Pneumatic Drainage.

A new system for the protection of houses from the infiltration of sewer gas and the disposal of town sewage has been introduced at Paris and Lyons by M. J. B. Berliez, civil engineer, and former director of the Compagnie des Vidanges, of Lyons. An illustration of this new system can now be seen in working order at the barracks of the Pépinière, Boulevard Malesherbes, where a thousand soldiers are quartered, and with the permission of M. Berliez we were able to examine every detail of the process. Underneath the closets the old cesspool has been emptied, thoroughly cleaned, and converted into a cellar. Here we found M. Berliez's apparatus. From each closet above a pipe communicates with an iron cylinder or drum. Within this first receptacle there is an iron basket which will retain a hard substance, such as a brush, or even an infant if thrown down the drain. The detection of crime is thus facilitated, and the obstruction of pipes rendered impossible. A portable handle, affixed from the outside, is used about once a week to impart a strong rotary motion to this basket; the presence of any hard substance is then detected by the sound, and any accumulation of softer substances macerated and driven out

From this first receptacle, and by natural gravitation, the liquefied sewage flows into a second iron receptacle placed close at hand, within a yard or so. A large ovoid floater occupies the greater part of the space within, the pointed end fitting hermetically an opening at the bottom, where the pneumatic suction keeps the floater in its place. It is not till the receptacle is almost full of water that the floater is able to disengage itself from this suction, and, rising, enables the sewage to escape by passing under the floater into the pipes, where the pneumatic suction carries it away. This suction is produced by a steam engine situated in the suburb of Levallois-Perret, and the iron pipes, placed within the main sewers, communicate not only with the Pépinière barracks, but with several private houses, and with a depot at the Place de la Concorde, where the contents of many cesspools are brought and emptied. The total distance is 4,600 meters. It is, therefore, on an extensive scale that the experiment has been tried, and so far has worked well, giving rise to no sort of nuisance, and instead of allowing sewer gas to ascend house drains, drawing it, on the contrary, away.

It is proposed to place these apparatus under all the houses of Paris instead of cesspools; to draw by pneumatic action all the sewage to depots situated in the open country outside Paris, and there pump it forward distances varying from ten to fifty miles, where it may be used either to irrigate farms or be precipitated and converted into solid manure. It is calculated that the sale of this manure and an annual tax of £2 8s. for every house where the system is applied will cover working expenses and yield a large profit. This tax would be an economy on the present cost of emptying cesspools, and the sanitary advantages secured would be an inestimable benefit. The principal objection to the system, so far as its application to towns such as Paris is concerned, rests in the fact that the iron used for the pipes must corrode under the action of sewage matter, and the slightest leakage would cause a total collapse of the whole system. Careful, constant supervision and prompt repairs would be indispensable. Then, the avoidance of nuisance depends on the frequent usage of the closets, as fermentation would set in if the receptacles were left half full for a few days. Families leaving home would have to carefully flush their closets the last thing before their departure; for though each house would be thoroughly protected from sewer gas, it would not be protected from any noxious gas arising within the receptacles. Fortunately these receptacles are very small, and must, in ordinary households, be frequently and automatically emptied during the day; so that, generally speaking, there would be no time for mischief to arise.—*Lancet.*

Detection of Lead in Tinfoil.

A drop of concentrated acetic acid is let fall upon the suspected leaf, and a drop of a solution of potassium iodide is added. If there is lead present there is formed in two or three minutes a yellowish spot of lead iodide. Kopp moistens the leaf to be examined with sulphuric acid. If the tin is pure the spot remains white, but if lead is present there is formed a black spot.

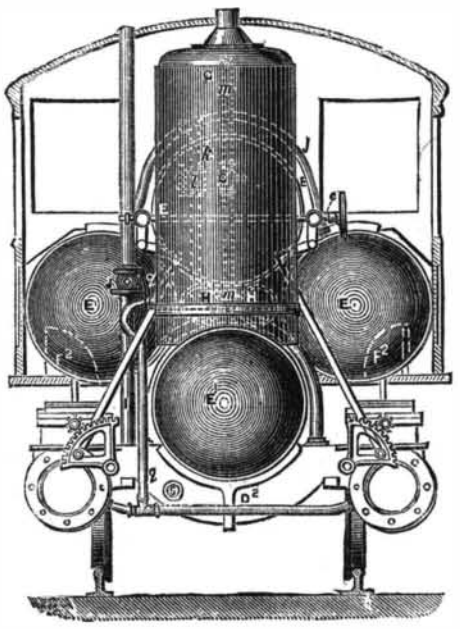
Tannin Soap.

Cocoa-nut oil, 18 lb.; Solution of soda (38° B.), 9 lb.; Tannic acid, ½ lb.; Alcohol, q.s.; Balsam of Peru, 1 oz.; Oil of cinnamon, ⅓ oz.; Oil of cloves, ⅓ oz. Saponify the cocoa-nut oil with the solution of soda, then add the tannic acid previously dissolved in alcohol, and add the other ingredients.—*Seifenfab.*

EXPERIMENT WITH AN AIR LOCOMOTIVE ON THE ELEVATED RAILROAD.

