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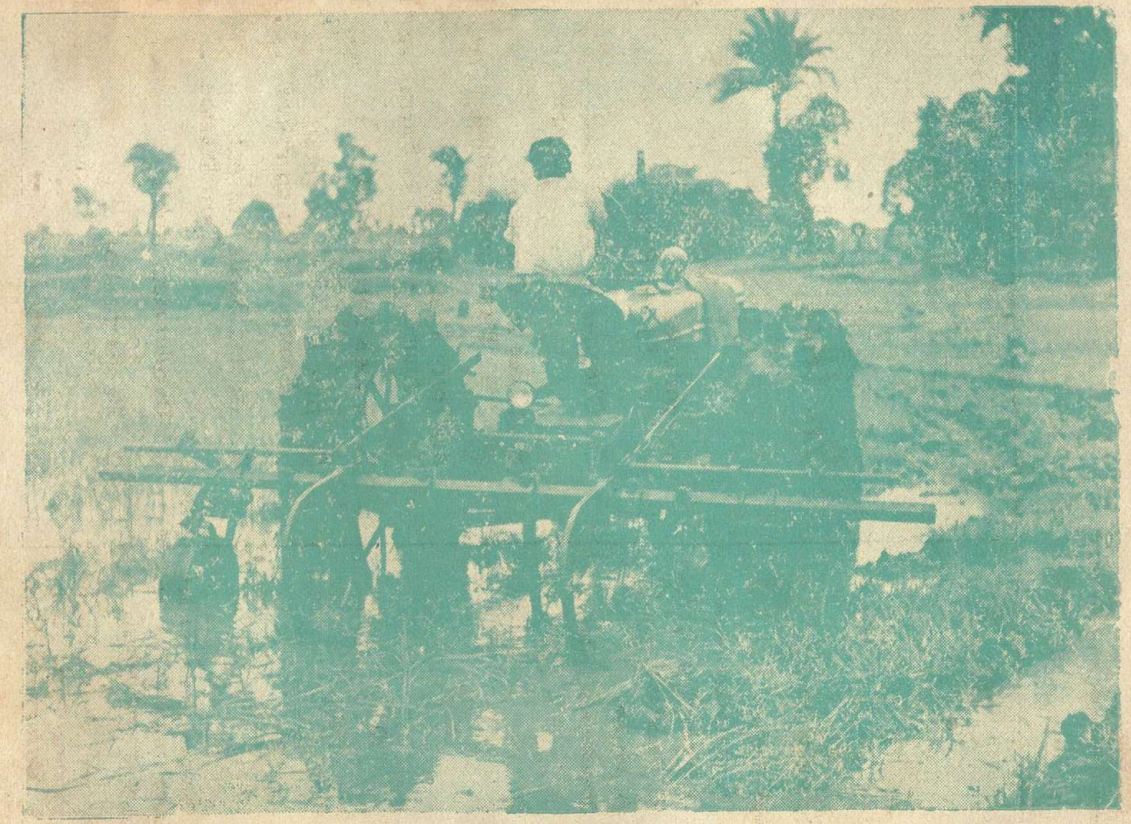

New type Tractor Ploughing Waterlogged areas.

FACT

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

Editor.

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EDITORIAL.

SARDAR PATEL.

THE demise of Sardar Patel on the 15th of this month removes from our midst one of the most outstanding personalities of Indian Public life.

He was the close henchman of Mahatma Gandhi in the great and long-drawn struggle to make India free.

And after freedom has been won, and the task of governing a vast subcontinent, with its diverse interests, devolved upon those whose training or experience in administrative art was practically nil, the Sardar boldly set about the task of governance, with a capacity that commanded respect, with a firmness of purpose that left nothing uncertain, and with a foresight and judgment that compelled the admiration of even those endowed with a larger vision.

His grim determination and purposive planning have enabled him to unify and consolidate the six hundred odd Indian States scattered throughout the length and breadth of India into orderly democratic groups and to bring them in line with the other states of the Republic.

It is both early and difficult to estimate the Sardar's contribution to India's present status but the fact is beyond dispute that his realistic outlook and firm resolve to face all issues with a view to preserving intact the peace and solidarity of the land, have helped considerable the position and dignity abroad as well as the security at home, of our young democracy.

He was one of those who could handle any situation readily without fuss or hesitation.

He was a thoroughly efficient organiser before he became a statesman and his organising abilities easily won for him the loyalty and admiration of even those hardboiled civil servants nurtured in the traditions of British Imperialism.

Taken all in all, Sardar Patel's death, though at the ripe age of 74, has created a big void in the ranks of our elder statesmen, which it is not very easy to fill, in the near future.

We may have men of greater vision than he, men of better brilliance and ability for catching the popular imagination.

But in him we find a rare balance and synthesis of qualities that conduce to safety and stability which proved to be so necessary, so sure, so dependable at the present juncture of India's political and economic evolution.

What was once said of a famous British statesman may, with equal aptness be said of the Sardar, that in him "blood and judgment were well commingled."

Except to a handful of intimates he rarely revealed the softer and more endearing qualities of his nature.

But we are assured by his life-long associates like Rajaji that the Sardar was very kind and gentle in private life and easily moved by human considerations.

With silent and sincere prayers India deeply bemoans the loss of one of her doughtiest sons, a born fighter yet an ardent promoter of peace.

May the Sardar's soul find rest in Grace Everlasting.

CHANGES IN WORLD FOOD OUTLOOK

FORECAST BY F. A. O.

IF UNDAMENTAL changes in the world food outlook have resulted from the crisis in Korea and the consequent expansion of military defence and assistance programs, the Food and Agricultural Organization (FAO) of the United Nations reports in its annual study, entitled "World Outlook and State of Food and Agriculture—1950".

The study concludes that world food supplies in 1950–51 will register only a slight gain, with actual and prospective changes moving mainly in the direction of greater purchasing power, fewer currency impediments, and a greater volume of international trade.

"It now appears that, at least during the next year or two, the requirements of both producing and importing countries will be so substantial that the threat of unmarketable surpluses will fade," the report states.

Other highlights of the report are summarized by the FAO as follows:–

"Widespread expansion of military programs will lift purchasing power. Thus, demand for agricultural products will be stronger than had been anticipated."

"Higher import demands and military aid expenditures of the United States will lead to an appreciable increase in the dollars available throughout the world for purchases of foods, including agricultural products, from the United States, Canada, and other countries. Thus, some of the currency impediments to international trade will be reduced."

"The volume of international trade will rise and its general pattern should tend to improve."

"Both buying power and supply, however, can be considered favourable only in comparison with earlier years. In all, world food supplies per person in 1950–51 will be larger than in the year before, but the gain will be slight. Supplies of food and the ability to buy it are still far below the levels required to give all the world's people nutritionally adequate diets."

These developments will help move the level and pattern of world trade in the direction required for a long-term solution of international trade and payment difficulties, FAO Director General Norris E. Dodd says in a forward to the report.

Noting that demand for products directly related to military preparedness has been intensified since the Korean fighting began, the Director General points out that it is not possible to increase supplies of these scarce products in the immediate future.

In the agricultural field, wool and rubber are mentioned as the

major commodities affected, with rice and to a lesser extent cotton, coffee and cocoa also beginning to feel the pressure of rising prices. Governments are already discussing with one another the possibilities of controlling the movement of certain scarce commodities through international action, Dodd adds.

Dodd says that since measures to improve distribution of scarce supplies are emergency expedients at best, governments must give increased attention to action which will favour continued high production by giving farmers assurance of a fair return when their products come to market.

Dodd also calls the attention of FAO member governments to two other issues suggested by recent events. One is the likelihood that the United Nations, having undertaken military action in Korea, can be expected also to take responsibility for relief and rehabilitation, in which case FAO, along with other specialized agencies, may be called on for work in its field.

The other issue, Dodd says, "is the clearly shown need to forestall war or civil disturbance by vigorous agricultural programs before, rather than after, the crisis begins." Pointing to land reform as a basic problem in most of Asia, he poses as a primary example for study the question of how technical assistance programs can be shaped so that their benefits will not be withheld from people on the land through unjust and inefficient systems of landholding.

"Other long-term trends and issues," he says, "have a bearing on the immediate questions concerning supply and distribution of farm, fisheries and forest products."

