

No. 744,250.

PATENTED NOV. 17, 1903.

F. W. & H. L. SHUPERT.
GRAVITY BOILER FEEDER.

APPLICATION FILED MAR. 30, 1903.

NO MODEL.

2 SHEETS—SHEET 1.

Fig. 1.

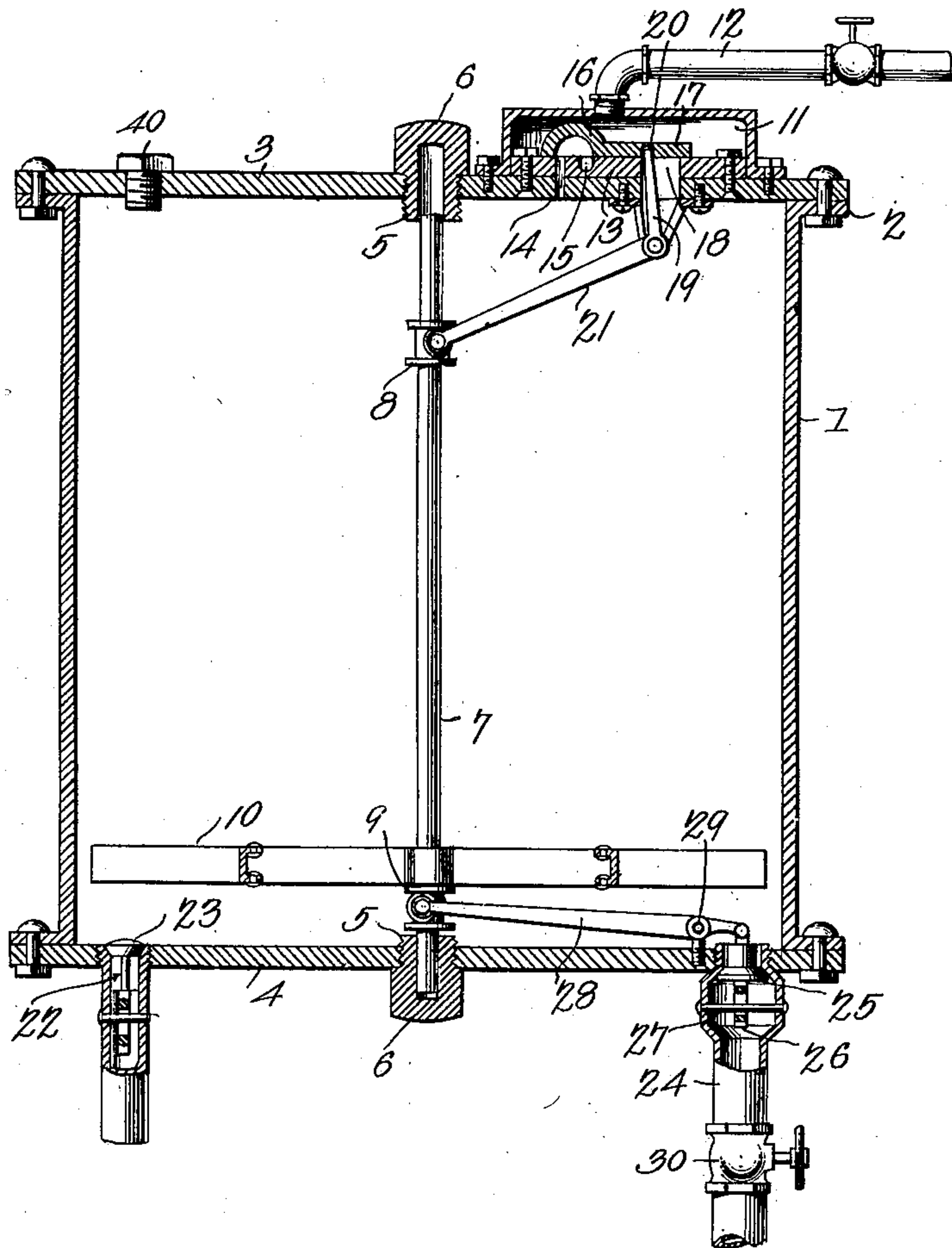


Fig. 2.

