

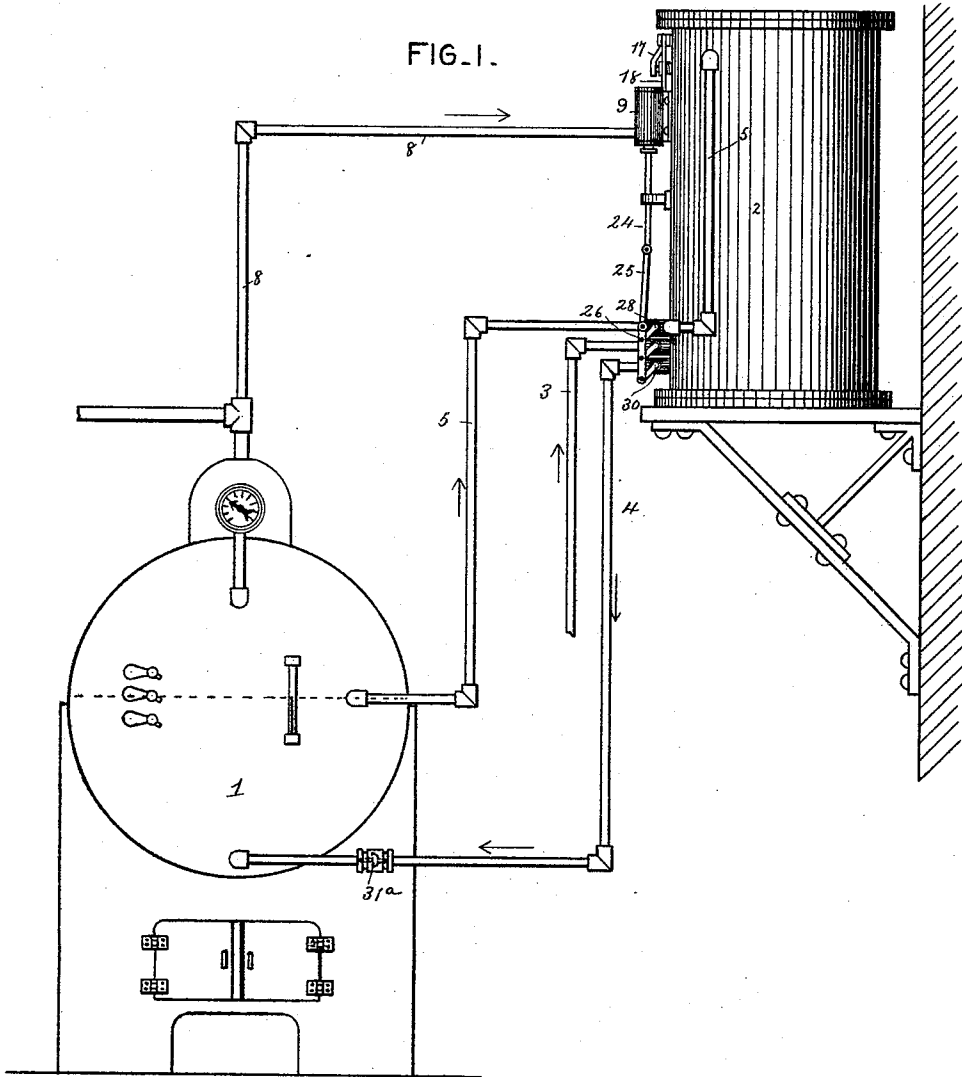
(No Model.)

4 Sheets—Sheet 1.

C. A. I. BABENDREIER.
STEAM BOILER FEEDER.

No. 437,551.

Patented Sept. 30, 1890.



WITNESSES:
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(No Model.)

4 Sheets—Sheet 2.

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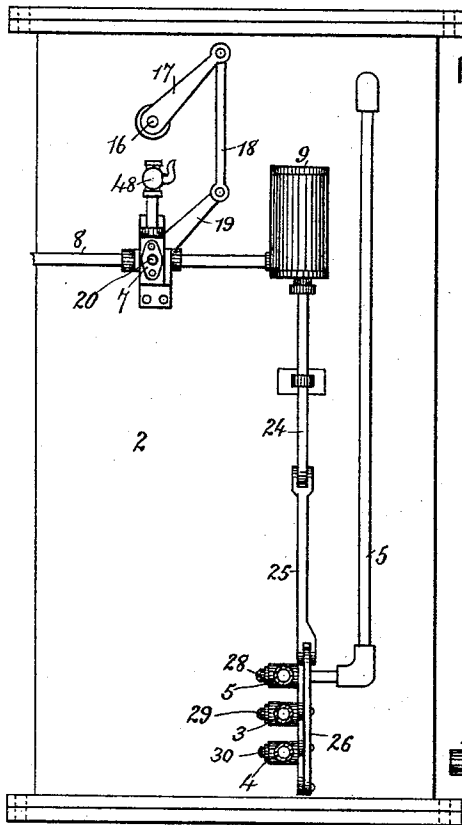


FIG. 2.

