FACT

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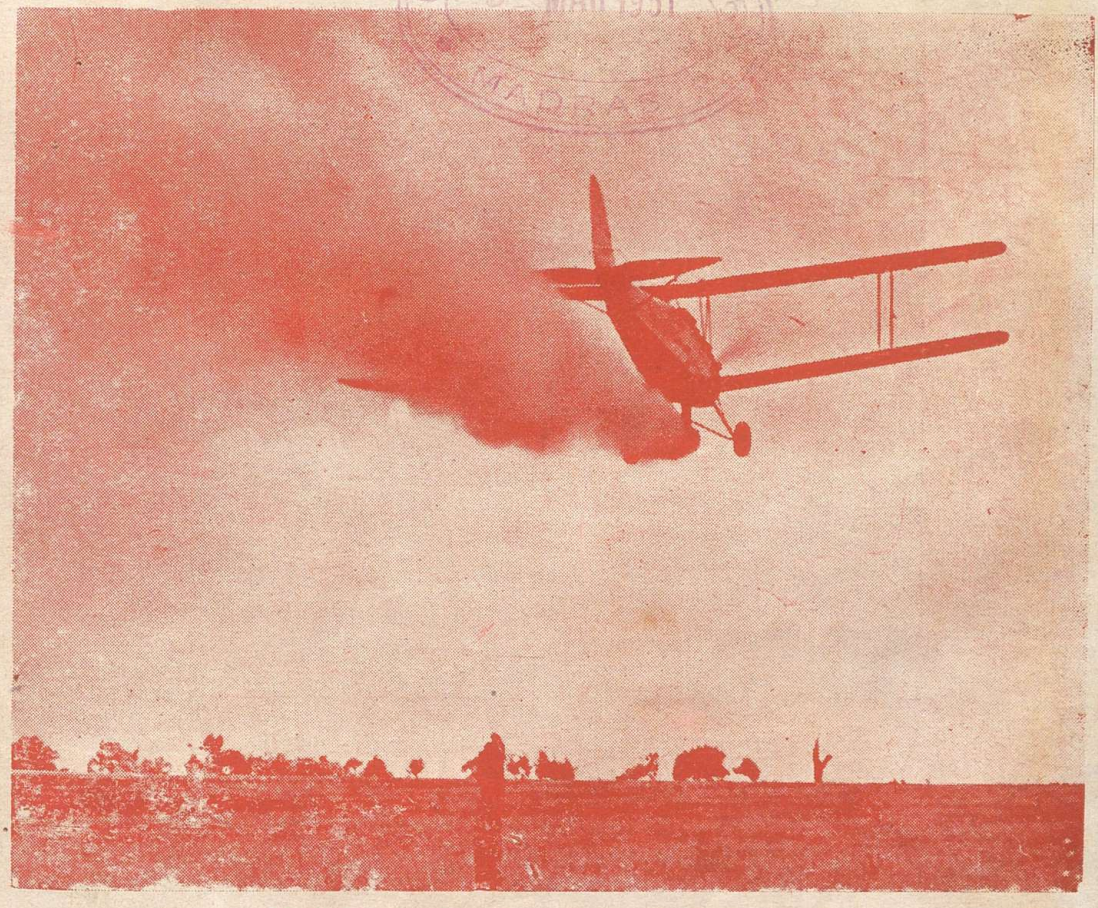

Seed-Sowing by Aeroplane—in Australia.

Dr. Ralph J. Bunche, winner of the 1950 Nobel Peace Prize.

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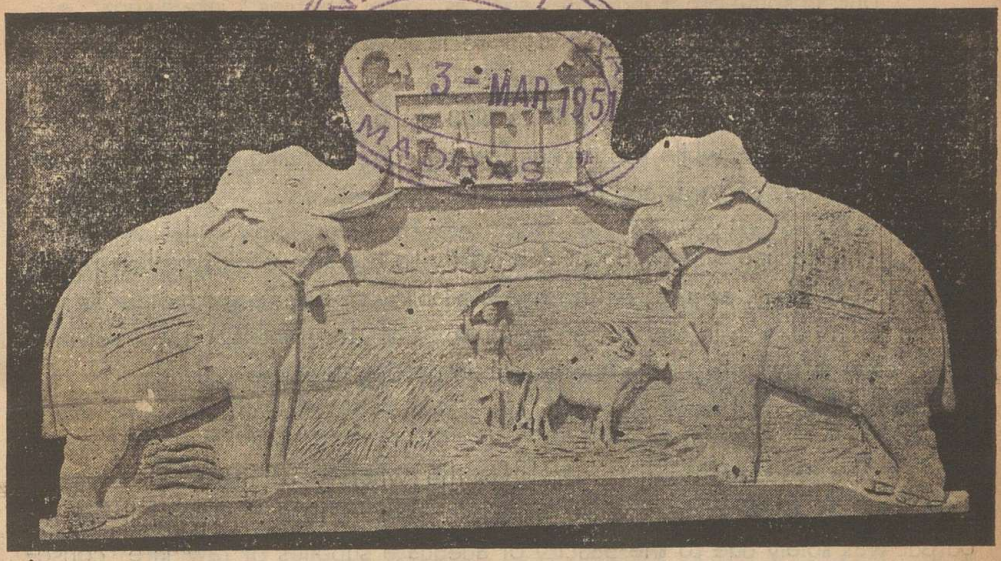
Books and Pamphlets on scientific, industrial and allied themes are accepted or review in this Journal.

Editor.

In this Issue .....



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EDITORIAL.

Industrial Progress in 1950.

THE problem of increasing production has been before our country for the past few years, but during 1950, it was very keenly realised, more than ever before, that intensive and overall production was the only means by which India could aspire to maintain peace at home and credit abroad. Neither world conditions, nor conditions inside the country itself, were exactly propitious for an all out expansion, but inspite of ravages due to earth quakes and famines, the general shortage of food materials, and the difficulties created by the disparities in foreign exchange rates, we have been able to make some headway in the production of certain important materials.

In a few major industries like coal paper and cement, we have been able to establish a record of progress which was more or less steady and consistent. The improvement in cement production has been appreciable in that the output during the period January-October 1950 aggregated 21-25 lakh tons as against only 16.58 lakh tons in the corresponding period of 1949. This indicates an increase of as much as 29 percent, which, considering the urgent need of the material for furthering the development of the country's resources, is a timely asset. Similarly paper production showed an improvement from 85.993 tons in 1949 to 89,000 tons; and coal production also a slight increase of about 2.8 percent over that of the previous year.

But, in some other industries such as steel, textiles, jute, sugar etc. there was decline to be noticed. This decline was rather marked in the case of textiles. For, during the first ten months of 1950, the production of cotton piece goods and yarn amounted only to 303 crores of yards and 97 crores pounds respectively, while the figures for the corresponding period of 1949 were 325 crores of yards and 113 crores lbs. respectively.

The decline was no doubt due mainly to the six-week textile strike in the city of Bombay, as also to the non-availability of adequate supplies of raw cotton. The dearth in raw cotton was inspite of the fact that the Government, early in the year, were successful in getting a large quantity of the commodity imported from America.

The production of jute goods for the whole year may be estimated at about 8.29 lakh tons as against 9.46 lakh tons in 1949. The fall in the output was solely due to the paucity of adequate supplies of raw jute consequent on the continued currency and trade deadlock between India and Pakistan. As regards sugar too the production declined from 10.04 lakh tons in 1949 season to 9.87 lakh tons in the corresponding season of 1950. So also the output of steel fell from 6,82,936 tons in 1949 to 6,42,893 tons last year.

But although a few of our vital industries have suffered a set-back as indicated above, it is indeed heartening to ramark that the trend of trade recovery shown during the period under review was satisfactory. The overall position of trade during the twelve month period between October 1949 to September 1950, discloses a net surplus of Rs. 9.50 crores, as against an adverse balance of as much as Rs. 220.66 crores for the previous corresponding period. This is indeed a highly encouraging sign, and provided the progress is steadily maintained this year also, there is no reason why we should not build up a steadily favourable trade balance.

Recently, when addressing the Associated Chambers of Commerce, Calcutta, India's Finance Minister Sri. C. D. Deshmukh expressed the hope that though we have serious difficulties to encounter, both internally and internationally, these by themselves would not be insurmountable if we are determined to face the situation with cool heads and stout hearts. The Government are doing the best they can to put India firmly and securely on the financial map of the Forward Nations of the world, and it is up to us, both as individuals and as citizens of the Republic, to co-operate whole-heartedly, with hard work, economical living, avoidance of wastages, and so forth, to help build a financially stable, industrially self-sufficient and progressive Free India.

