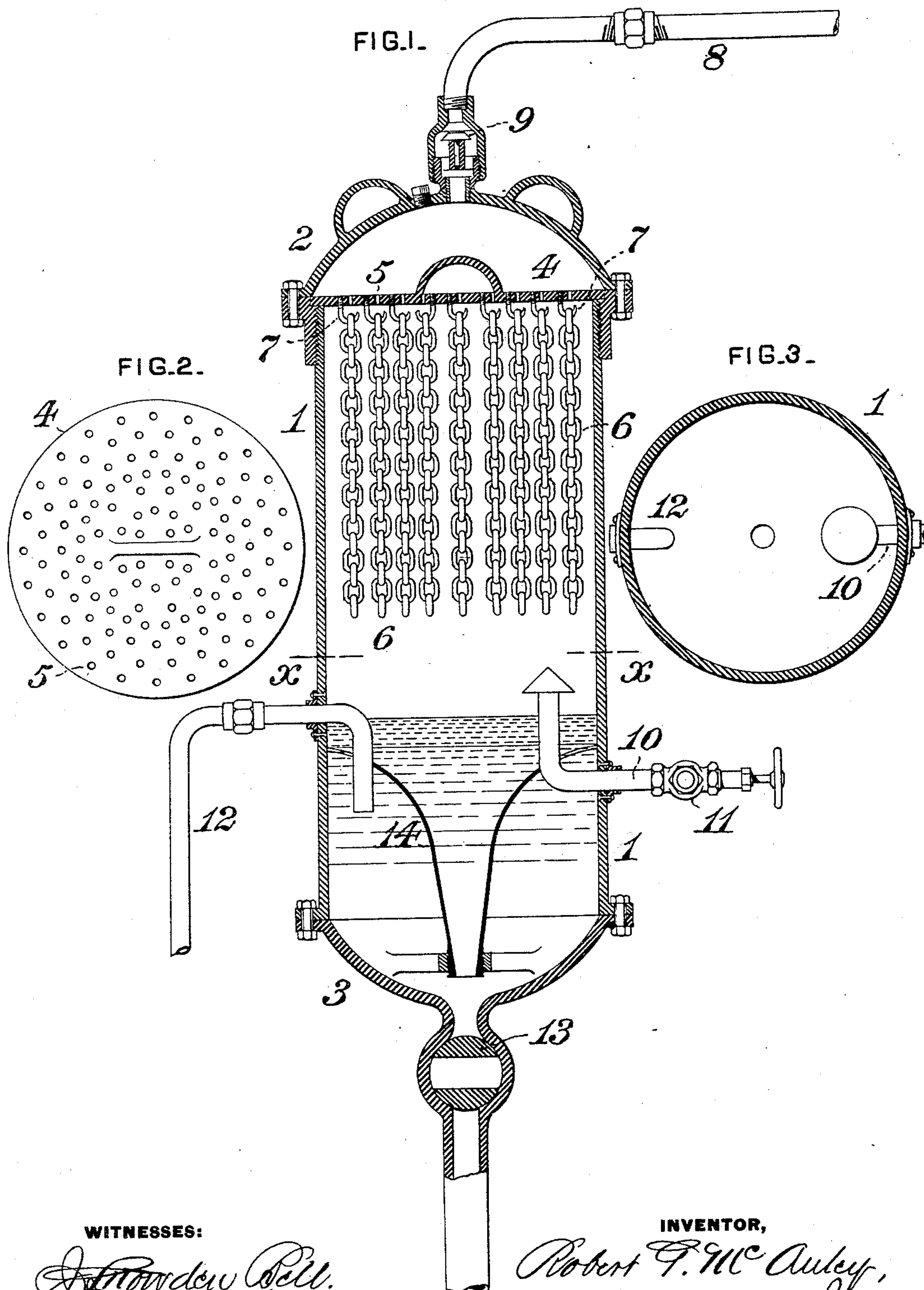


(No Model.)

R. G. McAULEY.
FEED WATER HEATER.

No. 459,254.

Patented Sept. 8, 1891.



WITNESSES:

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UNITED STATES PATENT OFFICE.

ROBERT G. MCAULEY, OF PITTSBURG, ASSIGNOR OF ONE-FOURTH TO
FRANCIS T. WILSON, OF JERSEY SHORE, PENNSYLVANIA.

FEED-WATER HEATER.

SPECIFICATION forming part of Letters Patent No. 459,254, dated September 8, 1891.

Application filed June 5, 1891. Serial No. 395,188. (No model.)

To all whom it may concern:

Be it known that I, ROBERT G. MCAULEY, a citizen of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented or discovered a certain new and useful Improvement in Feed-Water Heaters and Purifiers, of which improvement the following is a specification.

The object of my invention is to provide an appliance of simple and inexpensive construction, in the operation of which feed-water for steam-boilers may be heated and its saline and earthy impurities thoroughly removed prior to its supply to the boiler.

To this end my invention consists in certain novel devices and combinations herein-after fully set forth.

In the accompanying drawings, Figure 1 is a vertical central section through a feed-water heater and purifier embodying my invention; Fig. 2, a plan or top view of the distributing-plate, and Fig. 3 a transverse section through the shell at the line *x x* of Fig. 1.