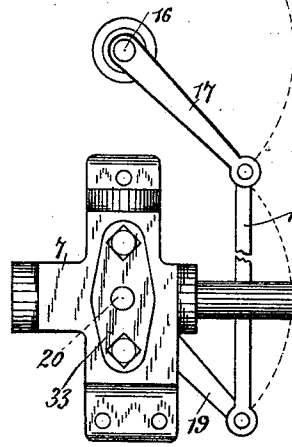


FIG. 5.

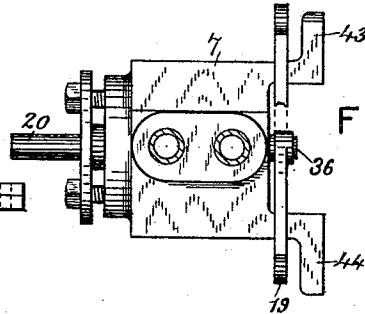
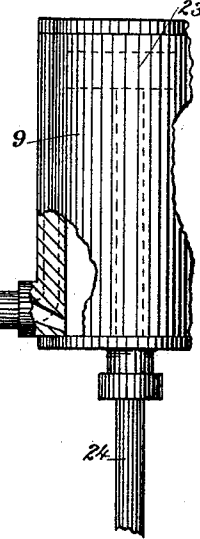


FIG. 7.

FIG. 4.

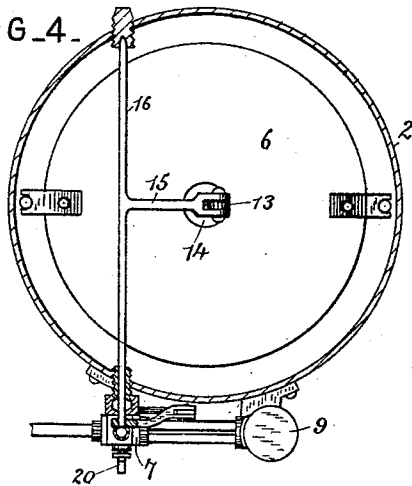
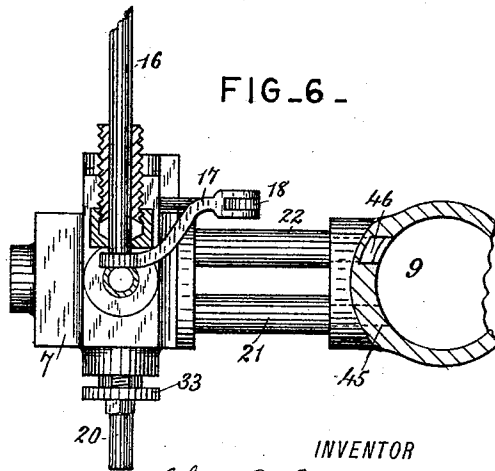


FIG. 6.



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FIG. 3.

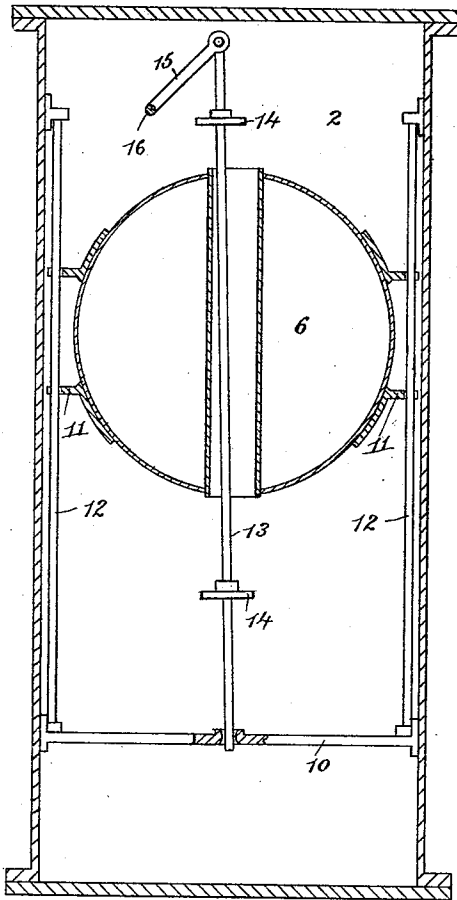


FIG. 8.