METALLISING

By
K. A. MENON, B. Sc. (Eng)

IN the early days of metal processing, heat and impact were the prime means of forming metallic parts or of joining together two or more components of the same or different metals. In the course of industrial advancement, quicker methods were found necessary and welding satisfied many of the requirements. However, the high temperature involved in the welding process created certain drawbacks. Stresses were set up and frequently distortion occured. In most cases the effects of previous heat-treatment were undone. Worn-out shafts which were built up by welding developed brittleness which could be obviated only by further heat-treatment. A new method which would overcome the draw-backs of welding was sought for and metallising was the answer in many respects.

Metallising is a process that applies through a special gun any metal, usually available in wire form, by melting and spraying it by means of compressed air on to any surface either metallic or non-metallic. The melting is effected by an oxy-acetylene flame as the end of the wire is extruded from the gun. Instead of acetylene, it is also possible to use propane, hydrogen, natural gas or manufactured gas.

Unlike in the welding process, the part that is metallised is not raised to any high temperature. Low temperature working minimises the chances of unequal stresses and distorsion. For example, a steel shaft after metallising and refinishing does not normally require any straightening or relieving of stresses.

Dis-similarity of the material that is metallised to the spray metal is no bar to successful metallising. Thus it is possible to metallise with equal facility the surface of a piece of paper, a piece of wood or a plate of steel with a metal such as, say, aluminium. Practically, limitation comes in only in the case of a few metals which are not available in wire form for the gun.

By proper selection of the metallising wire, it is possible to impart specially desired characteristics to the surface of the metallised object. Electrical conductivity, hardness and corrosion resistance are some of the properties that can be imparted by metallising. Also an article made of a comparatively cheap material such as mild steel when sprayed with stainless steel may practically answer the requirements of another made entirely of stainless steel. The economy effected thereby may be very considerable.

The porosity of the sprayed metal, though a disadvantage in many cases, is turned to advantage in the case of bearing surfaces. It permits oil absorption to the extent of 5 to 10% by bulk and reduces friction which in turn means more efficient working and longer wear.

To the maintenance man metallising is a process that offers a ready solution to many of his problems. The worn-out component of any equipment which is difficult or expensive to replace can be restored to its original condition or even improved upon by metallising at only fraction of its initial cost. By using a wire of similar quality to the parent metal a worn out component can be built up to its normal dimensions and quality. By using where necessary, a specially, wear resistant material for the spray, the built up component can even be made to give a much longer service than the original. Often the rate at which a given weight of metal is usefully deposited is much higher in the case of metallising than in welding. Modern guns spray as much as 21 lbs. an hour of stainless or high carbon steel.

In maintenance jobs, by resorting to repair by metallising quite often it is possible to avoid complete dis-assembling and refitting of an equipment which are un-avoidable if the worn-out parts are to be replaced. For example, a worn out pump shaft can be metallised and finished without dismantling the impeller from it. Replacement of the shaft will, of course, necessitate dismantling the impeller and fitting it again. Often the saving in time, which is most important to the maintenance man, is considerable.

The technique of metallising is not very difficult to master. Prolonged period of training, though it will give added experience, is not essential. Preparation of a clean and adherent surface, selection of the proper quality of wire, proper regulation of air and gas pressures, the handling of gun at the right distance and angle and an insight into the applicability of the process for the particular job in view are some of the essential requirements.

A word of caution is however necessary to the enthusiastic user of this new process. Since its tensile strength, bond strength and particle adhesion are all on the low side, sprayed metal should not be depended upon for such jobs as (a) bearing faces where balls or rollers operate on the sprayed coating, (b) screw threads and gear teeth on sprayed metal and (c) punches and dies.

The process has a vast field for application which has yet to be fully explored in our country.

THE CRISIS IN SULPHUR

A CORRESPONDENT.

THE standard text-books used by many present-day chemists when they were being trained laid the main emphasis upon Italy, and particularly Sicily, as the world's principal source of elemental sulphur. The fact that almost the whole of Britain's sulphur needs since the war have been met from America has surprised some chemists whose only contact with this element is with the sulphuric acid made from it. The virtual cessation of sulphur exports from the U. S. has led to a crisis for the British chemical industry, the seriousness of which would be hard to exaggerate. The production of materials for which large quantities of sulphuric acid are required has been curtailed, e, g., superphosphate. The prices of innumerable chemicals whose manufacture requires sulphuric acid will have to rise.

The development of a large sulphur industry in the United States began just before the first world war. In the previous century much of the sulphur required for sulphuric acid manufacture was imported from Italy but from about 1890 onwards the high price required drove more and more of the U. S. acid manufacturers to the alternative method of pyrites burning.

War Requirements.

In the first world war the total demand for acid rose so greatly that the use of sulphur returned and by the end of the war nearly half of America's sulphuric acid was being produced directly from sulphur. At the same time, however a new process for extracting sulphur from salt domes in Louisiana had been developed by Herman Frasch; indeed, even as early as 1913, 250,000 tons of sulphur were being produced from Louisiana compared with 4,00,000 tons from Sicily.

The Frasch process is simple and cheap. The sulphur deposits occur at depths of about 900 feet beneath clay, sand and rock. Pipes are sunk through a bore-hole and superheated steam is pumped down some pipes. This fuses the sulphur. Compressed air is pumped down other pipes and an aerated emulsion of molten sulphur rises to the surface through the remaining pipes. The emulsion solidifies on cooling in tanks and sulphur of high purity is immediately available.

The low costs of this process for extracting sulphur from natural deposits not only encouraged the American acid industry to develop sulphur-using rather than pyrites-burning plant, but it reduced the world price for sulphur, which had remained high so long as Italian deposits produced the dominant share of the world's total output of the element.

Competition.

Competition brought lower prices and the tendency to base acid manufacture upon such materials as pyrites, native to many countries, was checked. In a recent American

article it was said that the Frasch process "restored brimstone sulphur to its premier position as the source of world sulphur in the manufacture of sulphuric acid."

By 1920-1924, 800,000 tons of sulphur per year were being extracted from salt domes in Louisiana. Today the annual rate of extraction is 5 million tons. Unhappily there is every sign that the contribution of the Frasch process to the world's sulphur needs will come to an end when it is between fifty and sixty years old.

In 1944 the remaining reserves were estimated by the Bureau of Mines and the U. S. Geological Survey to be 82 million tons. By the end of 1950, 25 million tons will have been extracted. The residue of 57 million tons will last only another 11 years at the present rate of mining, 5 million tons per year. Some authorities in the United States believe that the 1944 estimate was somewhat conservative but even their more optimistic verdict is that Louisiana and Texas salt domes cannot continue to yield sulphur longer than another 15 to 20 years.

The Frasch process, though cheap to operate, has severe limitations. The sulphur containing salt domes of America lie on the Mexican Gulf coast between the Rio Grande Valley and Alabama. In all nearly 200 domes have been found but only 12 have been workable. The Frasch method can be applied only to domes that meet precise geophysical conditions. Also, the extraction method mines only a small area.

Even now when 5 million tons a year are being produced, only seven domes are being worked. The remaining five of the 12 in the history of this process have already been abandoned. One of the seven currently operated is said to yield two-thirds of the total sulphur produced, or about twice as much as the other domes together.

The Gulf Coast region has been thoroughly explored for both oil and sulphur and it is now felt that new deposits are unlikely to be discovered there. Domes are known to exist beneath the sea in the Gulf of Mexico, but the cost of underwater installation of the Frasch process would make sulphur extaction hopelessly uneconomic,

Exhaustion by 1970.

Within the United States sulphur deposits minable by the low-cost Frasch method will be exhausted by 1970 at the latest and probably some years before. The only hope for any continuation of this process seems to lie in Mexico where a number of sulphur-containing salt domes have already been prospected.

These deposits are a long way from industrial centres and communications would have to pass through jungle areas but useful tonnages of sulphur are believed to be producible. No developments of any size have yet taken place.

With the post-Korean re-armament programme increasing the demand for many products requiring sulphur and acid, an appreciable number of dearer sulphur sources is certain to enter production. In the past the low price of Frasch sulphur has discouraged these alternative processes. Another effect that is already disturbingly

realised in Britain is that America has decided to reduce sulphur exports drastically.

Sulphuric acid can be produced without using elementary sulphur. Indeed, pyrites and brimstone sulphur have been competitive raw materials for many years. The movement away from sulphur towards pyrites in America at the end of the last century began when Italian sulphur rose from 20 to 70 dollars per ton; it is not un-interesting to compare the recently advanced price to 22 dollars per ton. Making allowance for the reduced value of all currencies since the turn of the century, this comparison shows how greatly sulphur prices have been reduced by the Frasch process.

With a free choice, most acid manufacturers today would prefer to use elemental sulphur. The total cost of a pyrites roasting plant is 2½ times that of a sulphur burning plant. The labour and maintenance costs are much higher; total operating costs are said to be five times higher. One appreciable factor is that pyrites contains much less sulphur per ton; 40 per cent as against 98 per cent of the material burnt produces sulphur dioxide. The residual iron oxide is not an immediately valuable by-product; it must be further processed before it is suitable for the steel industry.