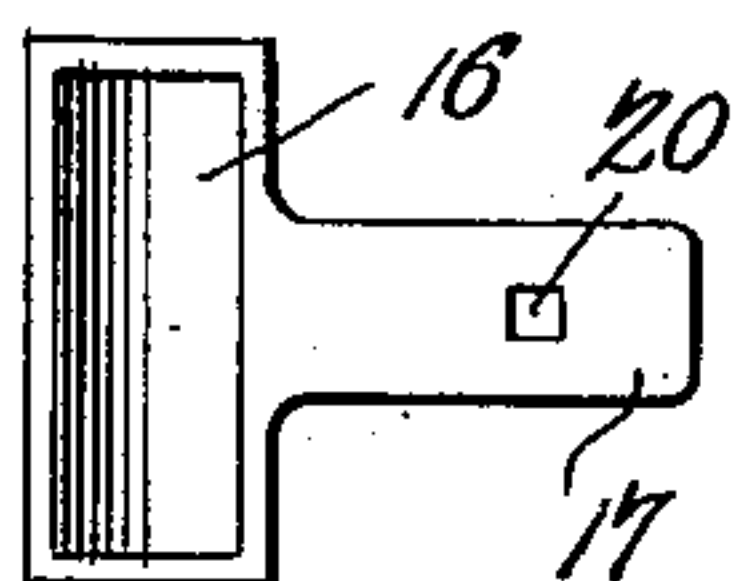
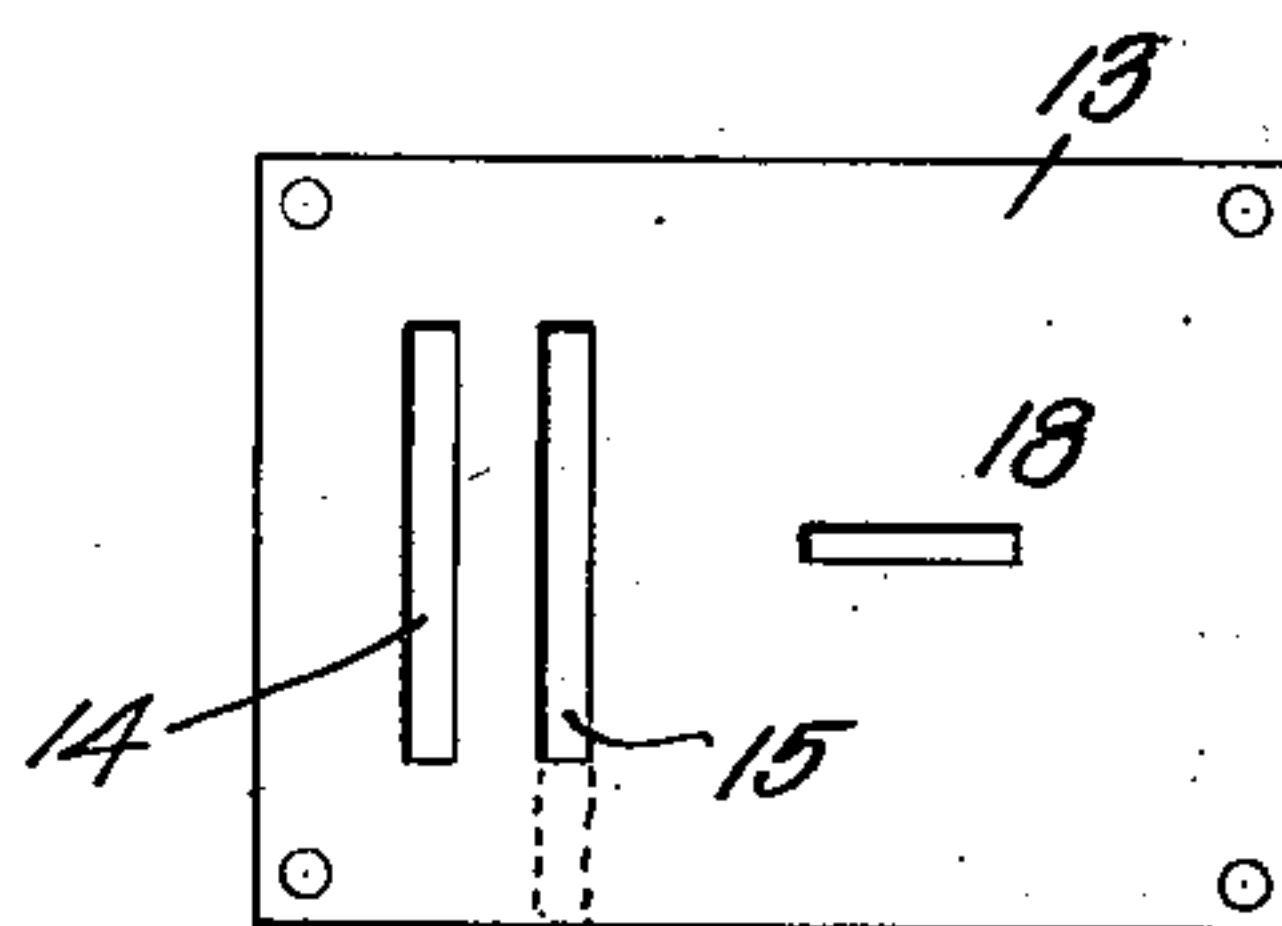


