

The Chemical Age

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Notes and Comments

Inventions and their Exploitation

INVENTION must be distinguished from research, although at times the closing stages of the two processes are in marked similarity with one another. Research is a conscious effort to discover knowledge. It may be used to discover knowledge of the fundamental processes of nature without hope or expectation of gain; it may be to discover just sufficient of the ways of nature to enable us to do things in a better way. The aim of industrial research is to enable us to do things better, or safer, than before; and sometimes to do things that we were unable to do before. When it is successful industrial research leads to patents—and then research becomes invention. There is, however, another class of invention which employs none of the processes of research in its earlier stages. To this belong most of the small odds and ends that assist our daily life, out patent window catches, our whistling kettles, and many another little gadget. To this class also belong many great engineering improvements. It is the invention that appears suddenly in the brain apparently from nowhere, a heaven-born idea that has only to be seized upon, realised, developed a little—and hey, presto! a fortune is made.

Are these two processes as different in fact as they appear to be in inception? Does an improvement ever spring suddenly into the brain? Does an invention that follows from research take its form slowly and is it built up, step by step, from what has been discovered before? We doubt it. In research as in invention, for success the same faculties are needed—a mind open to receive impressions—a mind quick to grasp possibilities—mental concentration, intended or accidental, which enables the sub-conscious brain to do its work. Then one day, quite often it is in the still watches of the night, there flashes on the mind the brilliant idea that is heralded as an invention. Nothing follows without concentration. Some inventions there are that can arise from mental thought alone; others require experimental treatment to elucidate and correct the mental processes. The inventor and the research worker alike have in common the gift of imagination and the almost equal gifts of mental concentration and perception. Industrially the result is not infrequently an application to the Patent Office.

Pitfalls for the Inventor

IN too many instances the real trouble and worry commences after the filing of the patent. It is one thing to invent. It is quite another to exploit; and

it demands yet other faculties of perception and caution to prevent being exploited. The exploitation is full of pitfalls. The machinations of rogues make honest men doubtful of the value of genuine inventions. We have recently been informed of one of the largest British concerns that turns down all inventions in a particular line of business that may be submitted to it, not because it is genuinely convinced that these are unsound, but because there has been in this field so high a percentage of roguery that it is fearful of burning its fingers. It must be remembered, before blaming this concern, that even the largest undertakings have to base their policy on the guidance of a very few individuals—and who shall blame a sound concern if it plays for safety? In the Patent Office there are 146 classes of patents. Who shall say how many new industries lie dormant amid the mass of unexploited patents?

It is time that the exploitation of patents were placed upon a sounder footing. It should be, for example, within the power of the authorities to call together committees representative of every industry, and to those committees patentees could, if they so desired, submit inventions. If these committees were empowered to try out every invention in which there seemed to experts to be some real value there would be at least a method of separating the wheat from the chaff. Firms that were doubtful about taking up an invention when submitted to them "out of the blue" would be far more ready to do so if the inherent respectability of the idea could be vouched for by a committee's certificate—especially if that were not lightly granted. We are encouraged to seek for ways of aiding the exploitations of useful patents by the remarks of Sir James Henderson in his address to the Engineering Section of the British Association. Sir James considers that "it only needs half the stimulus which is given to research to be given to the development of inventions to ensure a considerable acceleration in economic recovery." Exactly! Let us not place all our emphasis upon inventing, whilst neglecting the equally necessary business of exploitation.

The Press and Science

SIR RICHARD GREGORY, in his presidential address at the eleventh annual conference of the Association of Special Libraries and Information Bureaux at Oxford on September 21, pleaded for increased co-operation between science and the Press, as a service of public utility, in order to secure the utmost application of the results of scientific research to the needs and amenities

of daily life. In recent years, he pointed out, much attention had been given to the cultivation of appreciation of art, music, and literature, with the result that rich fields of study and delight had been opened to many people formerly unfamiliar with them. Something of the same spirit and intention was required of interpreters of science if its work and development were to be followed with enlightened pleasure. Science was "news," "news" which appealed readily to the public when placed before them in a form which could be readily absorbed. Yet very few scientific men had the time or inclination, and indeed not many had the ability, to transform scientific material into such a form as would be understood and appreciated by the plain man. This was a misfortune in more ways than one.

Urging that the public should be brought to understand more and more the place which science occupied in the fabric of civilisation, Sir Richard Gregory said that, whatever the ideals of a people, it was doomed to stagnation unless its science was living, and was continually informing every activity of national life. He advocated the building up of an organisation for the spread of scientific news, and emphasised the practical aims of modern science. Under the conditions of modern civilisation the community in general was dependent on science for its continued progress and prosperity. Under the influence of modern scientific discoveries and their applications, not only in industry, but also in many other directions, the whole basis of society was rapidly becoming scientific; and to an increasing extent the problems which confronted the national administration involved factors which would require scientific knowledge for their solution. It was in these directions that the Press could render the greatest service to science and the public at the same time. Under the present social and educational system, it was not possible to hope that at any very early date our schools would turn out a population of scientifically trained men and women. But it was becoming recognised, though too slowly, that what was needed was not so much detailed or expert knowledge of science, as the scientific outlook.

The Other Side of the Picture

THE CHEMICAL AGE, in common with other specialised journals serving the interests of a particular industry, is not so much concerned with the serving up of "snappy copy" as is the popular daily newspaper, but it is second to none in its realisation of the need for co-operation outlined by Sir Richard Gregory. The chemical industry has in its ranks many scientific men who could, if they would, transform scientific material into such a form as would be understood and appreciated by the plain man of the industry. But the industry, as a whole, has a profound secrecy complex. One section of it is afraid to tell another section how it produces its wares. Take any other industry to-day—gas, electricity, hardware, furniture. They tell us, both through their own trade journals and the national Press, how they plan and erect their new works, what they use and what they produce, and every detail of their processes. The chemical industry, alone amongst the great undertakings of this country, is silent on such points. On the one hand it has its scientific bodies, the largest of which are so averse to

publicity that they restrict summaries of their papers to an absurd 500 or 600 words and on the other hand we get occasional innocuous and useless paragraphs about the greatness of the service which the industry renders to mankind.

It is only by the gradual breaking down of some of these exaggerated ideas of secrecy that the Press can serve the industry as it needs to be served. The public want to know more about the industry than its mere bigness and the Press is ready to tell them if only it has the opportunity. May we look to men of Sir Richard's insight and imagination to help in overcoming the difficulties that at present lie in the way of complete co-operation?

Cheap Electricity?

"CHEAP ELECTRICITY" is a phrase that means different things to different people. The householder thinks of $\frac{1}{2}$ d. a unit; most industrialists do not think of a figure much below this. The chemical engineer, with his eye on the cheap power countries of the world where electrical current is generated by water-power from natural falls, and where the plant was erected many years ago when the capital cost was low, thinks in terms of 0.1d. and even as low as 0.05d. when he dreams of the vast possibilities that such cheap power would bring. Professor F. G. Baily in his presidential address to the Section of Engineering of the British Association suggests that by using waste coal for electrical power generation we may reduce the cost of current still further than by the present grid practice. Truth to tell the grid is not a very potent agent for supplying cheap current, and when it has to pay interest on the capital expended it will be far less potent—indeed almost impotent. Professor Baily thinks that since the grid lines can collect current from all parts of the country, electricity can be generated at the pit-head from "waste" coal and fed into the grid.

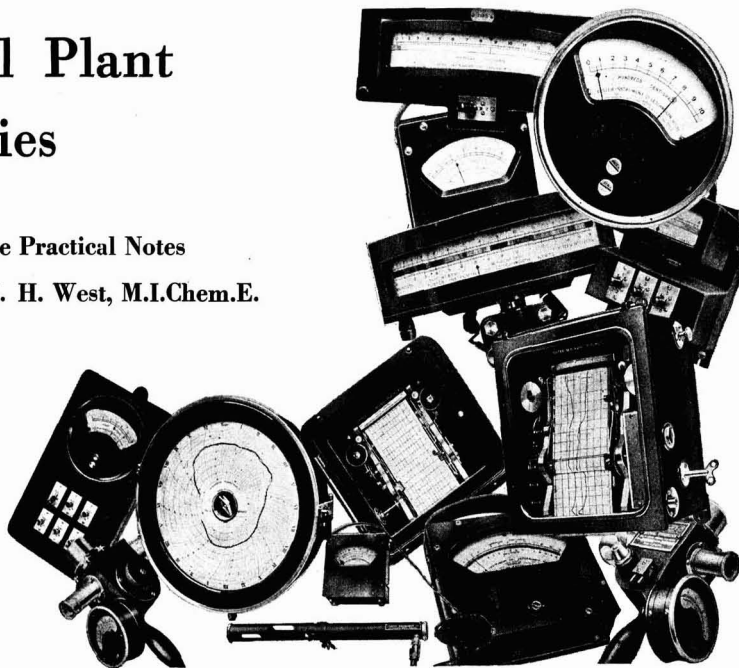
To the theoretically-minded there has always been a strange fascination in colliery pit-head dumps and other waste products of the mine. Unquestionably a pit-head dump contains much that is combustible, but whether it is economically combustible is another matter. The capital cost of a small generating station per unit of current produced is apt to be uneconomically large, the cost of firing the boilers cannot be as small as in the super-stations in which electricity is now being generated cheapest because although truly the pit refuse contains a high percentage of combustible, it also contains a still higher percentage of incombustible; to burn material containing from 40 to 60 per cent. of ash imposes an initial handicap upon the plant for which even low cost of fuel per unit of combustible does not necessarily compensate. Even if Professor Baily is right in his supposition that the cost of making current could be reduced in this way, it is still doubtful whether the price of electricity to the consumer would be reduced by any measurable quantity, and certainly not to the extent that would assist the development of chemical industry. Actually electricity stations which purchase coal at twenty shillings a ton sell the electricity they produce from it for no less than £25; this example shows how little the cost of the coal governs the cost of electricity to the consumer.

Chemical Plant Accessories

Some Practical Notes

By J. H. West, M.I.Chem.E.

Measuring instruments and automatic recorders are now available in many patterns to suit all industrial needs. The instruments in this group, made by The Foster Instrument Co., include thermo-electric pyrometers, electrical distance thermometers and automatic temperature controllers.



THERE are a number of simple and well-known points in connection with chemical plant fittings and accessories which make all the difference between efficient working on the one hand, and trouble and disappointment on the other. The very fact that these points are so obvious is possibly a reason why many of them are so often neglected or overlooked.

Measuring Instruments

The main point about measuring instruments, in general, is to be sure that their indications are, and remain reasonably accurate; if they do not remain accurate, those that use them will be misled and dangerous conditions may arise without due warning. Better no instruments at all, than instruments with a large and unknown error.

As regards mercurial thermometers, see that they are properly adjusted for stem error, and check works thermometers against an accurate ordinary chemical thermometer at regular intervals. Do not use mercurial thermometers in vessels made of aluminium or brass in case they get broken. Distant-reading thermometers operating a pointer on a dial by pressure are as a rule very reliable, at any rate for a considerable time, but after they have been in use for a long time they should be regularly checked against another thermometer which is known to be correct. Electric resistance thermometers, when correctly calibrated, are very accurate and reliable, and with anything like reasonable treatment they have much to recommend them, but make sure that the calibration is correct in the first instance.

Thermo-couples, correctly installed, are most useful, in fact indispensable, for higher temperatures, but these need considerable care in the way they are fitted up. It is essential, if correct readings are to be obtained, that the cold junctions should be always at the right temperature, and that the compensating leads should be of the right resistance. These points are often overlooked when pyrometers are changed from one part of the plant to the other. Occasional tests should be made with a salt bath or other source of known temperature to make sure that the readings are correct. Indicating and recording instruments should be kept well away from furnaces or the expansion of metal parts due to the heat may cause errors in the readings. If the instruments must

be near the furnaces a screen may be interposed to protect them from the heat.

Pressure and vacuum gauges are on the whole very reliable, but they do sometimes get out of order and it is just as well during every overhaul of the plant to check them against a standard instrument. A gauge-testing outfit should be available in all but the very smallest chemical factories.

Flow meters for liquids and gases should be calibrated at intervals when an opportunity offers, though it must be admitted that it is often difficult and troublesome to arrange for doing this. Still, it is worth while taking some trouble in order to avoid being misled by false readings.

Safety Devices

The main points in connection with the fitting of new safety valves are that they should be of ample area and that the actual valve and seat should be made of a material not liable to corrode under the conditions of service. In use, care should be taken to see that they blow off at the proper pressure, and once a week or at least once a month a test should be made by easing up the weight or spring to make sure that the valve has not stuck and is working freely. It is very important that all closed vessels in which steam or other easily condensable vapour is used should be provided with vacuum-release valves of ample area. If cold water is run into such a vessel when full of vapour, condensation is extremely rapid and unless the release valve is amply big air may not get in quickly enough to prevent the collapse of the vessel or its cover.

A simple and very useful safety device on tanks and other vessels containing liquid chemicals is the provision on the outlet pipe of a seating and plug worked from the top of the tank by a guided rod. If the outlet cock or valve leaks, sticks, or breaks, the plug can be quickly dropped and serious loss of liquid possibly involving damage or danger can be avoided, and repairs to the cock or valve can always be carried out without first having to empty the vessel. This is a very old device, going back to long before the days of modern chemical engineering, but it is not used as often as it might be in chemical works.

On some plants a host of automatic safety devices, usually electrically operated, are to be found showing by a sound or

light signal when limit maximum or minimum temperature, pressures, liquid levels, and so on, have been reached. These are quite useful up to a certain point, but a word of warning must be issued in connection with them. The men operating the plant get to depend on these signals and consequently pay less attention to its correct operation. The result is that, should the automatic signal fail to operate for any reason, and the best of them do fail sometimes, the men may fail to notice that abnormal conditions have arisen. If you have these devices do not assume that they are in working order, but have them tested once a day.

Cocks and Valves

Every cock should have a properly fitting key with which to turn it. The use of spanners and Stillson wrenches soon ruins the square on the plug. A little lubrication is essential to the easy working of cocks; if grease is removed by the chemicals there is always graphite. This point is of special importance with stoneware cocks which are apt to stick, and which will not stand rough usage to loosen the plug. Occasional grinding in of the plug involves very little trouble and ensures tightness against leakage and easy working. The same applies to valves of the screw-down type. Personally, the writer prefers gate valves either of the parallel or wedge pattern for most chemical liquids, especially corrosive ones.

A simple valve-grinding equipment is a very useful adjunct to the repair shop. Worn and corroded valves and cocks are often thrown on the scrap heap when they could easily be given a new lease of life, hence the reconditioning of valves and cocks should be a regular feature of maintenance work. Renewable valves, seats, and gates are valuable features which facilitate this work.

Inadequate attention is very often paid to the design and arrangement of heating and cooling coils two mistakes being frequently made. The first is making the coils too long in proportion to their bore. For every size of tube there is a limit of length, dependent on the velocity of flow inside and outside the coil, beyond which no further useful heat transmission takes place. This applies equally, of course, to heaters, coolers and condensers of the straight tube type, and

when velocities are high it is surprising how short the maximum effective length is; somewhere about two feet, for instance, with a $\frac{3}{4}$ in. tube.

The other mistake is that of placing the turns of the coil too close together and too much in line with each other, so that one turn shields the next. The plain cylindrical or helical coil is still used more than any other type, but it is by no means always the best. For the heating of a vessel with closed steam, the external tubular heater, with steam round the tubes and circulation of the liquid to be heated through the tubes, has several advantages. The circulation through the tubes is rapid and the heating consequently efficient, and, if a valve is provided on the liquid inlet to the bottom of the heater, the latter can be quickly detached for repairs without opening up or emptying the vessel.

Another useful type of heating coil is the hairpin coil with horizontal tubes attached to a steam chest, which is bolted to the flange of a large rectangular tubulure on the lower part of the vessel. This type of coil can be withdrawn for repairs or cleaning far more quickly than the cylindrical coil, which has to be lifted out of the vessel after removing the cover.

Lifting Tackle

With regard to portable lifting tackle the best policy is to buy only first-class material, and afterwards to see that it is kept in first-class order; it should also be kept in a place where it can be found when wanted. Cheap chain blocks, for instance, which jamb on every occasion, lead to much loss of time and temper, to say nothing of the risk of accidents. Riggers should be provided with a proper room or shed in which all portable lifting tackle, including slings and jacks, can be kept in orderly fashion, and it should be made an inviolable rule that all tackle after use on a job should at once be returned to this store and should be overhauled and greased where necessary ready for the next job. Do not forget that crane and other lifting chains should be annealed and tested at regular intervals. Never allow ropes or rope tackle to get wet, if it can possibly be avoided. Ladders for general use in the factory may conveniently be kept in the riggers' store, so that they can be found when wanted.

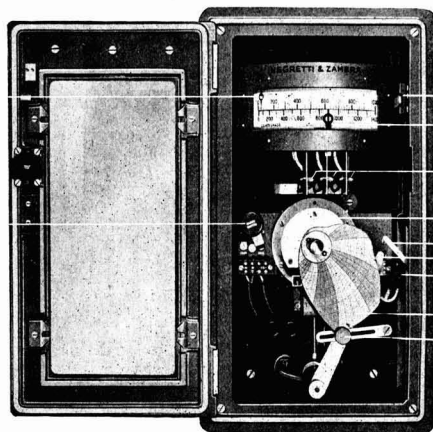
A Time-Cycle Temperature Controller

A NEW indicating time-cycle temperature controller has been introduced by Negretti and Zambra. This instrument, which is suitable for use with either the thermocouple or electrical resistance type of thermometer, operates one, two or three mercury switches, which may be used either for direct automatic temperature control, or to give coloured light signals or audible warnings when used in conjunction with manual control of furnaces, etc. A cam, driven by a small synchronous a.c. motor, is cut to give the desired time-temperature programme and is arranged to move the control contacts of the indicator over the temperature scale.

For coloured light signals, the middle of three switches controls a white light, which is "on" when the temperature correctly corresponds with that required. Deviations above or below this point bring into operation "high" and "low" switches which control red and green signal lights respectively, and also an audible alarm, if required. For automatic control, the switches are arranged to operate solenoid or motor-driven valves, contactors, or other suitable devices. The temperature interval between "high" and "low" contacts can be arranged as required, the minimum being one-half of 1 per cent. of the maximum scale reading of the controller.

Auxiliary apparatus can be supplied to meet special requirements, such as delayed action contactors. For example, a recent installation employing this instrument for signal light operation incorporated time switch gear which caused an additional audible warning to be given if a "too high" or "too low" temperature had not been corrected to normal within 30 min. Having been actuated, the audible alarm can be stopped by a push-button control accessible only to an authorised person. Arrangements can also be made, if

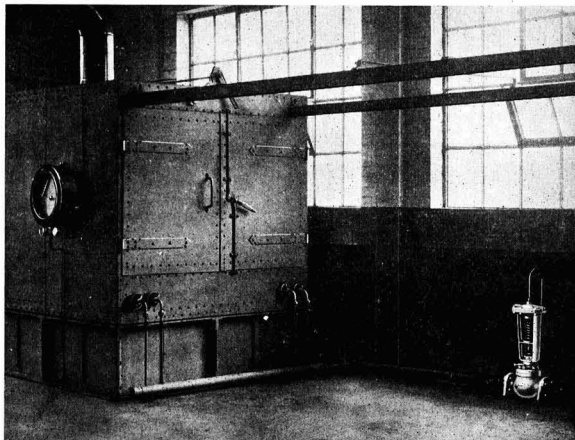
desired, for a special signal to be given when the cycle of control is completed; in addition provision can be made to permit the alternative of hand setting of the control point, if required.



Negretti and Zambra's new Indicating Time-Cycle Temperature Controller.

Air Operated Controllers

Are Available
For Temperature,
Pressure, Flow
or Liquid Level



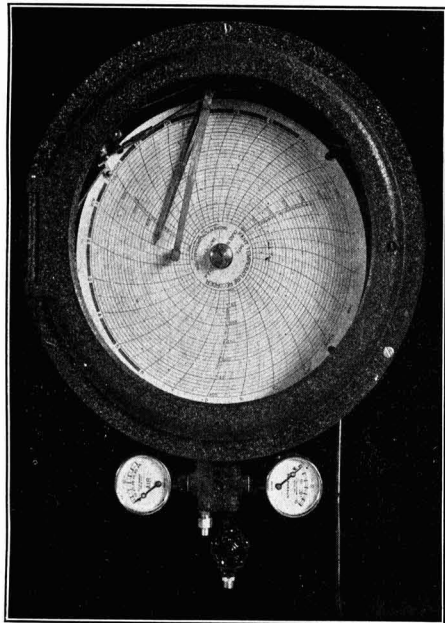
Kent Recording Temperature Controller maintaining the temperature of a large enamelling oven.

