

done, for example, by the Pfaudler Company here in this city, has wrought a complete transformation in many industries, such, for example, as the breweries. All sorts of big tanks which were previously made of wood have now been replaced with this enameled iron. Besides all kinds of big tanks enamel-lined, this ware is more and more being applied in kettles, piping and all manner of special apparatus. It is particularly adapted for use in the hauling of edibles and drinks, and it is found to give very satisfactory results, where its use is possible.

Copper—I merely mention this, as it is not applicable at all for practically any acid work, except acetic.

Lined Pipes—Because of the rapid strides which have only recently been made in the lining of pipe with tin, copper, lead, etc., and the satisfactory resulting product, I must mention it here. For example, in nitric acid work, where ordinary lead pipe is used, it is very possible that this lead-lined iron pipe would be more satisfactory.

(3) MEANS OF POWER TO BE USED—After solving the problem as to what kind of container shall be used for handling any liquid, of course the next question is, what means shall be used to move it from one point to another?

Gravity—Wherever possible it is naturally advisable to arrange the layout of any plant so that liquids as well as solids can be moved through each successive step of the process by gravity, which, of course, leaves nothing to get out of order and no cost for power. It is only in comparatively few plants, however, that this is possible, and it is with the others, which we will now concern ourselves. Of these, we have *Syphon*. This can be used and is quite frequently, even when air pressure is used. It can be used very nicely where liquids are lowered from an elevated tank to one below or even to one about on its own level. Alone, however, the syphon is not entirely dependable for large work.

Air Pressure is probably as simple a method of moving liquids in general, and nitric and sulfuric acids in particular, as can possibly be found. It is true that a compressor is needed, which means the operation of blowing acids, and is probably not as economical as to pump them; but the blowing operation is much more simple and considerably less trouble. For this work, where large quantities of acids are handled, it is customary to have what is known as a blow-egg or tank of steel or cast iron below the level of all the other tanks and lines in the installation.

Then by gravity the liquid to be drawn can be dropped into the egg, and, under pressure, depending on the distance and height to be delivered, it can be blown any reasonable distance. For delivery to any distance, it is more advisable to elevate almost vertically and then flow by gravity. With this system, of course, the tank must be equipped with the necessary air inlet, and liquid inlet and outlet as well as a vent.

Pump—In a good many cases gravity or air pressure may be impracticable or even impossible, and hence you must use a pump of some kind. Here again, as I stated above, the discovery and use of high silica irons has helped to solve many knotty problems. Special pumps, for example, are now pumping materials for which it has always been necessary to use stoneware. Taken for granted that it is necessary to pump the liquid, you must then decide, shall it be a centrifugal or a regular steam pump? The answer to this depends entirely on the local conditions. We find in our work that the centrifugal has advantages in one place, while the steam cylinder pump has them in another, and as a result we have both types well represented.

Injector and Air Lift are merely mentioned at this time.

(4) TYPE OF VALVE TO BE USED—The question of valves in any commercial installation sounds very simple and as a matter of fact is so in most cases; however, in acid work, it is a source of considerable anxiety and worry if you are concerned with exact weights and inventories. We have found that in certain cases where a certain make of valve might stand up very well against the liquid itself, on the other hand, if it were in contact with the fumes it would soon lose its effectiveness. Here once again high silica iron has shown fine results. Plug-cocks of this material we have had in use in certain very bad positions for 3 or 4 years, with no apparent wear, while previously we would replace the ordinary valve every 3 or 4 weeks.

(5) MEASURING OR WEIGHING—In any well managed plant it is, of course, of the utmost importance that all liquids used in the various processes shall be accurately weighed and accounted for. As stated above, an effective valve is absolutely essential for this. We weigh practically all our acids as used, and for this purpose have a tank located right on the scale platform. For some work, we rely entirely on measurement in the tank and for this have the tanks fitted up with sight glasses. For this, of course, the temperature should not vary greatly or there will be a large error introduced.

CURRENT INDUSTRIAL NEWS

HARDENING OF WATER-GLASS PAINTS

The quickened hardening of water-glass paints into an impervious layer is the subject of a lately reported German patent. The paints are mixed with an alkali bicarbonate or other material yielding carbon dioxide on heating and are heated just before use. The finely divided silicic acid uniformly separated out gives increased viscosity to the mixture. The covering properties are not affected and, within twelve hours after application the paint forms a firm waterproof and weatherproof coating.—A. MACMILLAN.

JAPANESE COPPER ORE

The output of copper ore in Japan in 1916 amounted to 111,562 tons as compared with 83,017 tons in 1915 and 78,700 tons in 1914, while exports amounted to 57,402 tons in 1916 as against 56,528 tons in 1915, and 43,305 tons in 1914. Russia now buys most of Japan's copper ore, her purchases amounting to 60 per cent of the total exports. The United Kingdom takes 20 per cent, while France, the United States and India share the balance, but their dealings are not large.—M.

SPITZBERGEN COALFIELDS

Hopes had been expressed in these times of international coal famine, says *Engineering*, 103 (1917), 590, that the Spitzbergen coal deposits might help at least the Scandinavian countries, but matters do not seem to progress very favorably. The contemplated Norwegian company for the exploitation of the so-called Svalbard coal fields at Advent Bay and Green Harbour with a capital of \$850,000 has not materialized, the funds not being fully subscribed and money not being found by other methods.

The scheme, principally started by Norwegian shipowners, has been abandoned in the original shape, but a company will be formed to protect the rights in question. It remains to be seen whether the Swedes will be more successful. The Swedish expedition for coal mining is about to start and comprises about 150 men, of whom 100 are to winter there. For the present year only a few thousand tons of coal are expected to be worked, but a great deal of preparatory work has to be done before rational coal mining on a large scale can commence.—M.