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## Water Purifier for Steam Boilers.

The accompanying engravings represent the apparatus for depositing the mineral and other matter contained in water, for which a patent was granted to Gustavus Weissenborn, of this city, on the 16th of January last.

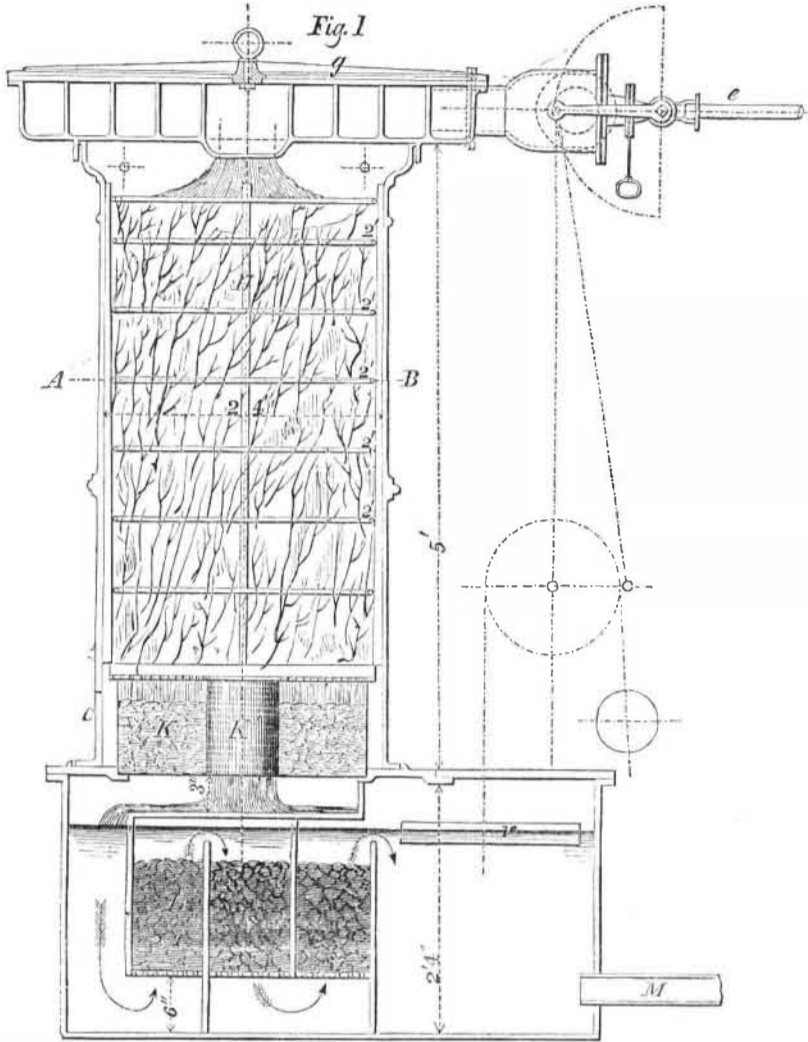
Fig. 1 is a longitudinal vertical section of the apparatus. Fig. 2 is a horizontal section through the large cylinder, A B, and fig. 3 is a plan view of the spiral exhaust chamber. The nature of the invention consists in the method of depositing mineral or other foreign matter held in solution in water, by heating the hard water by steam, and causing it to trickle or flow over an extensive surface of stones, twigs, and similar substances, and thus deposit the earthy or mineral substances in the water by the agency of heat, and the great extent of surface over which the water is made to flow.

b, fig. 3, is a pipe for introducing the steam. e is a pipe through which the hard water to be purified is injected in fine jets. ffff is the spiral channel through which the commingled water and steam pass to the center, 2, where they enter, in a fine shower, into the large cylinder, A B, and through brushwood, H, in fig. 1, between which and the sides of the cylinder, an open space is preserved, by four upright pieces of wood, at equal distances apart, and kept in their position by iron rings, 2'. The heated water flows from the brushwood into a sheet iron case, K, containing horse manure, through which it passes into the interior cylinder, which is a brass sieve, K', thence to the lower receptacle, which is placed in the ground, and can be made of wood. In this the water ascends from the bottom through pebbles or small stones, L, as shown by the arrows, fig. 1, then falls and rises again through pebbles in separate compartments, from which it passes to the reservoir, and is thence drawn off by a feed pump attached to the pipe, M. C is an exhaust relief pipe; g is the cover of the apparatus, and v represents a float to regulate the admission of water.

This is a close apparatus, and it will be understood that it is connected with a steam engine, the exhaust steam of which is injected into it, to heat the cold hard water which is admitted through the pipe, e, as has been described. The object of it is to deposit all the matter held in solution in hard water, on the brushwood, pebbles, &c., so as to render it pure previous to its being used in the steam boiler, and thus prevent it forming incrustations therein, the very principle recommended some years since in our columns to be employed in the limestone districts of our country for steam boilers, and which Mr. Weissenborn has here ingeniously carried out into practice. The annexed engravings represent an apparatus, designed for Messrs. Stillman Allen, & Co., of the Novelty Works, this city for an engine of about 100-horse power, and is about 2 feet 8 inches in diameter, and 5 feet high, with a tank or reservoir below ground of 5 feet long, 3 feet wide, and 2 feet deep.