In October last an interesting experiment with the Hardie air locomotive was tried on the Third Avenue Elevated Railroad, a run being made from the 128th street station to 42d street and return. The air pressure at the start was 580 pounds per square inch, and the pressure on the return, after a nine mile trip, carrying three cars, and stopping at every station, was 115 pounds. We give herewith the best representation of the engine that has come to our notice, and furnish detail views that will afford a good idea of the working parts of the machine.

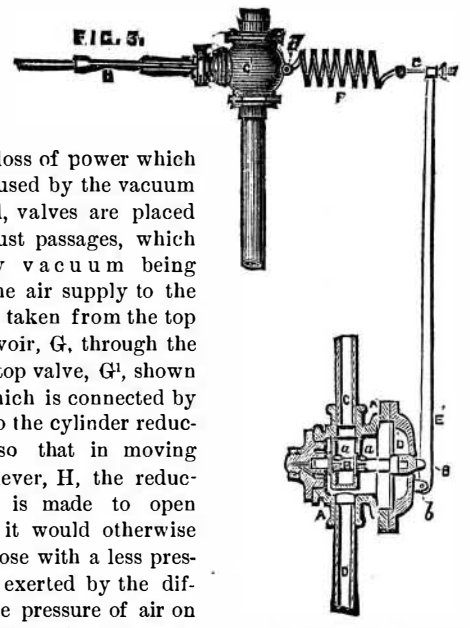
FIG 2



END ELEVATION OF AIR LOCOMOTIVE.

Fig. 1 is a perspective view, and Fig. 2 shows the position of the four air reservoirs, E E E E¹, the lowest one, E¹, running the entire length of the engine, its dished end being seen projecting beyond the cab frame. This reservoir is supported by the cylinder saddle, D², to which the bar framing is secured, while the other reservoirs are supported by brackets, bolted or riveted to the lower reservoir and frame. The reservoirs are all connected by pipes, *j k*, and the air passes from them through a reducing valve, *l*, into the bottom of a small boiler in the cab, the water of which is kept at boiling point, the design being not to mix steam with the air, but to heat and moisten it by contact with hot water. The reservoirs, E, have a capacity of 460 cubic feet, to which air is originally supplied at 600 pounds per square inch. The working pressure in the cylinders is 100 pounds to 130 pounds, and it has been found that when using the air expansively while running, *i. e.*, with a quick cut off, the expansion is sometimes so rapid that toward the end of the stroke the pressure in the cylinders is less than the external atmosphere; to obviate the loss of power which would be caused by the vacuum thus created, valves are placed in the exhaust passages, which prevent any vacuum being formed. The air supply to the cylinders is taken from the top of the reservoir, G, through the throttle or stop valve, G¹, shown in Fig. 3, which is connected by a lever, E, to the cylinder reducing valve, so that in moving the throttle lever, H, the reducing valve is made to open earlier than it would otherwise do, and to close with a less pressure than is exerted by the difference in the pressure of air on the diapbragm and valve seat. The two cylinders are connected by a pipe, through which, and the pipe, *q*, compressed air passes to the boiler, G, thence to two small reservoirs, H H, when the cylinders are used as air pumps, drawing their supply from the atmosphere, and making use in this way of part of the energy needed to retard the train going down hill or coming to a standstill. This arrangement proved to be so successful that no other brakes are required on the engine. The valve gear is shown in Fig. 5 and in the perspective view; the wheel, *e*, by levers, J K, moving the geared segments, I—which rotates the small toothed wheels, *a*, when the cut-off valves, D¹, on the spindle are either drawn together or apart, they deriving their motion from a lever, G, coupled to a crosshead by link, H. The cylinder saddle, D², Fig. 2, is made hollow and forms an exhaust chest, from which extends the exhaust pipe, I, with check valve, J, and it is also used as a vacuum chamber, when the cylinders are used as air pumps and draw their air supply from it. A hose connected with the coupling, S, Fig. 4, communicates with the vacuum brakes upon the train.

FIG. 3.



PRESSURE REGULATOR.

The main valve is held to its seat when the cylinders are used as compressors by the bridge-piece, D (Fig. 4), connected by an adjusting screw, K, to a diaphragm, L, which just keeps it off the valve when in ordinary work.

When compressing, the supply is drawn through valves, E, and delivered through valves, F, and pipe, *p*, into the small reservoirs previously mentioned. The admission of air to or production of a vacuum in the exhaust cavity of the saddle is controlled by a stop-cock within reach of the engineer. The engine weighs about the same as the ordinary elevated railroad locomotive.

