Flour Mill Insurance.

We published a few weeks ago a list of flour mills burned in the United States during October, in which the loss reported upon each mill was $10,000 and upward. From this list we find that there were twelve mills burned, with a loss of $265,000 in all, not speaking of the lesser cases, which foot up probably $15,000, making in all a loss of about $280,000. If we multiply this by twelve for the entire year, it would make a grand total of $3,420,000; but October would not be the proper month to average from, for reasons which will be recognized by millers themselves. Not one of those fires originated from any cause other than might have occurred in any large business, and taking the number of mills in the country, and the large amount of capital invested, this loss is low compared with other businesses of like proportions.

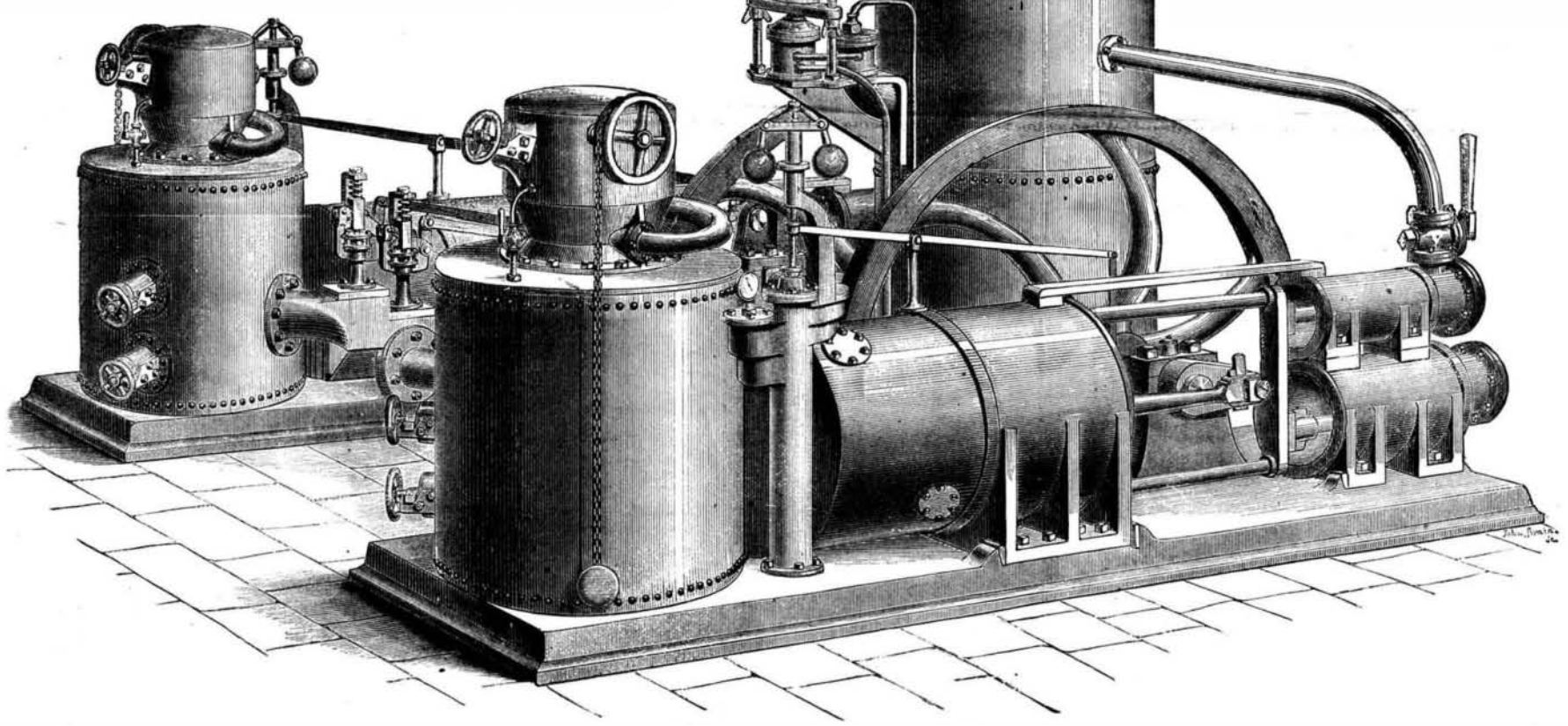
These fires may be divided into two groups, namely, those which originate by reason of defects in arrangement and construction, and those caused by the manner in which the mills are worked. Out of the entire number burned during the year so far, not one was caused from what the insurance actuaries would call the explosive property of the flour, and none would point to the fact that flour mill risks are any greater than those of other factories where machinery is largely used. The question then that naturally rises is this: Are new process mills, or those in which improved machinery is used, less liable to dust explosions than the number still pursuing the even tenor of their way with the old method?

We incline to the opinion that the roller process, with all its concomitant machinery, notable among which stands the improved dust catcher, is not so liable to explosion from flour dust, for the following reasons: In July, 1879, a report was made to the Society for the Encouragement of Manufactories in Prussia, in which it was announced that the Industrial Association of Lower Austria had investigated the causes which would produce explosions in flour mills. In this report it was stated that in the course of their investigation attention was called to the well known phenomenon, the artificial lightning in the theaters produced by lycopodium, which contains considerable oily matter. A similar blaze, or explosion, could not be produced with ordinary meal, but with meal which had been previously heated up to 30° C. the phenomenon would result precisely as with lycopodium.