Nevertheless, even in America a steady return to pyrites as a source of sulphuric acid is now likely to develop. Known American reserves of iron pyrites are sufficient to last for 25 years and further deposits could almost certainly be discovered. For American users of acid this must mean appreciably dearer acid. It is unlikely, therefore, that opinion in America will favour a revival of substantial exporting of cheap sulphur to countries which formerly relied upon American sulphur. As the price of acid in America steadily rises the chances of reviving sulphur exports will become less and less.

There are a number of deposits of sulphur besides the salt dome deposits, but it is unlikely that these will produce cheap sulphur. Even with relatively cheap labour available the large Italian deposits have long failed to compete with Frasch-obtained sulphur. It is felt in America, therefore, that surface deposits in Texas, Utah and California will be more costly providers of sulphur for acid than pyrites.

Still Plenty of Sulphur.

This, then, is the background to the present situation. To talk of an approaching world shortage of sulphur is incorrect. There is plenty of sulphur—in pyrites deposits and in mineral sulphate deposits. Appreciable amounts of elementary sulphur are still left in the surface deposits of the world workable by normal mining methods.

What has happened is that the one source of low-cost sulphur has come within sight of eventual exhaustion; and the effects of this have been sharply accentuated by rearmament and an enlarged demand for sulphuric acid. All the alternative methods of making acid or producing sulphur are inevitably more costly; widespread increases in costs in the chemical industry would seem to be inescapable.

THE ROLE OF THE EMPLOYMENT SERVICE IN A PLANNED ECONOMY.

Dr. N. DAS, Ph. D., I. C. S.

EVER since the end of the last World War, the attainment of a higher level of employment and better living standards have been the objective of Governments in all countries of the world. It has been particularly so in the underdeveloped countries of Asia and the Far East, where the problems of unemployment and under-employment have been more acute and chronic than in the better developed regions. Now, the maintenance of a high and stable level of employment presupposes the operation of certain factors: (a) that production is so organised that there is a continually increasing demand for labour in different sectors of the country's economy, (b) that this demand for labour is properly directed, and (c) that variations in demand are co-ordinated, over and not too distant period, with supply, by a process of training, vocational and occupational guidance and planned direction of employment-seekers into the right channels. In India, these factors have been largely left to chance, and the free play of economic forces has more or less decided the nature and level of employment. The establishment of a network of Employment Exchanges as part of a national organisation was, however, a step in the process of giving direction to those forces which have an intimate bearing on the volume and course of employment and unemployment. Similarly, the training schemes of the Ministry of Labour fulfilled a complementary function and were designed to ensure a steady flow of skilled operatives into industry and to remove shortages of trained personnel in certain trades and areas.

The National Employment Service was established in India only five years ago. These early years of the working of this new organisation have been full of stress and strain. As it was a novel experiment in India, public opinion had to be educated as to its rightful place in the national endeavour to achieve a high level of employment. This has not been easy. It is true that in the strictly limited field of finding jobs for employment-seekers, the progress so far has been quite satisfactory. The number of employers using the Exchanges rose from 3,510 in July 1947 to 6,919 in July 1950. The number of persons who applied to the Exchanges for employment assistance was 1,21,017 in July 1950, as against 51,756 three years ago. The number of persons placed in employment in July 1950 was 29,293 as against 16,683 in July 1947. Finally, in the field of training, over thirty thousand persons have been trained so far in trades and vocations in which there has been an over-all shortage.

The figures quoted are striking even by themselves. They show that an Employment Service is neither a luxury nor a fetish even in India. As a matter of fact, a public Employment Service can play an important part in the organisation, planning and promotion of employment, not merely in industrially advanced countries like the United Kingdom, France, Germany, U. S. A. etc., but in so-called backward countries as well.

It has been generally accepted that, for planned economic development, it is necessary to have a con-

trolled enconomy. Whatever the extent of these controls the co-ordination of manpower resources with the general economic plan at each stage is essential. This co ordination can be best secured through the agency of a well organised Employment Service, which can assume various responsibilities for the direction of employment in the light of priorities and along lines determined by national policy. For example, the Employment Service can collect and make available all relevant information regarding the employment situation and its probable trend in the country as a whole as well as in different industries, occupations and areas, on the basis of which, steps can be taken to maintain employment at a high level. More directly, the Employment Service, can, through training and re-training schemes and provision of facilities for occupational mobility, ensure a satisfactory distribution of manpower between various trades, professions and industries. It can also facilitate the geographical mobility of labour by securing the movement of surplus persons to areas where employment opportunities are comparatively greater. Finally, it can provide, in co-operation with educational interests and other authorities concerned, occupational guidance to persons who seek advice in regard to the best calling to follow. This last is an important function. If properly discharged, it would lead to a satisfactory distribution of the available manpower among the various trades and professions; it would eliminate overcrowding in certain occupations; and, last but not least, it would result in greater work satisfaction.

The Employment Service in India has not been able to assume full responsibility for discharging these functions, yet. A beginning has, however, been made in respect of at least some of these functions. The Employment Exchanges are increasingly becoming the main source of information on all matters relating to the employment situation in the country. Training schemes operated under the auspices of the Employment Service Organisation have become more comprehensive and broadbased. A certain degree of movement of labour is being achieved through the vacancy-clearing machinery.

Nevertheless, it must be admitted that we have touched only the fringe of the problem and much more still remains to be done. We have in India today both chronic under employment and technological and structural unemployment. To fight both these evils, it is necessary to have a programme of effective utilisation of idle resources—of men as well as materials—a programme of what is known as "manpower budgeting." The Employment Service can and should be able to play an active part in the execution of this programme.

It was Wendell L. Willkie who had said that unemployment was the new form of slavery which mankind seeks to hide from its own eyes by offering a so-called scientific explanation for it. Whatever the explanation the fact remains that unemployment undermines human values—on the economic as well as moral planes. If we are to rid ourselves of this new slavery, we must have manpower-planning as an integral part of our economic plans. It is my earnest hope that the Planning Commission set up by the Government of India will apply themselves not merely to the immediate problem of increased production but to the no less important task of effective utilisation of the country's manpower also.

EMPLOYMENT EXCHANGES
AND TRAINING CENTRES FOR WORKERS

By
Prof. J. J. ANJARIA

IT will be agreed that the problem of employment forms the very core of national plannig. Planning is not merely a matter of allocating financial resources as between different possible uses but also of making the most of all available real resources. The National Planning Commission has been asked in the terms of reference to make an assessment of the existing resources—material, human and capital—and to indicate in what ways they can be increased so as to secure the objective of raising the standard of life of the masses in the country. Planning as thus understood must mean that India's vast resources of manpower should be adequately and effectively used. It is, in this connection, that employment exchanges and training centres for workers can play a vital role.

Employment Exchanges have been functioning in other countries for many years past. In India the National Employment Service was started in 1945 primarily for the resettlement of ex-servicemen and discharged war-workers. Latterly, the organisation has been placed on a broader footing and it is now becoming a truly national service giving employment assistance to all classes of workers. I do not propose to give you any detailed statistical data but I may mention a few outstanding figures to indicate the value of the work being done. The total number of registrations up to August 1950 was close to 40 lakhs and the total number of placings was over 9 lakhs. The number of employers using these exchanges for the purpose of recruitment has been increasing steadily, the monthly average of employers availing themselves of the services of employment exchanges having increased from 4519 in 1949 to 6135 for the first eight months of 1950.

Admittedly, employment exchanges do not create employment. They are meant to bring the employer and the would-be employee into contact. The objective is to promote more scientific recruitment and to see that the various exploitative practices that govern recruitment of labour in various industries at the present time are gradually put an end to. Employment exchanges do not merely receive applications and notices of vacancies. They examine the qualifications and suitability of each candidate scientifically and attempt a similar classification of the various jobs that become available. In this manner, they try to find the right man for the right job or, if you like, the right job for the right man. The National Employment Service is now the normal channel of recruitment to all Union Government Offices and establishments. It is to be hoped that as the value of the service which is being offered by the employment exchanges gets better known, Indian labour including

skilled labour and employees seeking office jobs as well as employers will make more and more use of the National Employment Service.

Finding the right job for the right man is only one part of the work of improving the employment situation. The other, at least equally important, part of the work is to provide facilities for technical and vocational training. To this end the Ministry of Labour have started schemes of training for workers at about 60 different centres in the country. The scheme offers two-year and one-year courses of instruction and training for various crafts and industries including building. engineering, radioservicing and textile, metal, ceramic and chemical industries. This training is given free to selected candidates. Free lodging is also provided besides facilities for recreation and medical treatment. In addition, fifty percent of the trainees get a scholarship of Rs. 25/- per month.

