

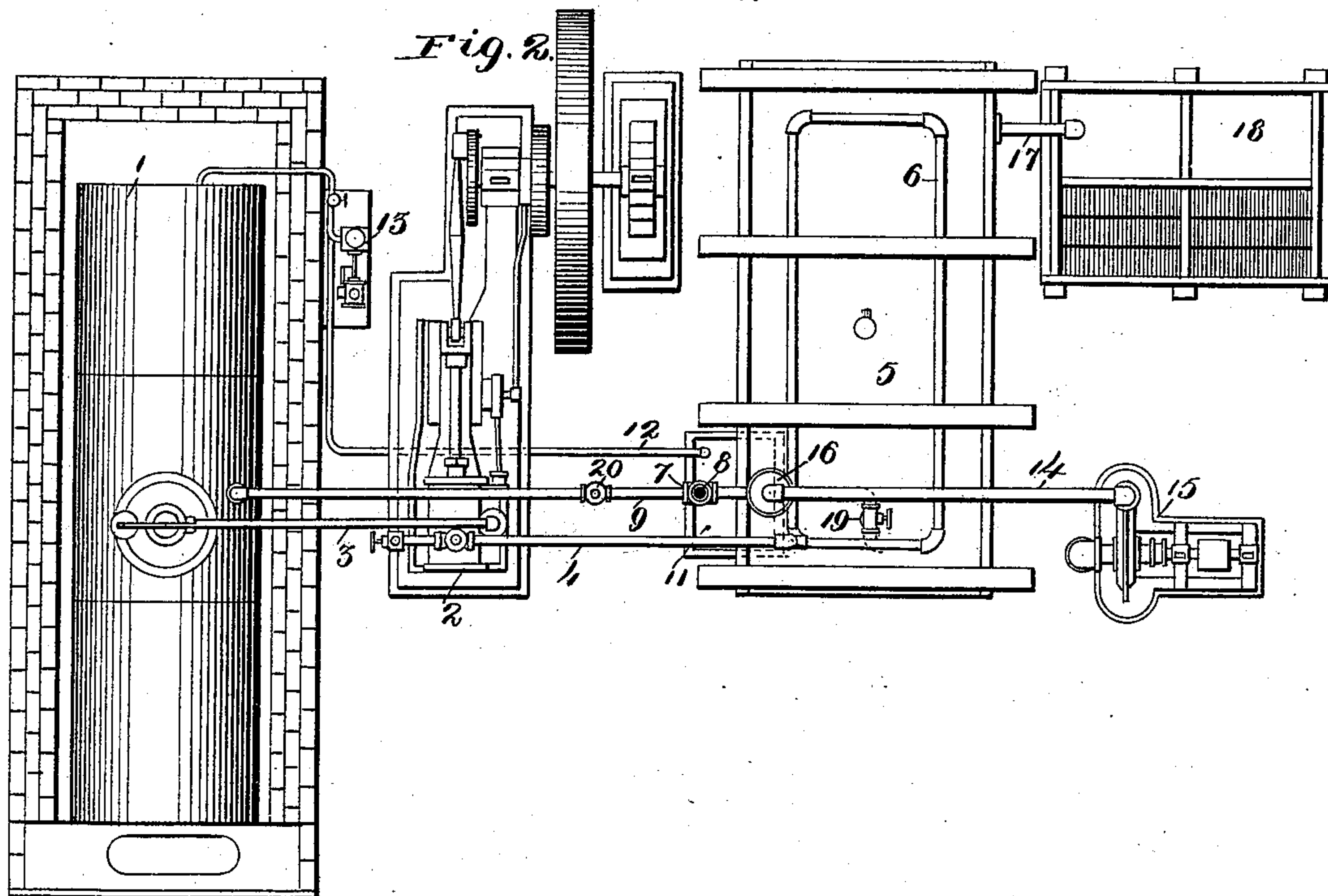
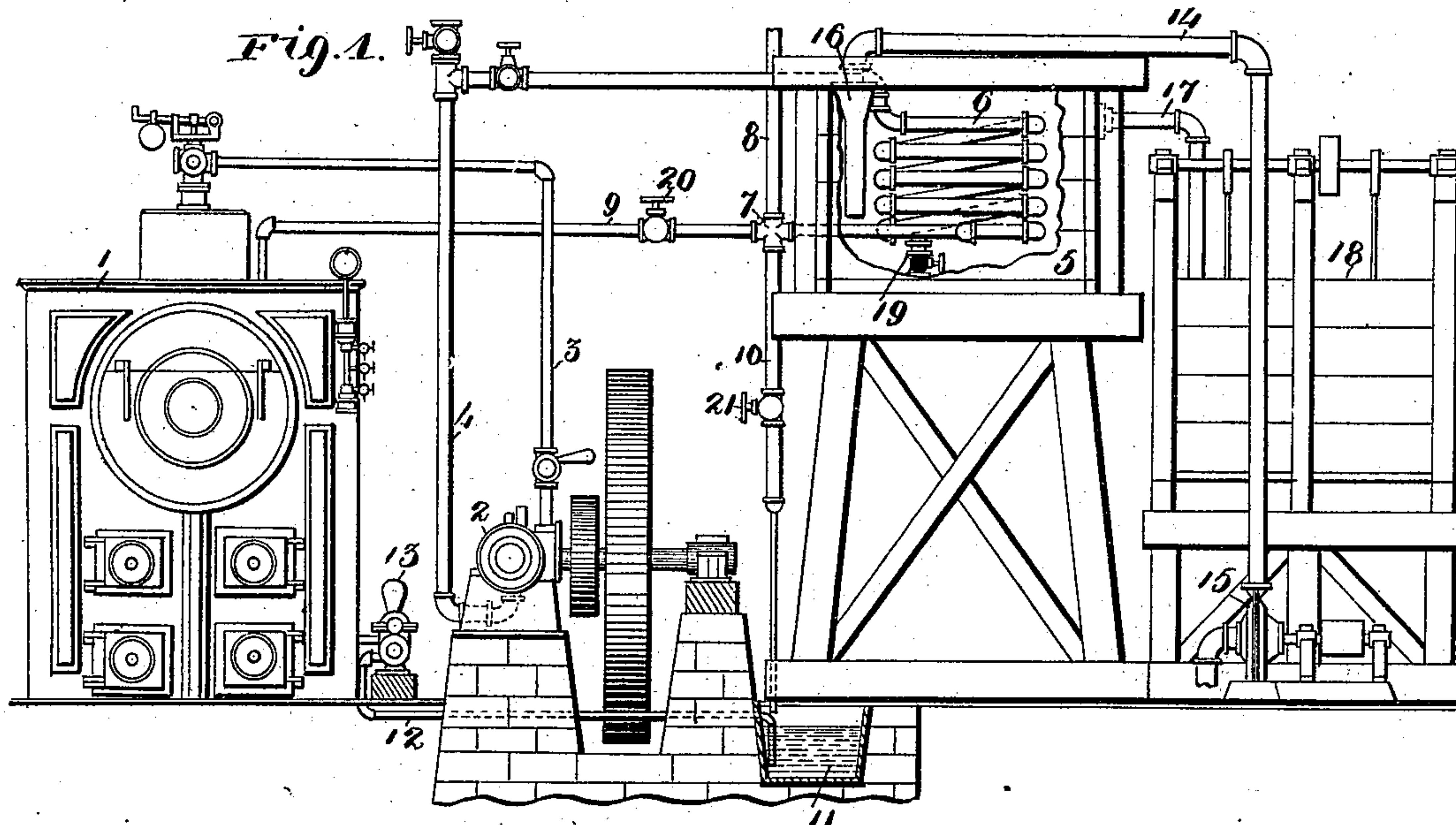
(No Model.)

