of many dabblers and incompetent people who have not realized even the rudiments of the necessities of business, much less understood the control that the chemist alone can provide in the success of what must be a highly developed manufacturing industry.

There is one thing again which comes to mind and that is the fact that the orange belt is lacking in just the very thing which this industry affords, and that is a manufacturing industry. This industry would act as a tremendous balance wheel for the whole scheme of citrus fruit raising in this section, not only from a moral but also a financial standpoint. We have seen the rise and lowering of values in the citrus grove; also in the study of financial conditions in the citrus industry we have often noted the difficulty the country banks have in making and keeping a balance of money available for fruit growers at such times as they require it the most. As it is now, the citrus industry is a very one-sided and unbalanced affair. Large volumes of fruit are marketed in a very short time and large amounts of money are thrown back into these communities only to be dissipated in what may be a reckless manner in a few short months leaving financial institutions, while perhaps not in serious difficulties, certainly embarrassed in taking care of reasonable demands. The by-product industry should regulate this in a sufficient and thorough manner.

2170 WEST 25TH STREET
LOS ANGELES, CALIFORNIA

CURRENT INDUSTRIAL NEWS

PLATINUM SUBSTITUTES IN LAMP MAKING

An incandescent lamp must be hermetically sealed and yet must have current led through its walls to the filament. From the beginning this has been effected by sealing two platinum wires through the red hot glass, all other methods of effecting a permanent seal having been quickly discarded. Of course there have been many patented propositions to effect this seal in some other way, such eminent inventors as Edison, Elihu Thompson, Sir Hiram Maxim, etc., having contributed to the list. Various improvements in lamp-making, however, reduced the amount of platinum necessary in a lamp to two bits of wire each a tenth of an inch long by 6/1000ths of an inch in diameter, making the fraction of the total cost of a lamp due to the platinum in it very small, even with platinum at its present price of $70 to $80 per troy ounce. Nevertheless, to such concerns as the General Electric Company, making 100,000,000 lamps per year, even this small amount of platinum per lamp mounts up. Lately, however, sundry substitutes for all-platinum seals invented by Byron E. Eldred, have met with such general success that they have to all intents and purposes displaced the use of platinum. Mr. Eldred made seals which were not only as good as platinum seals but better.

In sealing a wire through glass, two things come into play, one being the cohesion of the metal and the glass or what is termed the "wetting" of the metal by the glass, and the other the relative expansion and contraction of the metal and the glass. Softened or fluid glass "wets" platinum readily; this may in part be due to the specific physical affinity of the molecules of glass for the molecules of the platinum, and may in part be due to the fact that the platinum maintains a metallic surface during the sealing operation.

The expansion of glass, however, is somewhat more than that of platinum, even with the soft glasses which are often used for lamps. The difference is not great but it exists. The net result in cooling a platinum-glass seal from a high temperature to a lower temperature is that the platinum tends to shrink away from the glass. This shrinkage is not great but it is responsible for a little strain: a strain which is resisted by the cohesion of the glass and the platinum. Mr. Eldred conceived the idea of doing away with this condition of tension by making a wire whose expansion was a little less, but not much less, than that of the glass to which it was to be sealed. With a wire of this kind, on sealing and cooling the glass shrinks down on the wire and there is a little compression in the seal. The amount of this compression must not be great, since otherwise dangerous strains might exist; but a little compression there should be. He devised a type of wire having a core of nickel steel of a very low rate of expansion, a jacket of copper on the core and a further jacket of platinum on this copper sheath. The composition of the nickel steel was so chosen that its own expansion, averaged with that of the copper and the platinum, gave the wire as a whole a little less expansion than that of the glass so that in sealing the desired shrink-on effect or compression seal could be attained. The function of the copper in the combination was not only to give a greater electric conductivity, something which was very much needed in these small gauge leading-in wires, but also to make more regular the expansion of the nickel steel. While nickel-iron alloys can be made to have any expansion within a certain range that may be desired, yet this expansion is not regular through the range of temperature incident to the sealing in. The copper serves to make this curve of expansion more regular.

As soon as this substitute wire for seals was proposed, it met with general adoption and the Commercial-Research Company, which had acquired the Eldred patents, has recently sold the United States patents to the General Electric Company who have adopted the Eldred wire generally in their manufacture of lamps. The Commercial-Research Company, however, retained rights under these patents. The sum paid by the General Electric Company for these patents is said to be the largest ever paid for unlitigated patents.

