

No. 683,349.

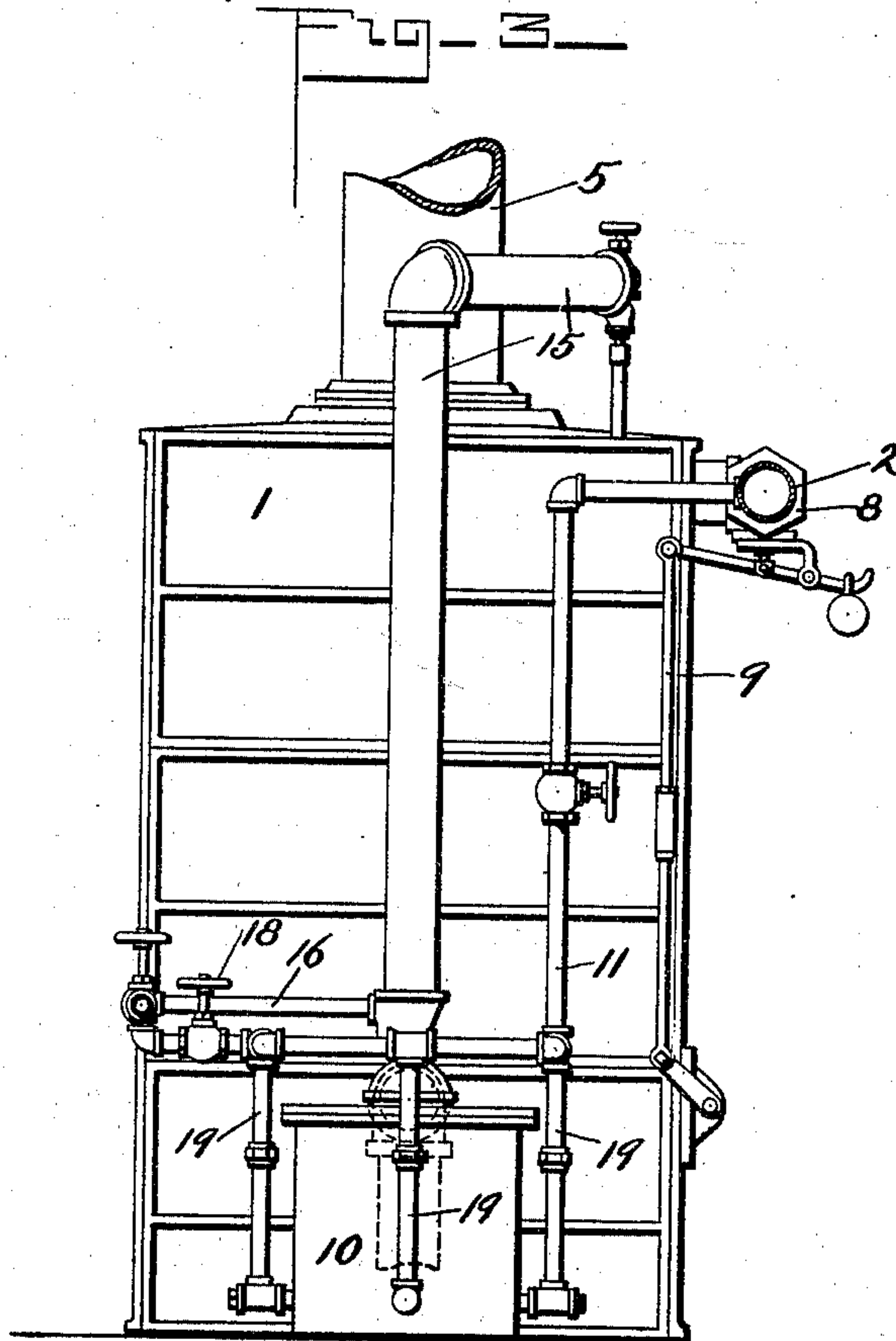
Patented Sept. 24, 1901.

A. SORGE, JR.
APPARATUS FOR PURIFYING WATER.

(Application filed Nov. 9, 1900.)

(No Model.)