Dodd sees the new technical assistance program as "a powerful force, both in the immediate future and for the long pull, in increasing the production and dollar-earning capacities of the less-developed countries and thus contributing to a larger and more balanced world output and trade." He points out that the present regular programs of FAO are working to these ends, and cites current plans for co-operating with the United Nations Secretariat in broad new studies of economic factors underlying international trade and payments.

The report also includes a section which sumarizes the world food outlook by areas and by commodities.

Barring further unfavourable weather, crop production in the Far East in 1950–51 may increase slightly, but any anticipated increase would leave per capita food supplies below the prewar level. Reported midsummer floods in China, however, indicate that improvement, if any, in wheat, rice and secondary crops will be less than expected.

Better prospects are seen for industrial and agricultural activity and income in the Indian sub-continent, Indonesia and Japan. Commercial agricultural producers in Asian exporting countries have gained from the expansion of import demand in North America, and in some cases have gained from changes

in the terms of trade following devaluation. These developments will probably continue, the report says. Production and standards of living can increase as rapidly as investment and economic development can provide new facilities for transport, communications and commerce.

FAO estimates that total volume of world trade may expand by more than one-tenth in 1950–51, although agricultural exports are not expected to expand in the same degree.

"Dollar earnings will rise because of increased armaments expenditures by the United States," FAO says. "This will ease the pressure of dollar shortages, and modify the previous plans of many countries for further cuts in their purchases from hard-currency areas during 1950–51."

In the case of selected commodities, the report looks for 1950–51 grain crops in the Northern Hemisphere to be somewhat larger than last year, with exportable supplies at least as large as those of 1949–50.

Increased output of rice in 1950–51 appears likely in the Far East, although supplies will continue short compared to other grains, and relatively high prices will probably prevail.

A substantially larger crop of sugar is also forecast for 1950–51, continuing the current upward trend in which all regions have shared. Consumption has kept pace with production, and much more could be consumed if rationing schemes were relaxed or high prices reduced, the report says

World production and consumption of fats and oils are expected to continue their current advance, with the increase occurring largely in the regions where supplies are shortest relative to prewar.

In the case of cotton, FAO estimates that consumption in 1950–51 may exceed output by about 10 percent, leaving a world carryover as of August 1, 1951, nearly three million bales less than a year earlier. In 1951–52 world cotton production is expected to benefit materially from the lifting of acreage restrictions in the United States and the stimulus of high prices.

As regards rubber, the supply outlook for civilian uses remains tight, despite rapid reactivation and expansion of synthetic rubber production in the United States. Because of the military importance of natural rubber, questions concerning the control of shipments by destination are being currently reviewed in intergovernmental discussions, FAO reports.

Concern is also expressed over the supply situation in wool, as growing military requirements superimposed on a tight world market for civilian uses cause wool prices to soar to record levels. Here also, FAO says, plans for international action have been projected in intergovernmental talks concerning the possibility of a system of allocations for raw wool.—USIS.

SILVER IN CHEMICAL PLANT CONSTRUCTION

SOME MODERN APPLICATIONS

THE wider use of silver in the construction of chemical plant has hitherto been hampered by price considerations and by the traditional tendency to look upon the material as a precious metal rather than an industrial component. Up to 50 years ago the price ratio of silver to gold was maintained fairly constantly at approximately 1 to 15. Following the demonetisation of silver, however, the price declined and by 1939 the ratio of silver to gold had fallen to 1 to 100. Prices have since been subject to sharp fluctuations resulting from artificial factors and controls, but at current levels silver can be more economically employed in chemical plant than several other corrosion-resistant materials. Increased consumption by the chemical, electrical and foodstuffs industries may be expected to result eventually in price stabilisation at an economic level for industrial users.

Silver has many valuable properties, some of which are unique. Of particular importance to chemical engineering are its high resistance to corrosion and its softnesss and ductility after annealing, which render it exceptionally well suited to various fabricating operations.

Silver is unaffected by alkaline solutions and by fused alkalis up to quite high temperatures, resists attack by most organic acids and has a higher resistance to acetic acid and acetic anhydride both in the liquid and vapour phases than any other metal in common use. Though hot sulphuric acid and all concentrations of nitric acid readily attack silver, more dilute sulphuric acid and phosphoric acid solutions have little effect even at boiling point.

The halogen acids produce a film of silver halide on the surface which inhibits further attack, unless the acid is sufficiently concentrated to dissolve the film. Silver is not subject to the formation of oxides at both normal and elevated temperatures but is attacked by most sulphur compounds. This resistance to attack over a very wide range of conditions rarely depends on the formation of a protective film; it is due chiefly to silver's high position in the electro-potential series, which is exceeded only by the standard potentials of gold and the platinum group metals.

Of major importance in many chemical applications is the fact that silver has a higher thermal conductivity than any other metal. At room temperature the figure is 1 00 cal/(sec.) sq. cm. (°C. per cm.), compared with a figure of 0.94 for copper. This outstanding plays a valuable part in dissipating the heat generated at electrical contact interfaces.

High Thermal Conductivity.

The heat transfer characteristics of silver and silver-lined chemical plant

compares favourably, for example, with those of nickel or stainless steel plant. In favourable conditions, the high thermal conductivity of silver coupled with its freedom from corrosion, enable very high overall transmission co-efficients to be obtained. At 0.056 cal./gm. per °C. at 20° C. the specific heat of silver is much lower than that of copper.

The ultimate tensile strength of fully annealed silver is about 20,000/ sq. in., while in the work hardened condition it is of the order of 40,000 to 45,000 p.s.i. To overcome its mechanical weakness and liability to sulphur tarnish silver is alloyed with copper and various other metals. In nearly all the available alloys, however, improved mechanical strength is accompanied by a reduction in the resistance to chemical attack, so that for use under corrosive conditions 99.99 per cent silver is preferred. The subject of alloying, however, has not yet been fully explored. Dr. J. M. Pirie has expressed the opinion that sufficiently active development of certain lines of investigation could yield an alloy which would combine the characteristic corrosion resistance of fine silver with mechanical properties of a reasonably high order.

Both the pure metal and its alloys can be rolled spun, drawn, etc., the accepted practices differing little from copper technique. Solid drawn tubes are produced upto 2 in. in diameter, tubes of a larger size normally being welded from strip. A number of tubular liners for autoclaves have been constructed, however, each liner being a solid drawn silver tube 30 ft. long, 20 in. diameter and of $\frac{3}{8}$ in. wall thickness. The billets cast or these tubes weighed nearly 2 tons each.

Bonding Property.

One of the most important properties of silver is the case with which it can be welded or bonded at only slightly elevated temperatures. Pure silver is therefore used to a certain extent as a bonding material in the manufacture of chemical equipment.

Since silver possesses a low specific heat, a fairly high co-efficient of expansion and a high thermal co-efficient, special provision has in some instances to be made to enable this expansion to take place without danger of buckling.

The use of solid silver for plant construction is, of course, limited by the cost of the metal and by its low tensile strength. Massive silver is therefore used mainly where thin-walled structures and low unit stresses are permissible. The principal application of this nature is in the construction of tubes and coils subject to low working pressures.

Fine Tubing.

For service at higher pressures, silver tubes and pipes are backed with a stronger metal by drawing down together a pair of heavy-walled tubes, one of silver, the other of base metal. In heat exchangers the silver tubes are expanded to fit tightly in the tube plates, which are usually of base metal sheathed with silver on the contact face and through the holes. Fine silver tubing is extensively used in the form of coils for

heating, cooling, and small-scale condensing operations.

Where all risk of contamination of the contents by base metals must be avoided, small pans and vessels may be constructed entirely of silver. Solid silver, often in cast form, is used for small parts which cannot readily be lined, such as plug cocks and various pipe fittings. Small and complicated cover plates for pressure vessels are made in a similar manner.

Though the initial cost of silver plant is high, this is largely offset by the recovery value when a plant or vessel is taken out of commission. It may be more economical in the long run to employ solid metal even in thick sections, than to attempt to line difficult constructions.

Cladding Technique.

Because of the relatively high cost of silver, however, the most widespread use of the metal in chemical plant is in the form of liners, pre-formed to fit a base metal shell or tube. The cladding or inlaying technique is also extensively used, to produce silver-clad copper, phosphor bronze and steel sheet, silver inlays or stripes, and silver-clad copper and other metals in wire and tube form.

