

DOUBLE BOGIE LOCOMOTIVE.

We illustrate herewith, a type of double bogie tank locomotive, constructed on the Fairlie system, which has been introduced with much success by Mr. William Mason, the well known locomotive builder, of Taunton, Mass. In this engine the ordinary form of boiler, with single barrel, is retained, and only one steam bogie is used, the hind end of the engine (at which the tank and coal bunkers are situated) being supported by an ordinary carrying bogie. Mr. Mason has built some of these engines with four wheels and some with six wheels to the steam bogie, and they are well adapted for use in cases where the entire weight of the engine is not required for adhesion, or where the heating surface demanded is not greater than can be advantageously obtained with the ordinary form of boiler.

We have now before us, says *Engineering*, from which we extract the engraving, reports on the working of some of the engines constructed according to the arrangement we illustrate; and their performance is spoken of in high terms, it being especially stated that they are very easy on the road, as might indeed have been expected. On the Howland and Aspinwall Railway, a line of 3 feet 6 inches gage, engines of this type are doing good work on a gradient of 296½ feet per mile, or about 1 in 17'7; while others are in use on the American Fork Railway (the gage of which is 3 feet), on a line of 4 feet 1 inch gage belonging to the Calumet and Hecla Mining Company; on the Utica, Ithaca, and Elmira Railway, and the Toledo, Wabash, and Western Railway, both of 4 feet 8½ inch gage; and on the Virginia and Tennessee Railway, the gage of which is 5 feet. Altogether the type is a very good one, and we expect to see its use largely extended.

APPARATUS FOR RAISING SUNKEN VESSELS.

We illustrate herewith Sowerbutt's patent system for raising sunken vessels and their cargoes, for working which a company has just been formed in England.

The principle upon which sunken ships may thus be raised is easily explicable by the simplest principles of hydrostatics. The ship and its loading is the exact weight of as much water as is expelled by its water draft, and when it becomes heavier than that it sinks. Again, so many pounds as the cubical contents of the timber of a wooden vessel is heavier than an equal cube of water, will she buoy up, even though full of water. Heavy non-buoyant bodies are also much lighter in water than in air. On these principles the practice has been, by means of divers, to attach pontoons or casks to sunken vessels, being first filled with water that they may be more easily sunk down to the wreck.

The water is afterwards displaced and air substituted. This has been effected in several ways, but all of them involve trouble, delay, and risk of miscarriage. The simplicity and self-acting character of the apparatus about to be described gives it a great superiority over all the methods previously employed. In blowing up wrecks, the charges are laid by the divers, and exploded by electricity. The apparatus at present under consideration may be described as follows: A number of pontoons and casks (A A), from 3 feet to 20 feet long, and from 3 feet to 12 feet in diameter, strongly made and sufficiently heavy only just to sink when filled with water, are attached to the sunken ship by a strong chain (A A A). Each of the pontoons contains a metal receiver filled with compressed air, sufficient when expanded

to fill the pontoon at a pressure to be regulated at will. The pontoons, having been lowered to the wreck from a tug, are attached by divers to the ship, as shown in the diagrams. If necessary, other smaller pontoons or casks, constructed on the same principle, may be stowed in the hold or cabin of the ship (D D). In each of the pontoons there is a tap—which may either be turned by the divers or by self-acting mechanism—by means of which a valve is opened in the receiver, and the air thus set free expels the water from the pontoon; and the required buoyancy having been obtained, the

study of proper remedies. For this purpose, Dr. George M. Beard, of New York city, has prepared a printed series of questions for answer by patients, the results of which are expected to be of value. All who are troubled with hay fever, and all who are personally familiar with the disease, should send for this series and supply such information as they can.

New Magneto-Mechanical Separator.

A new form of magnetic separator, for the removal of

fine particles of iron that become mixed with turnings and filings of copper and brass from workshops, has recently been devised by M. Varin, of Paris.

Two superposed hollow cylinders turn in the same direction, and upon them the material to be separated is scattered through a hopper. The surface of the cylinders consists in bands of soft iron which are kept in a magnetic state. The particles of iron are attracted to these cylinders, and at a certain

period of revolution are brushed therefrom into a receptacle, while the scraps of other metal fall to the bottom of the apparatus. The machine is said to be capable of separating 1,100 pounds of material per hour. It has also recently been employed by M. Mangon, for detecting titanic iron in arable earth, with remarkable precision, the iron, in such small quantities as 15 or even 7 grains in 22 pounds of earth, having been readily separated.

