shaft, above base line, 5 feet 4 inches. The area of immersed section (at load draft of 10 feet), is 253 square feet; displacement of water at load draft, 1,043.06 tuns; capacity of bunkers for coal, 194 tuns; description of coal used, anthracite; her draft is a screw fan.

This vessel contains two air pumps—one of salt water and the other of fresh; diameter of salt water pump, 18½ inches; diameter of fresh water pump, 13¾ inches. She is fitted with Pirsson's condenser, which contains 3,705 tubes; outside diameter of same, ⅝ of an inch; inside diameter, ½ inch; length, 4 feet 10 inches over all; and the tube sheets are ¾ of an inch in thickness. In addition to these, she has independent (steam) fire and bilge pumps of extra size, bilge injections, valves or cocks to all openings in her bottom, and all other necessary fixtures to make her a staunch and sea-worthy steamer. She is supplied with three masts, and is bark-rigged.

The hull was built by the United States government at the Charleston navy-yard; the builders of the engines and boilers are the Boston Locomotive Works.

BOWER'S ELEVATOR.

The elevator here illustrated is represented as raising water, though it may be used for other substances, equally well. The bucket, H, Figs. 1 and 3 is attached to the lower end of a series of lazy-tongs, G, the upper end of the series being connected with the inner arms of the levers, F. From the outer arms of these levers the ropes, D D, pass over the guide pulleys, E E, and are attached to the peripheries of the large wheels, C C, which are secured to the shaft, B. From this arrangement it will be seen that when a rocking motion is given to the shaft, B, by means of the handle, H, the bucket, H, receives a much greater motion either upward or downward vertically. To facilitate the filling and emptying of the bucket, the puppet valve, *d*, Fig. 3, is constructed in its bottom, and the sliding drawer, J, is arranged in the curb. When the bucket has been raised, the sliding drawer is pushed under it and the bucket allowed to descend into the drawer, when the projecting end of the valve rod pushes the valve upward, and allows the water to flow into the bottom of the drawer or spout, and out into any vessel placed properly to receive it.

Fig. 1

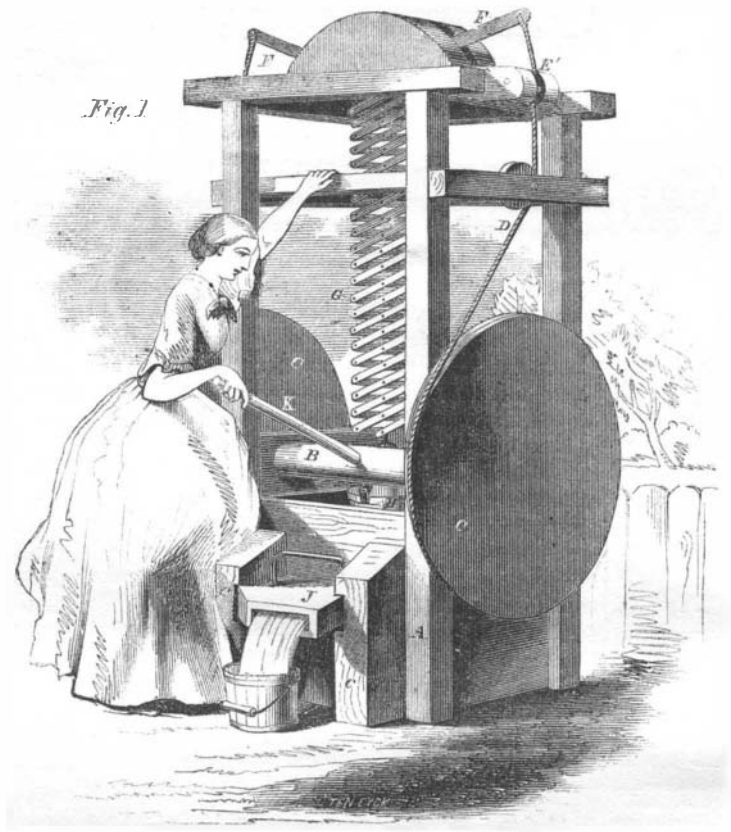


Fig. 2

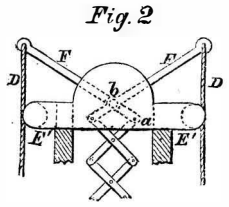
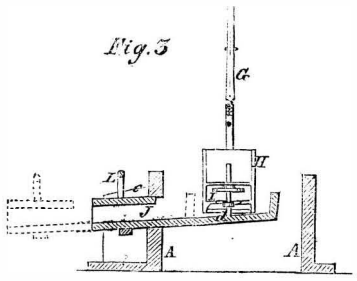


Fig. 3



BOWER'S IMPROVED ELEVATOR.

The patent for this invention was obtained, through the Scientific American Patent Agency, Aug. 2, 1859, and persons desiring further information in relation to it will please address the inventor, Abraham Bower, at Pekin, Ill.

RAILROAD COLLISIONS—AN ENGINEER'S DEFENSE.