Copper is the most widely used backing metal. In a standard type of steam-jacketed pan used in the food processing and other industries, the lining is made up, for example, from sheet about 0.03 in. thick. This is rolled and hand worked to shape, the edges of the sheet being joined by gas welding using a fine silver filler rod. The liner is made to fit closely in the shell and the surfaces to be in contact are coated with an alloy of low melting point. After the liner has been inserted the pan is heated and the silver pressed into firm contact. This method produces a strong bond which allows a high rate of heat transfer through the double wall and cannot easily be loosened at ordinary working temperatures. Many complex shapes can be lined in this way. Mild steel vessels can also be given a bonded lining if the steel shell is not too heavy. Bonding is not practicable in thick-walled vessels such as high-pressure autoclaves, the method usually adopted being to make the liner slightly oversized and press it into place.

Jointing Methods.

In general, the design of vessels or structures to receive a silver lining seldom presents any serious problems, nor is jointing difficult. The joint between the body and head is made by carrying the silver over flange faces and pulling up against a soft gasket by means of backing rings. Pipe joints may be made in the same way, or in the case of solid wall the methods applicable to copper piping may be employed. All jointing methods ensure that liquids or vapours in the system are in contact only with silver. Hence it is possible to build plant assemblies with silver contact surfaces throughout the system. Since silver surface easily bind together, special consideration must be given to parts such as agitator seals, cock and valve seatings, etc., which are in moving contact.

The fitted lining provides a very satisfactory working surface for many conditions and is readily recoverable, but there are disadvantages. Unless the lining is carefully bonded, there is a risk of collapse when working under vacuum particularly at temperatures above 200° C., when the strength of the bonding medium is low. Moreover, the production, fitting and bonding of a liner into vessels of complex design adds considerably to the original labour of construction. Sheets less than 0.03 in. thick cannot be conveniently fabricated and handled, whereas for many applications ample protection would be afforded by a considerably smaller weight of silver.

Problem of Porosity.

Uniform coatings of silver as this as 0.001 in., or even thinner can be applied by electrodeposition or metal spraying, but are too porous for chemical process work. A homogeneous deposit may be obtained by carefully building a heavy layer, but even with thick coatings complete freedom from porosity is difficult to guarantee. This method is used for such articles as centrifuge baskets, paddles of Werner-Pfleider type mixers, and other work which cannot readily be sheet lined or made solid.

A promising method, likely to become important, is the cladding of a silver sheet on a base metal plate before fabrication. Under carefully controlled conditions a very strong bond is produced which enables the composite plate to be worked as a single element. Some difficulties still exist but once the technique has been mastered it seems probable that the first cost of silver-lined plant may be considerably reduced and its range of application extended.

The scope for silver or silver-lined plant is extremely wide. In inorganic process the field is limited mainly by the inability of silver to resist attack by nitric acid and concentrated sulphuric acid. It is also limited by the availability of cheaper alternative materials. Silver is used, however, in handling cold hydroflouric acid, dilute sulphuric and hydrochloric acids, etc., and has numerous applications in the manufacture of medicinal chemicals and pharmaceutical preparations. It is also used as a ladle and mould material for making very pure castings of sodium and potassium hydroxide, and in pipes and valves for handling chlorine.

Organic Processes.

In organic processes silver is used in the presence of many acids, such as acetic and maleic acids, and in the presence of phenol and phenolic derivatives. One of the most extensive applications in this field is the condensation and general handling of acetic acid, which at the moment of condensation is particularly corrosive. This causes considerable difficulty to manufacturers who used copper containers, but has been solved by the use of silver.

Forty Tons Per Day Ammonia Plant In Spain

By
M. C. VERGHESE.

IN March 1950, Spain's most modern and largest plant for the manufacture of nitrogenous fertilisers (Ammonium Nitrate in the form of Nitro-chalk) was officially opened and started production. This plant is of interest to us for the following reasons:—

1. The Spanish plant "NICAS" was projected before World War II; In 1942 the buildings and 90% of the electrical instalations were completed but production started only in 1950. "FACT" was projected only in 1943, but production started in 1947.

2. Both "NICAS" and "FACT" are designed for 40 tons of ammonia per day but the N_2 and H_2 gas production methods and the end products are different.

"FACT" is designed to produce 50,000 S. tons of Ammonium Sulphate (21·0% Nitrogen) whereas the Spanish plant is designed to produce 65,000 S. Tons of Nitrochalk—Ammonium Nitrate—(15·5% Nitrogen.)

3. In both plants, the ammonia synthesis systems are similar which are modifications of the Haber Bosch Process on the N. E. C. (C. C. C.) lines.

4. For production of H_2, NICAS uses the electrolysis of water method and for nitrogen the air liquefaction.

5. Ammonia is converted into Nitric acid in Bamag units using O_2 from the electrolytic cells and nitrogen sections and an 80% solution of ammonium nitrate is made which is then mixed with ground limestone to produce nitro-chalk.

6. Thus NICAS uses electricity, air, water and limestone to produce a nitrogenous fertiliser.

It is interesting to go in detail into the process of operation of NICAS.

The plant is situated in the centre of the agricultural region of Castille at Valladolid which is the granary of Spain and therefore the main consumer of fertilisers. Hydro-electric power is available and the promoters of the firm are primary producers of electricity. Rail and road transport facilities exist and river water is available.

I. Production of Hydrogen & Nitrogen.

Hydrogen is produced by electrolysis of distilled water (dilute solution of casutic soda is the electrolyte). A battery of 265 cells are fed with D. C. at 600 volts and a total current consumption of 12,000 amperes. The installation consists of a big A. C. sub-station with two 30,000 KVA power transformers stepping down from 1,32,000 to 6,300 volts. The 3 phase 6,300 volts A. C. is converted in 6 mercury vapour rectifiers, into 600 volt 12,000 amps. D. C. The power consumption is less than 150 kilowatt hours per thousand standard cubic feet of hydrogen.

The nitrogen is obtained by compression, liquefaction and distillation of air into nitrogen and oxygen. The oxygen from these two sections are utilised in oxidising Ammonia to make Nitric acid later.

II. Ammonia Synthesis.

Hydrogen of 99.8% purity is stored in a gas holder of 1,50,000 c. ft.

capacity and pure nitrogen in a holder of 1,00,000 cubic feet. Two 1000 H. P. Clark compressors, compress the 1:3 gas mixture to 4500—5000 psig, but there is no centralised control panel as in FACT. No purification of gases is necessary since no CO, CO_2, H_2S, S etc. are present. The flow diagram shows the following differences from FACT in the synthesis section.

(a) Refrigeration compressors are not essential since ammonia used for refrigeration when vaporised goes directly to the Nitric acid section.

(b) There is a "cold exchanger" bofore the converter in which synthesis gas from filter gets cooled on its way to the ammonia cooled cooler and synthesis gas coming out of ammonia cooled cooler and going to the converter gets warmed up.
This equipment reduces the refrigeration necessary in the ammonia cooled cooler and prevents any mist of ammonia to be carried into converter by raising the gas temperature.

(c) The circulators are electrically driven machines-

III. Nitric Acid.

Ammonia gas is converted catalytically in four German Bamag Convertors each capable of oxidising 5 tons of ammonia per day. Catalyst used is Platinum-Rhodium alloy according to Bamag patents. The air feed to converter is enriched by the addition of 10% oxygen from the nitrogen and hydrogen sections and the mixed feed contains 12–12.5% ammonia.

54–58% strength nitric acid is produced in counter-current oxidation and absorption towers at atmospheric pressure.

The neutralisation of nitric acid is done with ammonia under closely controlled conditions giving a 80% ammonium nitrate solution.

IV. Nitro-chalk.

As the ammonium nitrate produced is only used as a fertiliser, it is mixed with ground lime-stone to give a material which is safe to handle, readily granulable and with 15.5% nitrogen contents.

The ground lime-stone is mixed with the concentrated ammonium nitrate solution and the temperature is kept below 85° C to avoid formation of ammonium carbonate. The mixture is passed down a tower and solidifies during travel and gets partially ganulated. In rotary driers the drying is completed and the mixture reduced to suitable physical condition for storage and use. A silo affords storage for 24,000 tons-nearly for 5 months' production.

The NICAS affords certain worthwhile advantages which may be borne in mind in future planning for Fertiliser Production in India.

1. In regions where coal, coke, natural gas etc. are lacking as raw material and where electricity can be cheaply obtained, hydrogen and nitrogen can be produced at competative cost, e. g. in Bhakra and D. V. C. areas.