THE first essential of an air-operated controller is that it shall be able to regulate the control air pressure without restraint on the measuring unit, and that the control air pressure should be varied proportionately over the control zone. Many devices have been used to obtain such characteristics, some better than others, but most of them suffering from one or another disability, sometimes costly and complicated. The Kent system, introduced by George Kent, Ltd., offers a satisfactory solution, as it is simple, rugged, and can be made to give any suitable relation between movement and control pressure.

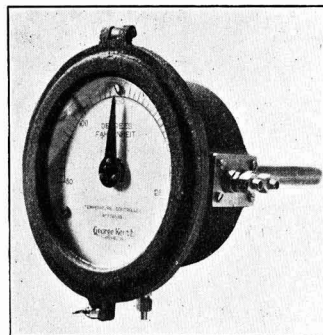
In use, compressed air is ejected from a nozzle under constant pressure towards a similar nozzle placed a short distance away. A large proportion of the original pressure is re-

duced by an amount proportional to the degree of obstruction. There will be no force on the vane or chopper tending to force it into or out of the jet, and therefore if the vane is operated by the measuring unit there will be no constraint on the latter. By slight changes in the shape of the receiving nozzle the relation between the proportion of jet intercepted and the control air pressure may be made to vary over the range in such a way as to compensate for valve or line characteristics. The nozzles and the vane are enclosed in a pressure-tight chamber with the vane operated through a long spindle. Water or other fluid may be made use of if compressed air is not available.

The pressure, temperature, flow and liquid level controllers have all similar control mechanisms. The control air pressure is regulated by a vane or chopper, obstructing the flow of air between two nozzles, as already described. The value at which the controller is to maintain the controlled quantity is indicated by a pointer, which moves over the chart



Kent Recording Temperature Controller.

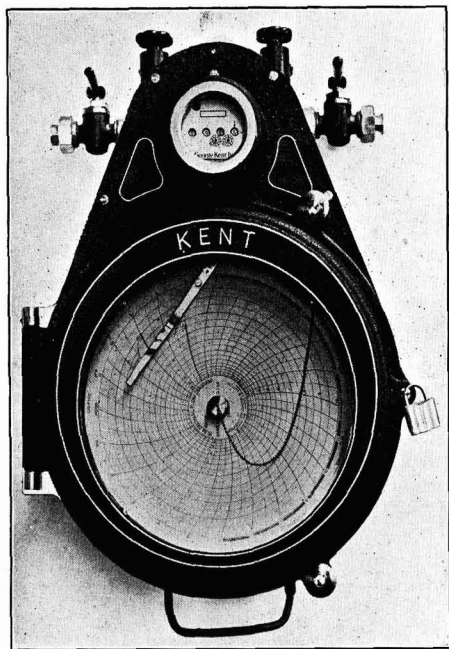


Kent Bi-metallic Temperature Controller.

covered as static pressure in the receiving nozzle, when the jet is unobstructed. If a vane or chopper, pivoted parallel to the axis of the jet, is allowed to intercept part of the jet,

concentrically with the pen arm. Generally, the control adjustment is effected by means of a key, which can only be applied when the instrument case is unlocked, but, if required, provision is made for the adjustment to be made externally.

In the case of the air-operated flow controller, the power unit of the Kent "KM" type recording flow meter is employed. The flow of the liquid or gas, which is actually to be controlled, is measured by the power-unit (which is



in effect a mercurial "U" tube with means for translating the "differential" pressure into "flow") by means of an orifice plate or other differential pressure producing device in the pipeline. The controller mechanism is housed inside the case of the meter.

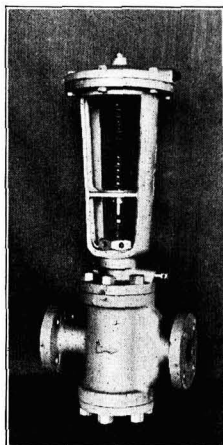
The valve controlling the flow is placed in the same line as the orifice. The meter, having measured the rate of flow and finding it does not coincide with the predetermined value, brings the controller mechanism into operation and immediately alters the compressed air pressure supply to the diaphragm unit of the control valve; this corrects the flow until the correct value is restored. The action of the controller is continuous and not intermittent.

In the case of the recording pressure controller the controller mechanism is also fitted inside the recorder case, the pressure element being either in the form of a Bourdon pressure tube of "siphon bellows," according to the pressure range over which the instrument is to control or record. This controller is connected by means of pressure piping to the point where the pressure is to be maintained. It is immaterial whether it is to control the pressure upstream or downstream of the control valve. The process is exactly similar here as in the case of the recording flow controller just described, except that the control valve is in practically every case in the pipeline which controls the fluid under pressure.

For the control of temperature three types of temperature measurement are employed; the first is the mercury-in-steel thermometer, the second the thermocouple, and the third the bi-metallic strip.

In the first case, the temperature element is a powerful mercury-in-steel thermometer, perfectly compensated against any changes of atmospheric temperature. It is sufficiently sensitive as to produce definite movement of the control valve for a change of temperature of 1/1,000th of the chart range. Each adjustment of the sensitivity of control is provided to suit the individual process, and the point of control is adjustable for the entire chart range. The temperature element operates the air relay mechanism, which, in turn, controls the diaphragm valve in the same manner as the flow controller and the pressure controller.

In the second case, the temperature measurement is made by means of a thermocouple operating a potentiometer, which has the specific advantage of great sensitivity and accuracy. No electric motor is used, the mechanism being driven by



On the left is a Kent Recording Flow Meter, Type KM/CD. The Kent Diaphragm Control Valve is shown on the right. This valve, as installed in connection with the Kent Recording Temperature Controller, will be seen in the upper illustration on the preceding page.

means of a small air turbine taking a minute amount of air, hence flame-proofing of the instrument is not required. The principle of the control mechanism consists in holding the chopper of the opposed nozzles arrangement in position by a light brake and of varying that position in accordance with the deflection of the galvanometer pointer. The pressure in the diaphragm unit of the control valve depends on the position of the chopper between the air nozzles, *i.e.*, on the extent to which the air flow to the diaphragm nozzle is throttled.

The third type of temperature controller, recently introduced, is the bi-metallic type, where the measuring unit consists of a bi-metallic strip coiled into a close helical spiral, one end of the spiral being fixed and the other end attached to the chopper of the opposed nozzles arrangement. This type of controller, however, is not provided with either an indicator or a recorder.

In nearly all cases the Kent controller can be suitably arranged for flush panel mounting, which is a feature greatly in demand in up-to-date installations.

To work in conjunction with the various air-operated controllers, it is necessary to have suitable control valves with all the features required to give the best results. The standard type of valve consists essentially of two parts, the diaphragm drive unit and the valve body unit. The valve is spring controlled, and is so constructed as to give equal percentage increases in flow for a certain lift in all parts of its range. The flow range is approximately 30 to 1. The plunger is made of stainless steel, or other suitable material, as are also the renewable seats. It is double-ended, so that the valve may easily be converted from direct to reverse-acting as required.

There are also Kent recorders for temperature and pressure, in addition to the firm's well-known and extensive range of flow meters for water, steam, air, gas, oil and other fluids, some of which have been previously described in THE CHEMICAL AGE.

Antifriction Metallic Packings

EXPERIENCE proves that a bush of antifriction metal of a flexible nature makes the best packing for pump stuffing boxes. It cannot wear or score the spindle, which is kept in perfect condition, true and highly polished. It does not waste away nor lose its properties, and in the usual way does not require renewal for a very long period. These packings are supplied by the Lead Wool Co., Ltd., in several forms, *e.g.*, rings made to the size required, lengths (of either round or square section) and loose forms which enable different sizes of gland to be packed from the same tin. They are made in two grades, the standard grade for steam, water, and oil, and grade No. 2 for use with acid, ammonia, etc.

Tank Gauges for Distance Indicating

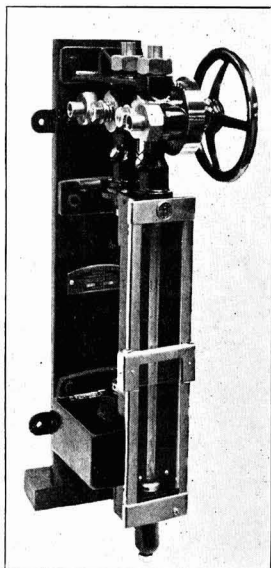
THE indication at a distance of the liquid contents of tanks and other vessels is of great convenience in chemical works, especially where the crude method of using ripping rods is ruled out on account of fire risk and by the volatility or toxic properties of the liquid.

The "Pneumercator" system of Kelvin Bottomley and Baird, Ltd., involves only simple elements in the tanks without diaphragms or working parts of any kind. Further, these parts—usually an inverted bell or in some cases a mere dip pipe fixed in the tank—can be made of any material to suit the liquid stored. For example, these parts are often

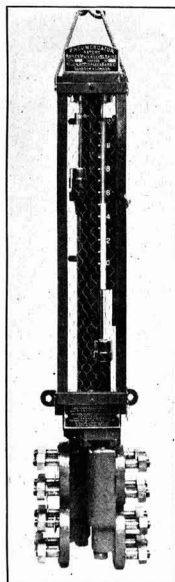
Some Characteristics of the Pneumercator System

Tanks and vessels with internal pressure or vacuum are readily dealt with by Pneumercator distant gauges which are, in such cases, fitted with control cocks geared together to avoid any possible mal-operation. Pneumercator gauges are self-checking and the hydrostatic principle of operation is

In the Pneumercator System the only connection between the tank and the gauge is a small $\frac{1}{4}$ inch tube which can be handled like an electric light cable.

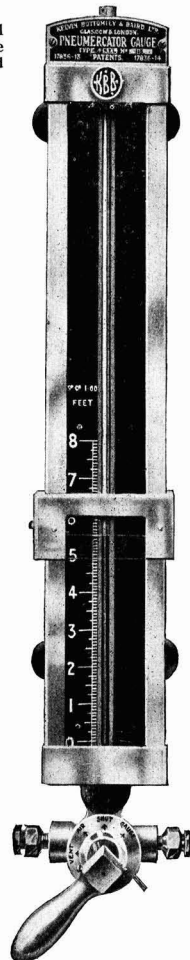


Above: Pneumercator Distance Indicating Gauge for boiler water level.

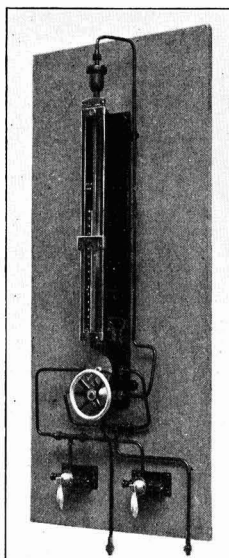


Left: Pneumercator Closed Hot-Well Gauge for distance indicating.

Right: Normal Pneumercator Gauge for ordinary vented tanks.



Below: Pneumercator Gauge employed on two ammonia liquor tanks.



of chemical lead, Staybrite steel, Monel metal, etc. In the case of fruit juices and syrups Staybrite steel is commonly used, while in many cases cast iron or wrought iron meets the case. The only connection between the tank and the distant gauge is a small $\frac{1}{4}$ -inch tube which can be run easily and handled like small electric light cable. The gauge is, in effect, a robust metal-constructed manometer (using mercury or other liquid), which involves no pivots, springs, delicate diaphragms, or any working parts except the robust control valve fixed to the bottom of the gauge.

dead simple, the mercury or other liquid column at the gauge being made to balance exactly the liquid column in the distant tank. They have a long and very successful history; for example, in connection with fuel oil tanks upwards of 1,600 ships have been equipped (including the new super Cunard liner, "Queen Mary"), while on land Pneumercator gauges are regularly dealing with every kind of liquid in use in industry.

In many cases it is convenient to arrange for one Pneumercator gauge to deal with a group of tanks, such as manifolding

of the gauge to a number of tanks involving a saving in initial costs. An interesting feature of these gauges is that with tanks of uniform cross section from "empty" to "full" a "weight of liquid" scale on the gauge will always read the correct weight of liquid despite changes which may occur in the specific gravity of the liquid. A special kind of Pneumercator gauge is made for indicating the water level in steam plant hotwells, which are operated on the closed feed system; it is known as the K.B.B. hotwell gauge.

A variety of types of Pneumercator gauge outfits are available to suit all kinds of special cases, and one may be mentioned in particular—the K.B.B. Pneumercator distant boiler water-level gauge. With modern water-tube boilers the steam drums are placed very high up above the firing or control floor so that it is frequently very difficult to observe

the ordinary steam drum gauge glass. The Pneumercator boiler gauge is placed below, or above, or at any reasonable distance from the boiler and thus in easy view of the firemen. Its important feature is that the gauge system does not carry any special indicating liquid but merely water from the boiler, so that at any time while in service the Pneumercator boiler gauge can be drained and flushed through, thus allowing the attendant to assure himself (as in the case of the ordinary steam drum gauge glass) that all passages are clear. If special indicating liquids are used in such gauges they cannot be drained and flushed through since that would eject the special liquid and put the gauge out of commission. The advantage of the Pneumercator distant boiler gauges in carrying only water from the boiler is fully realised by operating engineers.

Measuring Instruments

IN choosing instruments for the measurement of temperature, pressure, and other physical conditions associated with industrial processes, the importance of dependability, that is, the quality of lasting accuracy under working conditions, is paramount. In comparison with the possible losses that may occur as a result of inaccurate information, the cost of the finest instruments is inconsiderable, and it is becoming more and more realised that the manufacturer who "economises" in measuring instruments is running a risk of seriously limiting the quality and output of his products in comparison with the results obtained by more enlightened competitors.

Mercury-in-Steel Thermometers

When it is stated that over four million charts per annum are used on mercury-in-steel thermographs manufactured by the Cambridge Instrument Co., Ltd., it will be realised that this form of temperature measurement is employed in an extremely wide field of applications. The Cambridge instruments of this type, both indicating and recording patterns, have been redesigned in recent years, advantage being taken of modern developments in materials and methods of manufacture to secure even greater robustness and accuracy. They can be employed for temperatures between -40° C. and $+700^{\circ}$ C., or, for occasional temperatures, up to 800° C. A patented method of constructing the capillary tubing enables these instruments to be erected as much as 120 feet away from the point at which the temperature is measured, without need for any temperature compensation. Indicating thermometers are made with dials either 8 in. or 13 in. in diameter, while the recording thermometers, or thermographs, are fitted with 24-hour or 7-day charts having a working diameter of 10 in.

Vapour Pressure Thermometers

For some years the Cambridge Instrument Co. have marketed a series of 4-in. dial thermometers working on the vapour pressure principle, which by reason of their robustness, ease of reading and low cost, have replaced glass thermometers in wide and increasing fields of application. This useful series has now been extended by the inclusion of gas-filled thermometers of similar design which can be used for temperatures up to 800° F. A further development is a small recording thermometer working on the same principle, which has a 24-hour translucent chart $6\frac{1}{2}$ in. in diameter with the pen operating from behind, the whole record being thus visible without obstruction. This attractive new Cambridge thermograph will doubtless prove extremely valuable in enabling manufacturers to obtain temperature records in many applications where the higher cost of larger recorders has hindered their adoption. It can also be supplied mounted in a portable stand, complete with bulb, forming a compact self-contained instrument for obtaining occasional records of temperature at various positions.

Where it is designed to measure the temperatures at a number of scattered positions, and the temperatures do not exceed $1,000^{\circ}$ F., the Cambridge electrical distance thermometers are most convenient. The temperatures are measured by plati-

Need to be Accurate and Dependable

num resistance coils installed, with suitable protecting sheaths, at the various positions, and connected by leads to a central indicator or recorder. The latest type of indicator is suitable either for wall or panel mounting, and is made for any number of points up to 48. A larger indicator is also made for marine use or for extremely rough service; this can be arranged for up to 72 points. The recorder used with Cambridge electrical distance thermometers is usually of the thread recorder type, and give one, two, three, four, or six records on one chart.

Pyrometers

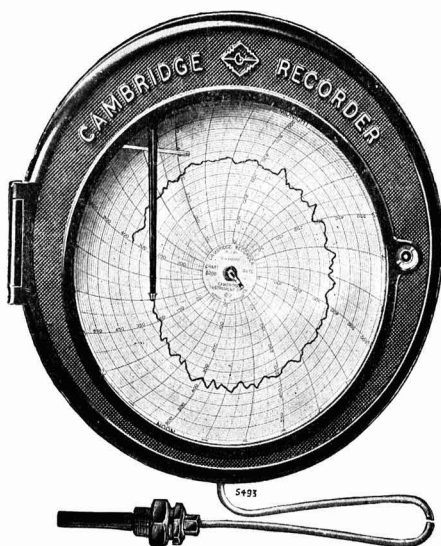
Thermo-electric pyrometers are used for the measurement of higher temperatures, in almost every branch of industry for temperatures up to $1,400^{\circ}$ C. An outstanding recent development is the Cambridge illuminated moving scale indicator. In this instrument the scale is engraved on transparent material and is optically projected on to a translucent screen carrying a fixed pointer. It forms a highly satisfactory indicating unit, being easily readable at a considerable distance, and can be readily arranged for flush mounting on panels. Although the instrument is of comparatively small dimensions, the optically projected moving scale is in effect either 18 in. or 36 in. long, and the figures and divisions are just as bold as if the indicator were a huge one with an actual scale of that length. Since the scale can be read easily at a distance, the instrument can be erected in a position which would not otherwise be possible, such as a somewhat inaccessible dark corner, while push button switches can be installed in a convenient position to connect one or a number to the one indicator. In this way most of the advantages of a separate single point instrument for each point can be obtained at a cost approaching that of a multipoint indicator, without the necessity for going close to the indicator to switch on or to take a reading.

Potentiometric recorders, giving continuous records lasting for one month, from one, two, three or six different points, are now supplied by the Cambridge Instrument Co. as an alternative to their well-known thread recorders, while a recent important development in the latter is the introduction of a two-point recorder (model B) which possesses all the advantages of the standard Cambridge thread recorders, but by reason of its simplified design, can be supplied for recording two different temperatures on one chart, at a considerably reduced cost. Both the potentiometric and the model B recorders are adapted either for wall mounting or for flush mounting on panels.

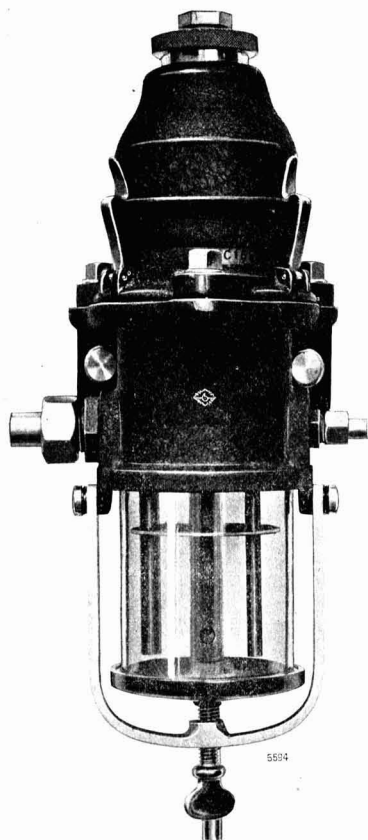
There has been considerable advance within recent years in the adoption of automatic temperature regulation. Instruments are now available for accurately controlling temperature, pressure, humidity, voltage or other variable conditions by operating electric switches, or by regulating gas, oil, air, steam or water valves. The latest form of Cambridge poten-



Cambridge 2-Point Model B Recorder.



Cambridge Thermograph (Mercury-in-Steel) with 10-in. diameter chart.



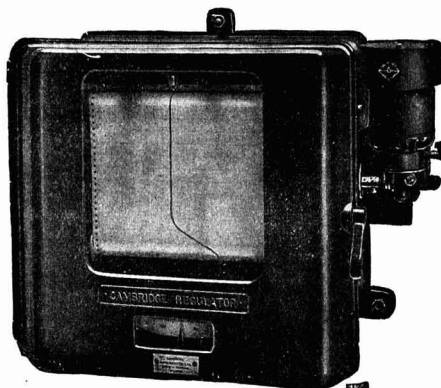
Automatic Temperature Controller (Recording Potentiometer).



The Cambridge Gas Regulator.



Automatic Temperature Controller of the potentiometer type.



Cambridge Electrical Carbon Dioxide Metering Unit.

tiometric recording controllers will operate motor-driven valves or electric switches up to 30 amperes at 250 volts without intermediate relay, and will control within an accuracy of 0.1 per cent. of the range of the instrument. Simpler regulators include a small self-contained gas regulator incorporating an internal by-pass.