Fig. 3.

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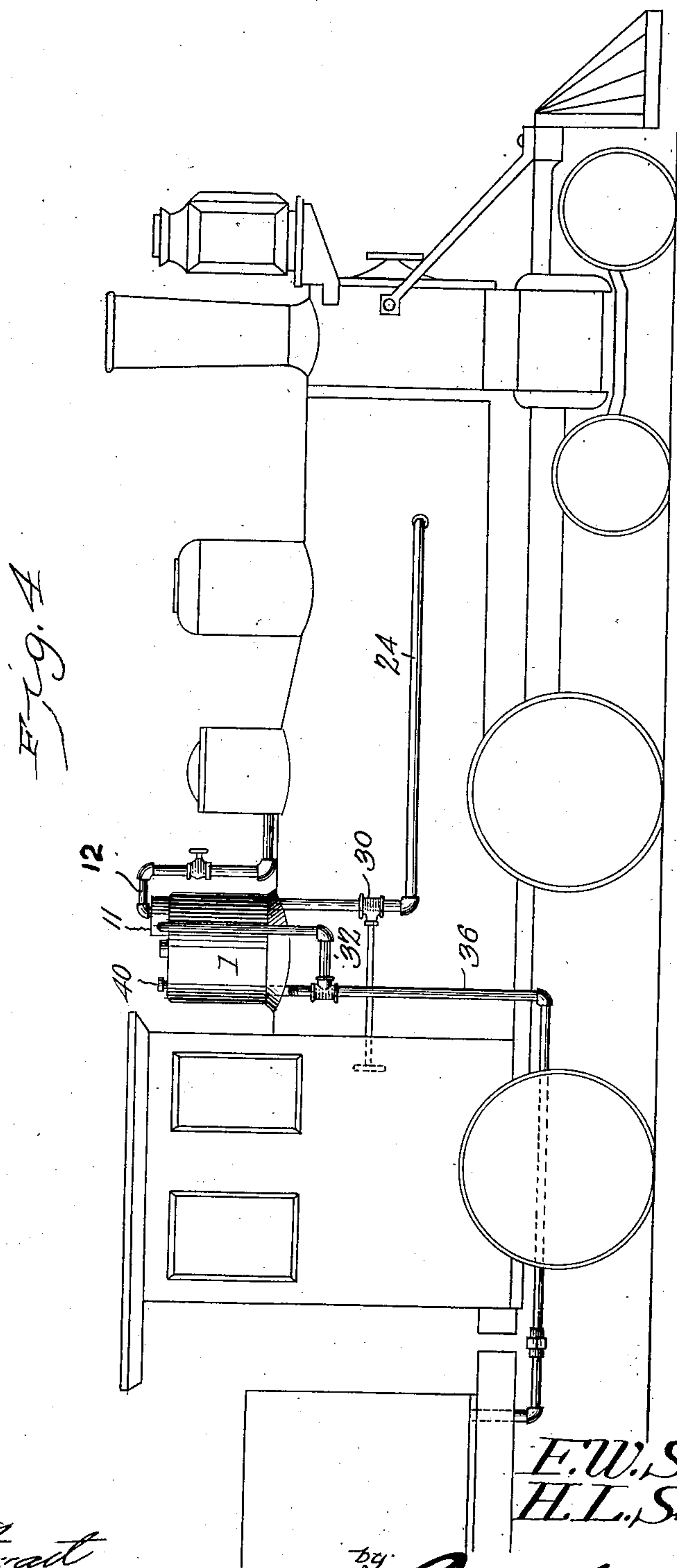
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2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

FRANK W. SHUPERT AND HENRY L. SHUPERT, OF SPOKANE, WASHINGTON.

GRAVITY BOILER-FEEDER.