In the Delhi region there are four Technical Centres, there is one Vocational Centre and one Centre specially for women. The number of seats sanctioned in the Technical Centres in the Delhi region is over 8,00,656 for adult civilians and 157 for displaced persons. The Vocational Centre has about 160 seats and there are facilities for training for 160 women. For the country as a whole, 9428 seats have been sanctioned for Technical Centres, 2432 seats for Vocational Centres and 352 seats for women. Already over 10,000 trainees are at present undergoing training at the various Centres in the country. You will agree that this represents a very good beginning.

One of the biggest problems before the country today is to secure an increase in production. This presupposes the availability of a steady supply of skilled workers for the various industries. The object of the technical and vocational training scheme is to ensure such a steady supply and to contribute thereby to an improvement not only in the quantity but also in the quality of production.

As you undoubtedly know the country is on the threshold of far-reaching developments. Work has already been commenced on a large number of river valley schemes. There are schemes for increasing the production of food and other agricultural crops, schemes for the development of industries, large-scale, small-scale and cottage, schemes for development of transport and communications All these require a wide variety of technical personnel. Industrial training is of primary importance in an under-developed country which desires to secure rapid development. We have at present a large supply of unskilled labour but unskilled labour can produce very little under modern conditions. If the various schemes of expansion and development, which the country is going to adopt as part of its planning, are not to be confronted with serious bottlenecks, it is of utmost importance that facilities for technical and vocational training are rapidly expanded.

Employment Exchanges and Training Centres are thus complementary institutions which together can play a great part in increasing the efficiency of labour, and thereby increasing the flow of goods and services available to the community.

It is customary to talk about the vast resources of manpower which India has. It is true that this is in one sense an asset; in another, however,

it is a liability. The larger of the population to be maintained out of given resources, the more difficult becomes the problem of poverty. It is not mere manpower that produces an abundance of wealth and income. Manpower has to be assisted by efficient instruments of production, especially capital goods, which help in the long run to produce a vastly expanded volume of consumer goods. It is the task of the Planning Authorities to create and find promising avenues of employment. I am deliberately avoiding the use of the term 'full employment' in this context. For, that concept which has been accepted by advanced countries in the west as an objective of policy has certain limitations when applied to an under-developed economy like ours. There is no doubt however, that planning must mean fuller and more productive employment. There is in this country a great deal of under-employment or disguised unemployment. Even those who are employed are not contributing most effectively to the increase of output. This state of affairs is inimical to the growth of national income. Fundamentally, income, espacially real income, flows from work. The potential resources available in this country are quite considerable and on a long-term view there is no reason to doubt that with the help of these resources, effectively utilised, a higher standard of living can be secured for the mass of people in the country. All this, however requires more work and better organisation. It is being realised more and more that the handicap in the way of increased production in many under-developed countries is not so much the lack of capital but the lack of skilled, technical and managerial labour. It is for this reason that the United Nations, the United States and the British Commonwealth have been planning measures to increase the availability of technically trained manpower in the under-developed countries. It is a high problem and it calls for a big effort. In this context the Employment Exchanges and Training Centres about which I have been talking to you tonight represent only the beginning of an effort in the right direction. But it is an effort in the direction. Its success depends not on what finance and other facilities the Government is in a position to offer but also upon the co-operation of employers, employees and the community at large. The creation of a planned economy in India will throw increasing responsibility on labour as it will give increasing benefits to labour. Efficient production under modern conditions requires a highly trained and well equipped labour force. It has been said that of all forms of investment, that on education is ultimately the most productive. The eminent British economist, Professor Pigou, once said that if he were in charge of Government he would make it a criminal offence to advocate retrenchment in education. Under present condition in India, I believe the same may very well be said about technical training for labour.

MODERNISING INDUSTRY.

WORK OF NATIONAL LABORATORIES.

By

Dr. S. S. BHATNAGAR and Dr. S. D. MAHANT.

THE birth of Indian Republic will always be associated with a record of notable progress in the field of scientific research. The year 1950 was a year of destiny for scientific research in India much the same as it denotes a turning point in India's political status. It marked the completion of first decade of organic scientific research in India as well as the inauguration of a new era wherein expanded facilities for research are becoming available in the shape of eleven national laboratories which the Council of Scientific and Industrial Research has been fostering.

Conceived as a measure for post-war development, the original scheme contemplated the establishment, of five laboratories dealing with different subjects in different parts of India. The plans were revised and extended as a result of the recommendations of the Industrial Research Planning Committee to include the following eleven research institutes: (1) National Chemical Laboratory, Poona. (2) National Physical Laboratory, New Delhi. (3) Fuel Research Institute, Digwadhi. (4) Central Glass & Ceramics Research Institute, Calcutta. (5) National Metallurgical Laboratory, Jamshedpur. (6) Central Food Technological Research Institute, Mysore. (7) Central Drug Research Institute, Lucknow. (8) Central Leather Research Institute, Madras. (9) Central Building Research Institute, Roorkee. (10) Central Road Research Institute, New Delhi. (11) Central Electro-chemical Research Institute, Karaikudi.

Of these the first seven have already been opened and have started functioning. The construction and equipment of others is being vigorously pushed along and nuclei units have started functioning already.

These national laboratories will undertake work of the kind that has not ordinarily fallen within the scope of industries. Their approach to industrial problems will be from a broad national point of view rather than from the narrow outlook of particular industries. Without being restricted by any ideas of immediate financial gain, the laboratories will be in a better position to employ suitable talent and to try alternative approaches to problems simultaneously. As a general rule, problems which bear on wider, social and economic aspects than industry could be concerned with are subjects of State scientific research and it is in this spirit that the laboratories will fulfil their functions. They will assist in improving known industrial processes, so as to increase efficiency of production and develop new processes so that new industries may be started in the country.

Fundamental Research.

At the same time, claims of fundamental research will not be neglected and full facilities will be provided to all those interested in pursuing the search for truth for its own sake. It is not intended that the national laboratories should supplant the existing research institutions. They are intended to supplement the work of these institutes and wherever necessary to assist them in promoting the cause of research. The scope of work in each laboratory could perhaps best be described to be of the form of a spectrum at one end of which research work of the purest academic types and highest quality is carried out and at the other technical developments of processes and equipment proceeds by stages.

In the planning of these laboratories, the need for future expansion has been prominently kept in view. Modern buildings have been erected in such a way that additional working space can always be added whenever required without interfering with the architectural design. Equipped with the most up-to-date apparatus and appliances, the largest technique of work will be employed by these research institutes in investigation of different problems. An innovation so far as India is concerned is the provision of pilot plant facilities which will enable laboratory investigations to be taken to a stage where they can be easily demonstrated to all those who are interested in their commercial exploitation. So far, most of the industrial research conducted in India has been confined to laboratories and although attempts have been made to rig up kitchen scale plant for demonstration of the processes, these have not proved very helpful in satisfying industrialists about commercial possibilities of processes. The working of the pilot plant will assist in formulation of better estimates of the form which the ultimate production units should assume and their costs of production, etc. Rising costs and unforeseen factors like devaluation have necessitated revision of the original estimates and the buildings and equipment of the laboratories are now expected to cost over Rs. 4 crores.

Practical Application.

The inauguration of the Board of Engineering Research is another important step in the practical application of scientific research. The close connection between developmental research and engineering has been appreciated in India during recent years, and ways and means of ensuring better co-ordination between the two have been under consideration. Proposals for the constitution of Board of Engineering Research were put up some time back as experience had shown that in solving the specific problems of industry and applying research to industrial operations, engineering research is an imperative necessity. The desirability of conducting research to various engineering subjects becomes all the more apparent when the developments of multi-purpose projects to increase agricultural production and extension of the various forms of transport are taken into account. The Board of Engineering Research which is composed of some

of the top-ranking engineers, industrialists and scientists in the country has been charged with the duty of initiating and co-ordinating research in various engineering subjects. At the inaugural meeting of the Board, besides the setting up of five expert committees dealing with different subjects, it was decided to conduct a survey of the facilities available in existing institutions and the problems a writing solution both with industry and State Government, as a preliminary to formulation of a programme of research and allocation of priorities.

With a view to providing additional facilities for scientific education and research, the Government of India has, during the current year, agreed to waive off the customs duty on scientific apparatus and equipment. The importance of this concession will be appreciated when it is stated that customs duty on these articles has ranged from 25 to 50 per cent of the landed cost and its waiving is a valuable subsidy to reaching and research institutions.

This concession follows the previous incentive to further interest in research on the part of industry. Some years ago it was agreed that any expenditure on research wheather it is incurred in a firm's own laboratory or takes the form of a contribution to a research association or any other research institution connected with the industry would be allowed to be deducted as an item of business expenditure in computation of income-tax. The importance that industry attaches to this concession is apparent from the formation of the Silk and Art Silk Mills Research Association during the current year. This industry has collected Rs. 25 lakhs to establish a research institute of its own.

Technique of Textile Production.