Draught and Pressure Gauges

The Cambridge instruments for indicating and recording pressures or vacua, like the mercury-in-steel thermometers, have been recently redesigned. The present instruments are suitable either for wall mounting or for flush mounting on panels, and are of similar dimensions and appearance to the mercury-in-steel thermometers. Dial gauges, for pressures from -60 to +60 inches of water are 8 in. and 13 in. diameter, while the standard pressure recorders, for pressures up to 2,000 lb. per sq. in., have 24-hour or 7-day charts 10 in. working diameter. A small pressure recorder, with charts 6½ in. diameter, is also made, in both wall and portable patterns, the wall indicator being also suitable for flush mounting on a panel. The portable pressure recorder is particularly useful for taking a series of short records of pressures at various points, for example, at a gas works.

Electrical Gas Analysis

In gas analysis, as in temperature measurement, Cambridge instruments cover a wide and comprehensive field of applications. Based upon the electrical katharometer method due to Dr. G. A. Shakespear, these instruments can be supplied for indicating or recording the percentages of carbon dioxide, sulphur dioxide, hydrogen, oxygen, etc., in other gases or in mixtures of gases. The latest design of CO₂ metering unit for boiler flue gases is exceptionally robust, and is thoroughly reliable in working. It has been recently redesigned to give

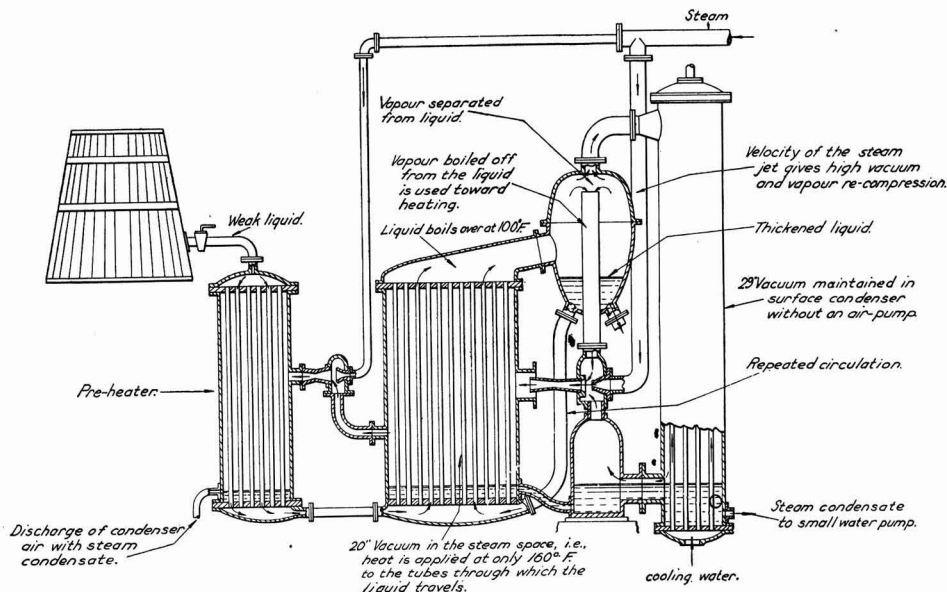
still greater efficiency, the new meter being combined with a bubbler and aspirator in such a manner as to prevent the possibility of splashing or flooding the meter, while at the same time choking of the bubbler is effectively guarded against. The bubbler portion is carried within a cylindrical glass vessel through which the action of the bubbler is clearly visible, so that it is easy to tell whether it is working properly. The bubbler can be dismantled for cleaning in a few seconds.

Ring Filling for Towers

THE processes in which intimate contact between liquids and gases or vapours is required are making increased calls on the efficiency of plant for this purpose. Considerable progress has been made in devising forms of filling which offer the highest possible contact surface coupled with the least interference with gas pressures, and without impairing the draining capacity of the irrigating liquids.

The Hydronyl Syndicate, Ltd., have had twenty years' experience of tower filling for a wide variety of purposes. Their Lessing contact rings are now made not only in all metals but also in porcelain and various types of acid-resisting stoneware. The diameter and length of these rings are equal, the range of sizes being from 4 in. x 4 in. down to ½ in. x ½ in. Rings are therefore available for every distilling and scrubbing operation, no matter what conditions prevail as regards its nature and the rate of throughput of material being treated. The introduction of benzol scrubbing in coal gas manufacture has proceeded apace in Britain during the last few years, and Lessing rings are used in the majority of plants erected. A pleasing feature is the increasing call for these rings by users of tower fillings in the Dominions, and foreign countries as far away as China.

An Improved Vacuum Evaporating Plant



F. Jahn and Co. have now acquired British and American patents for a vacuum evaporating plant, which can be built in simplex, duplex or quadruple effect. This plant is the only one in which the vacuum is gained and maintained without the need of an air pump. A simple steam injector is used for withdrawing the air from the condenser, and this steam is ultimately used for heating purposes. In this way the working of the plant is simplified. The plant is built in London, and several installations of the new type are already in operation.



Fig. 1.



Fig. 2.



Fig. 3.

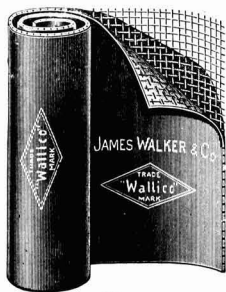


Fig. 4.



Fig. 5.



Fig. 7.



Fig. 8.

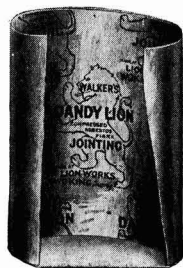


Fig. 6.



Fig. 9.

Packings and jointings are now available in a very wide range of patterns. This group includes (1) "Wallico Rod," for general steam purposes; (2) "Star" packing, for steam glands; (3) "Kerko," for ammonia plant; (4) "Wallico" sheeting for high pressure work, steam or water; (5) "Kromyde," for cold water and oil; (6) "Dandy Lion" jointing; (7) "Wallico" gauge glass rings; (8) "Golden Walkerite" jointing; and (9) "Rover" packing, for rotary pumps.

Packings and Jointings for Chemical Plant

DURING the last few years chemical products have played an increasingly important part in British industry, entailing special plant, each with its own peculiar requirement. In this connection the old established firm of James Walker & Co., Ltd., pride themselves that wherever packing and jointing are necessary, suitable types can be supplied by them. This has only been made possible by close study of the numerous problems and conditions which reveal themselves in the various types of plant.

In conditions necessitating a compressed asbestos fibre jointing capable of standing heat and also the action of acid, gas, etc., "Golden Walkerite" plays an important part. This quality of jointing is also supplied with a graphite finish where preferred. "Dandy-Lion" compressed asbestos fibre jointing is identical with "Golden Walkerite" with the exception of a brown finish. In conditions necessitating a joint to stand great heat, Walker's "Copandas" joints have been put on the market to meet this need. "Copandas" joints are metallic sheathed, differing from the ordinary copper and asbestos joint inasmuch that the asbestos foundation is of a special asbestos material infinitely stronger and more durable than asbestos millboard which is usually associated with this type of joint. "Copandas" joints are for Diesel engines and superheaters. Owing to numerous requests for jointing suitable for fitting into recesses of steam ovens, vulcanisers, etc., Walker's "Kukador" jointing has been put on the market and has met with a deserved success.

Where a rubber composition jointing is more suitable, "Questo" is recommended as a reliable jointing for steam, water, acid, ammonia and alkali. A feature of this jointing is that it will take up readily on uneven surfaces. From the point of view of economy, in "Questo" jointing, unlike many similar jointings, a unique system makes it possible to manufacture with the minimum amount of scrap, thus cutting down the cost to the consumer. For high pressure work Walker's "Wallico" sheet jointing is ideal. This jointing is

Need to be Carefully Selected

similar to "Questo" but reinforced with metal wire gauze. With the majority of reinforced jointings where a copper or brass wire is used, the tendency to rot is very marked. To obviate this the reinforced gauze is made of tinned steel wire.

With the increasing use of Diesel engines for power and the consequent use of oil, it is obvious that jointing material to withstand the action of oil has become a vital necessity. With this in mind, Walker's have put on the market oil jointings of outstanding merit, namely, "Sentinel" and "Gaskoid." These jointings can be guaranteed to withstand the action of oil, petrol, naphtha, etc., and according to existing conditions, so are the different types specified. As a metallic jointing, "Lion" sheet jointing is recommended. This is manufactured from asbestos cloth interwoven with white metal and brass wire, and proofed with a composition according to the use to which it is to be put. In cases where a plastic jointing is desired, Walker's suggest "Lion" jointing paste which is a non-poisonous jointing composition specially suitable for screwed and surface joints and also gas threads. As this paste consists of a large proportion of fine quality graphite, thus obviating corrosion, the joints are easily broken.

Where a pump packing is called for, the under-mentioned have met with deserved success. "Kromyde" a plaited leather packing which is suitable for all cold water or oil pump work. "Rover" which has been designed to meet the requirements of rotary pumps. It is also recommended for low pressure hydraulic work or wherever a good greasy packing is required. This packing is made in metallic and non-metallic form. "Glengarry," a plaited metallic hemp or flax packing for hydraulic and pump work, low pressure steam, etc. The yarns are impregnated and plaited up with graphite or mica. Strands of anti-friction metal are incorporated which add greatly to the stability and consequent

length of service. "Supasca" is a packing specially suitable for exhaust expansion glands and stop valves of motor engines of the Diesel type, and wherever a very high temperature packing is required. This packing is also supplied in either metallic or non-metallic form. "Crescent" is an asbestos and graphite packing suitable for high speed engines. Every yarn is saturated with a lubricant incorporating graphite which will stand a high temperature. This packing is also made in twist form which can be used for small glands, stop valves or small valve spindles.

It is extremely important that a satisfactory packing be used for ammonia plant, and with this in mind, "Kerko" ammonia packing has been specially designed. It is made in two types, namely, block and cushion. The block type is made in layers, one layer being a combination of white metal and fabric, the alternate layer being composed of a specially prepared composition in which flake graphite is introduced. The cushion type has a special rubber core which is covered with a fine texture proofed cotton cloth. It is very elastic and thus ensures a tight gland.

A really serviceable all-round packing for low pressure work, whether steam or water, is provided in "Popular" elastic packing, which is extremely resilient and is light in weight. "Star" steam packing is specially manufactured for use in small steam glands and will be found effective for all pressures. "Wallico Rod" is suitable for general steam use and embodies the principles of a semi-metallic packing, white metal being interwoven with the cloth. The white metal always faces up to the work and presents a continuous wearing surface which, combined with the graphite used in manufacture, reduces friction to a minimum. "Lion"

hydraulic automatic packing, the name of which indicates its use, is designed on definite scientific lines on the principle that the working pressure to which the packing is subjected actually makes it tight.

Hose plays an important part in most chemical industries, and Walker's, in full realisation of this, supply hose specially suitable for the liquid which it is intended to convey. It is not always easy to keep a tight joint on gauge glasses of boilers, etc. It has been accepted, however, that the cone type of ring for gauge glasses is the best. The objection to their use has been the fact that they so often get hard in use, and the material from which they are made perishes. Walker's have been able to dispense with this objection, and in "Wallico" cone rings engineers will find an article which will not get hard and which can be used many times.

In the interests of economy it is very necessary that steam pipes be well insulated. Full insulating efficiency can be obtained by use of "Lion" pipe lagging which is tightly filled with asbestos fibre, is double braided and true to size. It does not flatten out when put round the piping like so many loosely filled laggings. For bearings, etc., where a semi-solid lubricant is specified, "Lion" graphite grease is particularly effective. This grease may also be used as a lubricant in connection with hydraulic packings.

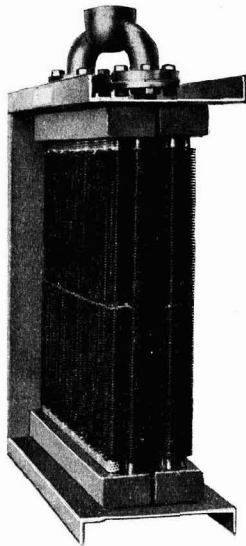
This detailed list of packings and jointings does not by any means comprise the full range of James Walker and Co.'s manufactures, but have been taken from specified requirements, which have been called for by the leading chemical firms. The makers are always alive to the needs of the chemical and chemical-using industries, and spare no effort to keep abreast of the various advances which are constantly being made.

Multiple Spiral Tube Heaters

ONE of the latest designs of the wide range of air heaters manufactured by The Spiral Tube and Components Co., Ltd., is their C.W. type air heater as illustrated. This is of all-welded construction in the steam or water circuit, the copper spiral gilled tubes being bronze-welded into channel steel headers. This type of heater can be built up with any

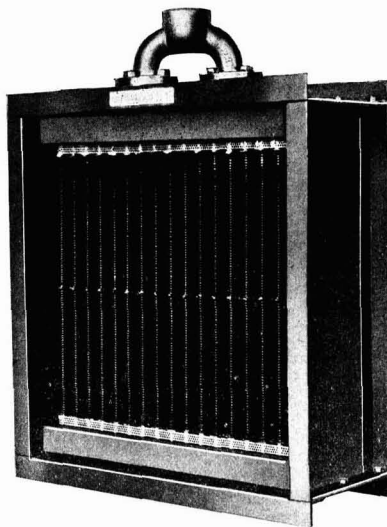
tubes are welded into a circular header. A heater of this form of construction has recently been completed for a closed circuit, high pressure, hot water system, guaranteed for a working pressure of 600 lb. per square inch.

The "Spiral Tube" unit heaters are also of all-welded construction, which obviates the possibility of leaky joints,



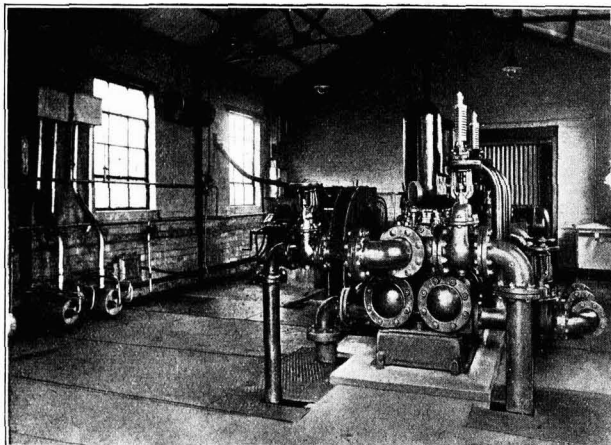
The latest type of Spiral Tube Air Heater can be built up to give any air temperature up to 370° F. The picture on the left, showing one side member removed, illustrates the simplicity of construction.

To clean the heater sections in one of these Multiple Spiral Tube Heaters it is only necessary to unbolt the manifold connections and remove them.



number of rows of tube to give air temperatures up to 370° F. It is a simple matter to unbolt the manifold connections and remove the heater sections for cleaning. An illustration of a heater of this type, from which one side member has been removed, shows the simple construction of these heaters. In cases where one row of tubes is sufficient for the duty, the

gives them a pleasing and workmanlike appearance and enables them to be marketed at a low price. They are made in six standard sizes, but special sizes for exceptional duties or for cooling are quickly made to special requirements. The makers also produce refrigerator coils with copper spiral gilled tubes, as well as coolers of all descriptions.



Left: A typical "Foamite" pump house as installed at chemical works, oil refineries, etc.

Below: "Foamite" two-gallon portable extinguisher, set in operation by inverting the container.



Fire Fighting by Foam

Is Your Works Prepared for Dealing with a Serious Outbreak of Fire?

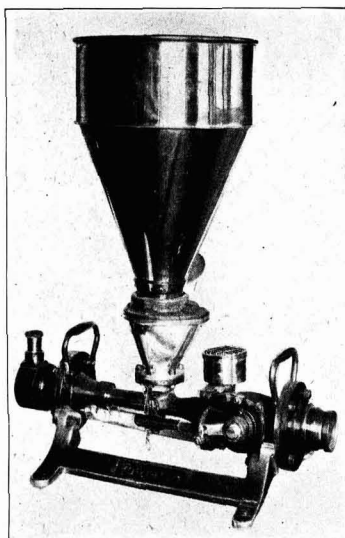
THE choice of fire-fighting apparatus for chemical works is a subject calling for serious consideration, and although there are certain commodities which still baffle the fire-protection engineer, most chemicals which are inflammable now come within the scope of one or more of the available extinguishing media. The inflammable liquid, however, constitutes the most serious fire risk in any works to-day, but as the practice of installing water hydrants is becoming more and more general, adequate apparatus of a modern type and with large-scale output can be adopted with compar-

tively small outlay in all but a few of existing chemical works.

In his book on "Chemical Fires," which has recently been published by the Institution of Fire Engineers, Mr. A. Pordage, the secretary of the Institution, points out that "foam" is one of the best methods of dealing with fires which involve inflammable liquids, the basic principle of the method being to mix a harmless acid salt with a carbonate containing a foam stabiliser, which is an organic colloid. As a result carbon dioxide is formed, along with a hydrate, giving a vast outpouring of small bubbles in dense association. These bubbles, filled with carbon dioxide gas, are formed of a wall or film of the hydrate rendered extremely tough and resistant by the colloid so that they do not collapse for a considerable period, not being affected by a fire, or even by such concentrated heat as that from a blow pipe. A mass of wet bubbles of this type smothers a fire in remarkable fashion, especially in the case of the most dangerous and inflammable liquids. Mainly the action is that of eliminating air and "blanketing" the combustion, on somewhat the same lines as carbon dioxide gas, and carbon tetrachloride vapour. In addition, however, the wet bubbles have a beneficial auxiliary cooling action, tending to reduce the temperature to below the ignition point, on the same lines as water, but without, of course, the serious disadvantages of flooding.

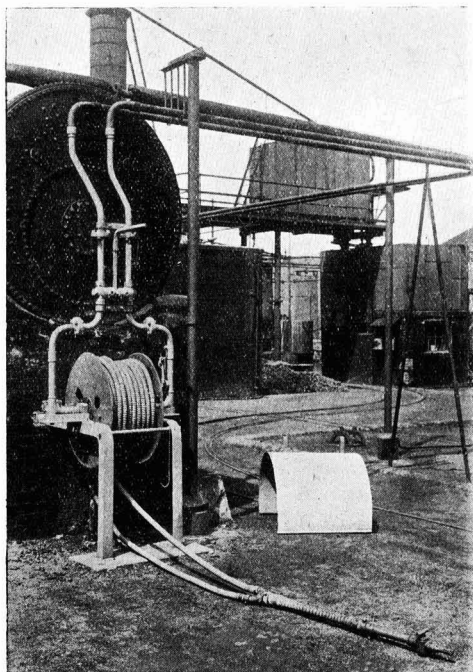
This foam method is available for use in a number of ways, with many varieties of equipment to suit different conditions. For the dangerous conditions already mentioned the most efficient method, although each job has to be studied on its merits, is perhaps the "two-solution" permanent installation. This consists of two storage tanks, one for each of the solid ingredients dissolved in water, a twin duplex pump, and twin piping, with valves, through which the two solutions pass separately until they meet near the discharge nozzles which can be of the fixed as well as the portable type, the latter being operated in conjunction with flexible hose.

The storage tank for the acid salt solution is lead-lined, and both solutions can be agitated by compressed air. Also the two ingredients are first dissolved in an adjoining



The standard "Foamite" Continuous Foam Generator.

smaller tank, fitted with steam coils and compressed air for agitation, the solution in the storage tanks being of constant standard strength. The twin force pumps used, generally of the reciprocating type, is driven in any convenient manner, steam, electricity, or internal combustion engine, and often two different methods are installed as an additional safeguard. Upon an outbreak of fire the pump is immediately started and each half pumps an equal volume of the carbonate solution with the colloid and the acid solution through the twin pipe circuit with admixture near the required permanent nozzles in the fire zone, as obtained by manipulating the necessary valves. The pipes used are of steel or wrought iron, able to stand a pressure up to 125 lb. per square inch, and all the valves may be in a central control room, constituting an efficient and convenient arrangement.



A typical "Foamite" hydrant with rotary hose drum, as supplied to the by-product plant at a gasworks.

Another standard method, capable of very wide application in industry generally, including chemical works, is the continuous "foam generator" equipment, intended for permanent installation under conditions of relatively short distance as regards discharging the foam. That is to say, the equipment can be installed in a central position for small works or near danger spots in larger establishments. Essentially the arrangement consists of a hopper into which is poured the mixed dry powder, leading to a short, horizontal, injector apparatus at the bottom, having at each end instantaneous fire hose connections. For use, the hose is coupled to a pressure water main, say, from town's supply or a pump, and water (fresh or salt) passed through, when the mixing powder is drawn into the water stream, instantly generating a huge volume of bubbles, discharged by the jet.

