

1. Where is the largest natural bridge in the world ?
2. Who was the first U.S. President to fly in an airplane during his administration ?
3. What domestic animal, with the exception of the dog, is more widely distributed than any other ?
4. What was the first important German city to fall before the American forces during World War II ?
5. Which is the heavier, gold or silver ?
6. What is the height of the highest peak in the Alps ?
7. Of what countries are these the capitals: (a) Rangoon ; (b) Bogota, (c) Port-au-Prince ; (d) Rawalpindi ; (e) Damascus ?
8. Where would you find the dial that marks the line of nought degrees longitude ?
9. What is the longest muscle in the human body ?
10. What are the two principal rivers of England which empty into the North Sea ?
11. Which Psalm in the Bible has 26 verses, each of which ends with the words, "For his mercy endureth forever" ?
12. What comparatively small country has the third largest merchant marine in the world ?
13. What kind of grass grows as high as 120 feet ?

FAMOUS COUPLES

Here are the first halves of some famous couples of history and literature. If we were, for example, to mention ADAM, you would of course supply EVE. Now see if you can name the running mates of each of the following :

1. Daman.
2. Evangeline.
3. Josephine.
4. David.
5. Harlequin.
6. Dombey.
7. Parls.
8. Pygmalion.
9. Venus.
10. Tristan.
11. Samson.
12. Launcelot.
13. Hansel.
14. Castor.
15. Scylla.
16. Antony.

How Many Words ?

How many words of four letters or more can you form from the letters in the word FACTIOUS ? Words that acquire four letters by the addition of "s" as in the words "dog" and "hats" do not count, and no proper names. We scored a total of 29 words, on this one. See how good you are at manipulating the letters in FACTIOUS.

ANSWERS

How much do you know ?

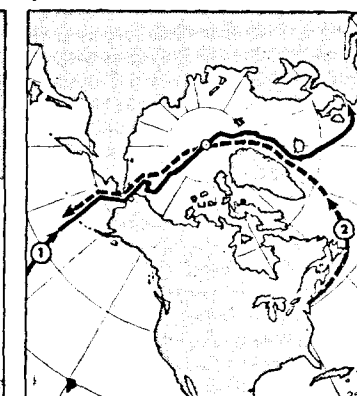
1. Rainbow Bridge, in Utah. This bridge extends 278 feet from pier to pier, and the distance from the bottom of the canyon to the top of its arch is 309 feet. 2. Franklin-D. Roosevelt (1882-1945). 3. The goat. 4. Aachen, in October of 1944. 5. Gold : almost twice as heavy. 6. Mount Blanc is 15,781 feet high. 7. (a) Burma ; (b) Colombia ; (c) Haiti ; (d) Pakistan ; (e) Syria. 8. Greenwich, England. 9. The sartorius, which runs from the hip to the knee. 10. Thames and Humber. 11. The 136th Psalm. 12 Norway, 13. Bamboo.

FAMOUS COUPLES : 1. Pythias. 2. Gabriel. 3. Napoleon. 4. Jonathan. 5. Columbine. 6. Son. 7. Helen of Troy. 8. Galatia. 9. Adonis. 10. Isolde. 11. Delilah. 12. Elaine. 13. Gretel. 14. Follsi. 15. Charybdis. 16. Cleopatra.

HOW MANY WORDS : Fact, fast, fiat, fist, foist, focus, fustic, fust, ascot, auto, cast, cist, coast, coat, cost, coif, iota, oast, otic, oust, scat, scot, scout, sift, soft, sofa, stoa, stoic, suit.

DID YOU KNOW ...

By SCIO



Despite his many impressive machines and accomplishments, man still is in the dawn of progress. His best steam locomotive is but 8% efficient, his latest diesel and gasoline engines barely 25%.

Just five days after the first U.S. nuclear-powered submarine Nautilus pioneered a west-to-east route (1) underneath the North Pole's ice cap, another U.S. nuclear sub, the Skate, navigated the same waters to complete the world's first east-to-west passage, (2) fulfilling the dream of mariners since the days of Columbus.

Grapes have been cultivated so long that the plant's place of origin cannot be accurately determined. Egyptians evidently grew grapes and made wine 6,000 years ago. The oldest Hebrew, Greek and Roman writings all refer to grape culture.

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H. E. Mr. Brezhnev being presented with a coach model by Sri Swarup CAOR, as memento of his visit to the Factory.

H.M. the Yang di Pertuan Agong of Malaya driving through the workshop of the Shell Factory.