2 Sheets—Sheet 2.



Witnesses

Geo D. Perry
W. H. Weir

Inventor

Adolph Sorge, Jr.

by [Signature]

UNITED STATES PATENT OFFICE.

ADOLPH SORGE, JR., OF CHICAGO, ILLINOIS.

APPARATUS FOR PURIFYING WATER.

SPECIFICATION forming part of Letters Patent No. 683,349, dated September 24, 1901.

Application filed November 9, 1900. Serial No. 35,919. (No model.)

To all whom it may concern:

Be it known that I, ADOLPH SORGE, Jr., a citizen of the United States, residing in Chicago, in the county of Cook, in the State of Illinois, have invented certain new and useful Improvements in Water-Purifying Apparatus, of which the following is a specification.

My invention relates to that class of purifying apparatus in which the impurities that it is desired to remove are brought down or collected by the chemical action of reagents supplied for the purpose and are afterward removed from the chemically-treated water by filtration. More particularly, it contemplates an apparatus for use in connection with feed-water heaters to purify the boiler-supply passing through the heater.

The object of the invention is to provide an improved construction in apparatus of the character referred to, and especially to insure a continuous flow of the chemical solution supplied in uniform proportion to the flow of the feed-water and with a uniform density of solution and to prevent the formation during the operation and in the pipes which conduct the solution to the feed-water of any deposit or incrustation resulting from the precipitation of the chemical before reaching the locality where the chemical is employed.

The invention consists in the matters herein set forth and particularly pointed out in the appended claims and will be fully understood from the accompanying description of the construction illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation of a feed-water apparatus embodying my improvements in one form, parts of the exterior walls being broken away to more clearly show its internal construction. Fig. 2 is a top plan view thereof. Fig. 3 is an end elevation thereof.

In said drawings, 1 designates a feed-water heater of the "open" type or variety; 2, the supply-pipe which discharges the feed-water into the upper end of said heater; 3, the outlet-pipe leading from the heater to the boilers, (not herein illustrated,) and 4 and 5 the inlet and exhaust pipes through which the exhaust-steam from the engine is supplied to and conducted from the heater. The latter may be of any usual or desired construction, it being herein shown as provided in its

upper portion with a series of inclined trays 6, upon the uppermost one of which the cold feed-water entering through the supply-pipe 2 is discharged to flow in a shallow stream over the succeeding lower trays subject to the heating influence of the surrounding atmosphere of exhaust-steam until it finally falls from the lowermost tray in a heated condition and collects in the lower portion of the heater, ready to be drawn off through the outlet-pipe 3, leading to the boilers. Any suitable float 7, controlling the valve 8 in the water-supply pipe through appropriate intermediate connections 9, may be provided to regulate the admission of the feed-water in accordance with the rate at which it is drawn off to the boilers and in such manner as to maintain substantially constant the water-level within the heater.

The chemical treatment of the feed-water is herein shown as accomplished by the provision of a chemical-tank 10, in which the desired reagent is placed and which is supplied with water under pressure from a suitable source—conveniently through a connection 11, leading from the supply-pipe 2. The water entering through this connection becomes impregnated with the reagent and is then discharged back into the feed-water through a pipe 12, in which a sight-feed 13 is provided to enable its flow to be visually regulated, the chemical-tank being thus, in effect, simply connected in a by-pass around a portion of the feed-water-supply pipe. This by-pass is as a further improvement arranged to have its discharge at a point where it will be free from the back pressure of the entering feed-water, which would tend to reverse the flow through the by-pass, and thus either choke and stop the flow altogether or check and render it irregular. To this end the by-pass is arranged to discharge either into the top of the heater, as shown, or into the supply-pipe 2 close enough to its point of discharge to be free from the pressure of the water entering through said pipe. The chemical solution then drops freely into and mingles with the incoming feed-water and is thoroughly intermixed therewith when it collects in the lower portion of the heater. The impurities brought down or collected by its reaction are then removed by a filter 14, that may be provided at any suitable point, but

which in accordance with the present design is conveniently located in the lower portion of the heater, as indicated in Fig. 1.