The coroner's jury at Greenbush, N. Y., having censured H. B. C. Miliken, the engineer of the defective locomotive attached to the train that was run into on the Hudson River Railroad (as noticed by us on pages 80 and 89), he has come out in a written defence of himself. The censure was to the effect that he did not comply with the rules of the company, which require that when a train stops, it shall be where there is a clear view of it both ways. He says it was impossible for him to do so; the steam pipe of his engine gave way when he was approaching the curve; and he was driven from his post by steam and gas, so that it was impossible for him to do his duty. We admit the force of this defence; but there is one point which has not yet been cleared up, and which has never been touched upon in the decision of the jury or in the evidence adduced, and yet it is the most important one of all, namely, why was a defective locomotive employed in running that express train? This was the primary cause of the accident. Some person should be accountable for endeavoring to run the train with an engine which had to be stopped several times for repairs, and then broke down in such a dangerous position. Is the Hudson River Railroad so miserably managed that there is not a spare locomotive on it, between Albany and New York, to take the place of a broken-down one? The public wants satisfactory answers to these questions.

BOILER INCRUSTATIONS—EXPERIMENTS TO REMOVE THEM.

We have received a letter from Mr. C. C. Halladay, of Utica, Ill., likewise a specimen of incrustation (which is more than half an inch in thickness) that was removed by the sole agency of slippery elm placed in his steam boiler. He says:—"I always put in sufficient of the elm wood to color the water in the boiler, and I renew it as often as it is found necessary to keep it in that condition. If the elm is used in sufficient quantities, it will convert the scale into a thick black mud, which is easily blown off. I always put in the elm blocks as large as I can get them. I have secured a saving of at least 25 per cent in fuel since I commenced using slippery elm in my boilers."

Another communication has been received from J. W. H., of Newark, Ohio, whose previous letter we published on page 55 of the present volume. He gives us some of his experience in regard to the use of different substances in his boiler, and says:—"Molasses was the first thing which I tried to remove the scale from my boiler, but it did not effect the object. I then tried molasses to see if it would prevent the *formation* of scale, and for this purpose it was equally ineffectual as in removing it, while it tended to produce foam. Next I used hemlock bark, and its results were similar; tried it three different times. This experience I related to a friend of mine, who advised me to try chestnut-bark, and in accordance with his suggestion, I put an armfull of it into the boiler, which is 36 feet long, and 3 feet 4 inches in diameter. After running it for a week, the water was blown off, and another armfull of this bark put in, and the boiler run again for two weeks longer, then blown off and run out. The man-hole plate was then removed, and upon entering the boiler the incrustation was found to be 1⅛ of an inch thick; so the barks had no effect whatever, either in removing or preventing the formation of scale in any boiler. This is a plain statement of my experiments with molasses and astringent barks to prevent and remove incrustations. I have found the *pick* to be the only effectual friend for removing scale, and I have given my experience for the benefit of others who may place too much reliance in molasses and other substances. It would no doubt be best to prevent the formation of scale altogether; you recommend the use of pure water—so do I; but how shall we get it when it is not to be had? The water which we have here may be filtered for any length of time, and yet it will form incrustations when used in boilers. That which we use is first run from the creek into a low reservoir, and from thence it is pumped into a second reservoir or tank 180 feet high, from which it is fed to the boiler situated 75 feet below. This I consider pretty good filtering; the tank holds 6,000 gallons. I am now trying potatoes in the boiler to see what effect they will have."

We understand that Newark, in Ohio, is situated on the magnesian limestone formation; and cold filtration will not remove the lime held in solution by the water in that region. The method of filtration which we recommended on page 55 of the present volume, embraces the use of the exhaust steam to precipitate the lime on the water before it is fed to the boiler. Several of our correspondents who have tried oak and hemlock blocks with success, in preventing incrustations, have informed us that "the remedy is worse than the disease." They complain that the gallic acid in these astringent substances, when set free in the boilers, attacks the metal, and soon eats it through at the rivets and joints. If this is so, then, of course it forms a most serious objection to the use of those substances. We do not think that slippery elm will be found so injurious as oak, chestnut or hemlock; but it is only by continued experiments that this can be fully determined.

IRON-MASTERS' CONVENTION.—A large convention of iron-masters, capitalists and others recently met in Portsmouth, Ohio, and nearly every furnace and iron interest in Kentucky and Ohio were represented. After organization, a statement was made of the iron interests of the two States, from which it appears that the average produce of pig-iron from 62 furnaces is 155,000 tuns per annum; value of cold and hot-blast metal, $4,650,000; population supported by furnaces, 31,000; hands employed, 6,200, &c. The committee to whom the matter was entrusted reported a memorial to Congress, in which they represent the iron manufacture in such a depressed condition as to render the capital invested scarcely remunerative, and that relief can only be afforded by a specific duty on the import of foreign iron. A series of resolutions were passed, alleging, among other things, that it is the duty of Congress to afford such protection as will infuse new life and energy into the iron trade of the country.

TENUITY OF SILK.—One hundred yards of the raw silk of the silk-worm does not weigh a grain; and it has to be doubled and twisted many times to form a fine thread for domestic use. Still finer are the fragile threads of the spider, which, proceeding from 4,000 holes in the little animal, are all twined together to form one slight gossamer line.