T. W. MATHER.

Steam-Boiler Feeder.

No. 198,850. Patented Jan. 1, 1878.

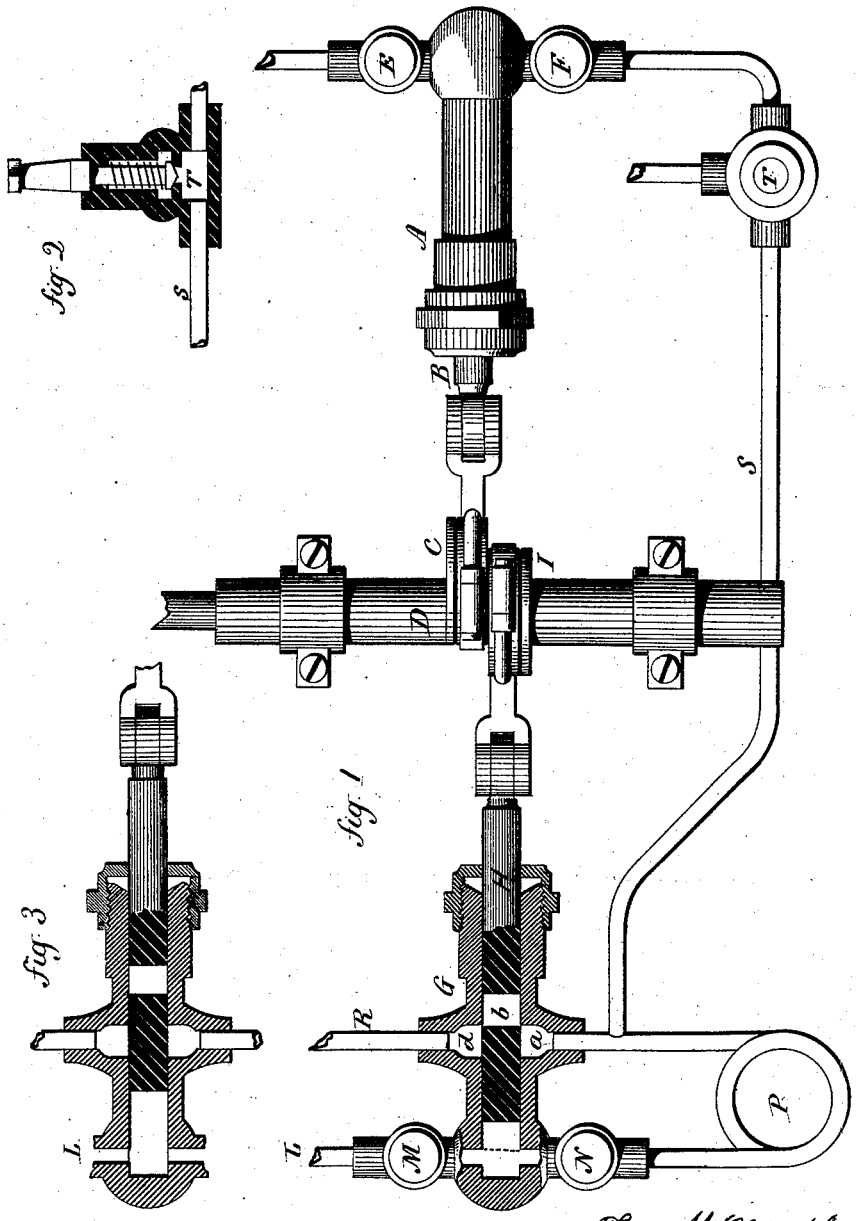

fig. 2

fig. 1

fig. 3

Witnesses.

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THOMAS W. MATHER, OF NEW HAVEN, CONNECTICUT, ASSIGNOR, BY MESNE ASSIGNMENTS, TO AUTOMATIC BOILER AND ENGINE COMPANY, OF SAME PLACE.

IMPROVEMENT IN STEAM-BOILER FEEDERS.

Specification forming part of Letters Patent No. **198,850**, dated January 1, 1878; application filed November 22, 1877.

To all whom it may concern:

Be it known that I, THOMAS W. MATHER, of New Haven, in the county of New Haven and State of Connecticut, have invented a new Improvement in Steam-Boiler Feed; and I do hereby declare the following, when taken in connection with the accompanying drawings and the letters of reference marked thereon, to be a full, clear, and exact description of the same, and which said drawings constitute part of this specification, and represent, in—

Figure 1, sectional plan view; Figs. 2 and 3, detached views.

This invention relates to an improvement in apparatus for feeding steam-boilers, specially adapted for use with boilers containing a small quantity of water and designed for rapid generation, but applicable, also, to boilers generally; the object of the invention being to maintain in the boiler a constant predetermined water-level; and the invention consists in the combination and arrangement of pumping devices, as hereinafter described, and more particularly recited in the claims.

