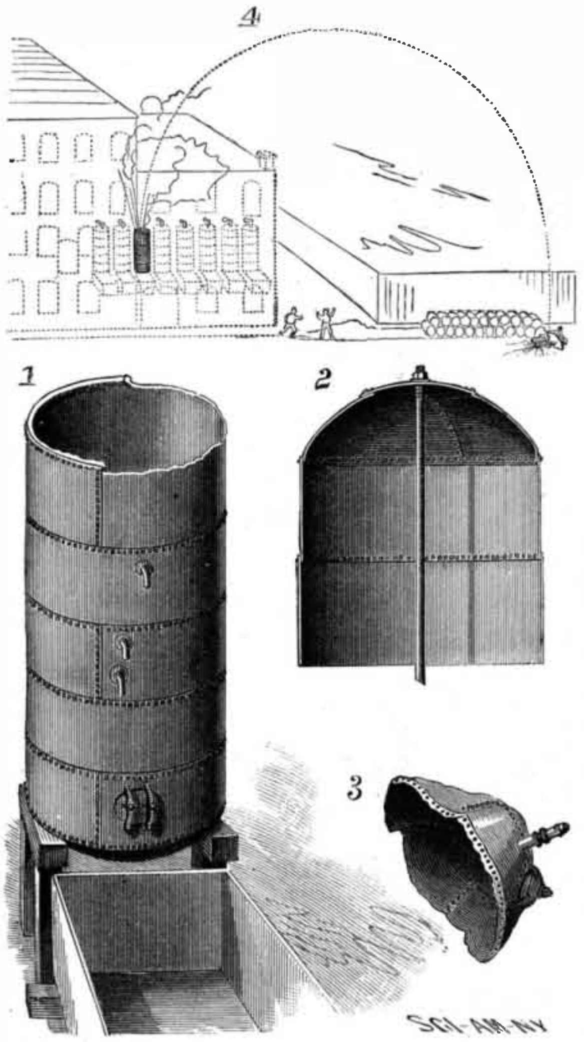
### EXPLOSION OF A LARD BOILER.

A somewhat curious accident occurred on the 14th of January, at Messrs. James Morrison & Co.'s pork packing establishment, situated on the corner of Bank and Riddle Streets, Cincinnati, Ohio.

There is at the rear of the main building a lard rendering house in which are eight rendering tanks (see Fig. 1). The night man noticed a flame of fire at tank No. 3 (shown in shaded lines), and immediately had an alarm turned in, but before the engines arrived the fire had spread to such an extent as to completely envelop the tank. As the tanks are subject to steam pressure, the pressure in this one was raised above the usual point, causing it to explode with a loud report, the domed top being projected through the roof and floors, and falling about 100 yards away, on some barrels of grease, crushing one of them in its descent (see Fig. 4).




A LARD BOILER DURING, BEFORE, AND AFTER EXPLOSION.

These tanks are 6 feet in diameter and 14 feet high, and are made of about five-sixteenths inch iron, single riveted; the heads are domed outward, and are stayed by one long 1¼ inch bolt passing from head to head, secured by nuts; they are supplied with steam from a pipe passing along the line of tanks, having a regulating valve at each, and are each provided with a safety valve set at about 40 pounds per square inch.

Under ordinary circumstances these tanks are strong enough perhaps, but it is necessary to provide for all contingencies, especially when we consider that the men in immediate charge of such apparatus are not first class machinists, although they are fully competent for their work of attending to this process; it may therefore be worth while to consider how the construction of these tanks may be improved.

By reference to the cut, Fig. 2 and Fig. 3, and as stated above, the heads are domed outward and stayed as described by a bolt; the objection to this plan is that the fluctuations of pressure cause a constant buckling at the flange where the head joins the shell, which the stay does not wholly prevent, and in time the head will crack at the flange, or the shell will crack near the point of junction.

Suppose the heads were domed inward and the stay added, and perhaps radial stiffeners fastened on to heads; they would be so stiff that buckling could not take place.

The necessity for some such plan as above can be seen, when it is noticed that the heads are further weakened by each having two large man lids in them.

Although the fire burnt the beams and floors only, this tank had much fire round it; but suppose all or any of the other tanks had exploded, how many lives might have been sacrificed! As it was, only one man was injured by a falling beam, and no one killed.

A. R. P.

### EXPERIMENTS WITH THE SIPHON.

Professor G. M. Clayberg, teacher of physics in the West Division High School, Chicago, sends us the following:

Some very instructive experiments may be performed in the following manner:

Take a piece of ordinary glass tubing about 5 mm. in internal diameter and one meter long. Fifteen centimeters from one end bend it to an angle of 100°, and five centimeters farther to an angle of 90°. Draw out the other end to a point, and grind off the point so as to leave a hole about one millimeter in diameter. Twelve centimeters from this end bend it twice at right angles in the same plane as the bend at the other end. Grind off the large end obliquely. When finished, the siphon will be as in the illustration.

Place the large end in a vessel of water in which a little aniline red has been dissolved, and support the apparatus high enough so that the whole siphon can be seen by all the class. Start the water, and of course it will run. Lift the siphon so that the opening of the large end is partly out of the liquid, and you will have the beautiful appearance of a succession of spaces filled alternately with the colored liquid and with air. The length of these spaces can easily be regulated by raising or lowering the siphon a very little. Again lift the siphon entirely out of the liquid until fifteen or twenty centimeters of air have entered, and then lower it into the liquid again. The long bubble of air will pass slowly down the long vertical part of the tube and then up the short and pointed arm until it reaches the small opening, when it will rush out with great velocity. The rapid escape of the air gives the liquid behind it great velocity, and when it reaches the small opening at the end of the tube it is suddenly checked, producing considerable pressure—pressure enough to throw a few drops of the liquid ten or fifteen feet high, easily seen when the drops strike the ceiling of the class room.