It was probable that in the mills the meal was heated, and in consequence much more easily ignited. The report gives as a reason why explosions were so few in former times, that the millers used to wet the grain, whereas it was not the case in these times. If the chemical constituents of meal are considered, the question assumes an entirely different aspect. All cereals, with the exception of buckwheat, contain a certain quantity of oily matter; for example, of a thousand parts of flour 18·50 are oleaginous; of rye, 21·09; barley, 26·31; oats, 39·00, and of corn as much as 48·37. These figures are taken from the work of Moleschoot on "Chemistry of Food." The presence of this oleaginous ingredient accounts for the explosive property of flour and meal. The grain having been crushed between the burrs under heavy pressure and a great amount of friction, a great deal of heat must necessarily be engendered by the operation, and a large quantity of moisture containing this oil is set free, and a spark from a stone or the flame of a lamp is sufficient to ignite at once the oil distributed among the fine particles of dust and flour, and an explosion takes place. At present time, by the roller system, no oil is lost from overheating, very little dust is made, and that which is made is taken charge of by the dust collector, and kept "out of harm's way." There is a great deal of difference in the fire risk on flour mills now, compared with a few years ago, and a careful investigation will show, we believe, the possibility of materially reducing rates, except perhaps in cases where these establishments are grouped together in considerable numbers.—*Milling World.*

FOG SIGNAL APPARATUS.

The fog signal apparatus shown in the annexed engraving consists of one pair of "Buckett" caloric engines working pumps for compressing the air, a reservoir for the compressed air, automatic gearing for opening the valves at given times and sounding the signal, and Prof. F. H. Holmes' patent double note "Siren" fog horn. The apparatus herewith illustrated is for light ship or signal station use when it can be placed near the engines, but when it is necessary to separate them, other means are adopted for operating the horn automatically.



FOG SIGNAL APPARATUS

The siren produces its powerful sound, which in calm weather may be heard twenty miles, by means of two slotted cylinders, one fixed and the other revolving within it. The slots, as they pass one another, stop, or cut off, the passage of compressed air or steam, and thus cause a series of vibrations and, consequently, a musical note, the pitch of which depends upon the speed of the revolving cylinder. In order to vary the note it is only necessary to control this velocity.

The double note horn is formed with a casing within which is a fixed slotted cylinder and a revolving cylinder moving upon a spindle. The slots are formed in each cylinder at opposite inclined angles, so that the motive fluid impinging against a number of inclined planes causes the inner cylinder to revolve with great rapidity. As this cylinder revolves it carries with it two disks, attached to the common spindle, and upon their peripheries are pressed levers under the action of small pistons operated by diaphragms to the outer surface of which compressed air is admitted. When the high note is required only one brake is put on, but for the low note both brakes are on, thereby reducing the speed of the revolving cylinder. While the notes are being sounded the pressure of air in the reservoir diminishes; but as the air for operating the diaphragms comes from the same source, the force on the brakes decreases in the same ratio, and the friction on the disks being reduced, the cylinder continues to revolve at a uniform speed, and the pitch of the note is constant.

The end of the crank shaft of the engine is formed with a screw that engages with a worm wheel upon which is bolted a cam having long and short projections. The short projection opens a small valve, and the long one opens the same valve and also a second one. The first valve is connected by a copper tube with the starting valve box of the horn, which, in turn, is connected by a pipe with the diaphragm of the first brake. When the cam opens the small valve, air from the reservoir passes to a diaphragm on top of the starting valve box, and the area being greater than that of the starting valve, the pressure at once opens the latter and a volume of compressed air is admitted to the horn, and at the same time a small quantity of air passes to the brake. The cylinder having only the resistance of one brake to overcome, revolves at the speed requisite to produce the high note. When the long projection of the cam strikes the second valve, air is admitted to the second brake, and the extra friction causes a reduction in the speed of the cylinder and the low note is produced. By adjusting these parts the notes and intervals of silence can be changed as desired.

The wrought iron generator of the engine is lined with fire brick, between the outer sides of which and the inner sides of the generator is an annular space. Air is forced into the generator by the lower small pump operated by the main piston, and this air is divided into two currents, one passing into the annular space referred to, whence it descends beneath the fire bars and so through the fire; the other passing into the upper part of the generator, above the fire, where its oxygen enters into instantaneous combustion with the carbonic oxide formed by the air which has passed through the fire. The intense heat causes expansion, and a valve allows a portion of the gas to enter the cylinder and actuate the piston, giving motion to the engine, as shown in the engraving. The upper small pump supplies air to the reservoir for operating the siren. For the engraving and for the description from which the above notes were taken we are indebted to *The Engineer*, of London.

Greenport Harbor.

A correspondent writing from Greenport, N. Y., dissents from our statement, in the SCIENTIFIC AMERICAN of December 8, that there were no good harbors in Long Island Sound west of New London, and adds that the harbor of Greenport is of sufficient depth to accommodate the Great Eastern. He also says an effort is being made to obtain a Congressional appropriation for building a breakwater there, which would render the harbor a spacious and convenient harbor of refuge for all vessels passing through Long Island Sound.