2. NACAS does not depend on raw materials such as sulphur or gypsum. This is important in countries where sulphur and gypsum deposits are meagre.

3. By incorporating calcium carbonate in the nitrogenous fertiliser, the nitrogen contents is reduced to a safe low value and a corrective ingredient to soil is obtained in addition.

4. From the point of national defence a set up as at NICAS can switch over to explosives manufacture at short notice.

India's Food Deficit-How to end it.

THE application of modern agricultural practices to even half of India's farms would eliminate the Nation's 10-percent food deficit.

This opinion was expressed in an article printed in "*Foreign Agriculture*", a publication issued by the United States Department of Agriculture. The author is Henry W. Spielman, formerly Consul (Agricultural) at the American Consulate General in Bombay, and at present Agricultural Attache at the American Embassy in Karachi.

The article, in part, follows:

"Many aspects of Indian life have combined to give credence to the widespread belief that India's farms can never produce enough food for all its people. The population is increasing by roughly four million a year, most of the good land is now being farmed, agricultural production methods and tools have changed but little over the centuries, and farmers resist change. Nevertheless, India's agricultural scientists believe that the Nation can feed itself. In its agricultural experiment stations it has the knowledge, and on its farms it has resources that are not fully utilized. In those areas where the two potentials have been brought together, farm productivity has been increased by 60 percent to as much as 400 percent. And a 10-percent increase is all that India needs to become self-sufficient.

'The system of agricultural experiment stations throughout India has been in operation for a number of years. Many of the stations are staffed with specialists trained in the United States or Europe and all of the stations have been highly successful. They have developed new crop varieties, improved plowing and cultural practices, developed water- and soil-conservation services and drainage programs, and introduced irrigation farming and land reclamation.

"Station experiments have shown that by using improved varieties, farmers can increase yields by an average of 12 percent. If they also use manures and commercial fertilizers, they can increase them 25 to 75 percent. And if, in addition, they use slightly improved indigenous farm implements, space crops in accordance with rainfall and soil conditions, and plant and cultivate at the proper time, they can increase output 20 to 50 percent more. When all improved methods were used on one plot of an Indian farm, production was increased by 400 percent.

"The Sholapur experiment station in the Deccan area of India reports an interesting example in its co-operative arrangement with a farmer on a dry hill-side nearby. The farmer agreed to follow the station's recommendations in his 15-acre grain sorghum field, from which he had been getting an average yield of 150 pounds an acre. He was to use his own equipment.

"His first step was to terrace the field to conserve both the soil and the moisture. Next, he prepared it for contour planting. Then he planted seed of the improved variety furnished by the station and spaced both the rows and the plants in the rows as recommended. Compost and chemical fertilizers were applied. When the crop was harvested, the farmer was amazed at the yield–660 pounds an acre.

"The director of the station is convinced that similar results could be obtained by most farmers in the Deccan area.

"Indian's agricultural scientists, then, do have the know-how for solving the country's food problems. The question remains how to bridge the gap between the experiment station and the farmer. The answer, of course, lies in extension services. These too, India has, but thus far they have reached few farmers.

"In Bombay Province there is an agricultural agent and three or four assistant agents in each of the 19 Districts. Each assistant supervises three to five village workers, who live with the farmers and pass along the latest recommendations of the Department of Agriculture. Because of the limited number of extension workers, only a small percentage of Bombay's farmers can be reached. Those who are getting up-to-date farming information and learning to use it are getting increased yields well above those of their non-participating neighbours. Undoubtedly production of all types of food-grains could be increased in a few years if there were enough trained extension workers.

"Although India's farmers tend to cling to the traditional ways, Indian agriculture is not so static as it might appear to a casual observer. Changes are taking place. For example, 10 years ago, farmers of the Gujerat District of Bombay Province were raising their own bullocks. Now they get them from commercial cattle raisers because farmers realize that, with young bullocks requiring four years of costly care and training before they can be of use, it is cheaper to buy them already trained. Another example is to be found in the region around Anand, also in Bombay Province. Ten years ago, this area was producing only enough milk for local consumption. Last year, even in the February-March off season the region sent 57,000 pounds of milk daily to the Bombay city market.

"All this evidence of progress and change indicates that India is moving toward a modernized agriculture and a solution to its food problem. It will not be an easy or quick solution, however. India has 340 million people to feed, and the population increases by about four million a year.

"In India as a whole, food-grains probably represent 60 to 75 percent of the diet. In some areas they make up 90 percent and in others about 45. Other sources of food are merely supplementary. Therefore most of the increased production will have to be in food-grains.

"Another custom that affects the general productivity of Indian farms is that of maintaining thousands of unproductive cattle on them.

"The fragmentation of Indian farms too has some effect on agricultural efficiency and therefore on the country's ability to feed itself. Few farms are a single unit. The farmer with five acres may have five different plots of land scattered over two square miles. He spends considerable time and animal power moving from one plot to another. Some of the Provinces have passed legislation to correct this waste. Bombay Province, for example, has fixed five acres as the minimum size of a plot. This law also provides that when a holder sells his land, if it is smaller than that minimum and his neighbors also have less than the fixed minimum, he must sell to one of his neighbors.

"Indian farms vary in size with the kind of principal grain they produce. The average rice farm in Bombay Province is five acres, while most jowar-grain sorghum farms consist of 30. Of course, in many places rice farms may be only two or three acres or sometimes, only one. Generally a family farm is the size that an able-bodied man with a grown son and two pairs of oxen can farm. Indian agricultural specialists believe that with the present type of farm power, this small unit is the most economic.

"Many of the aspects of Indian life that stand in the way of a highly efficient agriculture are rooted deep in religious beliefs and in tradition, and the Government will not find them easy to change. But increasing production to a level of self-sufficiency would not necessarily require any radical change in the social or economic conditions of the farmer. It calls only for making better use of his resources. India's food deficit is only 10 percent of total production. If the improved methods can be used on 50 percent of the farms, the country could feed itself. The other problems will eventually have to be faced and solutions found before agriculture can be on a continuously sound basis. The immediate problem is making two blades grow where one grows now. And this can be achieved by extension services that can effectively get the results of research from the experiment station to the farm."

USIS

How Britain is Tackling Problem of Rising Prices

MAIN FEATURES OF FINANCIAL POLICY

By

JOHN KINGSLEY

IN common with many other countries, Britain is faced with the problem of rising prices.

The newly-appointed Chancellor of the Exchequer, Mr. Hugh Gaitskell, in his first House of Commons review of the economic position presented the reasons for his belief, however, that the U. K. retail price index was not likely to increase by more than two per cent between the mid-summer of 1950, when it stood at 114, and the end of the year (June 1947 is taken as 100).

The risk of internal price inflation is recognised in Britain, and Mr. Gaitskell outlined the kind of policies which would be pursued by the Government. The most notable feature of his review was the unbroken continuity with the policies of Sir Stafford Cripps, who has been forced by ill-health to take at least a year's rest.

DISINFLATIONARY BUDGET.

The Budget next April, one may assume, will be disinflationary. That is to say, taxes enough to cover current and capital expenditure not met by savings will be raised. Food subsidies and price control will be used to help stabilise the cost of living. The capital investment programme will be restricted, as need be, by credit policy and the licensing of new building.

Restraint in pressing demands for wage and salary increases will be urged on trade unions. Saving will be encouraged. The drive for higher productivity in industry-greater output at lower cost—will be fostered even more intensively. These are the main lines of British financial policy as they have been for the past few years.

A number of new factors, however, complicate the outlook. One is the great increase in the sterling prices of raw materials following devaluation, accelerated this year first by the revival of American business activity and then sent rocketing since the Korean War by the rearmament boom.

The price index for U. K. imports of all kinds has risen from 110 in September 1949 to 137 in September 1950. The rise in the raw material component of the import index in the same period was from 118 to 163. A few months hence these increased prices will be reflected in the retail prices of many manufactured goods. Experience since devaluation just over a year ago suggests that it may take as much as six months or even a year. So the impact of the post-Korean price boom may not make itself felt until well into next year.

WAGE RATES.

The likelihood of prices rising

further in the U. K. brings into question the policy of "wage restraint" inaugurated early in 1948. This has never been an absolute wage "freeze" as it is often mistakenly called, but it did effect a very considerable slowing down of wage demands, particularly in the period after devaluation.