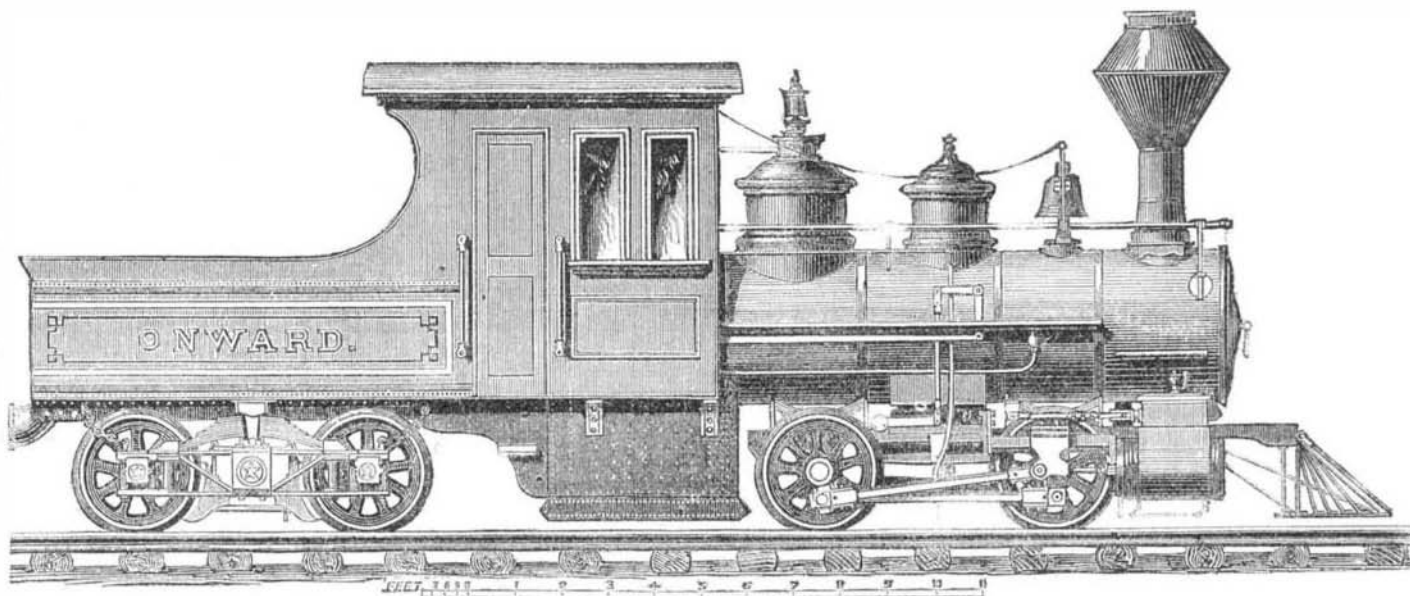
The Utility of Machines.

The following, translated from a volume recently published in France by M. Menier, entitled "The Tax on Capital," furnishes some suggestive facts for the consideration of those conservative individuals who cling to the sophism that labor-saving machinery is on the whole a misfortune to the skilled workman, since it supersedes the manual labor (of which he has, through experience and practice, obtained a kind of monopoly) by work with which in point of cheapness and accuracy he can never compete. "Homer," says the author, "mentions 12 female slaves as crushing, between stones, sufficient grain for bread for a day for 300 people. These twelve women, badly fed as they were, consumed themselves a large portion of the corn which they ground, while one woman's labor, at the most, could not prepare flour sufficient for more than twenty-five persons. There was evidently then an enormous absorption of circulating capital to produce this small result. Today, a single mill in France, containing twenty stones, attended by twenty workmen, produces sufficient flour to support 72,000 men, or, in other words, each workman feeds 3,600 bodies. In the time of Homer, the

same labor would have required 144 men, so that each modern mill hand has the power of 144 millers of ancient Greece." Again, if it should be attempted to spin by hand all the cotton which England manufactures in a year by machines carrying 1,000 spindles at a time, it would require 91,000,000 men, or the total population of France, Austria, and Russia combined. A woman can knit about 80 stitches per minute; by a circular loom she can make 480,000 stitches in the same period; thus the machine gives her the power of 6,000 persons.

The French Association for the Advancement of Science meets next year at Nantes, France, under the presidency of M. D'Eichthal.