The "Foamite" continuous foam generator has been supplied by Foamite Firefoam, Ltd., to many of the leading manufacturers in this country. It is quite simple to use, for in conjunction with a hydrant "firefoam" is produced so long as a single dry powder is poured into the hopper surmounting an ejector. The foam produced can be led to tanks containing inflammable liquids by means of fixed piping, or the unit may be used in conjunction with flexible hose and branch-

pipe. This generator is made in various models according to the output required, and, in addition, there is a machine of the same class but utilising two powders, this also being made in various models. With the No. 15 foam generator, under conditions of 100 lb. per square inch water pressure, the consumption is 50 gallons of water and 90 lb. of dry powder per minute, giving 450 gallons of foam product in this time. The larger sizes under the same conditions take respectively 100 gallons of water and 200 lb. of powder, and 250 gallons of water and 400 lb. of powder per minute.

Flexible hose is used for the foam on the same lines as for water. With the No. 15 foam generator, at 100 lb. pressure, using 150 feet of 2½-in. hose and a 1½-in. nozzle, there is given a jet of fire-fighting foam 80 feet in length. When long lengths of pipe are necessary, a modification of the apparatus is available in the shape of the "Duo Mixer," two separate hoppers being used for the powder. Similarly there is a whole range of portable foam extinguishers, the smaller sizes being brought into action by merely turning upside down, whereby the acid salt solution comes into contact with the alkaline solution containing a colloid, forming a high pressure jet of foam.

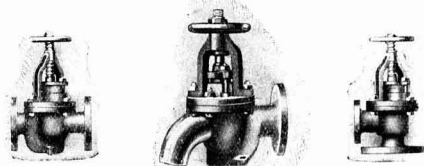
Stainless Steel Floats

STAINLESS steel floats, whilst only slightly more expensive than copper floats, offer numerous advantages. They are supplied by the Drayton Regulator and Instrument Co., Ltd., and are considerably stronger than floats made from similar gauge material; they are also unaffected by high temperatures. They are not subject to electrolytic action in weak alkaline or acidulated liquids, as they are made from the same material throughout—including the welding seam. The spuds are welded on the outside of the floats, which consist of two halves with overlapping rims. This not only ensures perfect roundness but also strengthens the float considerably. The surface of the float is highly polished. The gauge of the material from which they are made varies according to the pressure which they are required to withstand; they can be supplied up to very high working pressures.

Valves for Corrosive Liquids

FOR many years Haughton's Metallic Co., Ltd., have specialised in the manufacture of regulus non-rotative acid valves. These valves are of a special and peculiar construction adapted potentially for dealing with acids and corrosives. They are of the non-rotative plug type, and are so arranged as to be free from obstructions and to be quite safe for handling sulphuric acid and similar liquors even under pressure. Different designs are manufactured, either with flanges or with tail ends suitable for burning to lead pipe.

Haughton's valves have stood the test of time, and there are many of the largest chemical works in this country where



Acid Valves of the Non-Rotative Plug Type.

the plant is equipped throughout with these regulus non-rotative acid valves. Some large orders have recently been completed for India and the East. They are also exported to Australia and the Colonies generally. It cannot fail to be recognised that safety and efficiency are the outstanding demands on pipe-lines in handling acids and corrosives and it is with a view to combining these necessary features that the Haughton's acid valves have been designed. Those who are interested in equipment of pipe-lines for corrosives should not fail to make themselves acquainted with these valves.

Steam Plant Accessories are Many in Number

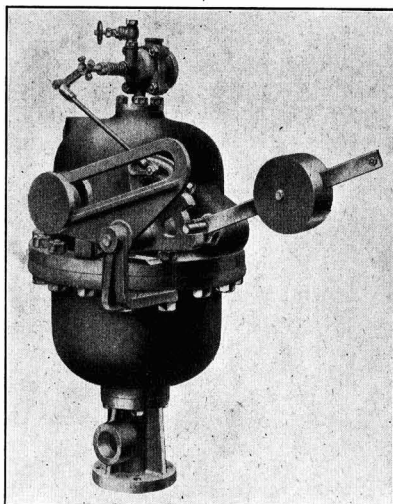
This article gives particulars of a range of reducing valves, steam purifiers, valve traps and thermostatic regulators

HOPKINSONS, LTD., have long been renowned for the manufacture of iron and steel parallel-slide valves, and a new range of bronze parallel-slide valves is now available in a number of sizes. A special feature of this valve is the unique arrangement of gland and stuffing box, which gives ease of adjustment and ensures even pressure upon the packing. "Platnam" seats and discs render the valve exceedingly durable and fluid-tight under severe conditions.

The "R" type reducing valve is a relay-operated valve with a large capacity and will meet the most exacting requirements under the severest working conditions. The main valve is controlled by a pilot valve through the medium of a piston. The system of operation permits the use of a single-seated main valve, which opens to maintain the correct reduced pressure, closing tight when this pressure has been reached. "Platnam" is used for the valves, seats, piston, and cylinder liner.

The Hopkinson Moynan patent steam purifier eliminates steam plant troubles which are due to the effects of suspended dirt or moisture which accompany the steam as it passes out of the boiler. Separation is performed by powerful centrifugal action, and the purifier contains no moving parts to require replacement or adjustment. All parts are robust and there is no possibility of anything becoming loosened and thus carried into the steam range. In addition to the standard type of purifier for installation inside the boiler, the pipeline type purifier is available to meet various conditions of operation.

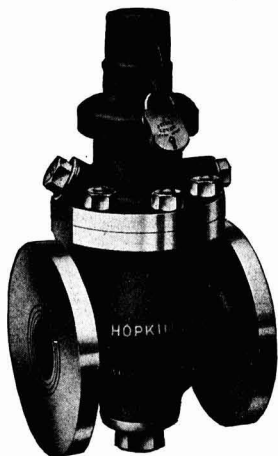
Several important features are possessed by Hopkinsons' "Nolos" slide valve trap. Among these is the fact that the trap can be efficiently lagged, and the loss through condensa-



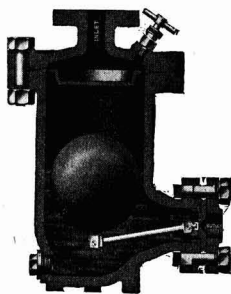
Hopkinsons' Return Trap has been designed to return hot condensate to the boiler from a number of different points at lower levels than the boiler.

tion in the trap itself is thereby reduced to a minimum. Operation on the slide valve principle prevents cutting action on the valve head and seat and also keeps the faces clear of sediment. The trap is designed to give a continuous discharge of condensate, and the consequent absence of turbulence in the trap itself enables dirt and foreign matter to settle to the bottom, whence it can be blown out when necessary. The seat and valve head are readily accessible and are easily removed without the necessity for disturbing the cover joint. As will be seen from the illustration, the trap is free from complicated internal parts which might come out of adjustment or cause mechanical trouble.

The "Robot" slide valve trap is recommended for duties where an intermittent discharge of condensate is preferred, and for systems in which an excessive amount of air is likely to be present. Possessing the advantages of slide valve operation, the trap has also been designed to avoid the use of complicated internal fittings. Air-locking cannot occur; the air escaping through the hole in the top of the bucket

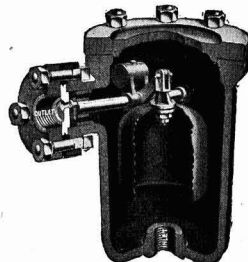


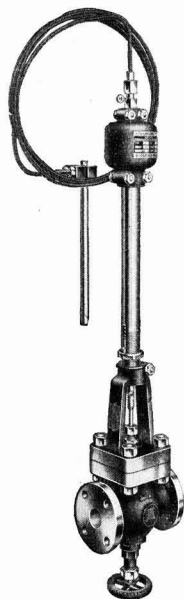
Left: Hopkinsons' "R" type Reducing Valve will meet the most exacting requirements under severe working conditions. It is a relay-operated valve, with a large capacity.



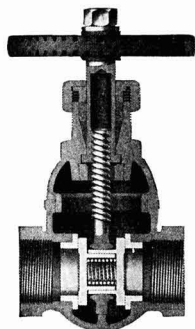
Left: Hopkinsons' "Nolos" Slide Valve Trap is free from complicated internal parts which might cause trouble.

Hopkinsons' "Robot" Slide Valve Trap is recommended for systems in which an excessive amount of air is likely to be present.





Hopkinson's patent "R" Type Thermostatic Regulator has been designed to meet the demand for an instrument giving accuracy of control and reliability in service.



Hopkinson's Bronze Patent Parallel Slide Valve is available in a number of sizes.

is ejected from the trap during discharge. Access to the working parts is obtained by removing the outlet flange, an easy operation which avoids the necessity of breaking the main cover joint, and there is thus a great saving of time and labour in inspecting the working parts. As in the case of the "Nolos" trap, the valve head and seat are of "Platnam," which is a non-corrodible and practically indestructible alloy.

Hopkinson's return trap has been designed to return hot

condensate to the boiler from a number of different points at lower levels than—and at considerable distances from—the boiler. Pure distilled hot water is returned, resulting in economy in fuel, reduced scale formation, with consequent increased boiler efficiency and a reduction of maintenance costs. Action is entirely automatic; maintenance and running costs are negligible, and no internal parts require lubrication. The movement of a ball float inside the body of the trap is communicated by means of an external lever to a rocking skate, the action of which operates the control valve on top of the trap. When the trap fills, the control valve simultaneously closes the trap to atmosphere and admits boiler pressure so that condensate flows by gravity into the boiler.

When high pressure steam is passed through a reducing valve into a low-pressure system, it is essential in the interests of safety that efficient means be provided to protect the system against a rise in pressure through any cause whatsoever. The provision of safety valves of adequate area is often impracticable, and Hopkinson's combined isolating and relief valve has been designed to provide an efficient safeguard. This valve prevents rise in pressure in low-pressure systems, relieves excess steam to atmosphere, whilst preventing unnecessary wastage of steam, and controls the steam supply in the event of failure of the reducing valve, without cutting off the steam supply to the plant.

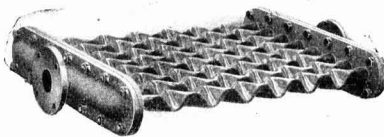
A patent "R" type thermostatic regulator has been designed by Hopkinson, Ltd., to meet the demand for an instrument giving accuracy of control and reliability in service. The vapour pressure generated by the expansion and contraction of a liquid or gas in the thermostatic bulb acts on the diaphragm, which utilises this pressure to operate the pilot valve. This valve controls the action of the main valve through the medium of a piston which is supplied with steam from the inlet side of the valve. The valve opens full-bore and remains fully open to within a few degrees of the required temperature, when it commences to regulate. The pilot valve has a limited movement, consequently a single diaphragm can be used, permitting of a supporting plate which safeguards the diaphragm against excessive temperature. This valve can be supplied in a number of different patterns with screwed or flanged ends, and different bulbs are supplied to suit the particular requirements of the installation.

Appliances for Steam Users

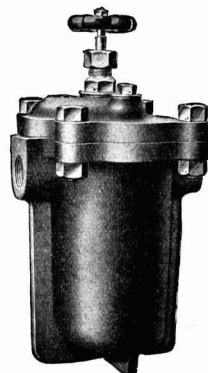
SINCE the formation of the company in 1900, Royles, Ltd., have specialised in appliances for steam users. These include calorifiers for the heating of water by steam, feed water heaters for utilising both live and exhaust steam, steam traps and reducing valves. Associated with calorifiers are temperature regulators, which may be adapted for controlling the temperature of tanks, where these are steam heated, either by direct injection or through coils. In connection with the latter the firm are able to supply batteries (or groups) of the Row patent tube, as illustrated, in a variety of metals, and which give a much higher efficiency due to the fact that the Row tube possesses *twice* the efficiency of plain tube. They have also been extensively adopted for cooling purposes as well as heating.

Among steam traps the "Syphonia" pattern has long since become a household word among users of these necessary adjuncts to steam plant. They are made in a variety of forms, suitable for all conditions, including the original ball float pattern which gives the most economical trapping, and open float patterns of the normal and inverted types. One of the accompanying illustrations shows the latest trap to be placed on the market of this latter type. The special features incorporated as standard are a blow through attachment, with which is combined a full bore by-pass, and an integral check valve, in case the trap is required to lift the condensation.

Reducing valves are also made in a variety of patterns, two of which possess the useful feature of having a safety valve combined which is automatically reset if any change is made in the reduced pressure. In addition to many other steam appliances Royles, Ltd., also manufacture twin and single strainers for the coarse straining of water supplies, sand filters for the removal of finer particles, and water

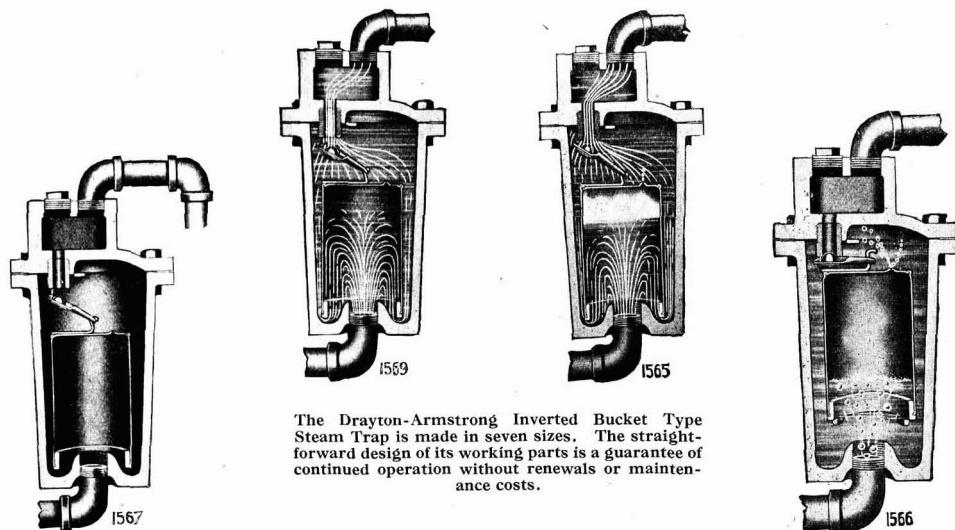


A Row Patent Tube Battery capable of being applied to cooling problems as well as heating.



One of the latest types of "Syphonia" Invert Steam Traps to be placed on the market.

softeners working on the lime and soda principle of the synthetic zeolite pattern.



The Drayton-Armstrong Inverted Bucket Type Steam Trap is made in seven sizes. The straight-forward design of its working parts is a guarantee of continued operation without renewals or maintenance costs.

Two Steam Traps Which Meet all Industrial Needs

OWING to their sound design and to the patented dual lever action of the valve mechanism, Drayton-Armstrong steam traps, made by the Drayton Regulator and Instrument Co., Ltd., combine more desirable features than any other trap yet offered. They have sharp, decisive action without jar or shock, and special provision is made so that the traps are automatically air venting. When discharging, the condensate has a scouring action, causing all dirt, oil, grease, etc., to be passed through the trap.

On starting up, condensate enters the trap completely filling the bucket and body, and passes freely through the fully opened valve into the condensate line. Steam entering the trap is caught in the bucket. When the bucket is two-thirds full of steam, it floats, closing the valve with a straight lift. As additional water enters the trap the buoyancy of the bucket is gradually reduced, and it sinks until the upright hooked strap attached to the top of the bucket engages in the end of the valve carrying lever.

Two upright prongs at the butt end of the lever act as fulcrums, against which the weight of the bucket acts to pull the valve off its seat. As the bucket continues to sink, the valve lever moves down the prongs, withdrawing the valve further from its seat. When the bucket rises due to steam entering the trap, the valve lever comes to rest in the horizontal position on top of the float, and the valve is lifted vertically towards its seat as the bucket continues its upward travel. The valve is free to be carried to its seat by the velocity of the water flowing up and out through the valve passage, and is also pressed home by the upward lift of the bucket.

Air and incondensable gases entering the trap pass through an orifice in the top of the bucket, accumulate under the trap cover and are eventually vented to the condensate line when the trap opens. Where large quantities of air must be passed, a simple type of thermostatic relief valve is fitted inside the bucket. This device is known as the "thermic strip" and can be fitted to all types of traps at a slight extra price. For superheated steam and units where only a small amount of condensate is normally handled, a double seated valve orifice is fitted to ensure that the action of the trap is intermittent.

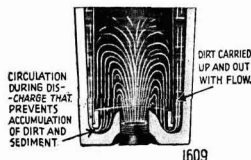
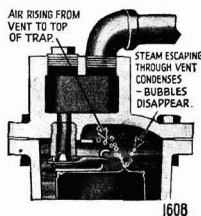
It will be found on comparison that, capacity for capacity, the Drayton-Armstrong trap is small, compact and light in

weight; where factory space is at a premium this is an important consideration. Provision is made for the automatic release of air on all standard traps and manual venting is unnecessary. By fitting a "thermic strip" rapid heating up and maximum efficiency of heating surfaces is obtained under conditions normally regarded as difficult in these respects.

The only friction point is at the fulcrum of the lever. Owing to the holes through which the fulcrum pins pass being drilled at an angle to the surface of the lever, there is only floating friction when the trap is operating. When the cover of the trap is removed the entire mechanism is exposed and can be dis-assembled and re-assembled without tools. In case it should be necessary to replace any parts, standard spares, which are interchangeable with the old parts, are quickly obtainable.

The scouring action of the condensate every time the trap operates keeps the body clean, and cleaning out at frequent intervals is unnecessary. This feature also makes the trap particularly suitable for positions where oil and grease are present in the condensate.

If fitted with a check valve on the outlet, Drayton-Armstrong traps will lift approximately 2 feet for every lb. per sq. inch of steam pressure available in the trap in excess of pressure at outlet. Allowances to be made for pipe friction losses. A minimum allowance of 5 lb. per sq. inch is recommended, which may





The Drayton Standard Industrial Steam Trap (balanced pressure) is suitable for all pressures of saturated steam from vacuum up to 120 lb. per sq. in. It has a very noticeable instantaneous action.

have to be increased for long pipes containing a number of bends.

The Drayton-Armstrong traps for low and medium pressures are made in seven sizes. The trap bodies are made of nickel iron and working parts are non-rusting; the valve and seat are made from chrome steel alloy, heat treated and stainless. The standard trap is suitable for superheat when fitted with stainless steel bucket.

The Drayton industrial (balanced pressure) steam trap is suitable for draining steam lines, heating coils, jacketed pans, and similar duties for all pressures of saturated steam from vacuum to 120 lb. per sq. inch. Its attractive features are large capacity, small bulk, self-adjusting for pressure, instantaneous action, strong construction, and low price.

A Balance Pressure Trap

The Drayton industrial steam traps, which operate on the balanced pressure principle, are not to be confused with ordinary thermostatic traps which operate on volatile liquid pressure. Such traps discharge with a dribbling action and have only a very slight valve lift. On the other hand, Drayton balanced pressure traps have a sharp, decisive action and full lift of the valve for the valve passage diameter. In addition, balanced pressure traps do not require setting for pressure and consequently they are particularly adapted to meet factory conditions where the pressure at the trap frequently fluctuates. The increase in capacity of balanced pres-

sure traps with decreasing temperature of water of condensation eliminates flushing when starting up and permits steam-heated apparatus to reach working temperature in the minimum time. Valves remain wide open when the trap is cold, thus automatically venting the apparatus or pipe-line to which the trap is attached and permitting the line to drain on closing down.

The operating element of this trap consists of a Drayton seamless metal bellows which is manufactured from the sheet at the company's own works. The element is housed in a hot pressed brass container of great strength and durability. This container, which also forms the cover of the trap, is attached to the body by four bolts, so arranged that the head of the bolt is locked from turning by flats formed on the side of the body, thus permitting the cover to be removed with the aid of one spanner only. The body is of high-grade cast iron which is treated against rusting and has ample section and clean passages. Valves and valve seats are renewable and interchangeable. Low-pressure traps fitted with gun-metal valves and valve seats are supplied for pressures up to 60 lb. per sq. inch; high-pressure traps for pressures up to 120 lb. per sq. inch are fitted with nickel alloy valves and valve seats.

Avoiding Long Lengths of Pipe

The small bulk of the Drayton standard industrial trap enables it to be installed close to its work and long lengths of piping leading to the floor are not required. As the trap does not rely upon radiation to the atmosphere for its operation, the surrounding temperature and conductive heat do not affect its action. No support other than the pipe-line to which it is attached is required. Its inconsiderable weight enables it to be attached to moving apparatus such as sugar boiling pans and jacketed cooking pans.