The recent foundation of the Ahmedabad Textile Industry's Research Institute at Ahmedabad is intended to provide new facilities for textile research. The Ahmedabad Textile Industry's Research Association was formed a couple of years ago with a contribution Rs. 52 lakhs on the part of industry and Rs. 19 lakhs by Government. The Institute being now brought into being will assist the textile industry in modernising its production technique and evolving new processes making use wherever possible of indigenous material. It will also help in standardisation of products and rationalisation of production methods.

Other important developments in the field of scientific research during the year 1950 include the publication of the second volume of "Wealth of India", as the Dictionary of Economic Products and Industrial Resources of India has been styled. This publication give up-to-date information about Indian raw materials and industries and represents the immense task of collecting and presenting the latest position about 4,000 different articles. While bringing out a vision of past history and splendour, it forms a fascinating dictionary which opens out new vistas of thought to those concerned with an economic utilisa-

tion of India's natural resources. The first volume containing information about 220 articles was published two years ago in two parts and secured handsome reviews all over the world. The second volume covers 300 articles dealing with many important substances.

Two volumes of the national register of scientific and technipersonnel have also been published during the year. The compilation of the register was undertaken on the recommendations of the Scientific Manpower Committee appointed by the Government in 1947 to assess the scientific talent available to the country and to recommend steps to increase facilities for trainining of suitable personnel to meet future demands. The register serves as an index of the present position and indicates in what branches there is a shortage and where there is a surplus. The first volume contains information about engineers and the second about the medical personnel.

Scientific research in India is now being geared to the important task of assisting in increase of national wealth and the promotion of national welfare. The potentialities are fully appreciated and in spite of other urgent demands, Government has supported the development programme. The national laboratories will not work in isolation. Integrated and coordinated plans of work and steps to secure the collaboration and cooperation of universities, scientific institutes and industrial associations in the country are envisaged. Special emphasis is being laid on the development of indigenous materials and resources and working them up into valuable and useful products so as to enrich national economy and provide new sources of employment. In this manner scientific research expects, in a short time, to play its vital role in India's assumption of its rightful place in the economic world.

Golden Tresses

Georgette Kamicoff, 34-year-old gipsy, was assaulted by four men walking on the outskirts of Buenos Aires.

One man kept watch, two held her and the fourth cut off her golden tresses.

Attached to her hair were 16 gold medals she told the police.

Home sewing

About 5,200,000 American women and girls do some kind of sewing in their homes. About 3,40,00,000 women make their own and their families' garments.

COMPOST DEVELOPMENT WORK IN INDIA.

By
Dr. C. N. ACHARYA

COMPOST Development work in India on the large scale may be said to have started early in 1944, when under a special grant given by the Government of India, a Training Course for Provincial Compost Officers in the Bangalore Process of Compost-making was completed (Aug. 1943-March 1944). The Scheme first worked under the supervision of the Indian Council of Agricultural Research, but in July 1945, the Government of India took over the work under their direct supervision and agreed to meet 50% of the expenditure incurred by Provinces in expanding Compost production in their respective areas. The Compost Drive gained added momentum after the advent of the National Government in 1947 due to the special emphasis laid by Congress leaders on the conservation and development of indigenous manures. Mahatma Gandhi gave his active support to the movement; and one of his staunch disciples Shrimati Mira Behn organized the first All-India Compost Conference in New Delhi in December, 1947, under the chairmanship of the Hon'ble Dr. Rajendra Prasad. In accordance with the recommendations of the above Compost Conference, the succeeding Food Minister constituted the Central Manure (Compost) Development Committee for the purpose of periodically reviewing the progress of Compost Development work in different areas and making suitable plans and recommendations to Government for expanding the work as rapidly as possible.

The Central Manure (Compost) Development Committee held two meetings, the first at Nagpur in July 1948 and the second at Jaipur in December 1948 and made several important recommendations, including one asking provinces to pass legislation for compulsory compost-making by Municipalities. The Madhya-Pradesh, Punjab, Bihar, Orissa, Bombay, Hyderabad and Mysore States have passed such legislation and the remaining Governments are also taking necessary action in the matter.

The East Punjab Government went one step further in June, 1949, when they promulgated a Special Ordinance (Manure Conservation Ordinance) for enforcing the villagers to keep their manure in pits instead of in overground heaps. The very satisfactory results obtained by the Punjab Government under the above Ordinance proves the soundness of their action in obtaining big results through legislation. The net advantage has been that East Punjab which was a deficit province in 1948 and 1949 has this year been converted into a surplus province. East Punjab has thus shown a good object lesson for other provinces to follow.

As a result of the intensive efforts carried out during the last few years, compost production has shown a rapid increase both in the urban and rural areas, as shown by the data presented in Table I.

TABLE 1. Progress of Compost Development in India.

Year	Quantity of compost produced.		
	From Town refuse.	From village & farm refuse.	Total
	Tons.	Tons.	Tons.
1944—45	1,82,610	2,10,000	3,92,610
1945—46	2,82,670	5,20,000	8,02,670
1946—47	4,09,360	8,29,000	12,38,360
1947—48*	4,86,080	12,58,986	17,45,066
1948—49*	7,21,257	27,65,944	34,87,201
1949—50*	12,09,089	51,67,512	63,76,601
Total	32,91,066	1,07,51,442	1,40,42,508

*The data for 1947–48 and succeeding years refer to the Indian Union area after partition.

During the year 1949–50, about 1000 Municipal and other urban centres produced about 12 lakhs tons of urban compost and about 1 lakh villages produced about 51 lakhs tons of rural compost.

That Compost production is the cheapest way to produce more food in the country is shown by the following figures of government expenditure on Compost production. (vide Table II)

TABLE II. Government Expenditure on Compost Scheme.

Year	Total quantity of urban & rural compost produced	Extra Food Production at 2 mds. extra grain per acre treated with 5 cartloads–2 tons compost.	Govt. of India's grants to Provinces.
	Tons.	Tons.	Rs.
1944—45	3,92,610	14,540	4,92,300
1945—46	8,02,670	29,728	4,88,532
1946—47	12,38,360	45,865	9,26,697
1947—48	17,45,066	64,632	8,15,395
1948—49	34,87,201	1,29,155	11,00,916
1949—50	63,76,601	2,36,170	21,67,990

It would be seen from the data presented in Table II that the Government of India expenditure for producing one ton extra food through the Compost Scheme comes to about Rs. 10/-, which is very small compared to the present price of about Rs. 300/- per ton of grain. The Government of India subsidy to reduce the price of imported grain comes to about Rs. 50/- per ton and instead of spending the money on imported food it is sounder economics to spend the amount in developing increased manure production within the country itself.

TRENDS IN INDIAN TRADE AND COMMERCE

By
Sri. GAJADHAR SOMANI

EVERYBODY agrees that the key to all our economic evils lies in increased production and the present world situation further aggravates the urgency of the problem. All ideological differences must therefore be subordinated to the execution of a national emergency plan under which the Government, business interests and labour should act harmoniously in producing more and more. Let us at this hour of national emergency engage ourselves whole-heartedly and unitedly in fulfilling the great task of building a new India. We cannot depend too much on foreign help at this critical period and our salvation lies in harnessing and mobilising our own resources at the highest pitch of efficiency.

FOOD.

Coming to the various problems in the economic sector the food situation naturally continues to cause utmost concern both to the Government and public alike and although we have been planning to make the country self-sufficient from April 1952 still the current situation is as dark as it could posssibly be. Natural calamities during the year such as the earth-quakes in Assam, the floods in the various parts of the country, the havocs caused by the locusts and pests and famine conditions in some areas have all combined to put a heavy strain on our meagre resources. These natural dislocations have told heavily upon our poor antional economy and whatever progress we wanted to achieve on the food front has been negatived.

We have imported 2.2 million tons of food-grains in this year against 3.7 million tons last year but looking to the present position we will have to import more than 4 million tons in the next year. It is really a great pity that although ours is an agricultural country we are compelled to spend such collossal amount of foreign exchange in importing food-grains which otherwise would have been utilised in purchasing capital goods and other vital raw-materials.

INDUSTRIAL PRODUCTION.

The production figures of the various industries for the year upto August 1950 show an increase of about 5% in the various items and especially in salt and cement we find that the production has gone up almost by one-third compared to the corresponding period of the previous year. In contrast to the rise in production of the various items it is really a very depressing factor to find that the production of cotton textiles and jute goods have gone down during the period under review. The textiles and Jute goods are the two main items of our exports which are contributing so much in building our export trade and earning the necessary foreign exchange. The two main bottlenecks in the way of increase in production in these two

major industries are the labour situation and the availability of adequate raw-materials.

The question of raw-materials especially for our textiles and jute industries which are the two major industries and main pillars of our national economy is of vital importance. Everything possible should therefore, be done to secure adequate quantities of cotton from all possible sources and special approach should be made to secure further cotton from America which has also imposed restriction on its exports. Moreover, the question of supplies from Pakistan has to be especially considered. There were general hopes that the question of Pakistan ratio would be decided by the International Monetary Fund during the latter part of this year but it appears now that any such chances are still as far off as they were before. Moreover, the demand for raw-materials is so wide-spread from all the countries that Pakistan has already been able to market substantial quantities of both cotton and jute to various other countries and the recent aggravation of the International situation has made things still easier for her to find ready markets for these essential commodities. Our Government must therefore, explore all possibilities of some equitable deal with Pakistan for securing some supplies of cotton and jute so urgently required by our two industries.