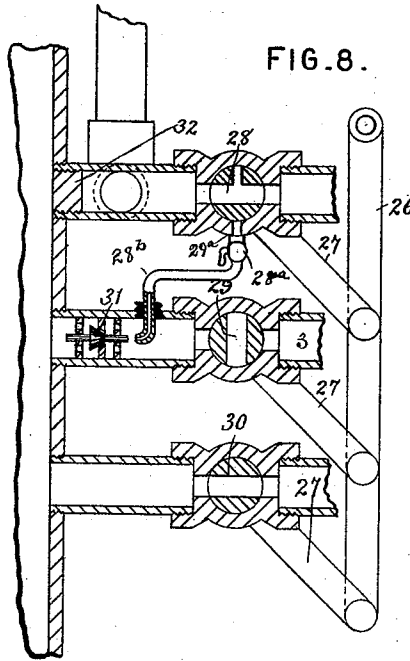
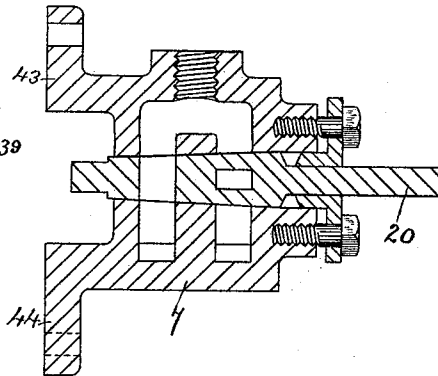
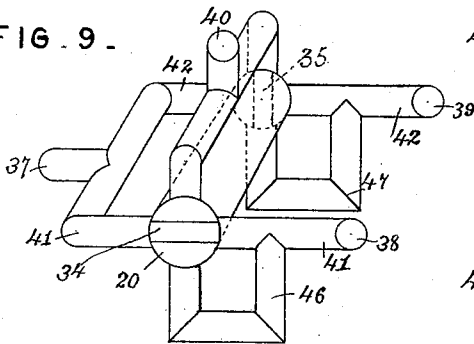


FIG. 16.

FIG. 9.