J. B. McCURDY.

COMBINED SURFACE CONDENSER AND FEED WATER HEATER.

No. 518,421.

Patented Apr. 17, 1894.



Witnesses;

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# UNITED STATES PATENT OFFICE.

JOHN B. McCURDY, OF JOPLIN, MISSOURI.

## COMBINED SURFACE CONDENSER AND FEED-WATER HEATER.

SPECIFICATION forming part of Letters Patent No. 518,421, dated April 17, 1894.

Application filed December 19, 1893. Serial No. 494,130. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN B. McCURDY, a citizen of the United States, residing at Joplin, in the county of Jasper and State of Missouri, have invented a new and useful Combined Surface Condenser, Feed-Water Heater, and Supply-Tank, of which the following is a specification.

My invention has relation to an improvement in combined surface condensers and feed water heaters and consists in the novel arrangement and combination of parts more fully set forth in the specification and pointed out in the claims.

In the drawings, Figure 1 is an elevation of my complete invention and Fig. 2 is a plan view thereof.

The invention has for its object to utilize the latent heat of exhaust steam from engines for the purpose of raising the temperature of the feed water coming in contact with the exterior surface of the pipes within which the exhaust steam circulates and within which it is condensed; to utilize the water of condensation also for feed purposes; to effect a perfect condensation of the circulating exhaust medium by providing means whereby the cold feed water can abstract a maximum number of heat units from the circulating exhaust medium; to provide means whereby the heated feed water may enter the boiler through the same pipes that convey the exhaust medium; and to provide other details to be hereinafter more fully described.