EXPORTS & IMPORTS.

Our total exports during the year 1949–50 were to the tune of Rs. 483 crores and our total imports during the same period were about 560 crores and we were thus faced with an adverse balance of trade to the extent of about 77 crores. At such a period when these huge adverse balances were causing a lot of concern to the Government, the devaluation came as a great corrective factor and we find today that in the post-devaluation period the various import controls and export stimulants have brought about a welcome change in the balance of trade figures. The statistics of foreign trade reveal that our total exports from September 1949 to August 1950 were approximately Rs. 502 crores and our total imports were about Rs. 501 crores and thus the whole position has been balanced. There is of course a general complaint that the various measures for promoting exports and restricting imports have been creating scarcity of supplies and resultant high prices of various essential goods. We must however, take a realistic and practical view and must be prepared to face certain scarcities for the general welfare. It is obvious that but for this policy of restraining imports and encouraging exports our foreign balances would have been used up in no time in making payments for adverse trade balances. As it is, we should realise that our foreign balances which stood at 1600 crores by the end of World War second are hardly standing now at Rs. 800 crores. It is therefore, in the general national interest that we must regulate our exports and imports in a way which will allow us to import adequate foodgrains without substantially affecting our remaining foreign balances.

COLOMBO PLAN.

The British Commonwealth countries have recently prepared plans for the development of their backward areas. This plan is now commonly known as 'Colombo Plan'. It is gratifying to note that the Anglo-American Bloc has keenly felt the need to help the backward Asiatic countries, technically as well as financially if not for any other reason, at least to ensure democratic stability.

They are now convinced that democratic stability can only be guaranteed if the world countries can effectively fight the problem of poverty and disease and can solve their problem of unemployment. The point Four Programme of President Truman is motivated by this desire of the U. S. Government "to help the free peoples of the world, through their own efforts, to produce more food, more clothing, more materials for housing and more mechanical power to lighten their burdens."

Viewed in this light, this Colombo Plan,—inasmuch as it affects our country,—has been prepared after a very careful consideration. This plan, (unlike the previous plans for the economic development of India requiring Rs. 10,000 crores or 15,000 crores), demands provision for only Rs. 1840 crores during the period of 6 years which means roughly provision for 300 crores per year. We are likely to raise Rs. 800 crores from within our country and we are likely to obtain Rs. 200 crores from our sterling resources during the course of this 6 years period. We shall have therefore, to manage for Rs. 800 crores loan from abroad.

This amount might be obtained either by way of loans from the (1) International Bank or (2) The Export-Import Bank of the United States or (3) by direct loans and grants from one government to another, chiefly the U. S. A. How much we shall be in a position to obtain and from which source depends upon our abilities to negotiate. But his plan has definitely paved a practical way for such negotiations. There are also encouraging signs that the U. S. A. might take keen interest in this direction. For the Gray Committee Report presented on 10th November 1950 to the U. S. President on foreign economic policies strongly recommends to the U. S. Government to render more financial aid to the backward Asiatic countries. They point out that economic development in Asia is an urgent necessity for democratic stability; and since economic recovery in Europe has reached a stage of development where aid to Europe can be reduced, aid should now be directed to Asia.

Our per capita national income is declining every year during the recent period and it will arrest the further fall. In terms of 1945-46 prices our per capita income was Rs. 237 in 1946-17, Rs. 233 in 1947-48 and Rs. 200 in 1948-49 and this situation has further deteriorated as our whole-sale-price-index has risen from 100 in 1939 to 400 in 1950 and the cost of living index has reached 320.

IRRIGATION - THE FARMER'S LIFEBLOOD

OVER a hundred power and irrigation projects are under construction in different parts of the country. Some of these will take years before they are completed or their full benefits reaped. But the farmer requires regular supplies of water in time and in adequate quantities to grow the food for the country's population and the raw materials for its industries. The solution for the immediate development of irrigation facilities, therefore, lies in the execution of minor irrigation works with all the resources available in the country.

India leads the world in irrigation, and despite the loss of a very large part of the best irrigated lands to Pakistan as a result of partition, about 48 million acres are irrigated annually in India. Of this acreage, about 17 millions are irrigated through canals managed mostly by State Agencies. The rest of the irrigation is done through tanks, surface percolation wells, tube-wells, etc. The term "minor" applies to this latter type of irrigation.

SURFACE PERCOLATION WELLS.

Surface percolation wells exist all over the country; the land irrigated by each well ranges from a fraction of an acre to 10 and 15 acres. The area irrigated by these wells very nearly equals the total irrigated area by the major canal systems. It may well be said, therefore, that the biggest source of minor irrigation is the surface percolation well. It is generally lined with masonry, and the water is lifted by draught animals working leather buckets or by Persian wheels. This is the type of irrigation fairly common throughout the East.

One of the disadvantages of irrigation through surface wells in particular and the reservoir system to a certain extent, is that the water has no fertilizing property in itself, unlike the canal system which carries a large quantity of fertilizing silt to the irrigated fields. To obtain the maximum benefit out of the water supplied through wells, a large quantity of manure has to be used. The Union and the various State Governments have been devoting increasing attention to the supply of manures, both organic and artificial, for securing the optimum yield of crops from the fields irrigated by wells and tanks.

OTHER SOURCES OF IRRIGATION.

The second largest source of minor irrigation is tanks and reservoirs. The water collects either in natural depressions, or the beds of streams are dammed up and shallow basins created for storing the water. It is estimated that nearly 8 million acres of land are irrigated annually by means of tanks.

Flood irrigation and inundation irrigation are the other sources of minor irrigation in India. The monsoon flood water of rivers is diverted to lands which are above the level of the ordinary supply in a river. The flood water soaks the

lands and the moisture retained in the soil allows the cultivation of a winter season crop, which otherwise would not be possible. The monsoon supplies of the rivers are heavily charged with fertilizing silt. This dispenses with the use of manures to a certain extent, and allows the regular annual cropping of the same piece of land without any serious effect on the soil. This system is very widely practised in Egypt.

The comparatively high cost of construction and operation surface percolation wells, is one of the serious drawbacks of this type of irrigation. The capital cost per acre irrigated and the cost of operation is two to three times more than that of the gravity flow from canals, and there is a progressive decrease of suitable draught animals and cheap agricultural labour. The practice is therefore increasing of lifting water from underground by means of mechanical pumps, wherever possible. As the surface wells do not generally have a sufficient supply of water for the installation of mechanical pumping units, efforts are being concentrated in utilising the sub-soil water resources of the country, particularly in the alluvial plains of the Indo-Gangetic basin.

More than 2,000 States-owned tube-wells each irrigating on an average about 400 acres a year, are working in the Western part of Uttar-Pradesh by means of electric energy supplied from the Hydro-electric Generating Plants on the Upper Ganges canal. It is proposed to sink another 3,000 tube-wells within the next two years in this alluvial tract. These tube-wells will be one more safeguard against the vagaries of the monsoon, which at present is capable of causing diaster on a very wide scale. The colossal deficit of 6 million tons in food-grains estimated for 1951 is a grim reminder of the country's dependence on the pranks of an erratic rainfall.

Misunderstood

Summer Visitor—"I do hope you keep your cows in a pasture"

Milkman—"Yes, madam, of course we keep them in a pasture."

Summer Vistor—"I'm so glad to hear that. I have been told that pasteurized milk is much the safest."

FACTS THAT INTEREST

The "Productigraph"

The Productigraph is a circular chart placed around the face of a clock. Removing the minute hand and extending the hour hand give a sweep indicator that cuts across the face of the chart.

The chart is made up of concentric circles. Each circle indicates the activity of one operator working on the charted job. Next, the circles are divided into segments of 5 minutes each. Filling in the minute-by-minute sequence of operations to be performed by each operator is all that remains.

Before the chart is set up, a time study for each operation must be made. In each circle, segments are scaled off to correspond to the standard time for the operations as they performed.

The productigraph is mounted around the clock face in such a way that the start of the shift on the chart corresponds to the actual or clock time at the start of the shift. Then, as the hour hand moves around the clock, it shows what each operator should be doing at a given time.

This makes it possible for the supervisor to check-at a single glance-the detailed progress of a line. When a delay takes a place, he gets a warning almost immediately and little time is lost in getting the line back in operation. And a glance at the Productigraph will tell the operator if he is falling behind to the point where other operators may be delayed.

Hydrogen in Aluminium.

Recent experiments show that hydrogen precipitated interdendritically when aluminium alloy solidifies lowers tensile strength and decreases ductility. There was no evidence that dissolved hydrogen embrittles aluminium.