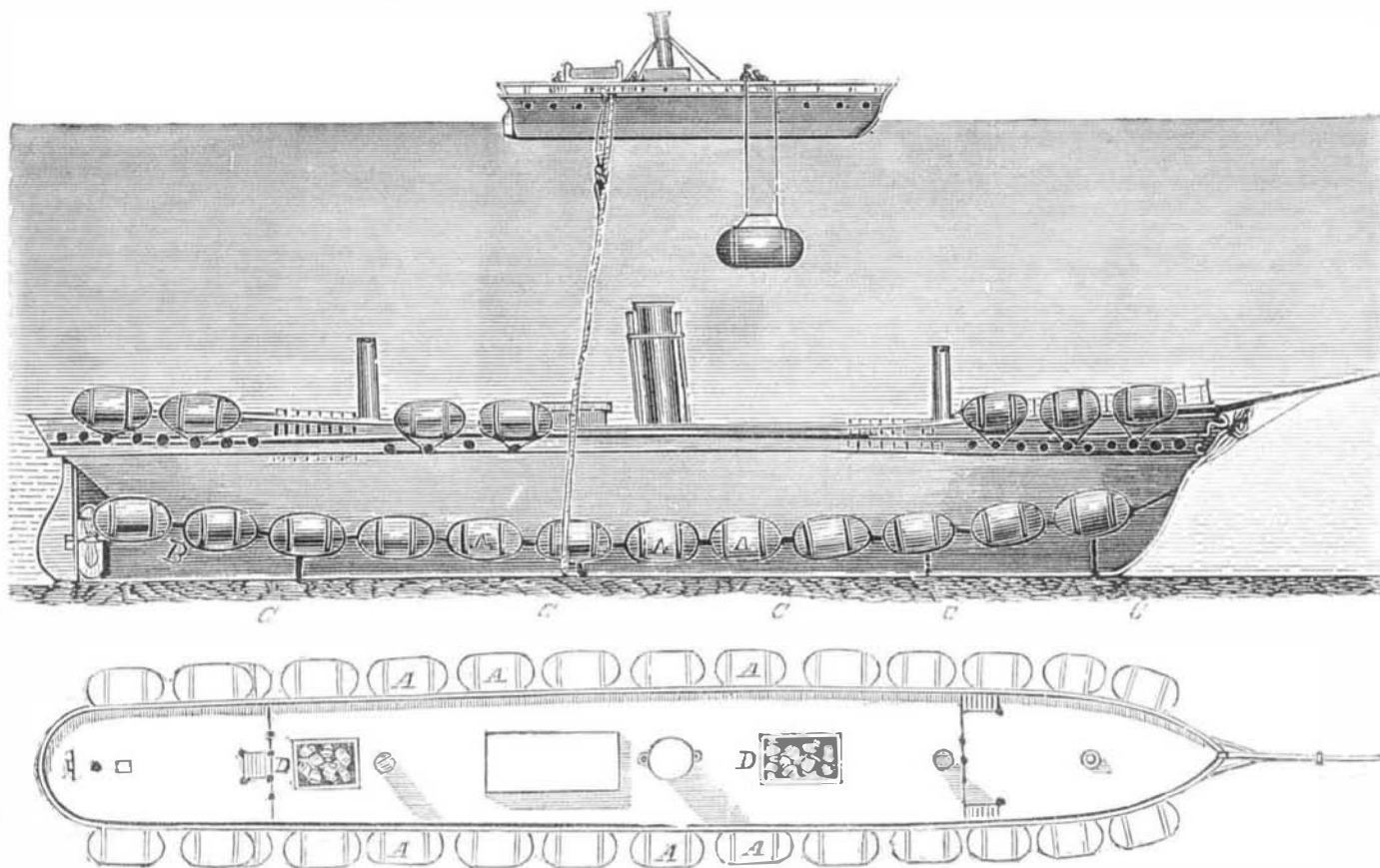
MASON'S DOUBLE BOGIE TANK LOCOMOTIVE.



ship rises to the surface, whence it may be towed into harbor. There are several obvious advantages in this system. The invention brings into operation a natural principle, simple and certain, and the water is expelled from the pontoons without employing pumping apparatus at the surface; and the pontoons being filled on shore, all that remains to be done is the arranging them about the wreck, which, from their extreme lightness under water, is a matter of little difficulty. —Iron.

Prospective Profits of English and American Railways.

The *Springfield Republican* says that the English roads seem destined to eat themselves up. Their earnings have increased 100 per cent since 1860, their working expenses 135 per cent. How many decades it will take for the expenses to catch up with the earnings is an unsolved problem. The English roads have cost three times as much per



SOWERBUTT'S APPARATUS FOR RAISING SUNKEN VESSELS.

mile as the American, largely on account of the heavy land damages, and their gross receipts are from two to three times as much per mile and their working expenses twice as much. The proportion of net earnings to capital is nearly equal in both countries, and less than 5 per cent.

Hay Fever.

From the best statistics that can at present be collected, there appear to be over fifty thousand persons in the United States who are annually subjected to this distressing complaint. In the opinion of the most intelligent physicians, it is to be classed among the nervous diseases, such as neuralgia, rheumatism, etc. An effort is being made in medical circles to obtain particulars from sufferers, and thus promote