Drayton steam traps are manufactured with scrupulous care. Every possible precaution is taken to ensure complete satisfaction; bellows are air-tested under water immediately after manufacture and temperature-tested as thermostatic units after filling and sealing. Before being assembled into bodies the elements are thoroughly aged in order to ensure that they are perfectly tight and sound. The trap is machined, drilled and assembled to standard gauges and is finally subjected to an operation test on steam before despatch.

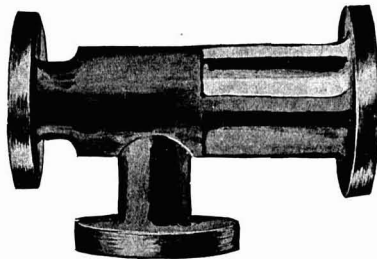
Acid Elevators and Acid Fume Exhausters

THE improved acid-resisting regulus metal acid elevators, made by Haughton's Metallic Co., Ltd., are extensively in use among chemical works. They are made of a special mixture of Regulus, and are claimed to resist the action of acid better than any other metal. Such elevators are worked by steam pressure and are adapted to raise acids from a depth by suction, and give delivery to a height.

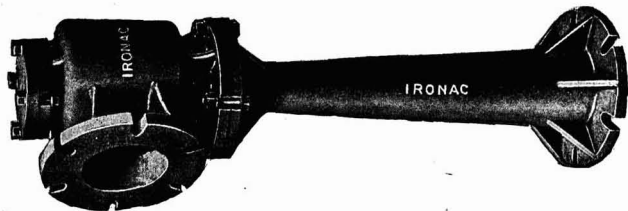
Haughton's improved sulphuric acid elevator, "Strong Arm" pattern, is the smallest and most compact acid elevator. It is quick to "catch" the acid, reliable and safe, and is largely used at vitriol works and gas works. These elevators are of regulus metal throughout, and they can be opened up for inspection without disconnecting the pipe-work. Steam nozzles and delivery nozzles are renewable.

Another illustration shows one of Haughton's exhauster blowers for exhausting and blowing acid fumes. These

blowers are made of Ironac and are suitable for sulphuric or nitrous gases. They are worked by steam or compressed air.



This Acid Elevator is made of an improved acid-resisting regulus metal.



Left: Haughton's Exhauster-Blower for acid fumes is made of Ironac and is worked by steam or compressed air.

Protection Against Corrosion

Some Outstanding Applications of Rubber and Vulcanite

WITH the extensive knowledge of the remarkable resistance to corrosive agents which certain grades of compounded rubber offer, gained by nearly half a century's experience in the manufacture of rubber for solid tyres and for sheathing electric cables for use under the foul conditions encountered in mines, the St. Helens Cable and Rubber Co., Ltd., introduced a new corrosion-resisting compound which they named Cabtyrit. This material has now been on the market for several years and is used in the plant of some of the largest chemical manufacturers and users in this country and abroad. It resists the action of practically all acids and alkalis, cold or hot (up to 100° C.), and is especially recommended for use in connection with hydrochloric acid (full strength), hydrofluoric acid, sulphuric acid (up to 50 per cent.), phosphoric acid, caustic soda, caustic potash, acetic acid, lime solutions, etc.



Cabtyrit in its flexible grades is an ideal material for aprons and gloves for employees at chemical works.

Cabtyrit is manufactured in sheet form in different thicknesses according to requirements and, provided there is sufficient access, can be applied to plant, parts, and accessories of practically any shape or size. It can be affixed and adheres tenaciously to metal, cement, brickwork and wood. It is not affected by vibration, will not crack and retains sufficient elasticity after vulcanisation to allow for variation in the coefficients of expansion between the vessel and the lining. It also has a great advantage in that the semi-flexible grades can be applied to plant *in situ*, thus saving dismantling and carriage charges. The hard rubber grade, however, is applied by a special process by which absolutely firm adhesion to metal is guaranteed, and, because of the special requirements of application, this class of work must be carried out in the maker's factory.

Dyers' Equipment

In dyeing and bleaching Cabtyrit linings minimise the risk of staining of fabric and have no accelerative effect on the rate of spontaneous decomposition of hypochlorite solution. Loss of available chlorine in this way is markedly increased by iron and the application of Cabtyrit results in a definite saving of active chemical. Every corrosion trouble is investigated individually by the St. Helens Cable and Rubber Co. and a grade of Cabtyrit applied which is known to be perfectly satisfactory under the conditions encountered.

Corrosion-resisting pipe lines and standard fittings are made in both the semi-flexible and hard rubber grades of Cabtyrit. Pipes up to 9 ft. in length, threaded or flanged according to requirements, can be supplied in sizes from $\frac{1}{2}$ in. diameter upwards in various wall thicknesses; flanges are drilled to B.E.A. standards unless otherwise specified. Pipe lines made of semi-flexible Cabtyrit are particularly serviceable. They have rigidity approaching that of hard rubber, are light in weight and will stand much rougher usage than ebonite because of their resilient nature. Such pipes can be used for practically any acid or alkali, cold or hot (up to 100° C.) Fitting and dismantling is easy and the slight flexibility tends to cover minor errors in alignment and simplifies installation.

Where the use of solid Cabtyrit pipes is not practicable, Cabtyrit-lined metal pipe lines can be supplied, lined in either a semi-flexible quality or one of ebonite hardness, including bends, elbows, tee pieces, etc. Pipes from 1 in. diameter upwards in any reasonable lengths can be lined to requirements. Acid hose and tubing made of a very flexible grade of Cabtyrit can also be supplied in various diameters and wall thicknesses.

Aprons and Gloves

Cabtyrit-impregnated fabric acid-proof aprons are made of strong cotton fabric impregnated with a very flexible grade of Cabtyrit. These aprons will withstand the hardest wear and are proof against practically all acids and alkalis; they are ideal for all work where corrosive liquids are employed. All Cabtyrit aprons are made of a special tough, flexible hard-wearing quality of Cabtyrit, and are particularly suitable for chromium plating and similar work where strong acids are used. Acid-proof leggings and acid-resisting gloves are also made of Cabtyrit. Other gloves are made of rubber specially compounded to resist abrasion. In addition, acid-proof buckets, jugs, ladles and measures are manufactured.

Many processes in the chemical and allied industries would be impossible but for the use of vulcanite, which, according to David Moseley and Sons, Ltd., is capable of resisting the corrosive action of many of the liquids in use. The non-absorbent qualities of vulcanite are also of great service in dyehouses for vat linings, roller coverings and dyesticks, as they can be rapidly cleaned and permit quick change-over of colours without staining. Vulcanite, moreover, is admirable for the lining of acid storage tanks, as the strong outer covering of steel can be lined with an acid-resisting vulcanite skin which adheres to the metal.

Hose and Hose Fittings

Among the plant accessories which are available in vulcanite are bends, elbows, T-pieces and junctions made to any shape or angle, suction bends with strainer ends, and bends with grooved ends for hose connection—all made to B.S.I. standards to enable ease of fitting and replacement. Buckets and measures are made to any requirements in all types, with solid vulcanite bodies, the handles of which are metal reinforced. Screwed elbows, unions, sockets and tees are made to all diameters and in all standard types and sizes. In addition, David Moseley and Sons supply vulcanite pipes and fittings which are ideal because they are non-corrosive, non-absorbent and long wearing. Pipes of all sizes and strengths are made with or without flanges. Branches, flanged pipes, unions, cocks, etc., for use by dyers, bleachers, chemical manufacturers, can be supplied in all types and in all standard sizes, plain or screwed, and with or without flanges. Vulcanite taps are manufactured in all types and sizes, screwed, flanged or spigotted for use with hose.

Ever since rubber gave the world a flexible pipe, David Moseley and Sons have made hose. Countless improvements have been worked out until the present vast range has come into being, supplying every trade and process with hose exactly suited to its purpose. Standard quality 1935A grey solid rubber tubing, for acid work, is noted in the chemical industry as the most reliable tubing obtainable.

News from the Allied Industries

Iron and Steel

A NEW BESSEMER PLANT has been completed by the United Steel Co. at Workington, where is produced the only acid Bessemer steel for rails, sleepers, and tubes in the country. It includes the latest features in steelworks practice and, though reducing costs, will increase the maximum weekly production from 5,500 tons to 7,000 tons. It is to be started next month.

Non-Ferrous Metals

AN INTERNATIONAL CONFERENCE of world copper producers may be held in New York early in October, when M. Pisart, a director of the Union Minière de Haut Katanga, is scheduled to arrive. Inquiries in copper circles as to the possibility of an international agreement resulting from the conference have evoked the opinion that such an agreement at present is highly doubtful.

Artificial Silk

THE TOMASZOW ARTIFICIAL SILK WORKS (Poland) has called an extraordinary meeting for October 13, at 1 p.m., in Warsaw, for the purpose of deciding upon a reduction of the share capital by 2,700,000 zloty, thus reducing the capital to 27,000,000 zloty by cancelling 90,000 shares of 30 zloty each. The capital was reduced in November last by cancelling 200,000 shares. The existing amount is approximately £690,000 at par.

Dyeing and Finishing

THE GOVERNMENT'S ATTITUDE towards reorganisation in the dyeing and finishing industry is still unknown. The more progressive elements in the industry admit that their troubles are twofold. Progress is being held up not only by the negative Government attitude, but also by the difficulty of persuading certain producers to join. The draft constitution to regulate prices and other conditions of trade is on the point of being completed. The constitution is drawn up on the basis of a voluntary scheme, with the eventual idea of obtaining statutory assistance.

Oil Refining

AN IMMEDIATE START IS TO BE MADE with the establishment of an oil refining industry in Great Britain. It is stated that a £360,000 plant for converting crude oil will be erected at East Halton on the Lincolnshire side of the Humber. At present practically all the lubricating oil used in this country has to be imported. The rights to use a new process of converting crude oil into lubricating oil have been obtained by a British company. The installation of the new plant will take about seven months to complete, and it will then be capable of producing approximately 40,000 tons per annum of finished lubricants. The consumption of lubricating oil in this country is approximately 500,000 tons per annum, of which 420,000 tons were imported from foreign countries at a cost of £3,726,800.

Notes and Reports from the Societies

Institution of Chemical Engineers

THE Institution of Chemical Engineers will hold its opening meeting of the 1934-35 session on Friday, October 5, at 6 p.m., in the rooms of the Chemical Society, Burlington House, Piccadilly, London, W.1. Papers will be presented on (a) "Crushing and Grinding," (W. F. Carey, M.Eng.), and (b) "Crushing and Grinding Appliances; The Connection between Type and Purpose" (Professor B. W. Holman, A.R.S.M.). The chair will be taken by the president, Mr. W. Macnab.

Leather Trades Chemists

A SYMPOSIUM on "Technical Aspects of Emulsions," organised by the International Society of Leather Trades' Chemists (British Section), will be held at the Royal Society of Arts, John Street, Adelphi, London, W.C.2, on Friday, December 7, from 10 a.m. to 6 p.m., Professor F. G. Donnan, F.R.S., will take the chair. The provisional programme includes "The Study of Emulsions in the Patent Literature" (Dr. W. Clayton); "Problems connected with the Preparation and Application of Emulsions used in Agricultural Spraying" (Dr. R. M. Woodman); "Emulsions and Emulsification in the Wood Textile Industry" (Dr. J. B. Speakman); "A Few Emulsification Problems Related to the Food Industry" (Dr. J. W. Corran); "Types and Performances of Emulsifying Machinery" (Mr. R. I. Johnson); "On the Mechanism of Emulsification" (Professor H. Freundlich); "The Stability of Emulsions in Thin Films" (Dr. L. A. Jordan); "Some Physical Properties of Dispersions of Asphaltic Bitumen" (Mr. L. Gabriel); "Emulsions in the Leather Industry" (Mr. W. R. Atkin and Mr. F. C. Thompson); "The Use of Highly Dispersed Emulsions in the Treatment of Toxic Conditions" (Dr. V. G. Walsh); and "Problems of the Handling of Emulsions in the Rubber Industry" (Dr. H. P. Stevens and H. W. Stevens). Advanced proofs of the contributions will be available during November and will be sent to those who apply for them (price 2s. 6d., post free). A dinner will be held at Maison Lyons, Shaftesbury Avenue, in the evening at 7.30 p.m., the charge for which will be 6s. 6d. exclusive of wines (morning dress).

Chemical Engineering Group

A JOINT meeting of the Chemical Engineering Group and the Road and Building Materials Group of the Society of Chemical Industry will be held on Friday, October 12, at 8 p.m., at the rooms of the Chemical Society, Burlington House, Piccadilly, London, W.1, when papers will be presented on "Pozzolanic Cements" (Mr. R. G. Franklin, B.Sc., and Mr. A. E. J. Vickers, M.Sc., F.I.C.), and "The Setting and Hardening of Portland and Aluminous Cements with relation to their Resistance to Water and Mineral Sulphates" (Mr. A. V. Hussey, M.I.Chem.E.). These papers form a very important contribution to the study of the properties of the hydraulic cements, a class of bodies of great interest to engineers, but one to which the same amount of research has not been devoted as to the more common Portland cements of dry-land construction. The chair will be taken by the chairman of the Chemical Engineering Group, Dr. W. R. Ormandy.

Institute of Metals

THE Institute of Metals and its local sections have planned a very full programme for the coming session. There will be three general meetings of the Institute—in March, May and September respectively—at each of which a number of important metallurgical communications will be presented for discussion. At the May meeting, Professor W. R. Bragg, F.R.S., will deliver the 25th annual May Lecture. The annual autumn meeting will be held at Newcastle-on-Tyne. In addition to the meetings of the parent organisation there will be held monthly throughout the coming session meetings of the Institute's six local sections which are located, respectively, in Birmingham, Glasgow, London, Newcastle-on-Tyne, Sheffield and Swansea. The programmes of each section are primarily designed to appeal to persons engaged in the local industries; thus in Birmingham papers will be read on "The Production of Brass Ingots" and "The Rarer Metals—Gold, Silver and Platinum" (as used in the local jewellery trades). The next membership election takes place on Wednesday, October 31.

At the Sign of the Cheshire Cat—II

IN the official advertisement upon the last page of the volume of Presidential Addresses, the aims of the British Association are set out in the following terms:

"The British Association seeks to promote general interest in science and its applications and its annual meeting affords unique opportunity for conference and co-operation between scientific workers and others interested in all departments of science.

"The Association relies upon a full membership and attendance at its meetings to assure the support of the numerous scientific researches and other activities carried on under its auspices."

This definition of its functions is hard to construe. The Association publicity agent cannot have been sufficiently informed and has not been able to master the true situation. The better course in advertising would have been to follow the modesty of a trade example, such as that of the brewers—"Beer is Best"—which leaves "Avoided" to be understood, if not some other verb, "to taste."

General Interest in Knowledge.

To aim at promoting general interest in *Knowledge* and co-operation between "knowing" workers and others interested in all departments of *Knowledge* is to attempt too much. No one can well be interested in all departments of knowledge; only a Master of Balliol, where alone perhaps modesty is a highly developed art, is recorded to have claimed the distinction—"I am the Master of this 'ere College; what I don't know isn't knowledge." Yet, strange to say, he knew nothing of what is vulgarly called "Science," though a scientific classic of the highest order, saturated with Plato. The fact is, the Saxon rudder knowledge is always being changed for the pretentious Latin bowsprit science, in a ship that won't sail anyway because its pilots have no sense of direction. We have to turn to *Alice* for a picture of the state of mind in the Burlington House attic:

Alice.—"Would you tell me, please, which way I ought to go from here."

Cat.—"That depends a good deal on where you want to go."

Alice.—"I don't much care where!"

Cat.—"Then it doesn't matter which way you go."

The word *Science* is seldom used with understanding. It has too long been inconsiderately flung across the stage of modern learning. Much of our present difficulty is a matter of words. Contending parties do not see that the different words used mean the same thing—if they mean anything to them. The first step in general scientific progress will be that we learn to put meaning into our words. Scientific knowledge—a term in constant use—is an anachronism: "knowledge-made-with-knowledge"; in what other way can it come? Instead of R-e-e-search, a year of word-study should be enforced at the University, so that the art of reading might be learnt; those who had learnt to read would know how to speak and to write, what not to write; library shelves would be spared a vast burden, in future.

The Scientific Worker

The idea is abroad that a scientific worker is merely a stool-sitting slave in a laboratory. Those who wish to see themselves as others see them need only turn to the "Radio Times" (September 14). Following the first page leader, at the close of which we are told:

"the policy the B.B.C. has always striven to carry out is to make everything that is broadcast the best of its kind," comes an article, "Science for the Plain Man"—in other words, *Knowledge* for the Plain Man—by Gerald Heard. "His first aim will be," he says, "to pass on some of the interests, some of the excitement he feels about what science is doing." He then adds: "I am not a scientist." In other words, in plain Saxon, he is to tell what knowledge does, how it is being used, without himself knowing. Scientist is a weak, vulgar term, to be got rid of along with "Science." A man who uses and makes knowledge may well be called an *Scientificer*, just as the man who works at an Art is called

Sir James Jeans and Co.'s
Entire and Wavy Grins
Aberdeen, 1859.1934

an artificer. The artist is a mere visionary who at once becomes an artificer when he does anything. The old word *Scienter*, which has the softness and rhythm that scientist lacks, may be taken as an intuitive contraction of scientist.

Mr. Heard writes: "This is the greatest age that science has ever known"; science is impassive and cannot know. This is the great age of knowledge, would be sufficient. He adds: "Still, the fact remains, extraordinarily few people are interested in science"—by which he means, interested in knowing or learning. "That is mainly because of the high specialisation that present-day science needs." On this point, every expert trader, every expert worker, is a scientific worker, within the limits of his occupation; he is also a specialist. The poor scientist is no exception to the rule. Why blame him so for doing as everybody else? When Mr. Heard speaks of himself as not a scientist, he simply means that he is not a laboratory worker. His final paragraph is illuminating in this respect:

"These talks aim at two things. They try to look both back and ahead. They try to show the 'story' that lies behind each find—the detective thrill of putting clue to clue till suddenly the key fact is pounced on. They try also to show how each key fact, however culminating, links with other facts and so is leading to ever greater discoveries. For all the sciences are linking up into one great grapple with which we may grasp the world in which we find ourselves. Science has already done more than most of us realise to change our lives. But the really exciting thing is that Science is only just beginning."

This is all very good but as to "just beginning" he has forgotten that Adam and Eve ate of the fruit of the tree of knowledge; that Tennyson wrote:

"Let knowledge grow from more to more."

The poet was thinking of so-called science but made no mistake of using so cryptic and un-English a word. The progress of the world throughout time has been in knowledge—the earliest workers must have been far more competent than the later, because they had so little experience behind them. The only difference between former times and now is that we have systematised the pursuit of knowledge and developed it into a well-paid profession, under the guise of "Science."

"The Times," of September 22, has a Report under the heading, "Science in the Press," of a speech by Sir Richard Gregory, at a Conference of the Association of Libraries and Information Bureaux, on the day before. No one has done so much to spread information of new knowledge and in advocacy of scientific method as has Sir Richard. He therefore speaks with authority. In intent, nothing could be better than the following exhortation:

The Place of Science

"Urging that the public should be brought to understand more and more the place which science occupied in the fabric of civilisation, Sir Richard Gregory said that, whatever the ideals of a people, it was doomed to stagnation unless its science was living and was continually informing every activity of national life. He advocated the building up of an organisation for the spread of scientific news and emphasised the practical aims of modern science.

"Under the conditions of modern civilisation the community in general was dependent on science for its continued progress and prosperity. Under the influence of modern scientific discoveries and their applications, not only in industry but also in many other directions, the whole basis of society was rapidly becoming scientific;

and to an increasing extent the problems which confronted the national administration involved factors which would require scientific knowledge for their solution. It was in these directions that the Press could render the greatest service to science and the public at the same time. Under the present social and educational system, it was not possible to hope that at any very early date our schools would turn out a population of scientifically trained men and women. But it was becoming recognised, though slowly too, that what was needed was not so much detailed or expert knowledge of science, as the scientific outlook.

"The function of the Press, more readily to be appreciated perhaps when something of this scientific spirit had been inculcated in the schools, might very well be, by fostering this outlook, to ensure that the problems of government and administration, of society and of economics, were approached with scientific understanding."

Undue stress is here laid upon giving the public news of scientific achievement when what we all need is understanding. No doubt, we shall get the broadcasts and Press news we deserve. The public will welter in tit-bits but will remain as "no-can," as unknowing as before, continue to bow the knee to every bold advertisement and worship quacks. 'Tis human nature so to do. Sir Richard Gregory is alive to the difficulty of overcoming public indifference and inability to think.