About half the British workers have, in fact, had wage increases during the period of wage restraint, but they have been small. The weekly wage rates index has moved from 104 in January 1948 to 108 in January 1949 and to 110 in January 1950, and the upward movement has only been recently resumed after the index had stayed at 110 for the first eight months of this year.

The index of wage rates underestimates the earnings of British workers because it does not cover earnings from overtime or piece-work bonuses. The increasing tempo of the industrial drive in the last two or three years has led to more overtime, so that overtime earnings or piece-work bonuses are now general in many industries.

The latest figures collected last April show that adult male workers are now working on an average a 47-hour week—half-an-hour longer than two years earlier. This trend will be accentuated by the pressure of rearmament and growing export orders. From the engineering industries of the Midlands, in particular, there are reports of production going ahead at full pressure.

INCREASED EARNINGS.

During the years 1947 to 1950 the average weekly earnings in the U K. have grown faster than the cost of living, so that many millions of workers have been enjoying greater real wages. Between 1947 and 1950 earnings increased by 20 per cent while the cost of living index went up 14 per cent. Another way of assessing the position is from consumption figures, which show that in the three years following 1946 food consumption increased 13 per cent, clothing 32 per cent, and durable household goods 38 per cent.

The British Government now seems to accept the need for more extensive wage increases than have been granted in the past two or three years. But Mr. Gaitskell has warned that wage increases must not be greater than is justified by increased production. The Government's decision to relax the sterner standards of the wage restraint policy needs to be judged in the light of the production record.

The increase in British production this year has been impressive enough to give grounds for confidence. With a negligible increase in the numbers employed, the index of industrial production has been showing an eight per cent increase this year over last. This is a notable advance, but it will now have to meet the increased demands of rearmament as well as the needs of the export and home markets.

TREATED SEEDS PREVENT CROP DISEASE

Seed treatment is an insurance against loss of crops. The fact that food stands and yields are often obtained without seed treatment, does not lessen its importance because the treatment is a prophylactic measure, practiced irrespective whether the disease is present or not, during a particular season. If the seed has not been treated and the disease appears in an epidemic form later, it might be too late. The article suggests a practical method for preventing such diseases.

HIGH quality seed of a suitable variety is the foundation of good cereal crops. The variety chosen should be well adapted to the soil in which it is to be grown. Equally important is the quality of the seed. It should be pure as to type, well developed, free from insect injury and disease and of good germinability. Ordinary seed can be greatly improved by proper cleaning and treating.

Losses due to various diseases of cereal seed like seedling blight, foot-rot, etc., are sometimes heavy. Considering the cost of treatment which on an average comes to about four annas per acre, it is worthwhile having the seed treated even as a preventive measure.

Passing seedgrain through a fanning mill is an effective way of removing many of the insect pests and disease-producing organisms that may be present, in addition to getting rid of coarse matter, chaff, and weed seeds. Thus, many smut balls and weevils are screened off and light kernels likely to be diseased, are blown away. Moreover, thoroughly cleaned seed can be treated with a disinfectant more effectively than uncleaned seed. Thorough cleaning, therefore, should be considered as a pre-requisite to chemical treatment.

KINDS OF TREATMENT.

The term "Seed Treatment" usually refers to the application of a chemical disinfectant to the seed. The disinfectant may be applied as a dust, slurry (a thin paste formed by the addition of a little water to the dust) or liquid. Disinfectants that are sold for use as a dust or slurry contain, in addition to the active chemical, a considerable proportion of some inert substance, such as talc. Most of the chemical fungicides sold at present contain mercury in some form. To obtain the best results, it is necessary to follow strictly the manufacturers' directions.

Certain disease of cereals, the casual agents of which are deep-treated in the seed and thus internally seed-borne, may be controlled by soaking the seed in hot water. This treatment is particularly effective in controlling the loose smuts of wheat and barley. The seed is first soaked in water at a temperature of about 80.2°F. for four hours, then placed in water at 125°F. for two minutes, and finally soaked for 10 minutes in hot water. After immersion in the hot water bath, the seed should be placed in cold water for a short while and then spread out to dry. Too long an immersion or a very high temperature will injure the seed, while too short an immersion or too low a temperature will fail to control loose smuts.

Unless special equipment is available, it is impractical on the ordinary farm to treat large quantities of seed by the hot-water method,

and only small quantities of seed should be treated at a time. The treated seed may be sown to produce a supply of smut-free seed. In India, the heat of the sun's rays is also used for the purpose. The suspected seed is placed in shallow, flat-bottomed tubs and covered with water so that the water level is about 2 inches above the level of the grain. The tubs are placed in the sun early in the morning, and allowed to remain there for about five hrs. Then the water is poured out and the soaked grain is spread on the threshing yard in the sun to dry. As a result of the action of the hot summer sun, the germinating dormant mycelium is killed and the seed also dried. Provided the days are long and very hot it is a better method for controlling loose smut.

CHEMICAL TREATMENT.

Small quantities of seed may be treated by placing the required quantity of the dust in a bottle and shaking vigorously for two to three minutes.

An earthen pot with a lid is also useful when not more than about ten seers of seed have to be treated. After covering the mouth of the pot with the lid, the grain and the required quantity of dust are placed inside the pot which is then well-shaken for a couple of minutes. The pot should not be more than half full.

For larger quantities a seed treating drum is convenient and useful. This may be made locally or purchased from a manufacturer. It consists of an ordinary oil drum to which is welded an iron pipe. The pipe rests on the two sides on wooden or iron pivots so that the drum can rotate. The drum should be half full. The method of treatment is simple. The grain is placed in the drum, the required dose of the fungicide added and the drum revolved for three to four minutes. Thus each grain gets coated with a very fine deposit of the fungicide.

The quantity of the fungicide to be used varies with the crop, the disease and the fungicide used. The usual dose is 1 part of the disinfectant to 250 or 300 parts of seed. This comes to 1½ to 2 chataks of the dust to 1 maund of seed.

Certain precautions are necessary in using the chemicals which are all poisonous. It is advisable to avoid inhaling the dust. The nose and the mouth should therefore be protected with a cloth or a respirator. The fungicide should not be handled with wet or moist hands, and should not be allowed to come into contact with wounds or broken skin. After the treatment is over, any 'dressing' on the hands should be removed by rinsing thoroughly with soap-water.

The bags which have contained treated seed should be kept separately and if they are to be used for carrying fodder, they should be properly washed.

It is advisable that the mixing of dust with the grain should be done in a reliable dust-proof machine. Grain should not be mixed with the powder on the barn floor or the mixing carried out in a sack.

Seed can be treated three to four months before sowing without inpairing its germination. But the treated seed should be stored in a dry and ventilated place.

DEVELOPMENT NOTES

SPRAY POND

By
PAUL POTHEN

ON the 14th of September was brought into service, a system for treating cooling and reusing the cooling water of the Ammonia Plant. This plant is the biggest consumer of water in the factory taking nearly 50% of the total water supply, amounting to 2,500 gallons a minute or enough water for a town with a population of 1,50,000 inhabitants. As originally planned, this water which was pumped from the filter beds was to perform its cooling function and flow back to the river with no change except an increase in temperature. This was justified economically but it was found after some operational experience that the water tended to be acidic in reaction with pH of 5.5 to 6 resulting in corrosion in pipes and cooling systems.

The problem was studied at length and it was established that corrosion was to be avoided by treating and recirculating the water. To permit this and to maintain its prime function of cooling, it was necessary to cool the water after use. The alternatives of cooling towers and spray ponds were investigated and the provision of a spray pond with a suitable pumping installation was finally decided upon.

The spray pond consists of a rectangular basin 100'x85', 3½' deep at the shallow end, half in cut and half in fill for economy and lined with a 4" slab of concrete protected from cracking by Maxweld fabric reinforcing. The cold well is at the south-west corner of the pond adjoining the pump house. The pump house incorporates the hot well for return water from the plant and houses 3 pumps of the following description on the pump floor which is about 8' below the water in the pond. The pumps have thus positive suction.

Pump: Kirloskar 10 UPI 12"x10"
R. P. M. 1440
Capacity 3000 gallons/min.
Total delivery head 70 ft.

Motors: G. E. C. 75 H. P.
400 volts, 3 phase, 50 cycles.
R. P. M. 2 Nos. 720 and 1 No. 960

The drive is through six numbers of D–128 V belts for each pump.