Improved Cottons.

Now tripple hybrid cottons with tensile strengths up to 1,30,000 psi. may be made commercially available 3 or 4 yr. earlier as a result of a seed-breeding program at Oguala, Mexico. Tropical conditions there have permitted rapid stabilization of new combinations in cotton.

New Electron Microscope.

A new simple and easy to operate, 30" high, table-model electron microscope has been devised in the U. S. A. An optical system employing permanent magnetic lenses replaces the electromagnetic or electrostatic lenses and eleminates the need for voltage stabilizers, current regulators, coil windings and many other controls. The instrument provides magnifications up to X 50,000 by photographic enlargement and direct magnification up to X 6,000. Specimens may be inserted in or removed from the evacuated column. Photographic plates may be changed without admitting more than a small amount of air to the column and pumping time between plates is reduced to 90 sec.

Ultrasonic Soldering of Aluminium.

Studies in the Mechanism of tinning aluminium and its alloys by the ultrasonic technique are reported (*Nature*, 1950, 166, 615). It is now established that the process is one of removing the oxide skin by cavitation erosion.

A specimen of aluminium was immersed in a bath of molten solder to which were communicated vibrations at a frequency of 18 ke. per sec. set up by applying 50 W. to the driver coil of magneto-stricter. The amplitude of oscillation in the bath was adequate to tin an aluminium surface immediately at atmospheric pressure. Tinning was completely prevented at a pressure of 4 atm. indicating the part played by cavitation. This has been confirmed by the finding that the usefulness of the ultrasonic technique for tinning difficult metals is related to their susceptibility to cavitation erosion. Ultrasonic cavitation was found to be severe at lower frequencies and tinning should, therefore, be more effective in this region. It was not possible to tin aluminium using at 1,000 ke./s. crystal to which 3 kv. (root mean square) was applied.

Coating and Lining Resins.

Four new resins for surface coatings exhibit chemical resistance, adhesion, and flexibility. Known as Epon resins, they are made from epichlorhydrin, acetone, and phenol by Shell Chemical Co. in a new Houstone plant.

The resins are a new class of condensation polymer with ether linkages between carbons and relatively wide distance between the functional groups. Actually, they are resinous polyhydric alcohols.

The ether bond is responsible for the chemical inertness. General Motors Inland Mfg. Div. operated an anodizing tank coated with Epon for 16 continuous months. The coating held up against 25% H_2SO_4 at temperatures as high as 210°F.

Novel Precision Thermostat.

New thermostat developed by the U. S. National Bureau of Standards provides smooth, continuous electric-furnace control between 1000–1500°F. The furnace winding serves as the sensitive element, forming part of a bridge circuit for control of a thyratron tube.

The thyratron circuit acts as a continuously variable valve. It allows just enough current to reach the furnace to compensate for temperature fluctuations. Temperature can be controlled within ± 0.1°C. for several hours or $\pm$ 1°C. for several days.

Glass-and-Nylon Tent.

Portable tent in which even the tent poles are made of glass-and-nylon fabric has been developed by B. F. Goodrich Co. for use as a field-phot laboratory. The fabric is waterproof and fireproof and will not admit light.

The tent covering comes in sections and is zipped together over supporting members, which are actually fabric air tubes inflated to 3 lb. The structure is 20x80x16 ft., weighs 750 lb., and can be set up by six men in 1½ hr.

Sterilizes Water.

Ultra-violet radiation purifies water at 400 gal. per hr. in stainless-steel tank 71 in. high by 12 in. in dia. Four ultra-violet ray tubes extend vertically through water. Baffles direct water toward the glowing tubes.

Textile Industry's Latest Development.

Heat-Setting Machine.

A new heat-setting machine for nylon and other thermoplastic fabrics has been developed by National Drying Machinery Co. The machine has six heating cylinders, each with an inner cylinder creating an annular space filled with high-boiling-point Dowtherm liquid. The liquid is agitated constant-

ly, thus transferring heat uniformly to the outer cylinder surface. Machine will "set" 50–60 yd. per min., depending on nylon weight.

Wider Uses for Hydrazine.

Hydrazine (N_2H_4) first reached prominence as a fuel for jet engines (McG–H Digest. Dec. '50, p, 37). Now its applications are spreading.

It is the basis for many new insecticides and herbicides. One compound slows the growth of grass. Another is used to prepare a new antitubercular drug. Still others are applied to silvering mirrors, blowing mirrors, blowing foam rubber, making new plastics and disinfectants, crease-proofing textiles, and stabilizing fats.

New Uses for Wollastonite, Latest Industrial Mineral.

Wollastonite is a calcium metallicate, white in color, with a fibrous cleavage. It commonly occurs as a metamorphic mineral associated with garnet in metamorphosed limestones.

Until recently, wollastonite was used only on an experimental scale. Now a commercial plant in New York State will produce industrial wollastonite products. Here are some of its latest applications:

When milled to a fibrous, cottony aggregate, it has special filler and filter applications,

In coated paper, a blend of wet ground wollastonite and kaolin upgrades the clay and permits a cheaper clay to be used.

As an additive to concrete, it greatly increases the strength of portland cement,

It is three times as effective as agricultural limestone when used as a soil additive.

By special processing, a particle size of 20–50 millimicrons is obtained that has demonstrated superiority over paper clay as a paper filler.

When mixed with glass cullet and bentonite and fired, it has high strength and resistance to shock. It can be sawed, and it can be drilled with an ordinary drill. Nails may be hammered into it without cracking or spliting it.

Sheet Titanium Announced.

High-strength sheet titanium is now commercially available for the first time. The new sheet, made by Rem–Cru Titanium, Inc., has a minimum yield strength of 1,30,000 psi. It can be readily rolled and has good formability. It requires a bend radius of only $1\frac{1}{2}$–3 times thickness, depending on rolling temperature and reductions taken.

The sheet, known as RC–130–A, is a binary 7% manganese–titanium alloy. The manganese stabilizes a considerable amount of the beta phase and strengthens both alpha and beta phases.

News & Notes

New Ideas for the Ceramic Industry.

Cutting costs, boosting production, and improving quality are everlasting challenges to executives in the ceramic industry Here are some ideas to help them.

Molten frit is quenched by water-cooled rolls. Process, developed by O. Hommel Co., flows frit through furnace orifice, drops it through hole in refractory channel, and rolls it to a thin sheet.

New glass-house quicklime, known as Kemidol Oxide-Fluxing-Ground and made by U. S. Gypsum Co., is now on the market. Its relative freeness of fines facilitates unloading from cars and keeps down dust. Unloading takes only one-half the usual time.

Oval decorating kiln can be loaded and unloaded by one man without stopping the conveyor. One-half of conveyor is outside the kiln, giving a long accessible area. Heating is by 12 radiant tubes, six on each side. Top temperature is 1500°F. Kiln is built by Toledo Engrg. Co.

New decals for pottery and glass decoration consist of enamels printed on a collodion film, which is attached by a water-soluble gum to a backing paper for support. Unskilled operators can handle the decals. Made by Johnson, Matthey & Co. Ltd., London, the decals are ideal for permanent labels on glass containers because the enamels are resistant to all detergents.

Examines Pots and Pans.

Ultraviolet light can show up otherwise invisible food particles and other sources of contamination on dishes, cooking utensils, and other kitchen equipment. New York City Dept. of Health is experimenting to determine its effectiveness in restaurant inspections. "Black light" lamps are mercury-vapor units and require special auxiliary apparatus.

How Good Are Fertilisers?

Soil specialists at University of Nebraska have tested effectiveness on wheat fields of various kinds of fertilisers, both alone and in combination.

Last fall 10 lb. of nitrogen were applied, and in the spring 30 lb. of available phosphate and another 30 lb. of nitrogen were applied. Wheat yield was 33 bu. per acre, as compared with 20 bu. per acre for unfertilised fields.

Superphosphate used alone brought a 27 bu. yield in another plot. Nitrogen alone produced 23 bu. per acre.

Better Potato Chips.

Longer shelf life for potato chips is promised by development of a stabilized refined corn oil by A. E. Staley Mfg. Co. New oil is stabilized with an anti-oxidant that retains effectiveness even under extreme heat. It should find use in all fried foods where oxidation rancidity is a problem.

Synthetic Lubricant.

Pressure-lubricated valves on 20 air compressors in a Celanese Corp. of America plant are lubricated with a silicone grease. Purpose is to reduce maintenance and frequency of greasing.

Competition.

Fresh orange juice is now being sold from coin-operated machines that mix an orange drink by adding the required amount of water to frozen concentrate. Machines in some locations are collecting more nickels than nearby Coca-Cola machines.

Refined Pear-Canning Waste Makes Excellent Syrup Base.

Soluble pear canning waste, previously disposed of at considerable cost, is now purified, for use as a syrup base, at an Oregon cannery. The process, while still on pilot-plant scale, looks commercially possible.