The pumps force the hard water into the purifier, and steam from a boiler, or the exhaust steam from the engine is admitted, in sufficient quantity to heat the water to about boiling

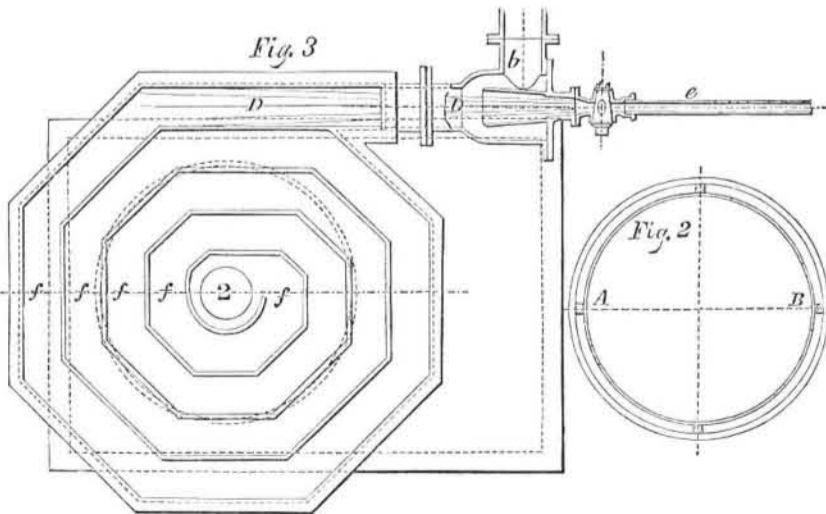
## WEISSENBORN'S PATENT WATER PURIFIER FOR STEAM BOILERS.



point. These come in contact in the upper part of the apparatus, at the entrance to a coil of pipe, which may be of 20 to 40 feet in length, and is arranged in the spiral form, to economise space, and afford greater friction than a straight smooth channel. The water is admitted through a sliding strainer, which divides the stream into numerous fine jets, thus insuring a more complete commingling with the steam, the force of which drives it with great velocity through this winding channel; thence it runs to the perforated basin, where it is showered over and trickles through the brush; from this it filters through horse manure, charcoal, or other suitable substances

contained in a coarse mat or sack, then falls and rises through the pebbles, L, placed in two or three compartments of the tank, from which it flows freed of its mineral matter, as described, into the reservoir, and thence by the feed pump is conveyed to the boiler. Any surplus steam from the apparatus is carried off to the air, or to a condenser.

At each stage of the process, a portion of the salts contained in the water is set free, and deposited in the purifier, chiefly in the spiral channel, and upon the twigs and stones, or whatever substitutes for them it may be most convenient to use, and also as a muddy precipitate at the bottom.



Due provision is of course made for opening the different parts of the apparatus, to remove the mineral and earthy matter from time to time—about every three or four months, we are told.

The most common incrustations formed in steam boilers are of carbonate and sulphate of

lime and magnesia. Heat expels from water its free carbonic acid, without the presence of which the carbonates of lime, &c., are insoluble, consequently, when the acid is expelled, these matters are precipitated. The evaporation of the heated water, causing a concentration of these salts, likewise brings them in

excess of the power of the water to hold them in solution, and also tends to the same results—their deposition. This is the philosophy of the process. But these agencies alone are insufficient to effect the separation of all the mineral matter before the water enters the boiler. To complete the process, the violent agitation of the water, its subdivision into small streams, and, in this state, meeting with, and percolating or trickling through, a mass of material presenting a great extent of surfaces for contact; all have to perform their part. As a further security for the desired result, horse manure, charcoal, or other matter, may be used, the object being, by the operation of their chemical affinities, to precipitate any solid matter which may chance still to have remained in solution.

The joint action of these principles purifies the water of its incrusting salts before it comes to be used in the boiler, leaving them deposited in the apparatus, where they are of no detriment.

This Incrustation Preventor requires but little space and attention, and it may be made quite a neat and ornamental attachment to the engine, while its utility as a heater is also self-evident. The impracticability of using the ordinary heaters for hard water, on account of the frequent bursting of the feed pipes from incrustations, renders this apparatus very valuable for some districts in our country. At the same time its services as a condenser are also deserving of attention. The form of this apparatus can be varied to suit the requirements of parties using it. The manifold evils resulting from the formation of incrustations in steam boilers, are well-known to all our readers, and need not be further alluded to at present. An efficient and simple remedy has long been a desideratum. Mr. Weissenborn—who is a mechanical draughtsman and engineer—has devoted much attention to the subject, and has invented this apparatus, and practically tested it. It is now attracting considerable attention in this city, and is here presented so that the public may have an opportunity of judging for themselves of its merits.

More information may be obtained of E. W. Sargent, Delmonico's Hotel, Broadway, N. Y.

Salt-peter.

Dr. A. A. Hayes, in a communication to the Boston *Atlas*, suggests a plan by which the present scarcity and high price of salt-peter may be in a great measure obviated. He proposes to import nitrate of soda, which is a natural product, found in the district of Atacama, South Peru. He says, "As the price of nitrate of soda at the port of shipment, is to a large extent made up from the cost of fuel consumed in refining (the country is a desert,) and the expense of transportation, it is apparent to every one, that under judicious arrangement, these charges might be much reduced, and either the crude or refined article delivered at the shipping port, at a cost much less than at present. During the last ten years, the cargo price of nitrate of soda at this port has not much exceeded two-thirds the price of the first quality of salt-peter, and it is now less than half that price. Nitrate of soda, in its dry and pure state, is composed of anhydrous nitric acid 63.53, and anhydrous soda 36.47 parts in a 100. As the nitric acid in 100 parts of salt-peter weighs 53.21, one hundred parts of nitrate of soda should afford nearly one hundred and nineteen parts of salt-peter, by exchanging its soda base for an equivalent of potash. This change can be easily effected by means of salts of potash, when salts of soda are produced on one hand, and salt-peter on the other. Salts of potash abound in wood ashes, and where wood ashes can be obtained, or any salt of potash cheaply, we may at once compete with India in the production of salt-peter for home consumption."