The Faculty of Knowing

It is for the few to press forward in hope of inducing the spread of a divine spirit of *Know-ness*—the faculty of knowing, in all senses of the word. This was the proposed aim of Section I. when the Section was founded by the British Association, in 1901, an aim all but entirely overlooked of late years. Apparently, the missionary spirit is gone out of us; the spread of "science" has meant mainly the spread of the black coat and desire for an insured future; bold adventure is no more, it seems; at most, it is in the air or in Arctic regions; the domestic hearth is forgotten.

Those who wish to know the history of the Association should read the interesting "Retrospect," ably written by the General Secretary, published in 1922. The body was founded in 1831, the year in which the Faraday spark was first seen to jump its gap. The spark has been given such opportunity, has been so cleverly nursed into greatness, that it now governs the world. The Association had a great influence in its early days, but has been so inefficiently cared for that it is now decadent, if not moribund. It was founded upon the model of the German Association of *Naturforscher und Aerzte*, an association of expert students of Natural Knowledge, including Medicine. The British Association originally had the same purpose as the German, though it never included medicine, unfortunately—a general section would have been valuable. It has long been a gathering of small groups of genuine workers accompanied by a large army of more or less interested camp followers—a Wimbledon at tennis time, with games in several courts. In fact, it has fulfilled its original purpose but has not yet discovered itself anew as an agent for the promotion of what I would have called public *Know-ness*.

Origin of the Association

The Association came into being soon after the Peninsular War, when conditions prevailed similar to those known to us of late. The art of scientific inquiry and discovery then had no position in the country: ignorance was publicly held to be bliss. Now the practice of the art is fully recognised and State supported: it has an established position, forming as it does a new estate in our polity—that of a recognised civil service. It has ministered greatly to commerce and industry. Unfortunately, alive as the public is to the benefits gained by systematised inquiry, they are so obviously to the fore, it is in no way informed as to the methods in use—in no way infused with the spirit which has actuated workers. The universities and, therefore, the schools have hitherto failed to make proper intellectual use of the new weapon the use of systematised knowledge affords. The public remains a mere onlooker of the game: only some of us know that great profit is to be gained by learning its rules and being

able to play it ever so little; these, therefore, urge that the public function of the Association should be to bring about this understanding; that the Games Champions should, for the time being, devote themselves to such service.

From this point of view, the "Addresses of the Sectional Presidents," delivered at Aberdeen, are an amusing bundle of wasted effort, for the most part: few of them are of practical interest. A brief notice of most will suffice. Strange to say, no one has taken advantage of the opportunity to review the period since the former meeting in 1885, although this is a critical, nodal date in the history of the progress of experimental inquiry. Faraday's work, both chemical and electrical, which began about fifty years before, was to come into full fruition from the eighties onwards. Those of us who have lived through the period know how vast has been an advance which the present generation takes for granted, having inherited it as mere religious belief. The text books teach it as such—as a church catechism. In this respect, we are much the worse off. The position is a strange one. The clerics are right in claiming us as with them: we have followed their methods, whilst upsetting their postulates. We are accustomed to think of Faraday working without prejudice of any sort, exercising *proportionate judgment* on six days of his working week. Then, on the seventh day of rest, lapsing into a primitive, unscientific attitude and state of faith, entirely given over to an imposed doctrine—the Sandemanian creed. Faraday on Sundays had a closed mind and was entirely prejudiced; during the rest of the week he was ever a seeker after proof and would accept no conclusion as "truth" until entirely satisfied of its probability. No student to-day is allowed to acquire a knowledge of his subject in Faraday's workaday spirit: dogma and doctrine prevail. Just as many of us have had painfully to unlearn religious doctrine put upon us in our youth—I definitely remember the time when I was casting out the devil from my belief—so the student of physical and biological science to-day, as he grows up, will have to unlearn the false metaphysical doctrine put upon him by teacher and text-book. The scientific press but serves to show how few recover their mental balance: the majority tend to wallow in dogmas. Our mansion of Natural Science, in the chambers of theory, in large part, is but a whitened sepulchre! None the less, we have a vast practical achievement in the cellars to our credit. The great task before us now is to secure freedom of the spirit—so that knowledge may prevail in the end. The device upon our banner is a strange one: we can but cry "*Excelsior*" and continue to force our way onwards and upwards.

Morphine from Poppy Straw

New Source of Income from Agriculture

A NEW process for extracting morphine and other alkaloids from poppy straw and poppy chaff remaining after the ripe capsules have been thrashed to separate the seeds has been brought to the notice of the Advisory Committee of the League of Nations. These parts of the plants have hitherto been regarded as useless and have been destroyed or utilised as a poor quality of manure. The process is regarded as a new source of income for agriculture, and owing to the ease with which stocks of the raw material can be accumulated, transported, and stored the manufacture can be uninterruptedly carried on throughout the year. There are at the present time some 8,000 hectares of land in Hungary under poppy cultivation, yielding some 13,000 tons of poppy straw annually.

The "Lancet" says: "The quality of the alkaloids is pronounced to be the same as that obtained from raw opium and to meet pharmacopoeial requirements. The effect of this new discovery on the supply of morphine for licit, and also illicit, purposes is likely to complicate still further the international control of drugs of addiction.

"The Hungarian Government and the inventor of the process are prepared to enter into arrangements both with private undertakings and with the Governments for the sale of the secret of the new process to foreign producers under certain conditions. All this makes it important to expedite the summoning by the League of Nations of the projected conference on the production of the raw materials of dangerous drugs."

Continental Chemical Notes

Austria

NITROCELLULOSE PRODUCTION, which ceased at the end of the war is to be restarted at Blumau.

Czecho-Slovakia

THE SODIUM PERBORATE CARTEL has been prolonged till the end of 1935; that for tar and tar products till the end of 1936.

Sweden

THE HORMONE, SECRETIN, has now been isolated in the pure state for the first time, although discovered in 1902. Swedish workers have extracted it from the mucous membrane of the small intestine of pigs in the form of a crystalline stable salt which undergoes activation on exposure to ultra-violet light.

Hungary

THE HUNGARIAN PRODUCTION OF LINSEED will be stimulated by the decision of Hungarian linseed oil manufacturers to take over 600 wagons of home-grown seed at a price above the world market rate. By prohibiting the erection of new linseed oil factories until August 1, 1935, the Government hopes to maintain a stable market.

France

AN EXPERIMENTAL PLANT for low temperature coal carbonisation, owned by the French licensee of Low Temperature Carbonisation, Ltd., was started up about a month ago.

A NEW FRENCH COMPANY for the production of synthetic petrol has been formed with a capital of 3 million francs under the name of Compagnie Française d'Essences Synthétiques.

THE TRADING RESULTS of the French chemical concern, Bozel-Maetra, for 1933, discloses a slightly improved turnover as compared with 1932, but shareholders are again going without a dividend.

CRUDE OIL SHIPPED TO FRANCE from the Irak fields will be refined until further notice in the Normandy refineries of the Compagnie Française de Raffinage, a subsidiary of the Compagnie Française des Pétroles.

FRENCH ESSENTIAL OIL PRODUCTION during 1933 dropped 10 per cent. in comparison with the previous year. The sales of natural and synthetic oils declined by 20 per cent., prices weakening in sympathy to the extent of 15 to 20 per cent.

Germany

AN AMBITIOUS SCHEME for medicinal plant cultivation in Thuringia in the coming year has been elaborated by the State authorities. The headquarters of the scheme will be at Arnstadt.

THE GERMAN OIL PROSPECTING CAMPAIGN for this year is reported to include 57 pioneer borings in hitherto unexplored areas, one-half of the expenses being met by State loans. Of these borings, 46 are situated in Hanover, 1 in Westphalia, 8 in Thuringia and 2 in Baden.

SCRAP MATERIAL FROM MANUFACTURE of viscose rayon and transparent paper can, it is reported, be readily converted into cellulose acetate. The method, as outlined by F. Ohl, in "Cellulose-chemie" (1934, page 67), overcomes the greater resistance of the material to acetylation (in comparison with cotton linters which possesses a larger superficial area) by a special preliminary alkali treatment. The scrap material, cut up into very small pieces of a maximum length of 10 mm, is treated for 30 minutes at 60° C. with 2 per cent. sodium carbonate solution, followed by 1 per cent. solution at 80° C. and 0.5 per cent. solution at boiling point for 10 minutes. It is then washed with 1 per cent. acetic acid solution and finally with hot water. With as little delay as possible the purified cellulose is gradually acetylated at an initial temperature of 16-18° C., the action being promoted by kneading and stirring. A period of 30-44 hours at a temperature not exceeding 80° C. is required for conversion to an acetone-soluble acetate. It is estimated that 1.5 to 2 million kg. of viscose scrap are available per annum in Germany and no practicable method of utilisation has been available in the past.

Spain

A SPANISH CONCERN for the manufacture of medicinal chemicals (S.A. Laboratorios del Norte de España) has been founded at Masnou in the province of Barcelona, with a share capital of 2.35 million pesetas.

Jugoslavia

THE MANUFACTURE OF CHEMICAL ASSISTANTS for the textile, leather and fur industries is to be undertaken by the Jugoslavian subsidiary of the Budapest firm of Gedeon Richter A.-G., in association with Gero and Ofner, of Ujpest.

Italy

COMPULSORY ADMIXTURE of 25 per cent. of rayon with all cotton goods is understood to be contemplated by the Italian Government with the object of reducing the demand for foreign currencies and at the same time stimulating the rayon industry.

ITALIAN PRODUCTION OF METHYL ALCOHOL underwent marked expansion in 1933, the officially declared production of 41,600 hectolitres of the anhydrous product comparing with 11,000 hectolitres in 1932. Respective quantities taken by the consuming industries were 23,100 and 9,500 hectolitres.

Letters to the Editor

Chlorinated Rubber

SIR,—In THE CHEMICAL AGE, of September 22 (page 253) there appears an article on chlorinated rubber which might lead the uninitiated to think that this is a new discovery. As a matter of fact Detel Products, Ltd., and its predecessor, have been making and supplying chlorinated rubber, under the registered name of "Detel," for the past few years. This company possesses, and works, Patent No. 305,968, granted to F. C. Dyche-Teague, B.Sc., F.I.C., F.C.S.—Yours faithfully,

D. E. JEANS,
Secretary.

Detel Products, Ltd.,
Long Drive, Greenford, Middx.

Training the Chemist

SIR,—THE CHEMICAL AGE has been devoting some space recently to the question of industrial management and the lack of some system of training chemists to that end. The following facts give a fair indication of the position as I find it after ten years in a large factory.

(1) The good chemist stagnates *because* he is a good chemist and therefore valuable *as such*.

(2) The poor chemist is either (a) "sacked" or (b) promoted to some administrative post if he has enough "influence."

(3) The secondary school boy is assisted in his efforts to become fully qualified. Once he attains to that standard he reaches a dead end. He is politely told that he lacks a "something" which can only be acquired by attending a university for three years. His experience and years of service become a handicap.

(4) He is given little opportunity of picking up "inside information" concerning the factory beyond his own "cog-wheel" job.

(5) A "pupil" system absorbs practically all the chances of promotion. These "pupils" arrive mysteriously on the scene and are given two or three years to study the methods of the entire factory. They are often public school men or arts graduates and have absolutely no technical training or technical outlook. (They have heard of Van Gogh, but not of Le Blanc.) Any scientific knowledge they manage to acquire is superficial.—Yours faithfully,

EXTERNAL GRADUATE.

Weekly Prices of British Chemical Products

Review of Current Market Conditions

THERE has been a further steady increase in business during the past week, and the chemical market is now fairly satisfactory in most directions. The strongest demand among industrial chemicals has been for acetic acid, formic acid, oxalic acid, formaldehyde and salamoniac. Supplies of potassium chlorate are reported to be scarce and there is a fairly good inquiry. Some interest has been shown in potassium bichromate and the recent improvement in the potassium carbonate market has been maintained. Barium compounds are not receiving much attention, and arsenic, sodium nitrite and sodium sulphide are dull items. The coal tar products market is quite active. All grades of cresosote oil are in good demand, a steady inquiry continues for cresylic acid, and there is a good seasonal trade in crude naphthalenes. A slight further improvement is shown in the pitch market and refined coal tar continues in demand for export. Only a limited business has been transacted in heavy solvent naphtha, toluol and xylol. Business in pharmaceutical chemicals has been on a moderate scale and quotations show little change. Aspirin, hexamine and sodium salicylate markets have been active, and there has been rather more inquiry for amidopyrin, methyl salicylate, phenazone and resorcin. There is keen competition for business in phenacetin. Essential oils have been in fair demand, particularly Japanese peppermint and lemongrass.

LONDON.—Chemical markets remain unchanged, there being a steady flow of inquiry. Prices for all products remain firm. There is little change to report in the coal tar products market from last week, prices remaining unaltered.

MANCHESTER.—With Lancashire holidays now at an end traders on the Manchester chemical market are not now worried by seasonal influences, and in most quarters this week it is reported that the movement of the bread-and-butter lines of chemicals is steadily getting back to about where it was in the first six months of the year. On the whole, the view of autumn prospects is fairly cheerful, although the absence of any sign of material improvement in the cotton and woollen textile industries, more especially the former, is a big obstacle to anything resembling a full development of business in chemicals locally. A little contract buying has been reported this week, though the bulk of the moderate aggregate

business continues to be in parcels for delivery at comparatively early dates. The alkali products and the heavy acids are, for the most part, moving off in fair quantities, and values almost throughout the market are well held. In some respects the demand for the by-products has shown a slight improvement compared with recent weeks.

SCOTLAND.—There is still a slight improvement to be reported in the Scottish heavy chemical market.

Price Changes

Pharmaceutical and Fine Chemicals.—AMMONIUM, benzoate, 2s. 10d. to 3s. 6d. per lb.; hippurate, 21s. 6d. to 23s. 6d. per lb.; CALCIUM, hippurate, 28s. to 30s.; lactate, B.P., 1s. to 1s. 5d.; EPHREDINE, hydrochloride, 4s. 6d. to 5s. 6d. per oz.; ERGOSTEROL, 1s. 9d. to 2s. 3d. per gm.; LITHIUM, chloride, cryst., 10s. per lb.; citrate, 5s. 6d.; powder, 5s. 9d.; hippurate, 20s. 6d. to 22s. 6d.; PHENACETIN, 2s. 9d. to 3s.; SODIUM, barbitalum, 14s. 6d. to 16s. 6d.; benzoate, B.P., 1s. 7d. to 2s. 1d.; hippurate, 25s. 6d. to 27s. 6d.; ZINC STEARATE, 1s. 1d. to 1s. 6d.; HIPPURIC ACID, 19s. 6d. to 21s. 6d.; SAFROL, 2s. 6d.

Essential Oils.—JAPANESE PEPPERMINT, 5s. 6d. per lb.

All other prices remain unchanged.

General Chemicals

ACETONE.—LONDON. £65 to £68 per ton; SCOTLAND: £66 to £68 ex wharf, according to quantity.

ACID, ACETIC.—Tech., 80%, £38 5s. to £40 5s.; pure 80%, £39 5s.; tech., 40%, £20 5s. to £21 15s.; tech., 60%, £28 10s. to £30 10s. LONDON: Tech., 80%, £38 5s. to £40 5s.; pure 80%, £39 5s. to £41 5s.; tech., 40%, £20 5s. to £22 5s.; tech., 60%, £29 5s. to £31 5s. SCOTLAND: Glacial 98/100%, £48 to £52; pure 80%, £39 5s.; tech., 80%, £38 5s. d/d buyers' premises Great Britain. MANCHESTER: 80%, commercial, £39; tech. glacial, £52.

ACID, BORIC.—Commercial granulated, £25 10s. per ton; crystal, £26 10s.; powdered, £27 10s.; extra finely powdered, £29 10s. packed in 1-cwt. bags, carriage paid home to buyers' premises within the United Kingdom in 1-ton lots.

ACID, CHROMIC.—10½d. per lb., less 2½%, d/d U.K.
ACID, CITRIC.—9d. per lb. less 5%. MANCHESTER: 9½d.
ACID, CRESYLIC.—97/99%, 1s. 8d. to 1s. 9d. per gal.; 98/100%, 2s. to 2s. 2d.

ACID, FORMIC.—LONDON: £43 10s. per ton.

ACID, HYDROCHLORIC.—Spot, 4s. to 6s. carboy d/d according to purity, strength and locality. SCOTLAND: Arsenical quality, 4s.; dearsenicated, 5s. ex works, full wagon loads.

ACID, LACTIC.—LANCASHIRE: Dark tech., 50% by vol., £24 10s. per ton; 50% by weight, £28 10s.; 80% by weight, £48; pale tech., 50% by vol., £28; 50% by weight, £33; 80% by weight, £53; edible, 50% by vol., £41. One-ton lots ex works, barrels free.

ACID, NITRIC.—80° Tw. spot, £18 to £25 per ton makers' works, according to district and quality. SCOTLAND: 80°, £23 ex station full truck loads.

ACID, OXALIC.—LONDON: £47 17s. 6d. to £57 10s. per ton, according to packages and position. SCOTLAND: £48 10s. to £53 ex store.

ACID, SULPHURIC.—SCOTLAND: 144° quality, £3 12s. 6d.; 168°, £7; dearsenicated, 20s. per ton extra.

ACID, TARTARIC.—LONDON: 1s. per lb. SCOTLAND: B.P. crystals, 11d., carriage paid. MANCHESTER: 1s. 0½d.

ALUM.—SCOTLAND: Lump potash, £8 10s. per ton ex store.

ALUMINA SULPHATE.—LONDON: £7 10s. to £8 per ton. SCOTLAND: £7 to £8 ex store.

AMMONIA, ANHYDROUS.—Spot, 10d. per lb. d/d in cylinders. SCOTLAND: 10d. to 1s. containers extra and returnable.

AMMONIA, LIQUID.—SCOTLAND: 80° 2½d. to 3d. per lb., d/d.

AMMONIUM BICHROMATE.—8d. per lb. d/d U.K.

AMMONIUM CARBONATE, SCOTLAND: Lump, £30 per ton; powdered, £33, in 5-cwt. casks d/d buyers' premises U.K.

AMMONIUM CHLORIDE.—£37 to £45 per ton, carriage paid. LONDON: Fine white crystals, £18 to £19. (See also Salammoniac.)

AMMONIUM CHLORIDE (MURIATE).—SCOTLAND: British dog tooth crystals, £32 to £35 per ton carriage paid according to quantity. (See also Salammoniac.)

ANTIMONY OXIDE.—SCOTLAND: Spot, £26 per ton, c.i.f. U.K. ports.

ANTIMONY SULPHIDE.—Golden Gjd. to 1s. 1½d. per lb.; crimson, 1s. 3d. to 1s. 5d. per lb., according to quality.

ARSENIC.—LONDON: £16 10s. per ton c.i.f. main U.K. ports for imported material; Cornish nominal, £22 10s. f.o.r. mines. SCOTLAND: White powdered, £23 ex wharf. MANCHESTER: White powdered Cornish, £21 10s. ex store.

ARSENIC SULPHIDE.—Yellow, 1s. 5d. to 1s. 7d. per lb.

BARIUM CHLORIDE.—£11 per ton. SCOTLAND: £10 10s.

BARYTES.—£6 10s. to £8 per ton.

BISULPHITE OF LIME.—£6 10s. per ton f.o.r. London.

BLEACHING POWDER.—Spot, 35/37%, £7 19s. per ton d/d station in casks, special terms for contract. SCOTLAND: £8 in 5/6 cwt. casks for contracts over 1934/1935.

BORAX, COMMERCIAL.—Granulated, £14 10s. per ton; crystal, £15 10s.; powdered, £16; finely powdered, £17; packed in 1-cwt. bags, carriage paid home to buyer's premises within the United Kingdom in 1-ton lots.

CADMIUM SULPHIDE.—2s. 5d. to 2s. 9d.

CALCIUM CHLORIDE.—Solid 70/75% spot, £5 5s. per ton d/d station in drums.

CARBON BISULPHIDE.—£30 to £32 per ton, drums extra.

CARBON BLACK.—¾d. to 5d. per lb. LONDON: 4½d. to 5d.

CARBON TETRACHLORIDE.—SCOTLAND: £41 to £43 per ton, drums extra.

CHROMIUM OXIDE.—10½d. per lb., according to quantity d/d U.K.; green, 1s. 2d. per lb.

CHROMETAN.—Crystals, ¾d. per lb.; liquor, £19 10s. per ton d/d.

COPPERAS (GREEN).—SCOTLAND: £3 15s. per ton, f.o.r. or ex works.

CREAM OF TARTAR.—LONDON: £4 2s. 6d. per cwt. SCOTLAND: £4 2s. less 2½ per cent.

DINITROTOLUENE.—66/68° C., 9d. per lb.