MINING PROSPECTS IN SOUTHWEST AFRICA

Now that the German rule in southwest Africa has ceased, says the *Mining World*, it is interesting to know what are the actual mineral possibilities of the country. The following information is taken from official sources and the figures quoted are for the year 1912:

COPPER AND LEAD—The high price of copper in September, 1912, enabled the Otabi copper mines to export a quantity of inferior ore in addition to increasing their output. The principal workings are those of Tsumeb mine. The ores are carbonates throughout and rich in copper and lead.

DIAMONDS—The largest stones are found in the Pomona territory where a trace of the Kimberley formation exists. In 1912, 902,157 carats were sold for £1,303,092 or an average of £1"8"8 per carat.

GOLD—Considerable prospecting has been done for gold, and a number of claims have been pegged off at Kunjas in the Bethany division but no development work has been done.

IRON—There are numerous iron beds in the country but these are not worked, owing principally to cost of transport and absence of suitable cheap coal. In Kaokaland, large tracts of iron ore exist.

TIN—The tin area lies around the Erongo Mountains and is found in the numerous pegmatic veins which pierce the mica schists. There are also deposits of alluvial tin on which attention is being concentrated. In 1912, tin ore to the value of £470 was exported to Germany.

WOLFRAM—At Nakais, a wolfram mine has been opened up where it is stated the quality of the ore is good but none of the metal has yet been exported.

The quality of the crude ores shipped averaged 16 per cent copper, 25 per cent lead and 400 g. silver per ton. The copper matte contained 47 to 48 per cent copper, 25 per cent lead and 400 g. silver per ton. The metallic lead contained 98 per cent lead and 910 g. silver per ton. The number of persons employed in the diamond industry was from 3000 to 4000 and in the copper industry 1000 to 1500.—A. MACMILLEN.

THE BOOM IN NATURAL INDIGO

Some idea of the effect of the impetus given to the cultivation of natural indigo by the lack of supplies of the synthetic product is obtained from a consideration of the official report from Pondicherry by the Consul, A. H. Drewe. About twenty years ago the exports of indigo from Pondicherry were an important item but with the introduction of synthetic indigo, trade began to decline and the area under cultivation gradually grew less till last year when it was only 448 hectares, an amount barely sufficient for the requirements of the local dyeing industry. The war, however, by curtailing the supply of synthetic dyes has created a demand for the natural product and prices have exactly doubled during the year. This enormous increase has had a corresponding effect in increasing the manufacture of natural indigo and also its cultivation. Whether the price will be maintained or whether the competition of British-made dyes will reduce it after a time cannot, at present, be foreseen. The trade, at any rate, has been revived and considerable interest is being taken in it by growers and dealers.—M.

WORLD'S BEST SUGAR PRODUCTION

The world's beet sugar industry, according to the West India Committee circular, has materially decreased. In 1912–13 the total beet sugar output was 8,976,277 tons, in 1913–14 8,908,375 tons and in 1914–15 8,156,534 tons. For 1915–16 it is estimated at 6,765,000 tons, the war being accountable for the diminution. Thus, the estimated crop of Germany is 1,850,000 tons as against 2,725,000 tons in 1913–14; of Austria-Hungary 1,170,000 tons against 1,672,000 tons; of France 200,000 tons against 230,000 tons; of Russia 1,700,000 tons against 1,731,000 tons or a total deficiency in the countries most concerned of 2,086,000 tons.—M.

DESTRUCTIVE DISTILLATION OF SEWAGE

In a paper on this subject before the Institute of Sanitary Engineers, London, W. J. Menzies described an apparatus designed to distil sewage destructively. The design is based on the fact that, when the crude material is heated to that point at which the chemically combined water is broken up, only a slightly higher temperature is necessary for decomposition and further that, when in the retort, owing to the immobility of the particles, only that portion which is in contact with the hot surface parts readily with its volatile matter. The apparatus provides for a thin layer of feces being kept in constant agitation on hot plates enclosed in a vessel. The products of distillation are obtained in a useful condition, and the operation is conducted without creating a nuisance. The oil, which distils, contains less than $^1/_4$ per cent sulfur and would therefore comply with the standard requirements for a fuel oil, and tests made with it in liquid fuel burners have been satisfactory in every way.

The first fraction is a colorless spirit of specific gravity 0.760 and vaporizes at a little above the normal temperature. From its smell, it seems to contain traces of pyridine bases. The second fraction is a pale burning oil which, however, must be further purified. The intermediate oils are light in color but are not viscous, while the last fraction appears to be a good lubricating oil with good viscosity. The presence of pyridine bases is regarded as adding value to the oil in connection with its use as a denaturant of alcohol.

Finally ammonia is recovered as liquor.—M.