In the practice of my invention I provide a shell or case 1, which may be of cast or wrought metal and is preferably, as shown, of cylindrical form. The shell 1 is closed at its ends by heads 2 3, and is supported vertically at a sufficient height above the water-level of a steam-boiler to admit of a proper amount of purified feed-water to be maintained in the shell and to be delivered therefrom to the boiler as rapidly as required. A distributing-plate 4 is fitted loosely on the upper end of the shell 1, and is held in position thereon with the capacity of ready removal whenever desired by the adjacent upper head 2 of the shell. The distributing-plate is perforated at short intervals throughout its entire extent by small openings 5, adjacent to which a series of hooks or hangers 7 is secured to the plate, projecting downwardly from its side within the shell 1. The hooks 7 serve to support a series of vertical deposit-collectors 6, which are preferably in the form of chains of links or rings, but which may be bent or twisted sheets, having notched or perforated edges, or rods provided with a series of projections, their essential feature being

that they shall present surfaces of such character as to be adapted to receive and collect saline impurities separated from the feed-water which trickles over them in its passage from the perforations 5 to and through the shell 1. A water-supply pipe 8, fitted with an outwardly-closing check or non-return valve 9 and leading from a pump or injector, is connected to the upper head 2 of the shell and delivers feed-water into the space between said head and the distributing-plate. A steam-supply pipe 10, controlled by a cock or valve 11, leads from the steam-space of the boiler into the lower portion of the shell and conveys live steam thereinto. A water-delivery pipe 12 leads out of the shell at a level somewhat below the discharge-opening of the pipe 10 and extends from the shell to the boiler at a point below the normal water-level therein. A blow-off cock 13, of any suitable construction, is fitted centrally in the lower head 3 of the shell, and a conical deflector 14 has its upper and larger end secured to the shell a short distance below the level of the water-delivery pipe 12, the opening at its smaller end being located adjacent to the blow-off cock 13.

In operation the feed-water which is forced through the supply-pipe 8, past the check-valve 9, passes through the perforations 5 of the distributing-plate into the shell, the finely-divided currents being exposed in their downward passage to the high temperature of the steam from the boiler which enters the shell through the pipe 10, by which the feed-water is highly heated and its saline constituents are separated and deposited on the surfaces of the depending deposit-collectors 6, over and around which the streams of feed-water pass in their downward traverse, the purified feed-water thereafter passing to the boiler through the pipe 12. The capacity of the collectors 6 increases as the deposit or scale accumulates thereon, and they are spaced at a sufficient distance apart to admit of a considerable accumulation without interference one with another. When the collectors have taken up a sufficient quantity of deposit, the period required therefor depending upon the character of the water used, the upper head 2 of the

shell is detached and the distributing-plate and connected deposit-collectors are removed to be cleansed, a duplicate plate and series of collectors being preferably kept in readiness and immediately inserted, so that the appliance may be put in service without delay upon the reattachment of the head. Mud and earthy matters are deposited in a sediment-chamber formed by the dished lower head 3, and these, together with such impurities as may be so light as to float upon the surface of the water, are blown off from time to time as required by the cock 13. The conical deflector 14 serves to direct the lighter impurities to the axial line of the shell and insure their discharge when the blow-off cock is opened.

It will be seen that the structure of my improvement is extremely simple, and that it can be made and maintained at comparatively slight cost. The large and effective area of separating-surface afforded by the deposit-collectors enables the feed-water to be thoroughly purified, and the ease and quickness with which these may be removed, cleared of deposits, and replaced are practical advantages which will be readily appreciated by those having charge of appliances of this character.

I claim as my invention and desire to secure by Letters Patent—

1. In a feed-water heater and purifier, the combination of a shell or case, a water-supply connection leading thereinto, a perforated distributing-plate extending across the shell below the water-supply connection, a series of deposit-collectors fixed to and depending from the distributing-plate, and steam-supply and water-delivery connections opening into the lower portion of the shell, substantially as set forth.

2. In a feed-water heater and purifier, the

combination of a shell or case, a water-supply connection leading thereinto, a perforated distributing-plate extending across the shell below the water-supply connection, a series of deposit-collecting chains fixed to and depending from the distributing-plate, and steam-supply and water-delivery connections opening into the lower portion of the shell, substantially as set forth.

3. In a feed-water heater and purifier, the combination of a shell or case, a removable perforated distributing-plate fitting across the shell at or near one of its ends, a head closing said end and securing said distributing-plate in normal position, a water-connection leading into the shell above said plate, a series of deposit-collectors fixed to and depending from said plate into the shell, and steam-supply and water-delivery connections opening into the lower portion of the shell, substantially as set forth.

4. In a feed-water heater and purifier, the combination of a shell or case, a water-supply connection leading thereinto, a perforated distributing-plate extending across the shell below the water-supply connection, a series of deposit-collectors fixed to and depending from the distributing-plate, steam-supply and water-delivery connections opening into the lower portion of the shell, a blow-off cock connected to the shell, and a downwardly-tapering conical deflector interposed between the steam-supply and water-delivery connections and the blow-off cock, substantially as set forth.

In testimony whereof I have hereunto set my hand.

ROBERT G. MCAULEY.

Witnesses:

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R. H. WHITTLESEY.