DIPHENYLGUANIDINE.—2s. 2d. per lb.

FORMALDEHYDE.—LONDON: £26 per ton. SCOTLAND: 40%, £25 to £28 ex store.

IODINE.—Resublimed B.P., 6s. 3d. per lb. for quantities not less than 28 lb., increasing to 8s. 4d. per lb. for quantities less than 4 lb.

LAMPBLACK.—£45 to £48 per ton.

- LEAD ACETATE.—LONDON: White, £34 10s. per ton; brown, £1 per ton less. SCOTLAND: White crystals, £33 to £35; brown, £1 per ton less. MANCHESTER: White, £34; brown, £32.
- LEAD, NITRATE.—£28 per ton.
- LEAD, RED.—SCOTLAND: £24 to £26 per ton less 2½%; d/d buyer's works.
- LEAD, WHITE.—SCOTLAND: £39 per ton, carriage paid. LONDON: £37 10s.
- LITHOPONE.—30%, £17 10s. to £18 per ton.
- MAGNESITE.—SCOTLAND: Ground calcined, £9 per ton, ex store.
- METHYLATED SPIRIT.—61 O.P. Industrial, 1s. 6d. to 2s. 1d. per gal. Pyridinised industrial, 1s. 8d. to 2s. 3d. Mineralised, 2s. 7d. to 3s. 1d. 64 O.P. 1d. extra in all cases. Prices according to quantities. SCOTLAND: Industrial 64 O.P., 1s. 9d. to 2s. 4d.
- NICKEL AMMONIUM SULPHATE.—£49 per ton d/d.
- NICKEL SULPHATE.—£49 per ton d/d.
- PHENOL.—8½d. to 9d. per lb. without engagement.
- POTASH, CAUSTIC.—LONDON: £42 per ton. MANCHESTER: £38.
- POTASSIUM BICHROMATE.—Crystals and Granular, 6d. per lb. net d/d U.K. Discount according to quantity. Ground 5½d. LONDON: 5d. per lb. with usual discounts for contracts. SCOTLAND: 5d. d/d U.K. or c.i.f. Irish Ports. MANCHESTER: 5d.
- POTASSIUM CHLORATE.—LONDON: £37 to £40 per ton. SCOTLAND: 99½/100%, powder, £37. MANCHESTER: £38.
- POTASSIUM CHROMATE.—6½d. per lb. d/d U.K.
- POTASSIUM IODIDE.—B.P., 5s. 2d. per lb. for quantities not less than 28 lb.
- POTASSIUM NITRATE.—SCOTLAND: Refined granulated, £29 per ton c.i.f. U.K. ports. Spot, £30 per ton ex store.
- POTASSIUM PERMANGANATE.—LONDON: 6d. per lb. SCOTLAND: B.P. crystals, 9d. MANCHESTER: B.P., 9½d.
- POTASSIUM PRUSSIAN.—LONDON: 8½d. to 8½d. per lb. SCOTLAND: Yellow spot material, 8½d. ex store. MANCHESTER: Yellow, 8½d.
- SALMONIAC.—First lump spot, £41 17s. 6d. per ton d/d in barrels.
- SODA ASH.—58% spot, £5 15s. per ton f.o.r. in bags.
- SODA, CAUSTIC.—Solid 76/77° spot, £13 17s. 6d. per ton d/d station. SCOTLAND: Powdered 98/99%, £17 10s. in drums, £18 5s. in casks, Solid 76/77°, £14 10s. in drums; 70/73%, £14 12s. 6d., carriage paid buyer's station, minimum 4-ton lots; contracts 10s. per ton less. MANCHESTER: £13 5s. to £14 contracts.
- SODA CRYSTALS.—Spot, £5 to £5 5s. per ton d/d station or ex depot in 2-cwt. bags.
- SODIUM ACETATE.—£22 per ton. LONDON: £23.
- SODIUM BICARBONATE.—Refined spot, £10 10s. per ton d/d station in bags. SCOTLAND: Refined recrystallised £10 15s. ex quay or station. MANCHESTER: £10 10s.
- SODIUM BICHROMATE.—Crystals cake and powder 4d. per lb. net d/d U.K. discount according to quantity. Anhydrous, 5d. per lb. LONDON: 4d. per lb. net for spot lots and 4d. per lb. with discounts for contract quantities. SCOTLAND: 4d. delivered buyer's premises with concession for contracts.
- SODIUM BISULPHITE POWDER.—60/62%, £18 10s. per ton d/d 1-cwt. iron drums for home trade.
- SODIUM CARBONATE (SODA CRYSTALS).—SCOTLAND: £5 to £5 5s. per ton ex quay or station. Powdered or pea quality 7s. 6d. per ton extra. Light Soda Ash £7 ex quay, min. 4-ton lots with reductions for contracts.
- SODIUM CHLORATE.—£32 per ton.
- SODIUM CHROMATE.—4d. per lb. d/d U.K.
- SODIUM HYPOSULPHITE.—SCOTLAND: Large crystals English manufacture, £9 5s. per ton ex stations, min. 4-ton lots. Pea crystals, £14 10s. ex station, 4-ton lots. MANCHESTER: Commercial, £10 5s.; photographic, £15.
- SODIUM META SILICATE.—£16 per ton, d/d U.K. in cwt. bags.
- SODIUM IODIDE.—B.P., 6s. per lb. for quantities not less than 28 lb.
- SODIUM NITRITE.—LONDON: Spot, £18 to £20 per ton d/d station in drums.
- SODIUM PERBORATE.—LONDON: 10d. per lb.
- SODIUM PHOSPHATE.—£13 per ton.
- SODIUM PRUSSIAN.—LONDON: 5d. to 5½d. per lb. SCOTLAND: 5s. to 5½d. ex store. MANCHESTER: 4½d. to 5½d.
- SULPHUR.—£9 15s. to £10 per ton. SCOTLAND: £8 to £9.
- SODIUM SILICATE.—140° Tw. Spot £8 per ton. SCOTLAND: £8 10s.
- SODIUM SULPHATE (GLAUBER SALTS).—£4 2s. 6d. per ton d/d SCOTLAND: English material £3 15s.
- SODIUM SULPHATE (SALT CAKE).—Unground spot, £3 15s. per ton d/d station in bulk. SCOTLAND: Ground quality, £3 5s. per ton d/d. MANCHESTER: £3 5s.
- SODIUM SULPHIDE.—Solid 60/62% Spot, £10 15s. per ton d/d in drums; crystals 30/32%, £8 per ton d/d in casks. SCOTLAND: For home consumption, Solid 60/62%, £10 5s.; broken 60/62%, £11 5s.; crystals, 30/32%, £8 2s. 6d., d/d buyer's works on contract, min. 4-ton lots. Spot solid 5s. per ton extra. Crystals, 2s. 6d. per ton extra. MANCHESTER: Concentrated solid, 60/62%, £11; commercial, £8 2s. 6d.
- SODIUM SULPHITE.—Pea crystals spot, £13 10s. per ton d/d sta-
- tion in kegs. Commercial spot, £9 10s. d/d station in bags.
- SULPHATE OF COPPER.—MANCHESTER: £14 5s. per ton f.o.b.
- SULPHUR CHLORIDE.—5d. to 7d. per lb., according to quality.
- SULPHUR PRECIP.—B.P. £55 to £60 per ton according to quantity. Commercial, £50 to £55.
- VERMILION.—Pale or deep, 3s. 11d. to 4s. 1d. per lb.
- ZINC CHLORIDE.—SCOTLAND: British material, 98%, £18 10s. per ton f.o.b. U.K. ports.
- ZINC SULPHATE.—LONDON: £12 per ton. SCOTLAND: £10 10s.
- ZINC SULPHIDE.—11d. to 1s. per lb.

Coal Tar Products

- ACID, CARBOLIC.—Crystals, 8½d. to 8½d. per lb.; crude, 60's, to 2s. 2½d. per gal. MANCHESTER: Crystals, 7½d. per lb.; crude, 1s. 1½d. per gal. SCOTLAND: 60's, 2s. 6d. to 2s. 7d.
- ACID, CRESYLIC.—90/100%, 1s. 8d. to 2s. 3d. per gal.; pale 98%, 1s. 6d. to 1s. 7d.; according to specification. LONDON: 98/100%, 1s. 6d.; dark, 95/97%, 1s. 3d. SCOTLAND: Pale, 99/100%, 1s. 3d. to 1s. 4d.; dark, 97/99%, 1s. to 1s. 1d.; high boiling acid, 2s. 6d. to 3s.
- BENZOL.—At works, crude, 9d. to 9½d. per gal.; standard motor, 1s. 3½d. to 1s. 4d.; 90%, 1s. 4d. to 1s. 4½d.; pure, 1s. 7½d. to 1s. 8d. LONDON: Motor, 1s. 6½d. SCOTLAND: Motor, 1s. 6½d.
- CREOSOTE.—B.S.I. Specification standard, 4d. to 4½d. per gal. f.o.r. Home, 3½d. d/d. LONDON: 3½d. f.o.r. North; 4d. LONDON. MANCHESTER: 3½d. to 4½d. SCOTLAND: Specification oils, 4d.; washed oil, 4½d. to 4½d.; light, 4½d.; heavy, 4½d. to 4½d.
- NAPHTHA.—Solvent, 90/160%, 1s. 6d. to 1s. 7d. per gal.; 95/160%, 1s. 7d.; 99%, 1½d. to 1s. 1d. LONDON: Solvent, 1s. 3½d. to 1s. 4d.; heavy, 1½d. to 1s. 0½d. f.o.r. SCOTLAND: 90/160% 1s. 3d. to 1s. 3½d.; 90/190%, 1½d. to 1s. 2d.
- NAPHTHALENE.—Purified crystals, £10 per ton in bags. LONDON: Fire lighter quality, £3 to £3 10s.; 74/76 quality, £4 to £4 10s.; 76/78 quality, £5 10s. to £6. SCOTLAND: 40s. to 50s.; whizzed, 70s. to 75s.
- PITCH.—Medium soft, 57s. 6d. per ton, in bulk, at makers' works. LONDON: £3 per ton f.o.b. East Coast port for next season's delivery.
- PYRIDINE.—90/140, 7s. 6d. to 9s. per gal.; 90/180, 2s. 3d. per gal.
- TOLUOL.—90%, 1s. 1½d. to 2s. per gal.; pure, 2s. 2d.
- XYLOL.—Commercial, 2s. per gal.; pure, 2s. 2d.

Intermediates and Dyes

- ACID, BENZOIC, 1914 B.P. (ex Toluol).—1s. 9½d. per lb.
- ACID, GAMMA.—Spot, 4s. per lb. 100% d/d buyer's works.
- ACID, H.—Spot, 2s. 4½d. per lb. 100% d/d buyer's works.
- ACID NAPHTHONIC.—1s. 8d. per lb.
- ACID, NEVILLE AND WINTNER.—Spot, 3s. per lb. 100%.
- ACID, SULPHANILIC.—Spot, 8d. per lb. 100% d/d buyer's works.
- ANILINE OIL.—Spot, 8d. per lb. drums extra, d/d buyer's works.
- ANILINE SALTS.—Spot, 8d. per lb. d/d buyer's works, casks free.
- BENZALDEHYDE.—Spot, 1s. 8d. per lb., packages extra.
- BENZIDINE BASE.—Spot, 2s. 5d. per lb., 100% d/d buyer's works.
- BENZIDINE HCL.—2s. 5d. per lb.
- p-CRESOL 34.5° C.—2s. per lb. in ton lots.
- m-CRESOL 98/100%.—2s. 3d. per lb. in ton lots.
- DICHLORANILINE.—1s. 1½d. to 2s. 3d. per lb.
- DIMETHYLANILINE.—Spot, 1s. 6d. per lb., package extra.
- DINITROBENZENE.—8d. per lb.
- DINITROTOLUENE.—48/50° C., 9d. per lb.; 66/68° C., 0½d.
- DINITROCHLOROBENZENE, SOLID.—£72 per ton.
- DIPHENYLAMINE.—Spot, 2s. per lb., d/d buyer's works.
- α-NAPHTHOL.—Spot, 2s. 4d. per lb., d/d buyer's works.
- β-NAPHTHOL.—Spot, £78 15s. per ton in paper bags.
- α-NAPHTHYLAMINE.—Spot, 1½d. per lb., d/d buyer's works.
- β-NAPHTHYLAMINE.—Spot, 2s. 9d. per lb., d/d buyer's works.
- o-NITRANILINE.—3ss. 1½d. per lb.
- m-NITRANILINE.—Spot, 2s. 7d. per lb., d/d buyer's works.
- p-NITRANILINE.—Spot, 1s. 8d. per lb., d/d buyer's works.
- NITROBENZENE.—Spot, 4½d. to 5d. per lb.; 5-cwt. lots, drums extra.
- NITRONAPHTHALENE.—9d. per lb.; P.G., 1s. 0½d. per lb.
- SODIUM NAPHTHONATE.—Spot, 1s. 9d. per lb.
- o-TOLUIDINE.—9½d. to 1½d. per lb.
- p-TOLUIDINE.—1s. 1½d. per lb.

Nitrogen Fertilisers

- SULPHATE OF AMMONIA.—October £6 17s. 6d., Nov. £6 19s.; Dec. £7, Jan., 1935, £7 2s., Feb. £7 3s. 6d., Mar./June, £7 5s. for neutral quality basis 20.6 per cent. nitrogen delivered in 6-ton lots to farmer's nearest station.
- CYANAMIDE.—Oct. £6 17s. 6d., Nov. £6 18s. 9d., Dec. £7, Jan., 1935, £7 1s. 3d., Feb. £8 2s. 6d., Mar. £7 3s. 9d., Apr./June £7 5s., delivered in 4-ton lots to farmer's station.
- NITRATE OF SODA.—£7 12s. 6d. per ton for delivery up to June, 1935, in 6-ton lots carriage paid to farmer's nearest station for material basis 15.5 per cent. or 16 per cent. nitrogen.
- NITRO-CHALK.—£7 5s. per ton to June, 1935, in 6-ton lots, 15.5 per cent. nitrogen.
- CONCENTRATED COMPLETE FERTILISERS.—£10 5s. to £10 17s. 6d. per ton according to percentage of constituents.
- NITROGEN PHOSPHATE FERTILISERS.—£10 5s. to £13 15s. per ton.

Inventions in the Chemical Industry

Patent Specifications and Applications

THE following information is prepared from the Official Patents Journal. Printed copies of Specifications accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Complete Specifications Open to Public Inspection

- CHLORINATED RUBBER, production.—Chemische Fabrik Buckau. Feb. 20, 1933. 416,252.
- FOLLICLE HORMONES and their esters, production of concentrated solutions.—Schering-Kahlbaum A.-G. Jan. 31, 1933. 416,256.
- OXY- AND AMINO-PYRIDINE COMPOUNDS, manufacture of derivatives.—Chemische Fabrik von Heyden A.-G. March 31, 1933. 416,273.
- ZINCIFEROUS LEAD, process of and apparatus for refining molten. Metallges. A.-G. May 2, 1933. 416,285.
- HEIROCYCLIC SULPHONIC ACIDS, manufacture.—A. Carpmæl (I. G. Farbenindustrie). April 23, 1934. 416,291.
- RECOVERING SULPHUR DIOXIDE from refuse sulphuric acid, process of and apparatus for.—Metallges. A.-G. March 15, 1933. 2622/34.
- TREATMENT WITH ALKALINE MEDIA of threads, fibres, fabrics, or similar objects composed of or containing cellulose acetate.—Soc. Pour la Fabrication de la Soie Artificielle Rhodiaseta. March 15, 1933. 4793/34.
- ARTIFICIAL FIBRES, process and apparatus for baling.—I. G. Farbenindustrie. March 16, 1933. 5045/34.
- REFINING TUNNY FISH LIVER OIL and products obtained thereby, process.—Dr. K. Merck, L. Merck, W. Merck, and F. Merck (trading as E. Merck, firm of). March 14, 1933. 6631/34.
- EFFECTING ADHESION or cementing of the surfaces of materials, method.—I. G. Farbenindustrie. March 11, 1933. 7794/34.
- SULPHONIC ACID and carboxylic acid derivatives of 1:1'-diaryl-3:3'-arylene-5:5'-bis-pyrazolones, manufacture.—I. G. Farbenindustrie. March 11, 1933. 7824/34.
- ETHER CONDENSATION PRODUCTS, manufacture.—E. I. du Pont de Nemours and Co. March 14, 1933. 8054/34.
- PARASITICIDAL COMPOSITIONS and preparations.—Grasselli Chemical Co. March 14, 1933. 8055/34.
- ESTERS FROM ACETYLENE, manufacture.—C. F. Boehringer and Soehne. March 15, 1933. 8068/34.
- ALCOHOLS, process for the manufacture.—J. Cristeseu. March 17, 1933. 8387/34.
- DISPERSIONS, preparation.—Dr. H. Hunsdiecker and Dr. E. Vogt. Dec. 14, 1932. 26710/34.

Specifications Accepted with Dates of Application

- CYANIDE SOLUTIONS, process for treating.—T. Ewan, R. J. Lennon, and Imperial Chemical Industries, Ltd. March 15, 1933. 416,475.
- OIL-SOLUBLE RESINS, production.—I. Rosenblum. Dec. 9, 1932. 416,476.
- RESINOUS COMPOSITIONS.—H. E. Potts (Shawinigan Chemicals, Ltd.). Feb. 8, 1933. 416,412.
- VINYL ESTER RESINS, articles made by the use of solutions.—H. E. Potts and Canadian Electro Products Co., Ltd. (Shawinigan Chemicals, Ltd.). Feb. 8, 1933. 416,413.
- SUBSTANCES SUITABLE AS WETTING, cleansing, dispersing, softening, and like agents, manufacture and production.—J. Y. Johnson (I. G. Farbenindustrie). March 6, 1933. (Cognate application, 6944/34.) 416,379.
- CELLULOSE from ligno-cellulosic materials, manufacture.—H. Dreyfus. March 7, 1933. 416,416.
- VAT DYE STUFFS of the anthracene series, manufacture.—W. W. Groves (I. G. Farbenindustrie). March 10, 1933. 416,385.
- AROYLAMINO-ANTHRAQUINONES, manufacture and application.—Imperial Chemical Industries, Ltd., and N. H. Haddock. March 11, 1933. 416,425.
- DISTILLATION OF VOLATILE PRODUCTS and oils from coal peat lignite and other carbonaceous substances or materials, apparatus for the extraction.—A. G. Brown and F. J. Morgan. March 11, 1933. 416,490.
- 1,4-DIAMINO-2-ARYLOX-ANTHRAQUINONE-3-SULPHONIC ACIDS, manufacture.—I. G. Farbenindustrie. March 15, 1932. 416,433.
- NAPHTHOYL BENZOIC ACID DERIVATIVES, manufacture.—E. I. du Pont de Nemours and Co. March 16, 1932. 416,502.
- CONDENSATION PRODUCTS from alcohols and phenols, manufacture.—British Industrial Solvents, Ltd., H. Langwell and C. B. Maddocks. March 17, 1933. 416,505.
- VISCOSITY OF MINERAL OILS, method of increasing.—J. Craik and Imperial Chemical Industries, Ltd. March 17, 1933. 416,513.
- COBALT-CONTAINING MATERIAL, treatment.—F. L. Bosqui and Rhokana Corporation, Ltd. June 22, 1933. 416,526.
- COBALT, production.—F. L. Bosqui and Rhokana Corporation, Ltd. June 22, 1933. 416,527.
- FERRO-COBALT, manufacture.—F. L. Bosqui and Rhokana Corporation, Ltd. June 22, 1933. 416,528.
- DISINFECTING SEEDS, agents.—Fahlberg-List A.-G. Chemische Fabriken and Dr. K. Memminger. Jan. 8, 1934. 416,364.
- CELLULOSE from ligno-cellulosic materials, manufacture.—H. Dreyfus. March 7, 1933. 416,549.
- CARBON DISULPHIDE and methyl alcohol from aqueous solutions obtained in the purification of benzole with methyl alcohol and caustic alkali, recovery.—National Benzole Co., Ltd., W. H. Hoffert and E. G. Hancock. March 6, 1933. 416,404.
- CELLULOSE from ligno-cellulosic materials, manufacture.—H. Dreyfus. March 7, 1933. 416,558.

Applications for Patents

(September 6 to 12 inclusive).