SUPERPHOSPHATES

Works for the manufacture of artificial manures, sulfuric acid, sulfates, etc., according to *Engineering*, are about to be erected near Bergen in Norway, cheap power and a suitable site having been secured. The cost is calculated at $400,000 and the works should be ready to start operations about the end of 1916. Norway is rich in one of the most important raw materials, *viz.*, pyrites, and of apatite there is also plenty, while a sufficiency of nitric acid can be obtained from the large atmospheric nitrogen installations. Cheap power is also available. Norway imports annually some 50,000 tons of phosphate and superphosphate and with the present rate of freights, the cost of these commodities has risen considerably.

The manufacture of superphosphate has assumed large proportions of late years; in Sweden, there are four factories with an aggregate production of 250,000 tons per annum; in Denmark the production amounts to 200,000 tons and in Holland to 300,000 tons, of which half is exported.

The aggregate production in England, Germany, France and Spain amounts to from 3,000,000 to 4,000,000 tons per annum. Among the largest importing countries is Russia.—M.

PHOSPHATE ORES

M. B. de Rollière, of Paris, whose discovery of a new ore of high phosphorus content was announced in a former issue, now draws attention to another that he has found in quantity in the granites of France. It is a manganese phosphate extracted from a blackish brown rock in cleavable masses and analyzes as follows: phosphoric acid 33 per cent, lime 2.5 per cent, manganese oxide 32.5 per cent, ferric oxide 32 per cent.—M.

SERBIA'S MINERAL WEALTH

Serbia possesses deposits of antimony, bismuth, chromium, copper, gold, iron pyrites, lead, and mercury besides coal, magnesite, sulfur, marble and other stones for ornamental and building purposes. Antimony ore is principally worked at Krupanj and Zajaca. The coal region lies in the vicinity of the Danube and thus the mineral can be shipped in normal times to districts where fuel is required. Varieties of coal found in the Timok valley are said to be almost as good as the best English coal. Gold is found in alluvial gravel and in quartz veins, especially in the district of the river Timok which forms the frontier of Bulgaria.

Dredging for gold takes place on the River Pek and River Morava.—M.

JAPANESE GUANO AND PHOSPHATES

H. M. Commercial Attaché at Yokohama reports that artificial manure manufacturers have requested the Japanese Government that the guano deposits on the island of Angaull might be worked again with a view to relieving the difficulties of artificial manufacturers who are suffering from lack of supplies from abroad.

The island of Angaull was owned by the German Government and leased to a German company which had arranged for shipping the phosphate to a British firm in Japan. As a result of the war, the island has been taken over by the Japanese and the working of the phosphate suspended. Supplies of phosphate from Africa and North America have been less than usual, and the Japanese are now making investigations as to whether they can obtain phosphate in Japan itself.—M.

THE MELTING POINT OF TUNGSTEN

The intrinsic brilliancy of tungsten filament just before melting is, according to Irving Langmuir (*Physical Review*, 1915), 7200 international candles per square centimeter. This would, in accordance with the constants of Nernst, Parani, Wartenburg, and Coblentz correspond to a melting point for tungsten of 3540° C. absolute, instead of the previously accepted value of 3200° C. As the presence of minute amounts of hydrocarbon vapors (from the vaseline or stop-cock grease) made these determinations somewhat doubtful, Langmuir recently made the redetermination of the melting point of tungsten by two methods. In the first, he determined the black-body melting point of large filaments in nitrogen while estimating the emissivity of helically wound filaments of various sizes in vacuum and in nitrogen. In the second method, he measured the brilliancy of a surface of molten tungsten, simultaneously determining the brilliancy of the image of a second surface of molten tungsten reflected in the first; thus, he directly determined the reflectivity of the molten metal. For this purpose, he made use of an alternating arc between tungsten electrodes in nitrogen. The ends of the two wires formed convex molten surfaces showing multiple reflections of the two electrodes which could be watched for an hour or more. The resulting melting points of three determinations were 3540°, 3532°, 3566° C. absolute, the value 3540 being the most probable.—M.

THE WHALE OIL INDUSTRY

The whale oil industry, according to *Engineering*, is becoming every year more important. In 1914, the world's production amounted to 750,000 barrels, hailing from every part of the globe. At the same time as the production has increased so have the uses to which the oil is put. It is now used for lubricating, often mixed with mineral oil, for the treatment of leather in tanneries, in the iron and steel industry for hardening purposes, in the textile industry for the manufacture of artificial rubber, for lighting purposes and in the soap industries. Large quantities are used in the manufacture of glycerine, whale oil thus being a factor in the production of explosives.—M.