A is a common force or plunger pump, to the plunger B of which power is applied by an eccentric, C, or otherwise. As here represented, the said eccentric is arranged upon a driving-shaft, D, to which power is applied to maintain the constant revolution. E is the inlet-valve, and F the outlet-valve, for the said pump, water being supplied to the inlet-valve from the reservoir. G is a second pump-cylinder, in which the plunger H is worked by an eccentric, I, on the shaft D, or otherwise, it only being essential that the plungers of the respective pumps shall work relatively to each other, as more particularly hereinafter described. L is a pipe leading from the water-level of the boiler to the inlet-valve M, so that, as the plunger H rises, it will draw from the boiler through the valve M, and on its descent will discharge whatever it may draw from the boiler through the outlet-valve N into a chamber, P, the said chamber here represented as a coil of pipe, the other end of the pipe returning to the pump above the discharge, and as at *a*.

Transversely through the plunger is an opening or port, *b*, which, at certain times in the movement of the plunger, opens to the inlet-passage *a*, and also to the corresponding outlet-passage *d*. From this outlet-passage a pipe, R, leads to the boiler, in the usual manner, for the water-supply pipe—that is, preferably, at its lowest point.

From the pump A and through the outlet-valve F a pipe, S, leads and opens into the chamber P, and in this pipe S, or between the valve F of the pump A and the chamber P, a pressure-regulated valve, T, is arranged. (Here represented as a spring-valve, and shown in section in Fig. 2.) The pressure of this valve is somewhat greater than the boiler-pressure, the object of which will be hereinafter explained.

The operation of this apparatus is as follows: Supposing the plunger H to be down, as indicated in broken lines, Fig. 1, as it rises to its highest point, as indicated in Fig. 3, it draws from the water-level of the boiler through the valve M into the pump; and supposing that the water in the boiler be slightly below that level, then the plunger H will draw steam only; descending, it will force that steam through the valve M into the chamber P.

When the plunger H has risen so as to close the passage *b* through it, as in Fig. 1, having previously discharged the contents below it into the chamber P, the plunger B of the other pump begins to descend, and the pump having been filled with water from the reservoir, that water will be forced through the valve F, thence into the chamber P, compressing and taking the place of the steam therein until the plunger H of the other pump has descended so far as to open the port *b* through it; then the contents of the chamber P, being under a pressure greater than that of the boiler, that extra pressure will force water from the chamber P, through the port *b* and pipe R, to the boiler, until the pressure in the chamber P falls to the pressure of the boiler, and so continuing, each rise of the plunger H drawing steam from the boiler, and on its descent opening the port *b* for the discharge of water to

the boiler, and until the required level is attained.

Again, supposing the water in the boiler to be above the level, the plunger H will then draw water from the boiler instead of steam, as before, and force the water into the chamber P. The plunger B, also working, will discharge the water, as before, into the pipe S and chamber P; but as that is now full of the water drawn from the boiler, the force of the plungers produces upon the water between the two pumps increased pressure, and so as to overcome the pressure on the valve T, and, opening that, the water in the chamber P will there escape to waste or return to the reservoir until the pressure in the chamber P is reduced to the pressure on the valve T, or until the port *b* is opened. Then the water in the chamber P will flow to the boiler through the open port until the pressure in the chamber is reduced to that of the boiler; but the amount thus flowing into the boiler will be less than that drawn out, because the draft is the full stroke of the plunger, and the port *b* does not open until after the plunger of the pump G has descended a considerable portion of its stroke.

Again, suppose the level of the water to be such that the pump G will be but partially filled, then steam will follow, resulting in a charge of both steam and water, which will together be forced into the chamber P, and the steam compressed by the force from the other pump, the surplus escaping through the valve T, and a small portion flowing to the boiler, as before. Thus the pumps continue, the one, A, to force a regular and constant quantity of water toward the chamber P; the other to draw from the boiler steam or water, or both, as the case may be, and accordingly discharge the surplus water or admitting additional water into the boiler. By this operation a substantially constant water-level will be maintained in the boiler.

The pump-valves are here represented as the common puppet-valves; but in practice it is preferable to operate the valves mechanically, in order to prevent any foreign substance interfering with the proper closing of the valves.

The pumps are shown in illustration as entirely separate, the one from the other; but they may be combined or directly united, it only being essential that the plunger of one shall operate relative to the plunger of the other, substantially as described. This feed, as before stated, is specially adapted to steam-generators containing but a small quantity of water, and generating rapidly, and in which it has heretofore been very difficult under high pressure to maintain a constant water-level, and without which such small generators are impracticable.

While it is preferable to construct the plunger H so as to form the valve or port *b*, through which the water passes from the chamber to the boiler, it will be readily seen that this may be a valve independent of the plunger, and operated by independent mechanism, it only being essential that the valve or port shall open at substantially the relative time described.

It is therefore not intended to limit this application to the particular construction of the parts as shown in the accompanying drawings.

I claim—

The combination of a pump operating to draw from the water-supply, a second pump operating to draw directly from the water-level of the boiler, and a chamber into which both the first and second pumps may discharge, with a valve opening from the said chamber to the boiler, and a waste-valve, and operating substantially as described.

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Witnesses:
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