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FIG. 14-

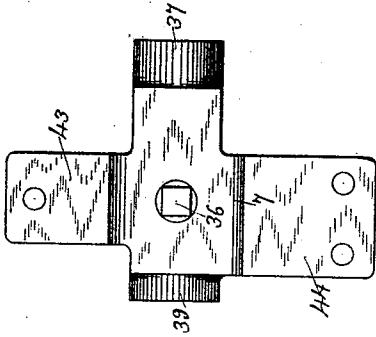


FIG. 15-

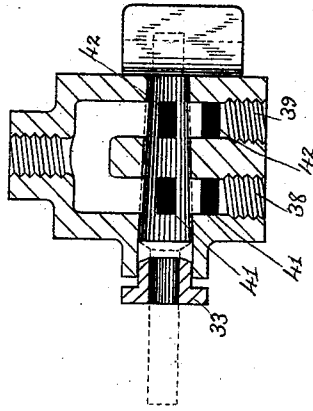


FIG. 12 -

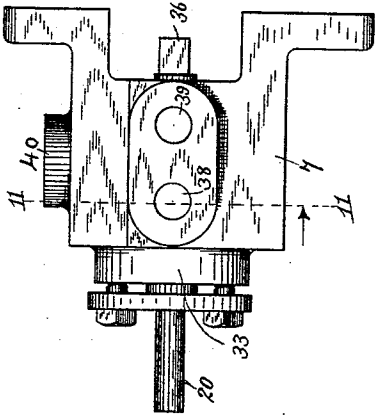


FIG. 13-

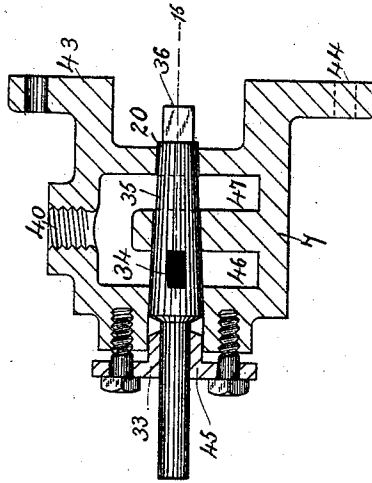


FIG. 10-

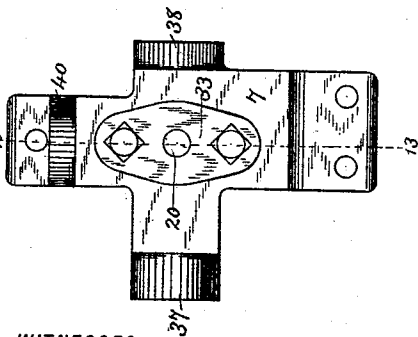
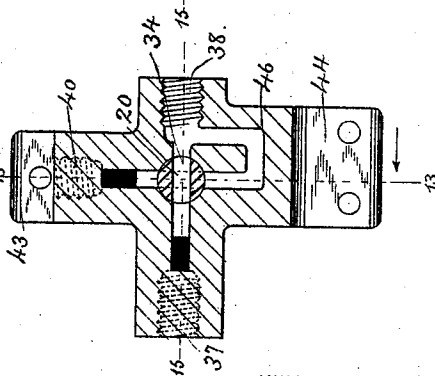


FIG. 11-



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UNITED STATES PATENT OFFICE.

CHARLES ALBERT I. BABENDREIER, OF BALTIMORE, MARYLAND, ASSIGNOR
TO LAURENCE C. BRICKENSTEIN, OF LITITZ, PENNSYLVANIA.

STEAM-BOILER FEEDER.

SPECIFICATION forming part of Letters Patent No. 437,551, dated September 30, 1890.

Application filed October 9, 1889. Serial No. 326,437. (No model.)

To all whom it may concern:

Be it known that I, CHARLES ALBERT I. BABENDREIER, a citizen of the United States, residing in the city of Baltimore, in the State of Maryland, have invented certain new and useful Improvements in Steam-Boiler Feeders, of which the following is a specification.

This invention relates to boilers and to steam-boiler feeders in which the water passes by gravity alone from an elevated trap into the boiler at the proper periods determined by the condition of the water in the boiler to be fed.

The invention consists in certain details of construction of the apparatus heretofore used, and in certain novel additional features; all of which will be more fully described hereinafter; and particularly pointed out in the claims.

More particularly the invention consists in the combination of a steam-boiler provided with a steam-exit pipe terminating at any desired water-level, and an elevated trap having communication at top and bottom with the lower part and water-line of the boiler for feed-water and equilibrium, respectively, a suitable water-supply and means for controlling the supply, feed, and equilibrium pipes, consisting of an engine having connection with cocks in said pipes fed by steam from the dome of the boiler and controlled by a peculiarly-formed steam-cock inserted in the passage from the dome to the engine, and itself controlled in operation by a float in the water-trap.

The operation of these parts is such as to supply the boiler up to any designated line immediately on the lowering of the level of the water sufficiently to unseal the equilibrium-pipe by the amount of water in the trap, and to immediately fill said trap for repeated use as soon as the level in the boiler rises high enough to seal the end of the equilibrium-pipe. It is intended that the opening and closing of the valves in the several pipes shall be by positive force from the engine, so that the float is not depended on to perform any operation requiring much force.

In the accompanying drawings, Figure 1 is an elevation showing a boiler with all the ex-