FIG 4

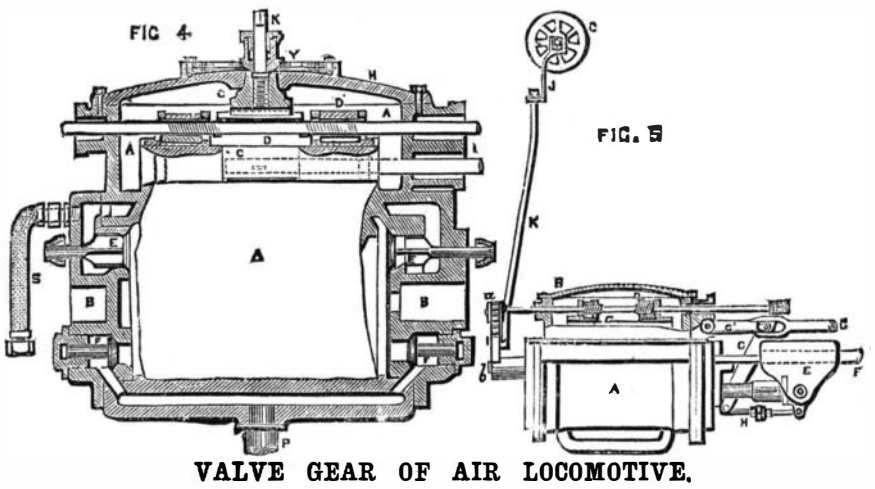


FIG. 5

VALVE GEAR OF AIR LOCOMOTIVE.

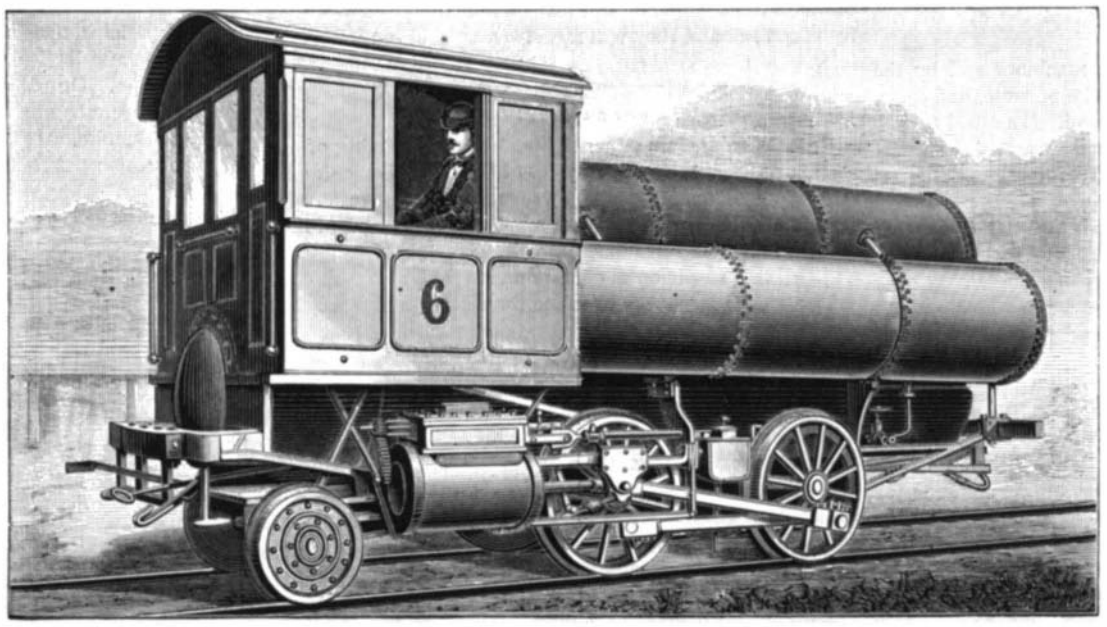


Fig. 1.—AIR LOCOMOTIVE ON THE ELEVATED RAILROAD.

Eruptions of Sulphureted Hydrogen.

A very peculiar phenomenon was observed last December in Missolonghi. On the night of the 15th of December the inhabitants were terrified by the sudden odor of sulphydric acid gas, which was so intense as to interfere with respiration. The next morning the sea was found to be covered with dead and dying fish, and it was seen that an eruption of sulphureted hydrogen gas must have taken place in the small creek of Aitolicon, which is almost completely cut off from the large bay. A similar eruption, accompanied with a light earthquake tremor, followed on the 13th of January, and other shocks were noticed in February. The phenomenon is exceedingly interesting, as explaining the occurrence of enormous quantities of fossil impressions of fish in many formations. At all events, such eruptions must have been of frequent occurrence in former times. It is also noticeable that the impressions of fossil fishes are sometimes filled with scales of pyrites, more particularly in the coal measures, proving that sulphur was present as well as iron.

THE best deep sea sounding apparatus is supposed to be that used by the U. S. Coast Survey.