Recovery of the sweet juice will save a considerable amount of refined sugar. Only enough sugar to bring syrups up to desired Brix would have to be added to the refined sigle-strength juice.

Process consists of milling pear waste, converting it to a calcium pectinate gel and pressing. Resulting juice is deaerated, boiled, and treated with an ion-exchange resin, gelatin, and activated carbon to clarify it.

Conversion of milled pear waste to gel is done to separate soluble from insoluble solids. It is accomplished by a lime gelatin process. De-esterification of the pectin is brought about by action of natural enzymes within a 4.5-9.5 pH range.

Organic Manures & Inorganic Fertilisers.

Extensive Field Trials with organic manures and inorganic fertilisers conducted on Indian soils with a view to determine suitable manures singly or in combinations are reported. (Indian J. agric. Sc., 1950, 19, 41).

Chemical fertilisers or organic manures when used singly were found to be inadequate; combinations produced the best results and mutually increased the assimilation of nutrients. Heavy organic manures continuously applied did not raise the C and N content of the soil but stimulated its microbial activity rendering available the reserve N, P and K.

Annual application of organic manures (supplemented by chemical fertilisers) is, therefore, essential to maintain soil fertility at a high level, especially in the tropics.

Industrial Research Laboratory, Devlali.

An industrial Research Laboratory under the Directorship of Prof. N. P. Gandhi, former Head of the Department of Mining and Metallurgy at the Hindu University, Banares, is being established at Devlali (Bombay). The laboratory will be equipped for chemical analysis, metallography, pyrometry, heat treatment and mechanical testing of metals and alloys, fuels, furnaces and refractory materials, examination of minerals, rock ores, etc.

The laboratory will undertake, as a private agency, to investigate day-to-day and long-range problems pertaining to the mineral industry.

British Productivity Gains at Highly Satisfactory Rate.

Productivity in Britain in the last 2 years has risen healthily. Estimates of 6 to 9% per year are considered accurate.

The part that the Anglo-American Council plays cannot be determined closely. But reports indicate that many new methods adopted and much new machinery installed can be attributed to the council's activities.

The main feature of the council's work has been the despatch of industry and specialist teams from Britain to the U. S. to study American methods. Each team, after touring its own home industry, spends 6 weeks visiting plants in the U. S. Then it prepares a report on its findings that is widely distributed throughout its industry.

Up to the third session of the council, held in London in October, reports had been published by 15 teams. Over 30 teams have visited the U. S., and reports are in preparation. More visits are planned.

Evaluation of Fertilisers.

New Analytical Technique for evaluating fertilisers were discussed at a recent meeting of the *Society of Public Analysts & Analytical Chemists* held in London.

The method usually employed for evaluating lime gives lower values from the view-point of agricultural practice. A simple technique of estimating the neutralizing value of lime, involving a short treatment with dilute acid and applicable to carbonates and limes has been stated to give results in agreement with the effects produced on soil acidity in pot and field experiments. Accurate determinations of phosphorus could be made by precipitating it as quinoline phosphomolybdate instead of the usual ammonium salt. There is no interference except from ammonium salts which can be destroyed before estimation. The respective standard deviations by the official and the new methods were 0.065 and 0.024 per cent of phosphoric anhydride.

The determination of potash content of fertilisers could be simplified and expedited by flame photometric method. Reproducibility was excellent and the results obtained agreed well with determinations by the official chemical method. Interference from other constituents was negligible. The chief advantage of the method is its speed which makes it particularly useful for production control.

Chemical Testing & Analytical Laboratory, Madras.

The Government of Madras have approved a scheme for the establishment of a Chemical Testing & Analytical Laboratory at Madras to provide facilities for analysis of minerals and other raw materials available in the State. A non-recurring grant of Rs. 8,56,300 and a recurring grant of Rs. 60,100 has been made for the purpose.

The laboratory will have three sections dealing with (a) natural and agricultural products, sugar, rubber, industrial waters, oils, fats and waxes, and soaps; (b) fuels, bitumen, tar, lubricants, etc; (c) ores, metals and their alloys, iron and steel, cement and concrete, paints and varnishes and plastics. The existing mineral research section attached to the Department of Industries and Commerce, where minerals collected by the Geological Survey of India (Southern Circle) are mostly assayed, is proposed to be integrated with the Chemical Testing & Analytical Laboratory.

X-Ray Inspects Canned Foods.

A new X-ray unit developed by the United States Army inspects canned foods for impurities while the cans are in their packing cases. The inspection method uses fluoroscopic techniques to reveal damaged or deformed cans. It also indicates the degree of deterioration of the contents, as well as corrosion, foreign matter inside the cans and other defects.

An automatic conveyor belt carries entire cartons of canned food before the X-ray apparatus. Mechanical controls turn each carton to permit it to be viewed from all angles. Cartons containing defective cans are marked and when they reach the end of the conveyor system are separated from the other cartons.

Under the present methods, cases of cans are opened by hand and inspected visually. This means that only the damage to the exterior of the cans or deformities in the cans that indicates food decomposition can be seen.

The new inspection equipment can be mounted on a truck trailer for rapid movement to food storage depots. All sections of the equipment exposed to radiation are screened by sheets of lead to safeguard persons working nearby. The X-ray equipment can also be used to inspect solid fuels in cans.—USIS

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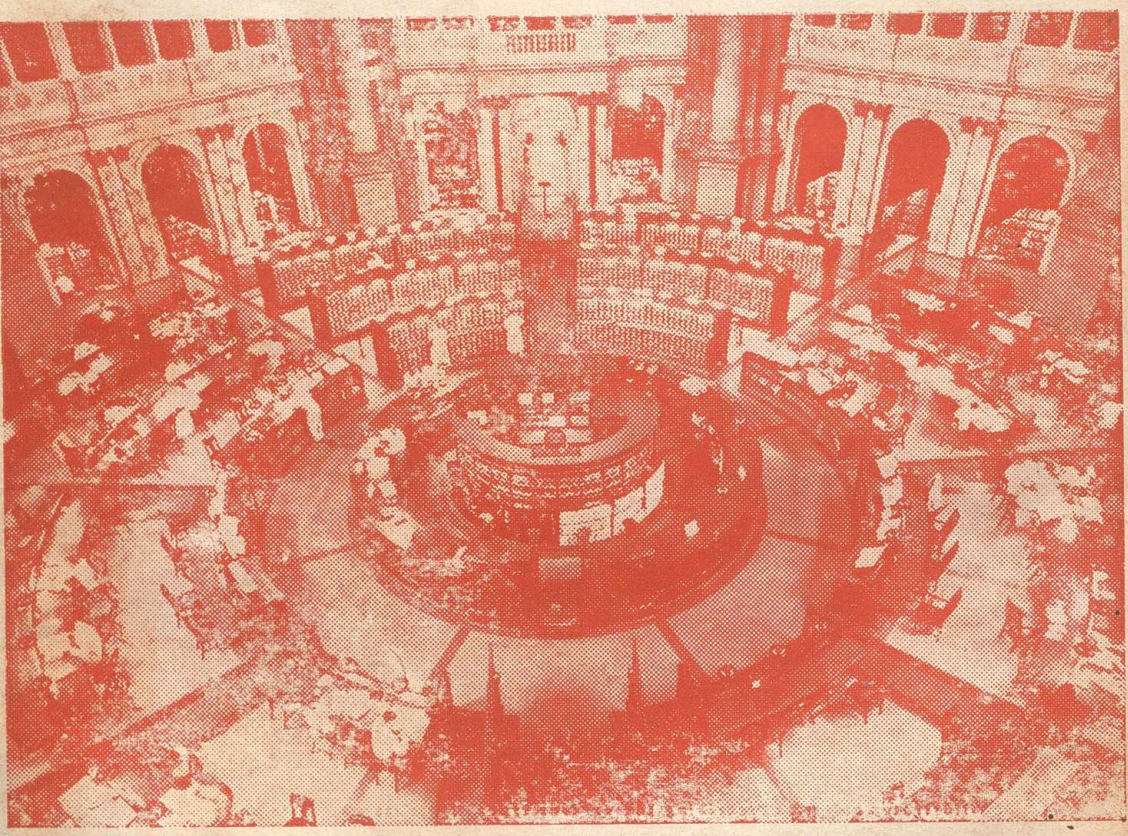

The Library of Congress, established 150 years ago in Washington, D. C., by the United States Congress, started with a small appropriation "for the purchase of such books as may be necessary for the use of Congress." Nucleus of the present collection was the purchase in 1815 of the 6,000-volume library of Thomas Jefferson, third President of the United States. Today the Library contains more than 3,00,00,000 books, pamphlets, maps, charts, photographs, prints, manuscripts, and other pieces of material. Its catalogs and bibliographical lists are used by thousands of libraries, schools and individuals in the United States and other countries.

The photograph shows the Library's main reading room with ranges of study tables.

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