SPECIFICATION forming part of Letters Patent No. 744,250, dated November 17, 1903.

Application filed March 30, 1903. Serial No. 150,266. (No model.)

To all whom it may concern:

Be it known that we, FRANK W. SHUPERT and HENRY L. SHUPERT, citizens of the United States, residing at Spokane, in the county of Spokane and State of Washington, have invented a new and useful Gravity Boiler-Feeder, of which the following is a specification.

This invention relates to that class of boiler-feeding devices in which the gravity or weight of the water fed is depended upon to carry it into the boiler, the tank which constitutes the feeder being provided with means whereby it is intermittently connected with the steam-space of the boiler for the purpose of subjecting the water contained in said tank to a degree of pressure equal to that which it receives through the feed-pipe and in which the pressure being thus equalized the water is permitted to flow freely from the feed-tank to the boiler.

Our invention consists in the improved construction, arrangement, and combination of parts which will be hereinafter fully described, and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a vertical sectional view of a feeder-tank constructed in accordance with the principles of our invention. Fig. 2 is a plan view of the valve-seat contained in the steam-chest connected with said tank. Fig. 3 is a detail bottom view of the valve. Fig. 4 is a side elevation of an engine to which our invention has been applied in operative position. Fig. 5 is a sectional detail view taken through the smoke-arch and showing the delivery end of the feed-pipe.

Corresponding parts in the several figures are indicated by similar numerals of reference.

1 designates a tank preferably cylindrical in shape and provided at its upper and lower edges with flanges 2, to which the tightly-fitting top 3 and bottom 4 are connected with the cylindrical portion of said tank. The said top and bottom are provided with centrally-disposed nipples 5, formed with caps 6, which constitute guides in which a centrally-disposed rod 7 is capable of a limited

vertical movement. Said rod or stem is provided near its upper and lower ends with flanged collars 8 and 9, between which is mounted a float 10, having a vertical movement upon the stem 7. The top of the tank supports a steam-chest 11, which is connected by a pipe 12 with the steam-dome of the boiler which is to be fed by means of our improved feeding device. The steam-chest 11 contains a valve-seat 13, which is securely bolted to the top of the casing. A port 14 extends through the said top and valve-seat, and another port 15, adjacent and parallel to the port 14, extends laterally through the steam-chest.

16 designates a slide-valve capable of connecting the ports 14 and 15. The stem 17 of said valve extends over a slot 18 in the valve-seat and the top of the casing, and in said slot is pivotally mounted a bell-crank lever having an upwardly-extending short arm 19, which engages a recess 20 in the under side of the valve-stem. The long arm 21 of the bell-crank engages the upper flanged collar 8 of the vertically-movable stem 7.

The bottom of the tank is provided with a water-inlet 22, equipped with a check-valve 23. Said bottom is also connected with a discharge-pipe 24, leading to the boiler and capable of being closed by an outwardly-opening valve 25, having a stem 26, which is supported in the perforation of a guiding and supporting brace 27.

28 designates a lever pivoted to a bracket 29, which rises from the bottom adjacent to the discharge-pipe 24, one end of said lever being pivotally connected with the valve 25, while the other end of said lever engages the flanged collar 9 of the vertically-movable stem 7.

The operation of this device, assuming that the source of water-supply is located at an elevation above the feed-tank, is as follows: When the float within the tank reaches the lower limit of its movement, which is the position indicated in Fig. 1 of the drawings, the weight of said float impinging upon the collar 9 will move the sliding stem 7 in a downward direction, thus causing collars 8 and 9 to operate the levers 21 and 28 to close the port 14 and the outlet 24, thereby cutting the

tank off from communication with the boiler. Water will now flow through the inlet 22 into the tank 1, and as the water rises in said tank the float 10 will rise with it until it reaches the upper limit of its movement, when it will engage the collar 8, thus lifting the stem 7 and causing the levers 21 and 28 to operate their respective valves. Steam will thus be admitted from the steam-dome to the steam-chest and through the port 14 of the latter into the upper end of the tank, while the valve 25 being at the same time opened the water contained in the feed-tank will flow through the pipe 24 to the boiler. The gravity of the water will be sufficient to feed it to the boiler owing to the equilibrium of pressure established. The check-valve 23 will prevent the return of any portion of the water contained in the feed-tank to the source of supply. As the water falls in the tank the float 10 drops until it again engages the collar 9, thus reversing the position of the valves 16 and 24 and again permitting water to flow into the tank. The steam contained in the tank will escape through the ports 14 and 15 to atmosphere. The discharge-pipe is provided with a cock or globe-valve 30, which may be closed when it shall be desired to temporarily suspend the passage of feed-water to the boiler. The steam-supply pipe 12 is likewise provided with a globe-valve, by means of which the passage of steam may be regulated or suspended whenever desired.