ternal attachments embodied in my invention. Fig. 2 is a detached elevation of the trap and the operating mechanism, the only parts omitted being the boiler and pipe connections. Fig. 3 is an axial sectional view of the trap, taken in a plane parallel to Fig. 2. Fig. 4 is a horizontal section on the line 4 4, Figs. 2 and 3. Fig. 5 is a detached elevation of the engine and its controlling-valve. Fig. 6 is a sectional view on the line 6 6, Fig. 5, looking downward, showing parts of the operating mechanism represented in Fig. 4 on a larger scale. Fig. 7 is a rear end view of the peculiarly-formed steam-cock for controlling the engine. Fig. 8 is a sectional view through a portion of the trap, and the feed, equilibrium, and supply pipes, showing the arrangement of the same together with their operating-levers and the connecting-link by which they are moved in unison when said link is connected to the engine. Fig. 9 is a diagrammatic perspective view of the ports and ducts with the peculiarly-formed steam-cock. Fig. 10 is a side elevation of the steam-cock. Fig. 11 is a vertical section on the line 11 11, Fig. 12, the plane of the section being parallel to the plane of Fig. 10. Fig. 12 is a rear end elevation similar to Fig. 7, with the omission of the operating-lever and on a larger scale. Fig. 13 is a section on the line 13 13, Fig. 14, the plane of the section being parallel to the plane of Fig. 12. Fig. 14 is a rear side elevation. Fig. 15 is a horizontal axial section on the line 15 15, Figs. 11, 12, and 13, the plug of the steam-cock being removed. Fig. 16 is an axial section similar to Fig. 13, but looking in the opposite direction.

1 represents the boiler; 2, the steam-trap; 3, the supply-pipe; 4, the feed-pipe, and 5 the equilibrium-pipes. (See Figs. 1 and 2.)

6 represents the float; 7, the steam-cock; 8, the steam-pipe, and 9 the engine.

The float 6 is mounted upon vertical rods 12 by means of the recessed projections 11, secured to said float, and the float has an axial perforation, through which passes the rod 13, having the upper and lower collars 14, with which the float engages as it is raised or allowed to fall by the weight of the trap. The rod 13 is secured at its lower end by a

transverse bracket 10, and is pivotally connected at its upper end with a crank-arm 15 on a rod 16, which rod 16 has bearing at two points in the periphery of the trap. One end of the rod 16 projects outward through a stuffing-box and carries on its outer end another crank-arm 17, which is connected by a link 18 to the lever or crank arm 19, which last named is keyed on the square end 36 of the steam-cock plug 20. It will thus be observed that the rising and falling of the float in the trap will rotate the valve-plug 20.

21 and 22 are the pipes leading from the steam-cock 7 to the opposite sides of the piston 23 in the engine 9. 24 is the piston-rod of said engine, which is connected directly or by a pitman 25 to the link 26, which is connected to the levers 27 of the turn-plugs 28, 29, and 30 in the pipes 5, 3, and 4.

31 represents the check-valve located in the water-supply pipe 3 for the purpose of preventing back-pressure or return of water in said pipe, as will be observed by reference to Fig. 8. In this figure, also, it will be seen that the equilibrium-pipe 5 does not enter the trap below, but is stopped by a plug 32 and is continued upward, entering the trap above its water-line.

33 represents a stuffing-box around the projecting end of valve-plug 20 for the purpose of preventing the escape of steam, the rear end being conical and adapted to be tightened in the housing by the action of the stuffing-box plate 45.

34 is a port in the valve-plug 20, and 35 a similar port at right angles to port 34, said ports being adapted to communicate with the parallel ducts 41 42 in the steam-cock 7.

37 is the inlet of the steam-cock 7, and 38 and 39 are the outlets or openings communicating with the respective sides of the piston 23. The inlet-passage is divided in the front part of the steam-cock into two passages 41 42, adapted to be opened and closed by the ports 34 and 35, respectively, said passages 41 and 42 extending forward horizontally and communicating with the respective ports 38 and 39.

Crossing at right angles to the ducts 41 and 42, and also controlled by the plug 20, are supplementary ducts 46 47, which communicate above with a common exhaust-port 40, and turning below are brought in communication with the ducts 41 42 to the rear of the valve-plug and just inside the ports 38 39. These supplementary passages are opened by the same opening in the plug 20 as is provided for the passages 41 42.

43 and 44 are respectively the upper and lower perforated flanges by which the steam-cock is secured to the side of the trap or in the top of the trap, or to any other support convenient.

The operation of the steam-cock is such that steam-pressure is always allowed to communicate with one side of the piston through the ducts 41 or 42, while the other side of the

piston has communication with the exhaust 40 through the supplementary ducts 46 or 47, the ports 34 and 35 in the valve-plug 20, as stated before, being at right angles to each other and coinciding with both pairs of ducts.

It is obvious that the equilibrium-pipe 5 should be of sufficient caliber to permit the immediate equalizing of the pressure above and below the water in the trap, so that the operation will be prompt and uninterrupted. It is also obvious that a check-valve of any approved pattern should be inserted in the feed-pipe between the boiler and the trap.

