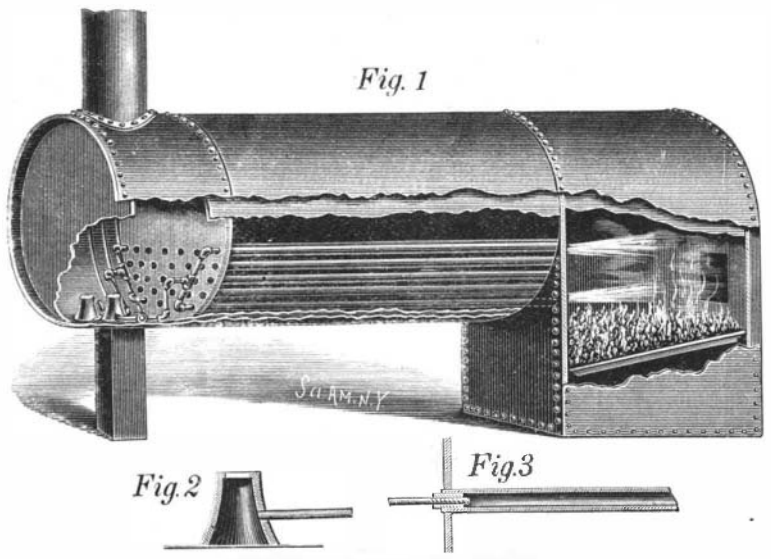
AN IMPROVED LOCOMOTIVE BOILER.

An attachment for locomotive and other boilers, in which the draught is urged by the exhaust of the engine, and the combustion of the fuel improved, is illustrated herewith, and has been patented by Mr. Charles S. Smith, of Pocatello, Idaho Territory. In a boiler of the ordinary locomotive type, as shown in the illustration, a pipe is connected with each of the exhaust nozzles, at points near the bases of the nozzles, as shown in Fig. 2, whereby a portion of the exhaust will be received and conducted to two of the tubes on each side of the boiler. The pipes from the exhaust nozzles are connected with T's, short pipes from which enter the smoke box end of the boiler tubes, to the ends of which they are fitted by bushings, as shown in the sectional view, Fig. 3. The steam thus passed to the fire box from the exhaust becomes heated to the temperature of the water in the boiler, its decomposition in the fire box greatly assisting in obtaining a higher degree of heat, while the force with which it enters causes the sparks and cinders to fall back, preventing them from passing into or through the tubes, and insuring a more complete combustion of the fuel.



SMITH'S LOCOMOTIVE BOILER.

ELASTIC ENGINE FOUNDATIONS AND SUSPENSION OF VEHICLES.

The complete and stable isolation of structures, machines, and vehicles, with a view to deadening shocks, preventing the transmission of vibrations, and diminishing the resulting noise, is a problem which has received a large number of solutions, none of which has hitherto given full and entire satisfaction. The processes employed for the isolation of machines consist in the use of rigid foundations or elastic substances. Masonry foundations, even with the superposition of framework, and surrounded with trenches, have proved insufficient.

The interposition of rubber has given good results in some cases but unsuccessful ones in others, and the causes of which are thus set forth by Mr. G. Anthoni in a recent communication to the Society of Civil Engineers:

"Rubber simply interposed between the floor and the tool to be isolated has been used for a long time, and gives good results, because the isolation is complete, but it can rarely be utilized thus because there is no stability, and movements may be produced that interfere with or are even dangerous for the service. Besides, in impact tools, the useful effect is diminished.

"If, in order to overcome such inconveniences, we connect the piece to be isolated by bolts, the vibrations pass through the latter, and the isolation is destroyed. Moreover, if we compress the rubber in order to give stability, there is no more elasticity, and if, on the other hand, we do not compress it, but allow it to retain all its elasticity, we do not obtain the stability in view of which the connecting bolt is used.

"Want of success may be due also to the improper use of rubber, for, in order to solve a problem of isolation, we must study the conditions that have to be fulfilled by the blocks from the standpoint of their form, surface, and thickness."

In order to leave rubber its entire elasticity, and to give the isolated system all the stability necessary, Mr. Anthoni has recourse to two methods, which at the same time secure isolation and stability: (1) An increase of the mass of the system to be isolated, and (2) an isolating and elastic attachment.

The first of these is applied to the foundation of machines, while the second is more especially designed for the suspension of vehicles of all kinds.

