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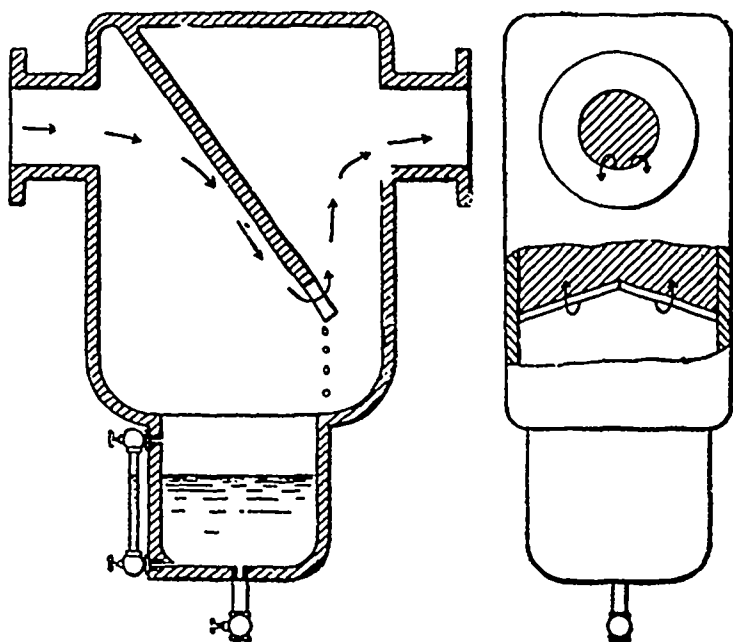
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ON SEPARATORS.

THIS is a day for watching the small economies of business. The time was, as the Locomotive says, when manufacturers paid comparatively little attention to the smaller losses that occurred in their mills and factories. Competition was not severe, and it was not considered necessary to keep a watchful eye on the innumerable small leaks through which profits escaped. Competition in all lines of manufacturing has increased tremendously, and the narrow margins on which business must be done make the most trifling losses worthy of serious consideration. This studied economy shows itself in the use of steam; and we find mills fitted out with triple-expansion engines and running at pressures that call for the utmost skill in designing boilers that shall carry these pressures safely. The drips from the pipes are carefully collected and returned to the boiler-house, and heat that otherwise would be wasted is utilized for heating feed-water. As the utilization of waste is increasingly realized, new problems are continually arising and forcing themselves on our attention. Thus, in saving the heat from exhaust steam, it was soon found that, when open heaters are used, the oil particles that are carried along from the engine pass into the feed-water and give trouble in the boilers.

The action of oily or greasy matter in boilers will be understood from the following extract from the Locomotive for March, 1885: "The action of grease in a boiler is peculiar. It does not dissolve in the water, nor does it entirely decompose. Neither does it remain on top of the water; but it seems to form itself into what may be described as 'slugs,' which at first seem to be slightly lighter than the water, of just such a density that the circulation of the water carries them about at will. After a short season of boiling, these 'slugs' or suspended drops seem to acquire a certain degree of stickiness, so that when they come in contact with the shell and flues of the boiler, they begin to adhere thereto. Then under the action of heat they begin the process of 'varnishing' the interior of the boiler. The thinnest possible coating of this varnish is sufficient to bring about overheating of the plates. We emphasize the point that it is not necessary to have a coating of grease of any appreciable thickness to cause overheating and bagging of plates and leakage at seams. The time when damage is most likely to occur is after the fires are banked; for then, the formation of steam being checked, the circulation of water stops, and the grease has a chance to settle on the bottom of the boiler and prevent the contact of water with the fire-sheets. Under these circumstances a very low degree of heat in the furnace is sufficient to overheat the plates to such an extent that bulging is very likely to occur." Of course there is greater likelihood of trouble with some kinds of oil than with others, animal oils being most troublesome, and mineral oils least so. Various means have been devised for preventing the harmful effect of oil in boilers, and one of the most

common of these is the separator. The object of this appliance is to free the steam of such particles of water, oil or dirt as it may hold in suspension. When the object is to remove entrained water, the separator is placed in the steam-main, near the engine; and when it is used to remove oil, it is placed in the exhaust-pipe between the engine and the heater. There is a great number of makes of separators on the market, but all of them depend for their action on the great mobility of steam and the inertia of solid or liquid particles. For convenience we may divide them into two classes, which we may call momentum separators and centrifugal separators, respectively. Our illustrations of these two types are to be considered merely as diagrams illustrating the principles of the separator, and in no sense as pictures of appliances that are in actual use. Fig. 1 shows the principle on which the momentum separator is based. Steam enters it at one nozzle and leaves it by the other, its general course being indicated by the arrows. Directly across the course of the steam there is a plate of iron called the baffle-plate. This baffle-plate causes the steam to deflect downward, but the oil particles, on account of