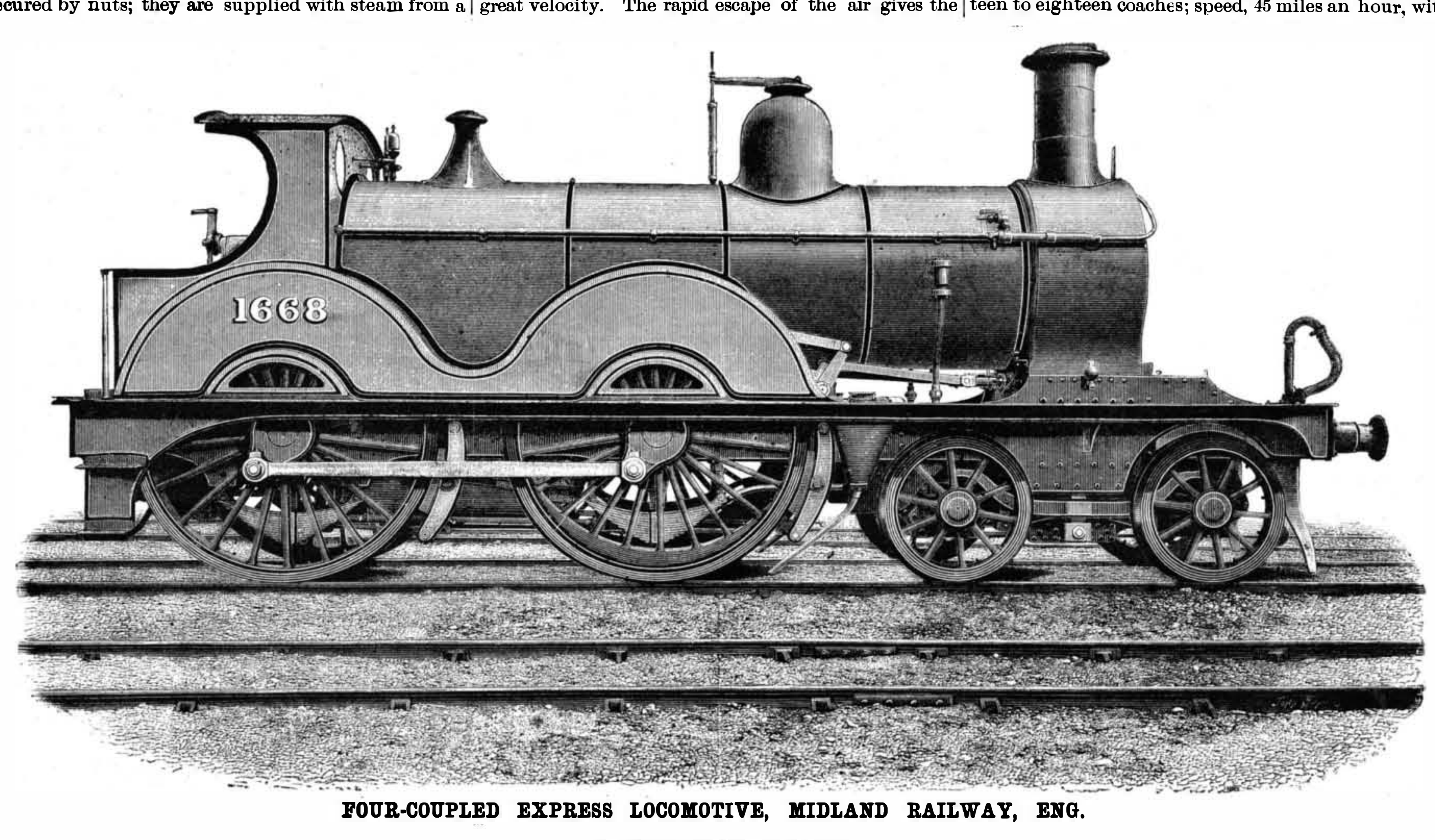
EXPERIMENTS WITH THE SIPHON.

This sudden arrest of the velocity of the flowing liquid illustrates the principle of action of the hydraulic ram.

### FOUR-COUPLED BOGIE ENGINE, MIDLAND RAILWAY.

We illustrate one of several new engines of a very powerful character, put to work within a few months on the Midland Railway, England. They have been designed by Mr. Samuel Johnson, locomotive superintendent of the Midland Railway, and were built under his supervision at the Derby works of the company. The cylinders are 19 inches in diameter, and the valves are placed on top, there being no room between them, and are worked by Joy's valve gear, which is now being very largely employed for locomotives.

These engines are employed in working the express traffic between London and Nottingham, the fastest traffic in the world, the average speed being, says the *Engineer*, 53·5 miles an hour, with loads of nine to ten coaches. The consumption is only 27 pounds to 29 pounds per mile, of common Derbyshire coal. The heaviest gradients are 1 in 119 for 3½ miles, and about 5 miles of other gradients of 1 in 162 to 1 in 177. These engines also work the Leeds and Derby mail with sixteen to eighteen coaches; speed, 45 miles an hour, with




FOUR-COUPLED EXPRESS LOCOMOTIVE, MIDLAND RAILWAY, ENG.