As an example of an elastic foundation for a collection of machines, we may cite the small central electric works established by Mr. Pulsford in the Faubourg St. Denis. The vibrations of these machines were annoying the neighbors considerably, and lawsuits were imminent, when Mr. Juppont, Mr. Pulsford's electrical engineer, conceived the idea of having recourse to Mr. Anthoni's method. The accompanying figure shows the application that has been made of it, and which is giving entire satisfaction.

A large oblong ditch was dug, the bottom of which was provided with a floor and a sheet of iron plate over which was distributed a certain number of rubber disks which formed an insulation at once electric and elastic. Upon these disks was laid a second iron plate riveted to a flooring that rendered the plate indistortable. It is upon this flooring that the foundation is built, places being left, of course, for the foundation bolts, and spaces being reserved sufficiently capacious to allow of the periodical cleaning of the ditch and for the accumulation of debris between two successive cleansings without interfering with the elastic suspension.

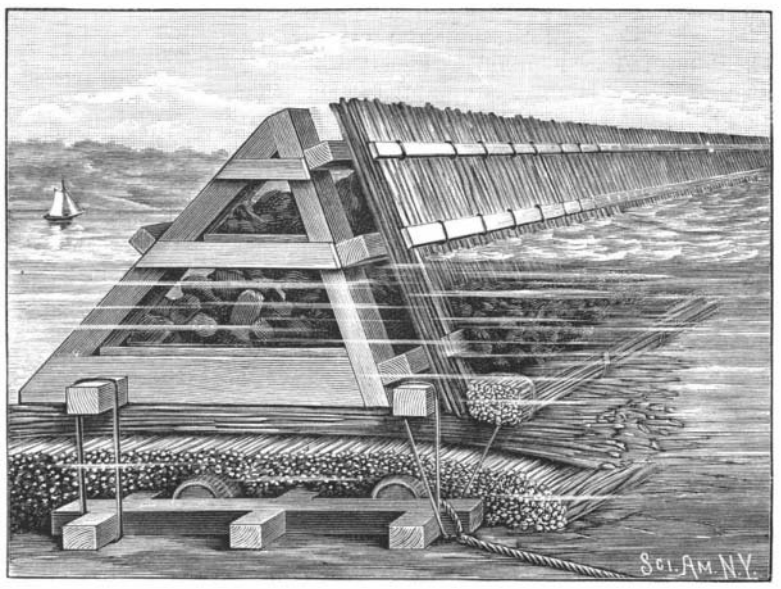
The foundation need not be of masonry, and in some cases it may be advantageous to use a caisson filled with sand, thus permitting of the easy shifting of the foundation. The trench is covered with a flooring or iron plate permitting of the motions of the masonry in a horizontal direction if it is a question of a steam engine, or in a vertical direction if the elastic suspension is applied to a steam hammer or a pump.

The steam admission and eduction pipes are wound spirally at the upper part, so that they may have elasticity enough to permit of the motion of the whole without forcing the joints.