FIGS. 1 AND 2.—DIAGRAMMATIC VIEWS OF THE MOMENTUM SEPARATOR.

their momentum, impinge against the plate and collect in drops until they run down and fall into the receiver below. Usually the baffle-plate is not cut square across at the bottom, but runs obliquely across the casing, as shown in Fig. 2, so as to lead the oil-drops to one side and prevent them from falling directly through the main current of steam. The reservoir or catch-basin is provided with a gage-glass to indicate the height of the oil and water in it, and also with a cock for drawing them off. Some provision should also be made for removing the particles of mud and grit that are liable to collect. Fig. 3 shows a centrifugal separator in which the steam is made to circulate spirally around a central core, the centrifugal action so developed throwing the particles of oil and water to the sides of the casing, where they collect and flow down into the catch-basin below, a glass-gage and a cock being provided, as before. The principles illustrated in these diagrams are applied in practice in a great variety of ways.

AN INDIA RUBBER SOLVENT.

THE demand for both gutta-percha and india rubber is extensive and increasing yearly, owing in a large measure to developments in telegraphy and electrical engineering, besides many uses which are being found for them in minor industries. The present supply of gutta-percha is not sufficient to meet the demand, and it is believed that unless steps are soon taken to preserve the sources of supply there will be an actual dearth of this commodity. This has had the effect of raising its value in the market, and while in 1860 the price of the best quality of refined gutta-percha was \$1,200, by 1890 it had advanced to \$3,900 per ton. An attempt has been made to economize this useful material by combining it with rubber, which is a much cheaper article, varying as it does in price from \$750 to \$1,600 per ton. In a new invention, the two materials are

blended by a cheap process, both being partially dissolved, and afterwards intimately mixed. The main feature of the invention is the employment of a substance hitherto little known or understood, but which exhibits singular properties. This substance acts as a solvent both on gutta-percha and rubber, and combines with them in such a way as to form a united and homogeneous mass, which possesses the qualities of the best gutta-percha, while being superior to it in nonoxidizing properties, elasticity, tensile strength and insulating power, besides being produced at much smaller cost.

BOILER CONNECTIONS.

IT is a pretty good plan to make all your connections for boiler appliances with pretty good sized piping, so as to avoid the chance of having them stopped up with a little scale as is too often

the case. For connecting up water-column, or other combinations of a similar character, use at least inch pipe, and though it may look out of proportion, it is better than having them stopped up and leave you without any means of knowing where your water is in the boiler. Steam gauge connections do not come under this head as they should come out of the steam space of the boiler and there is not the liability of being clogged that there is in water connections, still a little larger than is generally used will do no harm and might be an advantage in some instances.

In piping up boiler fixtures, or any other kind for that matter, it is a pretty good plan to make a free use of "crosses" instead of using "ells," and then plugging up the two free ends.

This gives you a chance to "probe" both ways by taking out the caps and is often very handy, indeed in keeping things cleaned up thoroughly and is a good plan to be used in all kinds of piping that is liable to be stopped up from dirt or scale.

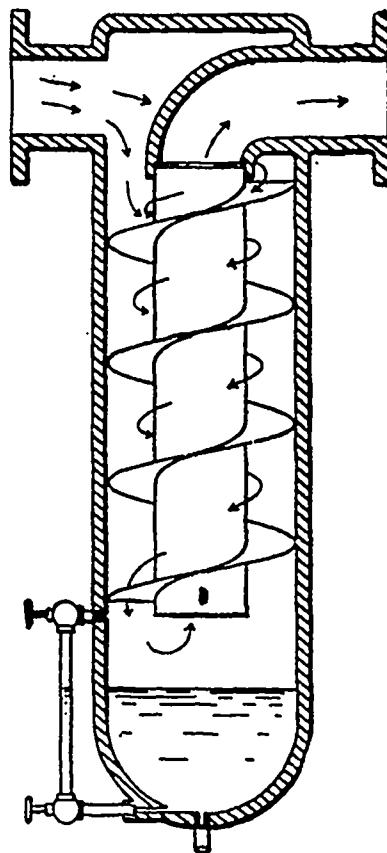


FIG. 3.—DIAGRAM SHOWING THE PRINCIPLE OF CENTRIFUGAL SEPARATORS.