The inlet manifolds are arranged so as to permit the end pumps to work on delivery from hot well to spray pond and delivery from cold well to plant respectively while the central pump can work on either duty. The delivery from pumps to spray pond and to plant are through 12" pipes.

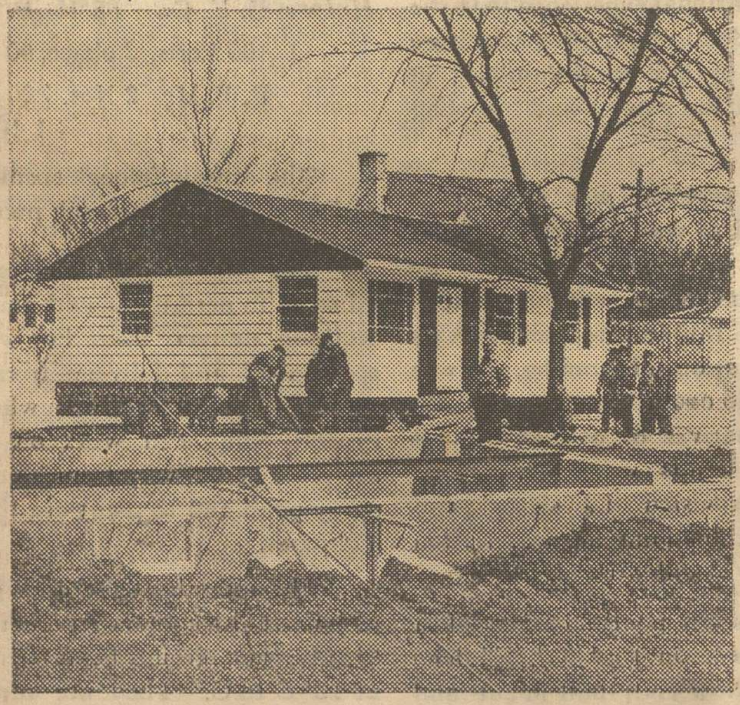
The spray heads are in groups of four at the corners of a square of 9' side, such groups being arranged at 12' C to C. They are mounted on 6" distributing manifolds, 3 in number supported on concrete posts at 6' 6" height from the tank bottom.

The spray heads are of cast iron and are of the vortex type.

Water from the various points in the plant are returned to the hot well by covered drains. An orifice meter is provided on the delivery line to plant for measuring flow. A float gauge visible from the pump pit and the operating floor indicates the level of water in the hot well. Provision for chemical treatment and makeup has also been made.

Except for the pumps and the valves, the entire project has been contrived locally, the extensive piping and fittings required having been made in our shops. Engineering, construction, maintenance and electrical groups have collaborated on a pleasing installation.

Whatever aesthetic qualities the project possesses, its functional purpose is the cooling of hot water. It is undergoing extensive tests as to performance, windage losses etc. which it will have to pass before it can relegate itself to the position of a pleasant sight in the factory premises.



The photograph shows an assembled prefabricated house being rolled on to its prepared foundation.

STANDARDISATION OF INDUSTRIAL PRODUCTS

GOOD PROGRESS IN 1949

Third Annual Report of The Indian Standards Institution.

CONSIDERABLE progress in the task of standardisation of industrial products was made in India during the year 1949-50. As against the target of 100 standards for the year, the Indian Standards Institution had finalised over a hundred standards and published sixty-nine by the end of March 1950. Besides this 157 standard specifications were in circulation for eliciting technical comments and an additional 213 were in other stages of drafting. It is estimated that the total number of subjects under study by the Institution had touched a figure nearing 700 by the end of the year under review.

The third annual report of the Indian Standards Institution which has just been published reveals that during the year the Institution received increased support both from Government and industry. Its membership rose from 475 to 563 and the number of Committee members went up from 1600 to 2,200. The number of sectional and sub-committees is reported to be nearly 240 as against 190 in the previous year.

Among the proceedings of the ISI Committees, particular mention has been made in the report of the recommendation of the special committee on weights and measures and the scheme of certification marking now under consideration of the Government of India. The special committee has recommended that, in order to avoid the existing confusion and consequent national loss brought about by the divergent systems of weights and measures prevalent in India, one uniform system should be adopted as standard all over the country. In the opinion of the special committee, the metric system would best serve the present needs and also assist the future development of India.

The certification marking scheme is a measure intended to encourage standardisation of industrial products, which should also convey to the consuming public a guarantee of quality in respect of goods to which the mark is applied. In this connection a draft bill, which was earlier submitted to the Government of India, is now under consideration and it is expected to be introduced in the next session of Parliament.

Other subjects under consideration by the two hundred and odd committees of the Institution cover a wide range of engineering, textile and chemical items including cement and concrete, ferrous and non-ferrous metals, electrical plant, conductors and accessories, timber, hardware, refractories, radio equipment, batteries, cotton yarn and cloth, jute, wool, textile stores, national flag, rayon, organic and inorganic heavy chemicals, fine chemicals, lubricants, rubber products, paints and allied products, bitumen and tar, essential oils, inks, etc.

An indication of the success of the efforts of the institution is to be found in the sale proceeds of standard publications which recorded an increase from Rs. 5,700 to 25,200 during the year under review. The library of the institution has accessioned 3000 new specifications during the year, the total number of standard specifications in the library now being more than 10,000.

Though in the original budget estimates, a deficit was indicated, the Institution managed to operate within its income. A contributory factor in this direction is the increasing interest evinced both by the Government and industry. The direct contributions of the industry are stated to be about 32 per cent of the total income, while its indirect contributions by way of expenses of its representatives on ISI committees have been estimated to be even more. Of the rest of the income, 53 per cent is still contributed by the Central Government. It is, however, noticed that the current activities of the Institution are on a wider base than in the year under review and the estimated deficit at the end of this year is expected to exceed one lakh of rupees.

In the field of international co-operation, the report recalls the sessions of the International Organisation for Standardisation (ISO) Technical Committees for shellac and mica, commodities which, on an average, bring in foreign exchange to the extent of Rs. 15 crores every year. The Institution called meetings of these ISO Committees in January 1950, which were inaugurated in a joint session at New Delhi by the Hon'ble Dr. S. P. Mukerjee, the then Minister for Industry and Supply and President of the Indian Standards Institution. The countries represented at these sessions included the USA, the UK, France, Belgium, the Netherlands, Finland, Switzerland, Portugal, Italy and India. The sessions led to agreement on a majority of important points regarding international standardisation of shellac and mica.

Copies of the report (price Rs. 2/- can be had from the Secretary, (Administration), Indian Standards Institution, 19, University Road, Civil Lines, Delhi 8.

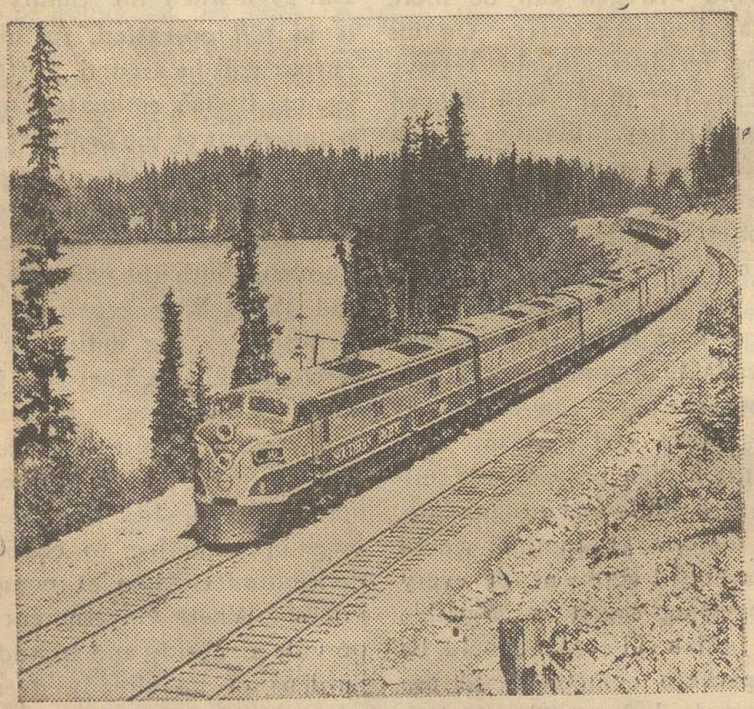
USE MORE FERTILISERS

IT has been estimated that a food production of 74 million tons in 1953, as against today's 60 million, would make India self-sufficient nutritionally. This can be done, for India's agricultural needs are still elementary. Water and Nitrogen are the two main brakes on her agricultural development, but even in the short term a substantial increase can be obtained. While water is by far the most essential element, there are nevertheless vast areas-as much as 40% of the 250 million cultivated acres-which have enough water but not enough nitrogen. And nitrogen can be more readily applied than water. On this reasoning fertilisers should receive the first priority in any well planned agricultural policy. Because of such familiar factors as the shortage of fuel, the exhaustion of land and the effects of erosion, the land is starved of vital nitrogen. Whereas in China and in Japan the cultivator has always put back into the soil every bit of available organic matter, the Indian peasant burns cow-dung and considers night soil unclean. But even if the Indian peasant was suddenly to turn all his fuel into manure, ever-all manure production would suffice for only 1 acre out of every 10. This being so, it is arguable that the Indian cultivator should be taught, perhaps compelled, to use compost and sludge. The technique is simple and well enough known and, widely enough applied, could provide some 6 million tons of humus.