In practice it has been found that where
5 caustic soda or other solid compounds are employed as reagents a better and more uniform chemical reaction can be counted on if the flow of water through the tank 10 be so regulated as to produce a saturated solution,
10 which of course will always be of uniform strength. With such a saturated solution, however, a constant tendency exists to produce a deposit in the pipe 12, leading from the tank, and it frequently happens that in
15 a comparatively short time the incrustation resulting therefrom will completely close or choke such pipe and stop the working of the apparatus until it is removed. As a further improvement and for the purpose of obviating this difficulty, therefore, the pipe 12 is
20 herein shown as provided with a jacket 15, through which a circulation of hot water or steam is maintained. An inlet-pipe 16, leading from any suitable source of supply, is
25 herein shown as entering said jacket close to the tank 10, while a discharge-pipe 17 leads from the upper extremity of the jacket down into the heater. With this construction saturation is secured and a uniform solution will
30 continue to flow from the tank; but the heating of the water by the jacket will so increase its chemical-carrying capacity or, in effect, decrease the density of the solution as to overcome and prevent any tendency toward the
35 formation of a deposit in the pipe 12. As herein shown, also, a valved connection 18 leads from the hot-water pipe 16 to a plurality of downwardly-extending pipes 19, leading into the bottom of the chemical-tank, these
40 pipes being also in communication with the feed-water connection 11 and serving as the inlet-pipes through which water is supplied to the tank 10. The object of this arrangement is to enable the caustic soda or other
45 chemical, which tends to settle down in a solid cake at the bottom of the tank, to be periodically stirred up by a copious supply of hot water admitted through the valve 18, the attendant being instructed to open this valve
50 at intervals frequent enough to prevent such solidification.

Obviously various changes may be made in the details of the construction shown, and the essential features of the improvement
55 still made available in whole or in part. It will also be understood that, while particularly designed for use in connection with the heater system in the purification of feed-water for boilers or the like, my foregoing
60 improvements, in so far as they relate to the prevention of incrustation in the chemical-feed pipe, may also be applicable to a greater or less degree in other systems of water purification, in some of which a heater might not
65 be necessary and would therefore be omitted or in which it might be supplied in some other form or connection. Obviously, how-

ever, the operation of the apparatus as to this feature of my invention would be much the same if the heater were simply a filter instead of both a filter and heater, or if the
70 filter were provided separately from the heater, and even if the pressure heater or filter were substituted for the open form shown my improvements would still be available to
75 some extent; but in so far as the invention contemplates the securing of a uniform flow of the chemical, it particularly relates to open-heater systems, since in them the pulsating discharges of large volumes of exhaust-steam
80 from the engine produce varying degrees of back pressure on the incoming feed-water and the variable opening of the feed-water valve, due to the greater or smaller consumption of water, produces varying pressures, so
85 that if the chemical be conducted into the feed-water pipe where it is subject to these varying pressures its flow is found to be seriously irregular and subject to stoppage, especially as it is more or less throttled in
90 any case by the sight-feed and needle-valve. The conducting of the chemical directly into the top of the heater or into a point of the feed-water inlet-pipe so near to the heater that the feed-water pressure or head is re-
95 lieved or removed is found to be a marked improvement in this respect and to produce materially better results in securing the uniform flow of chemical desired.

I claim as my invention—

1. The combination with a water system, of a tank containing a purifying agent, a discharge connection leading from the tank into the system, and means for preventing the incrustation of said connection. 100
2. The combination with a water system, of a tank containing a purifying agent, a discharge connection leading from the tank into the system, and means for heating said discharge connection. 105
3. The combination with a water system, of a tank containing a purifying agent, a discharge connection leading from said tank into the system, and a heating-jacket applied to said discharge connection to prevent the
110 incrustation thereof. 115
4. The combination, with a feed-water system, including an open heater, steam inlet and exhaust pipes, and a water-supply pipe, of a tank adapted to contain a purifying
120 agent and supplied at its bottom with water under pressure, and a discharge connection leading from the upper portion of the tank into the heater system at a point where the water-pressure has been relieved. 125

In testimony that I claim the foregoing as my invention I affix my signature, in presence of two subscribing witnesses, this 2d day of November, A. D. 1900.

ADOLPH SORGE, JR.

Witnesses:

HENRY W. CARTER,
A. J. CUMMINGS.