The above-described mechanism will operate automatically and reliably to replace the water in the boiler each time a sufficient amount is used to uncover the mouth of the equilibrium-pipe, the interim between the supplies being always sufficient to permit the filling of the trap by the hydrant. The several communicating-pipes are opened or closed at the proper time, so that while the water is passing into the boiler there can be no back-pressure on the hydrant supplying it, the same being cut off entirely, and while the water is coming in from the hydrant there can be no opposition to it from the steam, inasmuch as the equilibrium and steam pipes are both cut off, and there will be no difficulty from air-pressure, inasmuch as the equilibrium-pipe 5 is further provided with a port 29^a, communicating with the outer atmosphere or supply pipe at will through a cock 28^a, located in a branch pipe 28^b, leading to the supply-pipe 3, between the hydrant or supply and the check-valve 31, so that when the cock 28 places the port 29^a and trap 2 in communication the steam in the trap will, if the cock 28^a be properly turned, rush into the hydrant-pipe 3 and thus equalize the pressure on both sides of the valve 31 and thereby allow the latter to open under the pressure from the hydrant. The cold water of course condenses the steam and thus overcomes the pressure. The exhaust 40 may also be provided with an additional cock 48, in order to regulate the exhaust to prevent the too sudden movement of the piston in the engine by forming a cushion of the exhaust-steam behind it. Furthermore, it will be observed that the operation of the valves is not directly dependent upon the float, which is not always reliable for doing work where much force is required, but said valves are operated by the force of the steam in the engine, the float only being utilized to oscillate the easy-moving valve of the engine.

I find it essential to employ the turn plugs or cocks 28 29 30 instead of the usual slide, check, or puppet valves, for the reason that the plug or cock is effective in resisting unusual and adverse pressure, whereas the said other valves are effective in resisting pressure from one direction only, and when the pressure of the hydrant exceeds that of the boiler, as is always the case when the fires are first started, it is readily seen that anything but

a plug would open under the pressure of the hydrant and thus cause the boiler to become flooded.

5 Having thus described my invention, the following is what I claim as new therein, and desire to secure by Letters Patent—

10 1. The combination, with a boiler, a trap, feed and equilibrium pipes, communicating between the boiler and trap, and a supply-pipe communicating with the trap, of valves
15 in said pipes, arms for operating said valves, a link connecting said arms together, an engine having a piston connected to said link for controlling the operation of said valves, a
20 steam-cock 7, communicating with the dome of the boiler and controlling the operation of the engine, and a float in the steam-trap controlling the operation of the steam-cock 7, all
substantially as set forth.

25 2. In a steam-boiler feeder, the combination of the boiler, the elevated water-trap, the supply-pipe, the feed-pipe, and the equilibrium-pipe, valves in said pipes arranged so that the supply-pipe is opened while the feed and
30 equilibrium pipes are closed, crank-arms 27, for operating said valves, a link connecting said arms together, an engine having a piston-rod connected to said link for operating said
valves simultaneously, a steam-pipe communicating with the engine and controlled by a
suitable valve, a rock-shaft operated by a float in the trap, and crank-connection between
said rock-shaft and the steam-cock, substantially as set forth.

3. In a steam-boiler feeder, the combination, 35 with the boiler and trap, of the pipes 3 4 5, connecting said boiler and trap, valves in pipes 4 5, adapted to be opened simultaneously, and the valve in pipe 5 having an exhaust-port, a valve in pipe 3, adapted to be
40 closed when aforesaid valves are open, and an exhaust-duct leading from the valve in pipe 5 to the pipe 3, substantially as set forth.

4. In a steam-boiler feeder, the combination, 45 with the boiler and a trap, of a pipe connecting the said trap with the boiler on a selected water-line therein, a feed-pipe connecting said trap and boiler, a water-supply pipe connected to said trap, turn-plugs in said pipes connected together so as to operate in unison,
50 and an engine for operating said turn-plugs, substantially as set forth.

5. In a steam-boiler feeder, the combination, 55 with the boiler and a trap, of a pipe connected to the upper part of said trap and terminating in the boiler at a selected water-line, a water-supply pipe connected to said trap, a feed-pipe connecting said trap and boiler, turn-plugs in said pipes connected together
60 so as to operate in unison, an engine for operating said plugs, and a float in said trap for controlling the operation of said engine, substantially as set forth.

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Witnesses:

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THOS. IRELAND ELLIOTT.