But sludge and compost are not enough. If they were applied universally most of the land in India would still be short of nitrogen and, in areas such as North Bihar of phosphates too. When a country such as Japan with only 16 million acres of arable land utilises 4 million tons of fertilisers annually the ¼ million tons India consumes appears indeed light. It is, of course, not easy to get more fertilisers because of the world shortage and the dollar gap. That the Government is fully aware of the need for fertilisers is proved by the Sindri scheme. But even when the Sindry scheme is in full operation, its maximum output will be around 5,00,000 tons against India's estimated minimum requirement of the order of 3 million tons. Therefore the country might benefit from permitting reputable and experienced business concerns, who have both the contacts abroad and the selling expertise, to sell fertilisers to the cultivator on a commercial basis. They sold 1,00,000 tons a year by such means in the 30s, when agricultural prices were ruinously low. Government has neither the supplies nor the knowledge of marketing to enable it to distribute fertilisers at competitive prices. Where Government has to provide a subsidy and to add to the burdens of an already overloaded administration, business could make a profit and still sell at a reasonable price. The figures are eloquent; the application of 1 maund of sulphate of ammonia costing Rs. 14/-would

increase paddy production by 4½ maunds for potatoes. And the cultivator would get Rs. 45/- for his paddy, his net gain thus being Rs. 31/-

But vital though fertilisers are, irrigation is even more so and, unlike fertilisers, irrigation can be supplied only by Government. It is not only the major irrigation works involve expenditure on a scale which Government alone can finance; it is also that only Government has the machinery to enable it to collect water-rates from thousands of separate small farms. Indian agriculture has always had to take a very large ganble on the weather-particularly the monsoon; and the Bengal famine of 1943 was a tragic reminder that the weather can go wrong. Most of the easily irrigated areas and their existing works went at Partition to Pakistan. Nowhere in existing India can millions of acres be brought under irrigation by a simple barrage like that at Sukkur. India has to use high dams and multi-purpose schemes, or else go through the painful detail of sinking thousands upon thousands of individual wells. Indeed, both are required.



The photograph shows the modern Diesel locomotive and passenger cars of the "Shasta Daylight," a daily passenger train operated on a 718-mile route between San Francisco, California and Portland, Oregon, on the Pacific Coast of the United States.

FACTS THAT INTEREST

Petrol in Pellet Form.

Shoveling piles of petrol and kerosene around like pea coal and studying new uses for these pelletized water-insoluble liquids are routine at Southwest Research Institute.

The Carburolith process to make the balls of fuel was developed in France after the War. The Institute is conducting pilot-plant study.

The pellets are not capsules. Made of small, highly porous spheres of algin (a derivative of brown seaweed), they resist leakage, prevent vaporization loss. They are 98% liquid by volume. Favoured sizes are 1/8-½ in. dia.

Pelletizing is inexpensive and simple. A water solution of algin emulsifies the oil product. The emulsion is then mixed with calcium chloride to form the pellets.

A distinct possible commercial application is handling and storage of liquids in solid form to reduce fire hazards.

Removes Sulphur from Iron.

Over 90% of the sulphur is eliminated from iron by a special ladle technique at A. M. Byers Co. Cupolas are tapped into an open-top lip-pour ladle, and sodium hydroxide is added during the tapping. The hydroxode melts to form a desulphuring slag.

The hot metal with its layer of slag is poured into a hooded-top ladle, thus intimately mixing iron and slag. This results in unusual sulphur reduction.

The metal is then poured into a third ladle for transporting to the bessemer converter. The hooded-top ladle retains the slag

Plated Phosphorus Alloys Promise Commercial Use.

Electro-deposits of cobalt or nickel alloyed with as much as 15% phosphorus are possible with a method developed by U. S. National Bureau of Standards. The phosphorus alloys are hard, corrosion-resistant bright, and said to be more easily deposited than chromium.

Indicated uses include: gages, cylinder walls, piston rings, and other machine parts where wear resistance is required.

Plating baths consist of nickel or cobalt salts to which phosphorus acid is added. Bath pH is between 0.5-1.5. Solution must be buffered, phosphoric acid works well. Bath temperature is 75° C. or more. Current density is 5-40 amp. per sq. cm.

Appearance of deposits depends on phosphorus content. Alloys with less than 2% are usually smooth with a matte finish. As phosphorus increases, brightness increases to a peak at 10% phosphorus.

Deposit hardness as plated varies from 350 to 720 Vickers, increasing with phosphorus content. Heat treating increases hardness.

100-Million Photos per Sec.

Device for making 100-million photographs per sec. has been developed at U. S. Army Aberdeen Proving Ground. The Army is using it to record shock and detonation waves in studying explosives in shaped charges.

The terrific speed is made possible by a framing grid and rotating mirror. The grid is a focal plane shutter consisting of a series parallel slits through an opaque plate. Slit width determines exposure time, and the ratio of space width to slit width determines number of successive frames.

The mirror sweeps a full-size image of the grid across a 4x5-in. film plate. The total distance the image moves to expose the entire film is only one space width.

To obtain a detonation record, a first image is formed on the grid and the image combination moved across the film by the mirror. Resulting picture is viewed through the grid.

Weed Killer.

New chemical is designed to kill practically all types of vegetation. It can be applied in original powder form or dissolved in water for spraying. Weed killer discourages regrowth and retards burning.

Metal Powder Developments.

Powdered metals until recently have been limited to oil-less bearings and cemented-carbide parts. At a meeting of the Metal Powder Assn., technical papers pointed up progress in die design, press design, and powder developments.

New applications of powdered metals include: bearings, bearing parts, odd-shaped gears, clutches, ratchets, and cams.

Special applications: Copper combined with steel so the copper will melt when the steel is shaped to produce a self-brazing part; lead dispersed in copper to provide bearing properties.

Combination of powders: Copper combined with carbon for brushes, the copper provides conductivity, the carbon antifriction properties; silver combined with tungsten resists heat and wear; and mixtures of copper, tin, iron, lead, graphite and silica to produce heavy-duty friction surfaces.

How to Cut Processing Posts with 14 Practical Methods.

Cost reduction in processing plants can be made to work. Here are 14 tips that will help if applied intelligently:

1. Make a material balance-then you will know what you are using and where.

2. Check operating standards by comparison with other plants' data.

3. Check process efficiency in terms of throughput for a given piece of equipment.

4. Cut careless waste with proper and sufficient instrumentation.

5. Set up equipment operating records in writing–for both clean out intervals and replacement.

6. Polt operating data graphically to spot unknown correlations in processes.

7. Eliminate wasteful sampling by control units—a pint three times a day is a half ton a year.

8. Consider making solutions more concentrated to save handling and storage.

9. Recheck past employee suggestions.

10. Make a time study of plant operators.

11. Get maximum work from all research and pilot-plant equipment.

12. Improve safety practices.

13. Prepare loss reports for materials lost in processing-this will help stop dumping bad batches.

14. Write up modern operating procedures for operators.

Electromagnetic Conveyor.

Electromagnetic can conveyor is a British experimental development. Its purpose is to aid handling of empty cans during manufacture and to convey them to the filling department without damage to their enameled surfaces.

The conveyor is an elongated electromagnet with a vertically placed track to which the cans stick upright. Cans roll along the track on their rims.