EXTENSIVE PLATINUM DEPOSITS

According to recent press reports from Madrid, an eminent engineer claims to have discovered platinum-bearing minerals of enormous wealth in the Ronda Mountains of Seville and Granada. The hills are said to be of the same geological formation as that of the Urals, and specimens of platinum exhibited to the Spanish Institute of Engineers have attracted the attention of the Government which is proceeding to make extensive investigations. Optimistic opinions compute the wealth of the platiniferous areas as exceeding even that of the Russian mine fields.—M.

CEMENT TESTING

According to the *Engineer*, a laboratory for testing cement has now been added to the Technical Research Department of the Imperial Institute of London. In certain countries, such as the Argentine, the Government has adopted an official specification for cement to which all cement intended for use in the construction of public works must conform. The Argentine Government also requires the certification of such cement by a laboratory recognized for that purpose by the Government of the exporting country. H. M. government has now recognized for this purpose the cement testing laboratory of the above Institute where analyses and tests will in future be conducted for British-made cement for contractors, engineers, manufacturers and others desiring to export cement to countries where a government certificate is required.—M.

BRITISH BOARD OF TRADE

During the months of October and November the British Board of Trade received inquiries from firms in the United Kingdom and abroad regarding sources of supply for the following articles. Firms who may be able to supply information regarding these things are requested to communicate with the Director of the Commercial Intelligence Branch, Board of Trade, 73 Basinghall Street, London, E. C.

INQUIRIES DURING OCTOBER

Bitumen, tar and pitch
Blanc fixé
Cardboard boxes
Crayons, for lumber work
Cellulose wadding
Enameled steel rings
Glass powder or flour
Lactic acid
Lime blue
Needles, knitting machine
Packing materials
Picture postcards, cheap
Potato flour
Salicin
Thermometers
Ultramarine blue
Bone, good, such as pen sticks
Bootlaces, rifle, price about 14/6 per gross
Buckles, small metal, cheap
Clay, calcined and raw for glass melting pots and ovens
Display stands for picture postcards
Electric lamps, metal filament
Ferro-cerium stones for automatic lighters
Fibreboard, vulcanized for suit cases
Mugs, earthenware or porcelain
Porcelain goods for electrical purposes
Ramie yarn for gas mantles
Teapot stands, tile with nickel plated surround
Tins decorated for floor polish
Zinc sheets for dry batteries

INQUIRIES DURING NOVEMBER

Agate, rough
Automatic lighters
Celluloid accumulator boxes
Chemicals:
  Aniline oil and salt
  Arsenic, metallic
  Barium nitrate
  Benzol
  Calcium acetate, pure
  Calcium chloride
  Calcium sulfide, luminous
  Carbon disulfide
  Diamido phenol
  Didymium nitrate
  α-Naphthylamine
  Formaldehyde
  Guaiacol
  Magnesium chloride
  Manganese sulfate
  Potassium iodide
  Sodium bichromate
  Sodium hydrosulfite
  Strontium carbonate
  Tetrachlorethane
  Toluol
Copper sheets, perforated
Beads, bead necklets, cheap plain or colored
Charcoal, flake free from dust
China clay for picture frames
Collar-studs, bone or imitation bone
Corset-steels
Electric batteries for pocket lamps
Enameled iron shades
Glass and glassware
Glass, opal
Glass wool
Gum
Harmonium reeds
Hooks and eyes, brass
Logwood, for making dyes
Mantles, incandescent
Marbles, glass
Porcelain for incandescent lamps
Pumice stone
Rubber sponges
Stearine flake
Shaving sets
Struts, nickel-plated, to fit on back of leather-covered mirrors
Toilet ware
Tools, trade

SEARLES LAKE POTASH IN 1916

At the recent annual meeting of the Consolidated Gold Fields of South Africa in London, Lord Harris in reviewing the company's American investments said:

"Of course the interesting question there is, What is the American Trona Corporation going to do? We experimented first of all with a process which proved after a fair trial to be unsuccessful, or, rather, too expensive and wasteful for adoption, and we have now reason to believe that the process which has been substituted will be entirely successful, besides being more economical. It is not a difficult process and has only to be adapted to the special climatic conditions of the country. A very elaborate trial of the brine was carried out during the summer by an independent firm of chemists, and the results have been reported on by capable referees so encouragingly that the company felt justified in ordering the plant, which, I am happy to say, is of a standard type, and at present it is anticipated that potash will be produced next year—the most optimistic hope in the earlier months—when we shall most probably still have the advantage of the high price obtainable for potash at the present moment. All the work necessary to secure the company's title to the area located in accordance with the mining laws of California is being carried out, with a view to obtaining an indefeasible title from the United States authorities. These proceedings necessarily take time, but our legal advisers inform us that they have no doubt that such title will be granted us in due course."