- REMOVAL OF PARAFFIN WAX from hydrocarbons.—J. Y. Johnson (I. G. Farbenindustrie). 25876.
- ORGANIC HALOGEN COMPOUNDS, manufacture.—J. Y. Johnson (I. G. Farbenindustrie). 25877.
- NITROGENOUS CONDENSATION PRODUCTS, manufacture.—J. Y. Johnson (I. G. Farbenindustrie). 25973.
- HYDROCARBON OILS, treatment.—H. Nielsen. 25668.
- ABSORPTION OF DYE STUFFS, retarding.—Soc. of Chemical Industry in Basle. (Switzerland, Sept. 19, '33.) 26187. (Switzerland, July 21.) 26188.

(September 13 to 19 inclusive).

- EMULSIFYING APPARATUS.—A. R. Bannister and F. B. Day. 26331.
- EMULSIFYING APPARATUS, valve.—A. R. Bannister and F. B. Day. 26332.
- PHENOLALDEHYDE RESINS, preparation.—Beck, Koller and Co., J. Ehrenfeld, H. Honel and O. Reichhold. (Aug. 26, '33.) 26964.
- EXPLOSIVES, manufacture.—C. Belani and Bergite Co., Ltd. 26446.
- QUATERNARY DERIVATIVES of heterocyclic compounds, manufacture.—A. Carpmæl (I. G. Farbenindustrie). 26693.
- HETEROCYCLIC COMPOUNDS, manufacture.—A. Carpmæl (I. G. Farbenindustrie). 26948.
- PRIMARY PHOSPHATES of amino acid esters, manufacture.—A. Carpmæl (Schering-Kahlbaum). 26832.
- AZO DYE STUFFS, manufacture.—Deutsche Hydrierwerke. (Germany, Sept. 13, '33.) 26360.
- TANNING SUBSTANCES, manufacture.—J. R. Geigy. (Germany, Sept. 16, '33.) 26540.
- 2-METHYL- β - β' -NAPHTHOTHIAZOLE, manufacture.—W. W. Groves (I. G. Farbenindustrie). 26305.
- BLUE PIGMENT COLOURS, manufacture.—I. G. Farbenindustrie. (Germany, Sept. 13, '33.) 26307.
- TERTIARY AMINES, manufacture.—I. G. Farbenindustrie. (Germany, Sept. 16, '33.) 26429.
- QUATERNARY ORGANIC NITROGEN COMPOUNDS, manufacture.—I. G. Farbenindustrie. (Germany, Sept. 14, '33.) 26466. (Germany, Dec. 21, '33.) 26467.
- N-SUBSTITUTION PRODUCTS of alpha-amino-anthraquinone, manufacture.—I. G. Farbenindustrie. (Germany, Sept. 19, '33.) 26535.
- AQUEOUS SUSPENSIONS, dehydration.—I. G. Farbenindustrie. (Germany, Sept. 15, '33.) 26539.
- 2-ACETYLAMINO-3-CHLORANTHRAQUINONE, manufacture.—I. G. Farbenindustrie. (Germany, Sept. 20, '33.) 26659.
- WATER-INSOLUBLE AZO DYE STUFFS, manufacture.—I. G. Farbenindustrie. (Germany, Sept. 16, '33.) 26674.
- STABLE ALUMINIUM SALTS, manufacture.—I. G. Farbenindustrie. (Germany, Sept. 16, '33.) 26675.
- WATER-INSOLUBLE AZO DYE STUFFS, manufacture.—I. G. Farbenindustrie. (Sept. 8, '33.) 26694.
- INTERMEDIATES, and their use in manufacture of dyeline papers. Imperial Chemical Industries, Ltd., P. T. Gale and A. Sexton. 26445.
- PLASTIC MATERIALS.—Imperial Chemical Industries, Ltd. 26706, 26707.
- VAT DYE STUFFS.—Imperial Chemical Industries, Ltd., I. M. Heilbron and W. E. Jones. 26801.
- MONOAZO DYE STUFFS.—Imperial Chemical Industries, Ltd., and W. G. Reid. 26976.
- COLOURING MATTERS.—Imperial Chemical Industries, Ltd., R. Robinson, and J. Walker. 26977.
- FLAKE-RESISTANT MATERIALS.—Imperial Chemical Industries, Ltd. 26978.
- DEGREASING METAL, ETC.—Imperial Chemical Industries, Ltd. 26979.

From Week to Week

ASHANTI-ADOWSENA (BANKET) GOLDFIELDS, LTD., state that the order for the crushing, milling, and cyanide plant has been placed with Fraser and Chalmers Engineering Works.

SIR ERNEST BENN will deliver the first of the autumn series of Luncheon Addresses at the National Liberal Club, London, on October 17. The subject of his address will be "Is there a chance for liberty?"

COUNCILLOR JOSEPH WATERS has been unanimously invited at a private meeting of Darlington Town Council to accept the Mayoralty of the town for the forthcoming year. Councillor Waters is a well-known Darlington chemist.

MR. JAMES BLACK, president of the Bo'ness Co-operative Society, has been appointed to a position at Grangemouth Dock, where machinery has been installed by the Scottish Co-operative Wholesale Society Soap Works for the extraction of fat for the manufacture of soap.

THE PHARMACEUTICAL SOCIETY OF GREAT BRITAIN will formally open the 93rd session of their school, and present the Handbury Medal, diplomas and prizes on October 3, at 3 p.m. The inaugural sessional address will be given by Professor George Barger, D.Sc., F.R.S., professor of chemistry in relation to medicine, University of Edinburgh.

A DEMONSTRATION OF THE FOAM-MAKING BRANCHPIPE, a new Pyrene appliance for dealing with oil and petrol fires, took place at Brentford, Middlesex, on September 19. Eight of these branchpipes can be used on a single fire pump and will produce over 5,000 gallons of foam per minute. Two of the Pyrene foam-making branchpipes were seen in action against a 30 feet tank of blazing oil and petrol.

A NEW ISSUE IS ANTICIPATED of shares in the National Coke and Oil Co., which is working a low temperature carbonisation process, and already operating a two-retort plant at Cannock. It is expected that the issue will consist of 5s. ordinary shares and 6 per cent. £1 preference shares, both at par. Construction is being planned for retort plants at Trafford Park, Manchester, Cardiff, Erith and Glasgow. The chairman of the board is Mr. W. B. Mittford.

INTERNATIONAL COMBUSTION, LTD. (Grinding, Screening and Filtering Division), report recent orders for 4 ft. by 5 ft. 2 and 3 surface, type 39 Hummer electric screens, to convert existing Hummer equipment to double surface and triple surface operation; and a 4 ft. by 5 ft. 3 surface, type 31, Hummer electric screen for screening granulated borax. Among recent orders from abroad they report a No. 70 Raymond Impax pulveriser to grind dry Wankie coal for firing reverberatory furnaces. This is additional equipment to the No. 80 Raymond Impax pulverisers recently ordered. Further export orders include ten 4 ft. by 8 ft., type 400, Hummer electric screens for coal screening; two 18 in. dia. Andrews classifiers for treating gold sulphide ore, which is a repeat order, and Ro-Tap testing sieve shakers for testing work.

THE MANCHESTER COLLEGE OF TECHNOLOGY has issued its annual prospectus (400 pages), which contains details of a new higher course in the department of applied chemistry. This course is described as "Chemical Engineering," and, in addition to the ordinary staff in applied chemistry, a special lecturer in this branch will take charge of such classes as those in the design of chemical plant and in the mechanical properties of fluids. The students of this course will be required to take such subjects as German and industrial administration as well as the more technical classes. The design of chemical plant, on which Mr. William Cowen will lecture, includes the study of the basic unit processes of the chemical industries and the effect of the controlling physical laws on the design of plant.

AT THE SIXTH ANNUAL GENERAL MEETING of Acetex Safety Glass, Ltd., held in London on Wednesday, a resolution providing for the voluntary liquidation of the company was approved. Lieut.-Col. John Williams, the chairman, said that at the last annual general meeting the election of the present board was confirmed by the shareholders, and the new board were entrusted with the consideration of the recommendations in Sir Basil Meyhew's report, viz., to submit a case to counsel to advise on matters arising out of the promotion and flotation of the company, and to examine as to the advisability of carrying on the business or otherwise. The board's examination had established that the prospect of carrying on the business with any benefit to the shareholders was so remote that they had reluctantly come to the conclusion that they would not be justified in recommending that the business be continued. Negotiations had been opened with two other safety glass companies with a view to amalgamation, but no satisfactory arrangement could be reached, and the directors had eventually come to the unanimous view that the only proper course to adopt was to wind up the company. He anticipated that, under the liquidation, they would be handing back to the shareholders approximately £30,000.

THE LOCAL GASWORKS at Hamelin (Germany) is installing apparatus, the first of its kind in the world, to make gas harmless for human beings.

THE MONTECATINI COMPANY is raising its capital from 500 to 600 million lire. One million fully-paid shares will be issued and distributed free in the proportion of one new share for every five held.

THE DEATH OCCURRED on September 23, after an illness of a month's duration of Mr. Philip S. Wood, senior partner of Wood and Fairweather, of Newcastle-on-Tyne. Mr. Wood, who resided at Ravenscroft, Westoe, South Shields, was in his 81st year, and had been connected with the business for the past 62 years.

PROFESSOR JOHN ALEXANDER MILROY, who since 1924 had been professor of bio-chemistry in Queen's University, died on September 19. A native of Kirkcowan, Wigtownshire, he was educated at Edinburgh University. He was the author with his brother, Professor T. H. Milroy, of a text-book of "Practical Physiological Chemistry."

THE BRITISH RED CROSS SOCIETY has issued a manual on first-aid in defence against chemical warfare. It supplies in simple form the main facts in connection with chemical warfare, describes the agents used in such warfare, and the first-aid treatment appropriate to each, and gives an account of defensive measures for the protection of the public.

A CONFIDENTIAL MEMORANDUM containing hints for commercial visitors to and information regarding methods of trading in the British West Indies has been issued by the Department of Overseas Trade to firms whose names are entered on its special register. United Kingdom firms desirous of obtaining a copy of this memorandum should apply to the Department of Overseas Trade, 35 Old Queen Street, London, S.W.1. Reference number C.Y.4348 should be quoted.

THE IMPORT DUTIES ADVISORY COMMITTEE has received an application for the removal from the free list of powdered, crushed, or ground sulphur, flowers of sulphur, colloidal or paste sulphur and sulphur in roll, stick, cone or similar moulded form. Representations should be addressed in writing to the Secretary, Import Duties Advisory Committee, Caxton House (West Block), Tothill Street, Westminster, London, S.W.1, not later than October 20.

THE CANADIAN DEPARTMENT OF MINES, at Ottawa, has issued a fourth edition of their handbook entitled "The Mineral Industries of Canada." This handbook presents in popular form a brief sketch of the more important economic minerals so far discovered in Canada, and of the mining and metallurgical industries founded thereon. Applications from mining and financial houses, public libraries and others interested in Canadian mining matters, should be addressed to The Secretary, Office of the High Commissioner, Canada House, Trafalgar Square, London, S.W.1.

AT A CONFERENCE OF SALT MANUFACTURERS held in Bombay, it was unanimously resolved to form a Salt Marketing Board with a control committee in Calcutta, both of which will begin to function from October. The object of the board is to regulate imports and prices as laid down by the legislature and the board has been generally on the lines of the Tariff Board recommendations, and its members include all the members at present supplying salt to Bengal. It has been definitely agreed that its activities shall be strictly within the Protection Act, and provision has been made for the promotion of the Indian industry, especially in Bengal.

Latest Oil Prices

LONDON, Sept. 26.—LINSEED OIL was firm. Spott, £20 5s. (small quantities 30s. extra); Nov.-Dec., £19 2s. 6d.; Jan.-April, £19 7s. 6d.; May-Aug., £19 12s. 6d., naked. SOYA BEAN OIL was steadier. Oriental (bulk), Sept.-Oct. shipment, £14 15s. per ton. RAPE OIL was quiet. Crude extracted, £27; technical, refined, £28 10s. naked, ex wharf. COTTON OIL was quiet. Egyptian crude, £13; refined common edible, £16 10s.; and deodorised, £18, naked, ex mill (small lots 30s. extra). TURPENTINE was steady. American spot, 41s. per cwt.

HULL.—LINSSEED OIL, spot, quoted £19 10s. per ton; Sept., £19 2s. 6d.; Oct.-Dec., £19 5s.; Jan.-April, £19 7s. 6d.; May-Aug., £19 12s. 6d., naked. COTTON OIL, Egyptian, crude, spot, £13 15s.; edible, refined, spot, £15 10s.; technical, spot, £15 10s.; deodorised, £17 10s., naked. PALM KERNEL OIL, crude, f.m.q., spot, £15 10s. GROUNDNUT OIL, extracted, spot, £21 10s.; deodorised, £25 10s. RAPE OIL, extracted, spot, £26; refined, £27 10s. SOYA OIL, extracted, spot, £16 10s.; deodorised, £19 10s. per ton. COD OIL (industrial), 35s. per cwt. CASTOR OIL, pharmaceutical, 36s.; first, 31s.; second, 28s. per cwt. TURPENTINE, American, spot, 43s. per cwt.

Books Received

- The Electronic Theory of Chemistry.**—By R. F. Hunter. London: Edward Arnold & Co. Pp. 125. 8s. 6d.
- Nitrocellulose Ester Lacquers.**—By Dr. Fritz Zimmer, trans. by H. K. Cameron. London: Chapman & Hall. Pp. 246. 18s.
- Classification Universelle Systematique et Coordonnee des Connaissances Humaines.** By Maurice Phisus. Paris: Librairie Armande Legrand. Pp. 143. 10 frs.
- Directory for the British Glass Industry, 1934.** Sheffield. Society of Glass Technology. Pp. 410. 4s.
- Journal of the British Wood Preserving Association.** Vol. IV. London: British Wood Preserving Association. Pp. 135. 7s. 6d.
- A Laboratory Manual of Inorganic Chemistry.** By John B. Ekeley. London: Chapman & Hall, Ltd. Pp. 294. 12s. 6d.
- Lubricating Oil Tests and their Significance.** By J. E. Southcombe. London: Germ Lubricants, Ltd. Pp. 85. 2s. 6d.

Official Publications

- Final Report on the Fourth Census of Production (1930).** Part III. London: H.M. Stationery Office. Pp. 529. 8s.

New Companies Registered

Barking Zinc Oxide, Ltd.—Registered September 25. Nominal capital £40,000. To acquire the undertaking of Wharf Properties, Ltd., and to carry on the business of manufacturers, exporters and importers of and dealers in pigments, lakes, dyes, colours, coal-tar, gas-tar, products derived or capable of being derived from coal, shale, schist or any carbonaceous or mineral materials, chemicals, minerals, ores, drugs, inks, stains, paints, acids, oxide of zinc, etc. A subscriber: Alan G. Maby, 5 Thavies Inn, E.C.1.

Bingham, Baker & Co., Ltd., 34 Victoria Street, S.W.1.—Registered September 22. Nominal capital £1,000 in £1 shares. To manufacture, purchase and sell industrial gases, carbide of calcium, refrigerating plants, machinery and materials, welding plants, apparatus and materials, etc. Directors: Charles H. Bingham, Ambrose P. Baker.

Middlemass and Co., Ltd.—Registered September 12. Nominal capital, £500. Manufacturing chemists, manufacturers of and dealers in glues, gelatines, sizes, gums, dextrines, starches, distempers and adhesive products and substances of all kinds, chemicals and chemical intermediates, salts, acids, gases, disinfectants, insecticides, etc. Directors: Thomas J. Brooksbank, Trefula, St. Day, Truro; Alphonso T. A. D. Middlemass.

Forthcoming Events

- Oct. 1.**—Institution of the Rubber Industry (Preston and District Section). "Has Chemistry or Engineering contributed most to the development of Rubber?" S. A. Brazier. Victoria and Station Hotel, Preston.
- Oct. 1.**—Society of Chemical Industry (London Section). "Vegetable Parchment and Wrapping Materials for Food." Dr. W. L. Davies and J. Strachan. 8 p.m. Burlington House, London, W.1.
- Oct. 3.**—Institution of the Rubber Industry (West of England Section). "The Rubber Industry—Its Political and Economic Problems." F. W. Hinde. Town Hall, Trowbridge.
- Oct. 3.**—Society of Public Analysts. 8 p.m. Burlington House, Piccadilly, London.
- Oct. 3-13.**—Institute of Patentees. Tenth International Exhibition of Inventions. Central Hall, Westminster, London.
- Oct. 4.**—Midland Metallurgical Societies. "Research as Regards the Iron and Steel Industry." W. H. Hatfield. 7 p.m. James Watt Memorial Institute, Great Charles Street, Birmingham.
- Oct. 5.**—Institution of Chemical Engineers. "Crushing and Grinding." W. F. Carey. "Crushing and Grinding Appliances." Professor B. W. Holman. 6 p.m. Burlington House, Piccadilly, London.
- Oct. 5.**—West Cumberland Society of Chemists and Engineers. "Local Industrial History." D. R. Wattleworth. 7 p.m. Workington.
- Oct. 5.**—Andersonian Chemical Society. "Safety in the Chemical Industry." J. Pratt. 3 p.m. Royal Technical College, Glasgow.
- Oct. 5.**—Society of Chemical Industry (Glasgow Section), Institute of Chemistry (Glasgow Section), Chemical Society. "The Chemist and National Defence." J. Pratt. 7.30 p.m. Royal Technical College, Glasgow.

New Chemical Trade Marks

Compiled from official sources by Gee and Co., patent and trade mark agents, Staple House, 51 and 52 Chancery Lane, London, W.C.2.

Opposition to the registration of the following trade marks can be lodged up to October 19, 1934.

Uniox. 552,631. Class 1. Chemical substances used in manufactures, photography, or philosophical research and anti-corrosives. Union Glue & Gelatine Co., Ltd., Cransley Works, Garrett Street, Golden Lane, London, E.C.1. July 14, 1934.

Solaval. 548,008. Class 1. Chemical substances for use as ingredients in textile printing compositions. British Dyestuffs Corporation, Ltd., Imperial Chemical House, Millbank, London, S.W.1. January 23, 1934.

Nitrosin. 552,079. Class 1. Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. British Dyestuffs Corporation, Ltd., Imperial Chemical House, Millbank, London, S.W.1. June 20, 1934.

Company News

International Paint and Compositions Co., Ltd.—The directors have declared the usual interim dividends of 3 per cent. on both the preference and the ordinary shares.

Lafarge Aluminous Cement Co.—The accounts for the year ended March 31, 1934, show a profit of £17,384. The directors recommend that from this there be appropriated £115 to write off loss on sale of certain freehold property, and that the balance of £16,968 be carried forward in reduction of the debit balance on profit and loss to £966.

Lovering China Glays.—The report for the year to March 31, 1934, shows a profit of £5,188, against £8,545 in the previous year. After applying £14,838 for debenture interest and £2,662 for allocation to sinking fund for redemption of debentures, the total loss for the year amounts to £12,312, making, with the debit balance brought forward, a total debit of £41,078. It is proposed to make a distribution of the past year's profits to debenture-holders under the terms of the supplemental trust deed in the form of an interest payment of 2 per cent. on October 2.

Indestructible Paint Co.—The directors state that, based upon the whole of the company's results for the first six months and preliminary figures for the remaining period to date, they feel justified in increasing the usual ordinary interim from 5 per cent. to 6½ per cent., which will be paid, less tax, on October 8. It is further stated that profits show a satisfactory increase over those for the corresponding period of last year. Foreign subsidiaries, under conditions prevailing, operated satisfactorily; in France there has been no improvement in the building industry, but in Germany sales have considerably increased, and this subsidiary has shown a profit for the first half-year.

Chemical Trade Inquiries

The following trade inquiries are abstracted from the "Board of Trade Journal." Names and addresses may be obtained from the Department of Overseas Trade (Development and Intelligence), 35 Old Queen Street, London, S.W.1 (quote reference number).

British India.—The British Trade Commissioner at Calcutta reports that the Indian Stores Department is calling for tenders (Order No. M-4675), to be presented in New Delhi by October 23, 1934, for the supply of paint and dry pigments required for the period March 1, 1935, to February 29, 1936. (Ref. B.Y. 7891.)

Canada.—A firm of engineers at Montreal desires to undertake the representation of United Kingdom manufacturers of equipment and supplies for pulp and paper factories and other industrial and heating plants, on a basis open to negotiation, throughout the Dominion. (Ref. No. 267.)

Denmark.—A firm of agents established at Copenhagen wishes to obtain the representation of United Kingdom suppliers of raw materials and plant used in connection with the oil, chemical, sugar, alcohol, textile and metal industries. (Ref. No. 279.)

Norway.—An agent established at Oslo wishes to obtain the representation, on a commission basis, of United Kingdom manufacturers of chemicals used in wood pulp and paper-making industries, including alum, precipitated chalk, rosin, salt cake, sulphate of iron, sulphur, tartaric acid, toluol. (Ref. No. 283.)