Our invention, as will be seen from the foregoing, may be applied to all kinds of boilers, whether stationary, locomotive, or marine. It will, however, be understood that when the device is applied to boilers, such as locomotive-boilers, where it is not convenient to have a source of supply disposed above the feed-tank, means will be required for forcing the water into said tank. When this is the case, we connect the exhaust 15 of the tank by means of a short pipe 32 with the pipe 33, which connects with the water-supply, which in this instance has been illustrated as being the tender-tank of a locomotive. The pipe 33 is connected to the under side of said tank. Now it will be seen that when the float 10 reaches the lowest level in the tank 1 and the water contained in the latter is passed to the boiler the said tank will be filled with steam under boiler-pressure. The reversal of the valves cuts off the communication with the water-space of the boiler and opens the port 15, not, as hereinbefore described, to atmosphere, but to the supply-pipe 33, whereby by contact with the cold water the steam contained in the tank 1 is quickly condensed, thus forming a vacuum which causes the water to rise in said tank through the feed-pipe 33 and the valve 23. When the water in the tank 1 reaches a certain level, as hereinbefore described, the float 10 will operate to reverse the position of the valves, as hereinbefore described, connecting the upper portion of the

tank with the steam-dome and the lower portion of the tank with the water-space of the boiler, into which the feed-water will thus flow by gravity from the tank 1.

It is obvious that at the starting of the device in operation or when the water-supply tank has become empty it will be necessary to displace the air from the tank 1 by filling the latter with water, which may be accomplished through a suitable screw-plug with which said tank is for the purpose provided. The device after this will operate automatically.

The device is simple as to the construction thereof and may be readily applied to boilers now in use without necessity for extensive changes of any kind.

We desire it to be understood that while we have in the foregoing described what we consider to be the preferred form or forms of our invention we do not limit ourselves to the structural details herein described, but reserve to ourselves the right to any changes, modifications, and alterations which may be resorted to within the scope of our invention and without departing from the spirit or sacrificing the utility of the same. It may also under many circumstances be found desirable and advantageous to employ a plurality or battery of feeders in connection with a single boiler, and we reserve the privilege of so doing.

Having thus described our invention, we claim—

1. In a boiler-feeding device, the combination of a feed-tank, a centrally-disposed stem having a limited vertical movement in said tank and provided with flanged collars near its upper and lower ends, a float vertically movable upon said stem, a valve-controlled steam-inlet at the top of the tank, a valve-controlled water-outlet in the bottom of the tank, said steam-inlet and water-outlet being connected respectively with the steam-dome and the water-space of the boiler, an independent water-inlet having a check-valve, and connections disposed interiorly of the feed-tank for simultaneously operating the controlling-valves.

2. In a boiler-feeding device a feed-tank having nipples centrally disposed in the top and bottom thereof and provided with caps, a stem provided with flanged collars near its upper and lower ends and having a limited vertical movement regulated by said caps, a float movable upon said stem, a valve-controlled steam-inlet and a valve-controlled water-outlet at the top and bottom of said tank, connections disposed interiorly of the tank for simultaneously operating the controlling-valves, and an independent water-inlet having a check-valve.

3. In a boiler-feeding device, the combination of a feed-tank, a steam-chest mounted upon said tank and having a port opening into the tank and a port opening laterally from the steam-chest, a slide-valve capable

of connecting the two ports at one limit of its movement and of separating said ports at the other limit of its movement, connecting means between the steam-chest and the steam-
5 dome of a boiler to which the invention is applied, a valve-controlled water-outlet connecting the bottom of the feed-tank with the water-space of the boiler, float-operated means for operating the controlling-valves of the
10 water-outlet and the steam-inlet, and a pipe connecting the exhaust from the steam-chest with the pipe connecting the bottom of the

tank with the source of supply, said supply-pipe being connected with the bottom of the tank or vessel constituting the source of 15 supply.

In testimony that we claim the foregoing as our own we have hereto affixed our signatures in the presence of two witnesses.

FRANK W. SHUPERT.

HENRY L. SHUPERT.

Witnesses:

S. W. MACY,

E. J. HOLLAND.