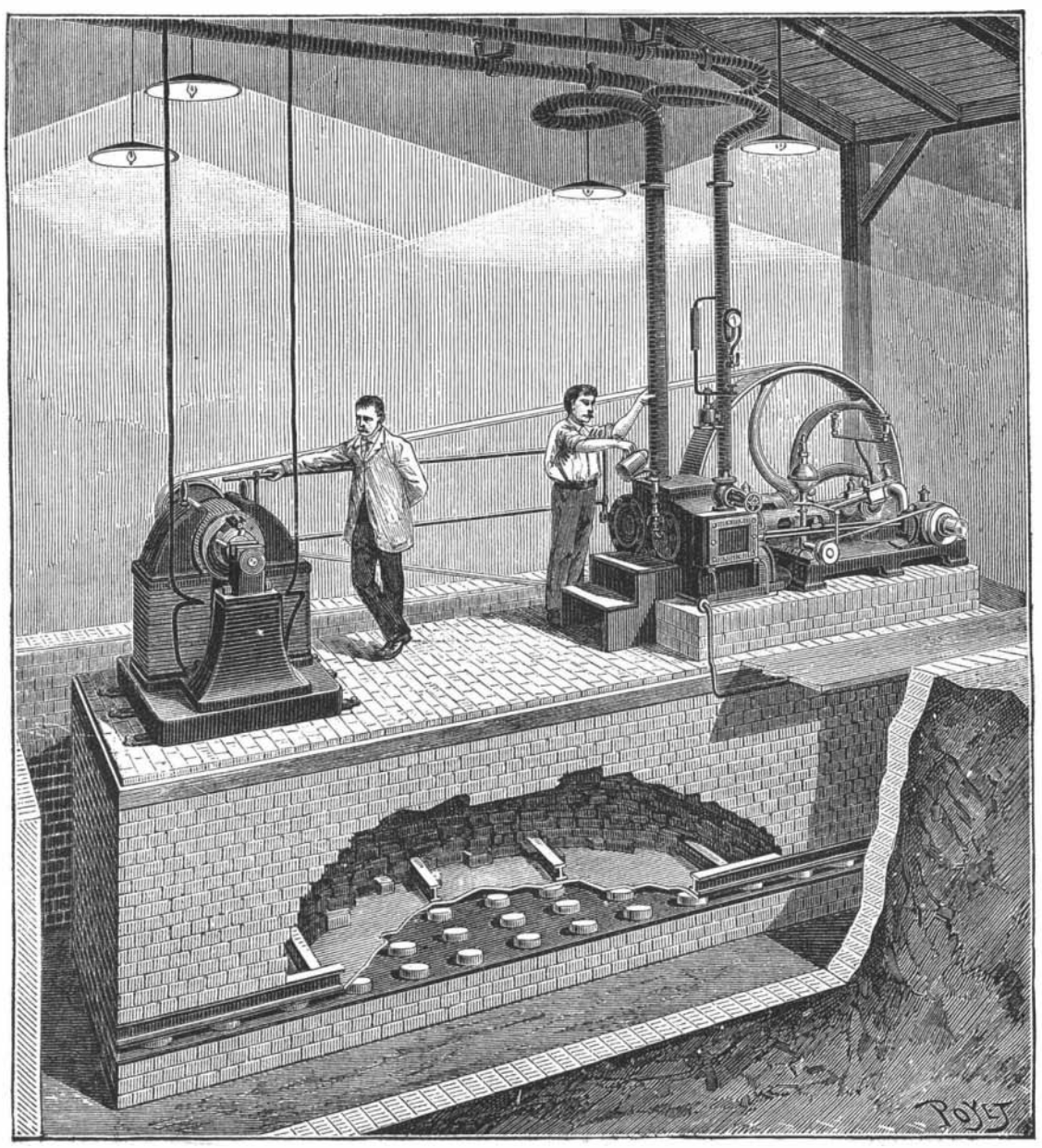
In the case under consideration, the oscillating motions reach an amplitude of $\frac{3}{10}$ inch, and nothing is more curious than to see the whole affair, whose weight exceeds 25 tons, displace itself rapidly without the least vibration being felt at the edge of the trench. The same process is applicable to the rails of railways upon metallic viaducts crossing cities, and to the engines of boats, etc.

The second method of isolation, applied to vehicles, consists in the use of a rubber support, which, placed between the axle and the spring of carriages, gives a complete and stable isolation, increases the ease of motion and the duration of service, diminishes the noise, and reduces the variations in the tractive stresses of the horses.

This rubber support serves to fix the spring firmly upon the axle, if it is a question of a vehicle, without interfering with the elasticity of the junction by too much tightening, a drawback connected with all the arrangements hitherto employed. This result is obtained by means of a mode of attachment which interposes (1) an isolating rubber tube between the coupling plate and axle; (2) of a foundation disk of rubber supporting the load; and (3) of a reaction disk which isolates the nut and lessens the rebounding. The compression between the metallic parts is effected without crushing the metallic joint.—*La Nature.*



WEEKE'S SYSTEM OF BUILDING DIKES.



ELASTIC SUSPENSION OF MACHINES.

WEEKE'S SYSTEM OF BUILDING DIKES.

The dike illustrated in the accompanying engraving is admirably adapted for use at places where the water is of considerable depth. It consists primarily of a floating frame made of wood, and which is provided with barrels or other suitable floats. This frame is anchored by lines or piles. The work of building up the dike is carried on upon this floating frame, and above water line, the structure being gradually submerged as the superincumbent weight increases. A thick layer of rails, brush, willows, poles, or other similar material is placed upon this frame, and one or more similar layers are placed upon this transversely. These layers are lashed to the frame by wires and clamp timbers. Upon this structure is mounted an inclined trestle or frame, as shown in the cut, of