The track consists of two outer running rails and a middle rail. All three rails constitute poles of the electromagnet. Cans are propelled by travelling waves of magnetic force that are induced in the middle rail. Can speed depends on wave speed.

The conveyor is energized by dc. The field winding provides the mmf. to keep cans on the track while the armature winding concentrates the mmf. along the middle rail at points made to travel by brushgear revolving around commutator.

Aluminium Etching Compound.

Concentrated alkaline material does not form hard sludge deposits.

Pennsalt AF-18, a new, highly concentrated alkaline compound for etching aluminium without forming hard sludge deposits on the bottom of the etching tanks is now being offered by the Special Chemicals Department of the Pennsylavania Salt Manufacturing Co., 1000 Widener Bldg., Philadelphia.

The new etching compound is the result of considerable research at Pennsalt's Whitemarsh Research Laboratories to develop a product which would give a bath of long life, assure uniform etching, and at the same time avoid the rock-like sludge deposits. Research work was followed by extensive field tests.

Packaged in a 300-pound non-returnable drum Pennsalt AE-18 is recommended for use in concentrations of five to seven ounces per gallon of water at temperatures of 140° to 150°F. Depending upon the degree of etch desired, the parts may be immersed for 30 seconds to 10 minutes, followed by rinsing in a clear water dip or spray.

A titration chart and other information may be obtained from the company.

Fuel Oil Additive.

Liquid's homogenizing action gives clean, complete oil burner combustion.

A flash point of over 200°F. is one of the distinctive features of Instant Acting Sabanol, "the Homogenizing Fuel Oil Treatment," developed by American Sand-Banum Co., Inc., 9 Rockefeller Plaza, New York 20, N. Y. It is said to be a safe and certain means for clean and complete combustion in oil burners since it is non-toxic and non-explosive. It is a neutral liquid concentrate free of abrasives, benzene, petroleum solvents, alcohol, ether, carbon tetrachloride or any other chlorinated solvents.

Sabanol disperses sludge and water in the oil, holding in suspension for maximum burnability. Further, it softens and then disintegrates any adhering, existing sludge. Thus this too, is burned. Time, expense and damage of mechanical cleanings are eleminated.

Sabanol also contains a soot retardant and rust inhibitor, likewise effective in all grades of fuel oil.

News & Notes

Flexible Varnish.

No. 123 insulting varnish stays flexible after baking. This makes it useful for impregnating transformer and other coils. It has excellent bonding characteristics, high dielectric strength, high resistence to oils.

Flame-sprays Coating.

New flame-sprayed membrane coating for steel surface resists acids, alkalis, salt solutions and some solvents. Material is polyethylene resins to which modifiers have been added. Coating is done only by manufacturer.

New Synthetic Rubber.

Polybutadiene, or PB rubber, is made without styrene. Developed by Phillips Petroleum Co., the rubber is claimed to be superior to GR-S synthetic rubber and equal to cold rubber in quality. Shortage of benzene, from which styrene is made, is limiting GR-S production. PB rubber process mixes high-abrasion furnace carbon black with polybutadiene latex before conversion to solid rubber.

Purifying Crude Glycerine.

Ion exchange is an efficient method to remove ionised solids (ash) and color and odor-producing materials from crude glycerine. Advantages: uniform product, low operating cost, product stable to light, and no foots produced.

Aqueous glycerine solution is passed in series through a cation and an ion exchanger, or through a mixed bed of cation and anion exchanger, or through a combination of units. First Passage through a single pair of beds removes 90% or more of ionizable materials, while second passage will leave 1% or less.

Operating costs include regenerant chemicals—sulphuric acid and caustic soda—as well as resin and equipment amortization, labour and evaporation. In general, ion exchange is cheaper than distillation for crudes with less than 10% of ionized solids and for sweet waters with less than 2%.

Plastic Floor Covering.

Oxychloride, or "Plastimail", is a smooth, durable, and fire-resistant plastic, which has been applied to floors of several box cars of the Western Pacific line. After 11 months service, inspection of a test car revealed that the floor was in excellent condition. The car had been subjected to heavy loads, including rough equipment. Loading and unloading had been done with fork-lift trucks.

Maintenance and time out of service are held to a minimum because of long wearing qualities of the plastic. The smooth surface simplifies cleaning. Cost of ordinary surface repairs has proved low. The plastic is applied over a layer of wire bond and troweled to any desired finish.

One-Fired Tile Glazing.

Revolutionary process for applying glaze to tile is applicable to any color or texture and produces tile at a cost less than half that for hand-decorated tile. Process, owned by Cerametal Corp., may be applied with equal success to dinnerware, terra-cotta, glass, and porcelain enamel surfaces.

It permits superimposing of one or more glazes on another on the tile body, which carries a predetermined pattern. One firing then matures the entire design with the colors in arrangement and number determined by glazes. Colors do not blur, Success of process depends on composition and mixing of glazes.

Perfect Molten-Metal Dyeing.

Molten metal fixes color in Standfast Dyers & Printers Ltd.'s vat-dyeing process. Principle is simple. Cloth is impregnated with dye liquor. Then it passes through the metal bath where dyeing is completed and set. System

uses metal-dyeing machine and a conventional soaping range. Cloth passes continuously from bath to soaper.

Dyeing takes place in the molten-metal bath. Exhausted dye liquor is exhausted in a bath similar to the dyebath but containing a glauber-salt solution.

Metal is Wood's metal—an alloy of bismuth, cadmium, tin and lead. Mercury was first used, but health hazards were great. Wood's metal has a slightly higher melting point, 71°C., but no health hazard is present. Functions of the metal are: (1) to exert even pressure on cloth; (2) exclude air; (3) serve as heat source in contact with cloth.

Full fixation, fastness and increased penetration are obtained in a matter of seconds.

Maximum range speed is 120 yds. per min. Over 6-million yds. of cloth have been processed by the system, one machine having processed by the system, one machine having processed 45,000 yds. of cloth in an 11-hr. day.

Hints on How to Overcome the Heat.

Air-cooling systems are expensive. Here are some ways to keep a plant cool without air conditioning:

* Keep sun's direct rays from windows. Insulate roof and side walls. Use heat reflecting materials on exterior roof surface, or spray water on the roof.

* Eliminate indoor sources of extra heat. Insulate all exposed hot surfaces. Ventilate hot vapor processes with exhaust hoods.

* Make the best of natural ventilation. Keep room air moving. Open all windows on the windward and leeward sides of the plant. Keep windward monitors closed.

Move the air in the plant mechanically. Motor-driven roof ventilators move air in and out. Try fans in dead-air areas to move air with the wind.

* Provide facilities for cool drinks. Educate workers on benefits of proper dress, frequent bathing and diet. Keep salt-tablet dispensers in areas where workers perspire excessively.

House Plant insecticide in Squeezable Bottle.

Killing bugs on house plant is made more convenient with Spray-Away, a product of the Bulb of Month Club, Chicago 90, 111. Spray-Away, priced at $1.25, is packaged in the unbreakable Plaxpak Polyethylene bottle. User simply flips up the cap, aims and squeezes. Out comes amist containing DDT, rotenone, and methyl naphthalenes. Self-atomizing feature of bottle integrates package and product into a handy household gardening accessory. Bottles are manufactured by the Plax Corporation, Hartford, Conn.

New Fertilisers.

A survey conducted by the Missisippi Agricultural Experiment Station and the Bureau of Agricultural Economics reveals that it is possible for cotton farmers in the Mississippi Delta to reduce their production costs by using anhydrous ammonia (compressed synthetic ammonia gas) as a nitrogen fertilizer in the production of cotton and corn. The reduction is more noticeable in the case of larger farms which can fully utilise tanks and heavy equipment used in applying this fertiliser. Anhydrous ammonia contains 82% nitrogen, and calculated on the basis of 50 pounds of nitrogen per acre a four hundred acre farm saved about $400 last year by using the new fertiliser instead of the nitrogens usually applied; the saving was two to three cents per pound of nitrogen used on cotton. If the use of anhydrous ammonia with his own equipment is to be economical an individual farmer will have to fertilize fifty acres or more. The new fertilizer is not at present suitable to all soils, especially heavy soils but research is being conducted to improve the position. Between 1947 and 1949 the area fertilized by anhydrous ammonia increased from 2,00,000 acres to one million acres, and indications are that it will spread to other states also.

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Ground-nut Cultivation in our experimental garden.

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