The apparatus finds extensive application in many regions where mine waters charged or saturated with mineral salts that form destructive boiler incrustations, can be readily freed from such salts by a precipitation of the latter, and subsequently fed into the boiler, thus saving the expense of patronizing water works companies of adjoining towns and cities.

Referring to the drawings, 1 represents a boiler of any approved type, and 2 an engine supplied with steam by means of the pipe 3. The exhaust pipe 4 of said engine leads to a precipitating vat or tank 5, the said exhaust pipe terminating in a coil 6 within said tank and the end of said coil terminating in or having secured thereto exterior to the vat a cross coupling 7 to which are secured and from

which lead the relief pipes 8, pipe 9 leading to the boiler, and pipe 10 leading to the hot well 11, whence the waters of condensation are pumped back into the boiler through the pipe 12 by means of the pump 13. The precipitating vat is supplied with cold fresh water through the delivery pipe 14 attached to the supply pump 15 drawing water from any suitable source or supply. The water is delivered into the funnel shaped opening of a wooden or similar non-conducting guide pipe 16 within the vat 5, the open lower end of said pipe 16 being directly superposed over the horizontal terminus of the exhaust coil 6, so that as the water passes through the pipe 16 it will strike the end of the exhaust coil, and thereby abstract from the waters of condensation and steam within the coil a maximum number of heat units. The result is that very little uncondensed steam escapes through the relief pipe 8, the waters of condensation flow into the well 11, and the water within the vat 5 is heated sufficiently to be used either for feed purposes, or for purposes of ore concentration. In the present instance I have shown an overflow pipe 17 leading to the ore concentrator 18, the latter better operating with water at a higher temperature, since the separation between the gangue and ore takes place better with water at such higher temperature. In the path of the coil within the vat is placed a valve 19 opening into the vat; so that the valve when opened and after the engine has ceased operating, the water from the vat may be made to flow through that end of the coil into the pipe 9 and into the boiler, the valve 20, on said pipe being opened and the valve 21 on pipe 10 being closed. Of course during the operation of the engine, valve 20 is closed, valve 21 is opened and valve 19 is closed. I have called the vat 5 a precipitating vat since in it the soluble mineral salts of the feed waters can be precipitated from their solution before the water is fed into the boiler, the precipitate falling to the bottom of the vat from which it can be removed if necessary. The precipitation is accomplished by any of the chemical methods in vogue, depending on the nature of the soluble salts in the feed water.

By the above construction it is found that in practice the majority of the waters of con-



densation find their way back into the hot well 11 from which they are led back into the boiler; very little steam escapes from the relief pipe 8; the back pressure against the piston is reduced to a minimum; the maximum amount of heat units are abstracted by the feed waters in the vat, the desired temperature is always attained for the water in the vat for purposes of ore concentration, and in cost the device is cheap, and durable and produces most satisfactory results.

It is to be understood that the exact arrangement of the parts is not adhered to, so long as they continue to sustain the same relation to each other as herein set forth.

Having described my invention, what I claim is—

1. A combined condenser and feed water heater comprising a boiler, an engine connected to the same, an exhaust for said engine, a terminal coil for said exhaust, and a cold water pipe superposed over or in proximity to the exhaust end of the coil, substantially as set forth.

2. A combined condenser and feed water heater, comprising a boiler, an engine connected to the same, an exhaust for said engine, a terminal coil for said exhaust, a vat for said coil, a cold water pipe within said vat

having its delivery end superposed directly over the exhaust end of said coil, a valve in said exhaust end opening into said vat, a relief pipe, and pipes leading respectively to the boiler and a suitable hot well leading from the terminus of the exhaust end, substantially as set forth.

3. A combined condenser and feed water heater, comprising a boiler, an engine connected to the same, an exhaust for said engine, a terminal coil for said exhaust, a vat for said coil, a cold water pipe within said vat having a funnel-shaped opening and a delivery end superposed over the exhaust end of said coil, a valve in said exhaust end opening into said vat, a relief pipe, a pipe leading to the boiler and a third pipe leading to a suitable well, a well, a feed pump, a pipe leading from said well to said feed pump, suitable valves in said pipes, an overflow for said vat, a cold water delivery pump, a pipe for delivering water to said vat connected to the delivery pump, and a suitable concentrator communicating with the overflow from said vat, substantially as set forth.

JOHN B. McCURDY.

Witnesses:

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