

No. 688,773.

Patented Dec. 10, 1901.

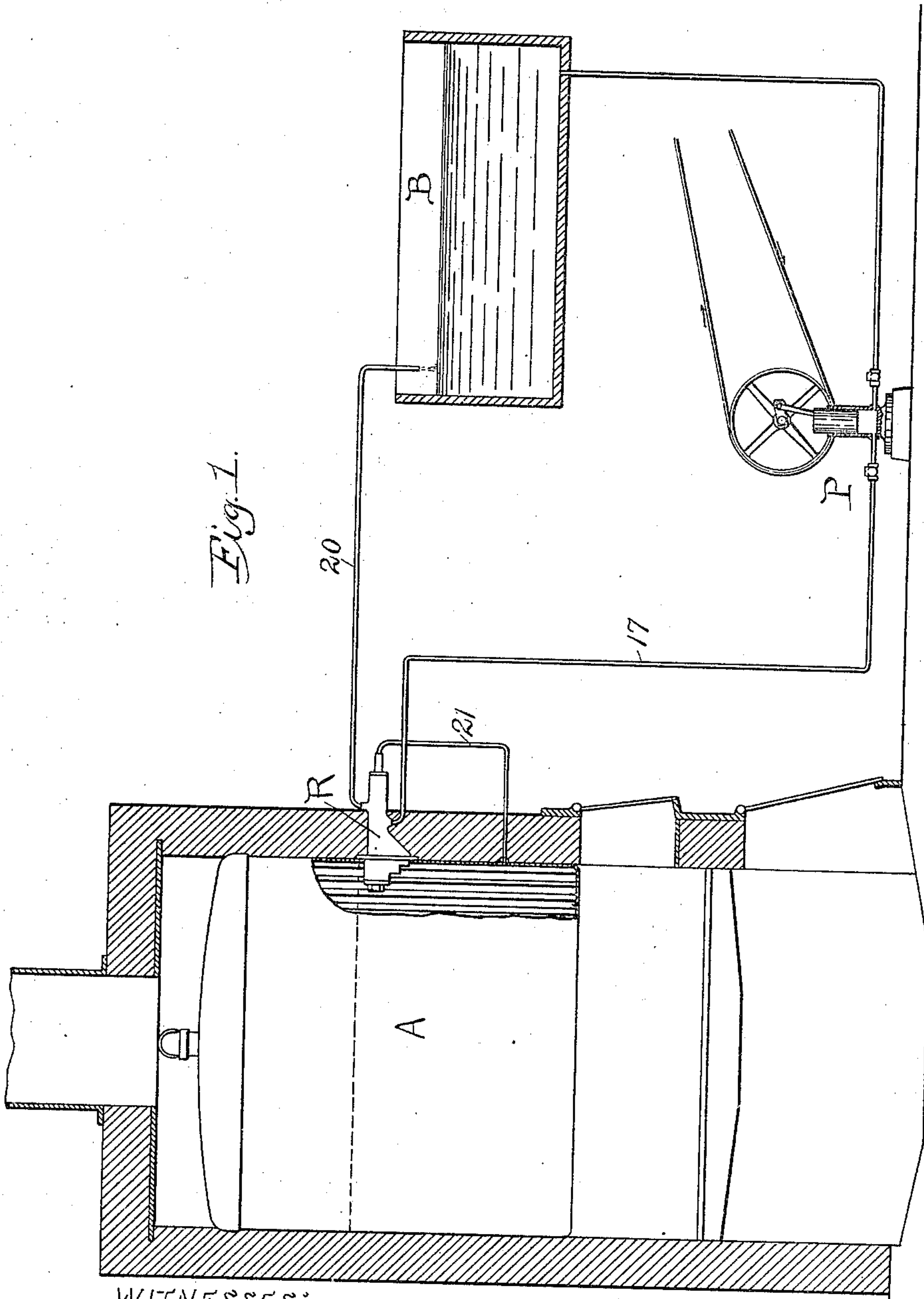
W. H. EDMONDSON.

FEED REGULATOR FOR BOILERS.

(Application filed Mar. 26, 1900. Renewed July 15, 1901.)

(No Model.)

2 Sheets—Sheet 1.



WITNESSES:

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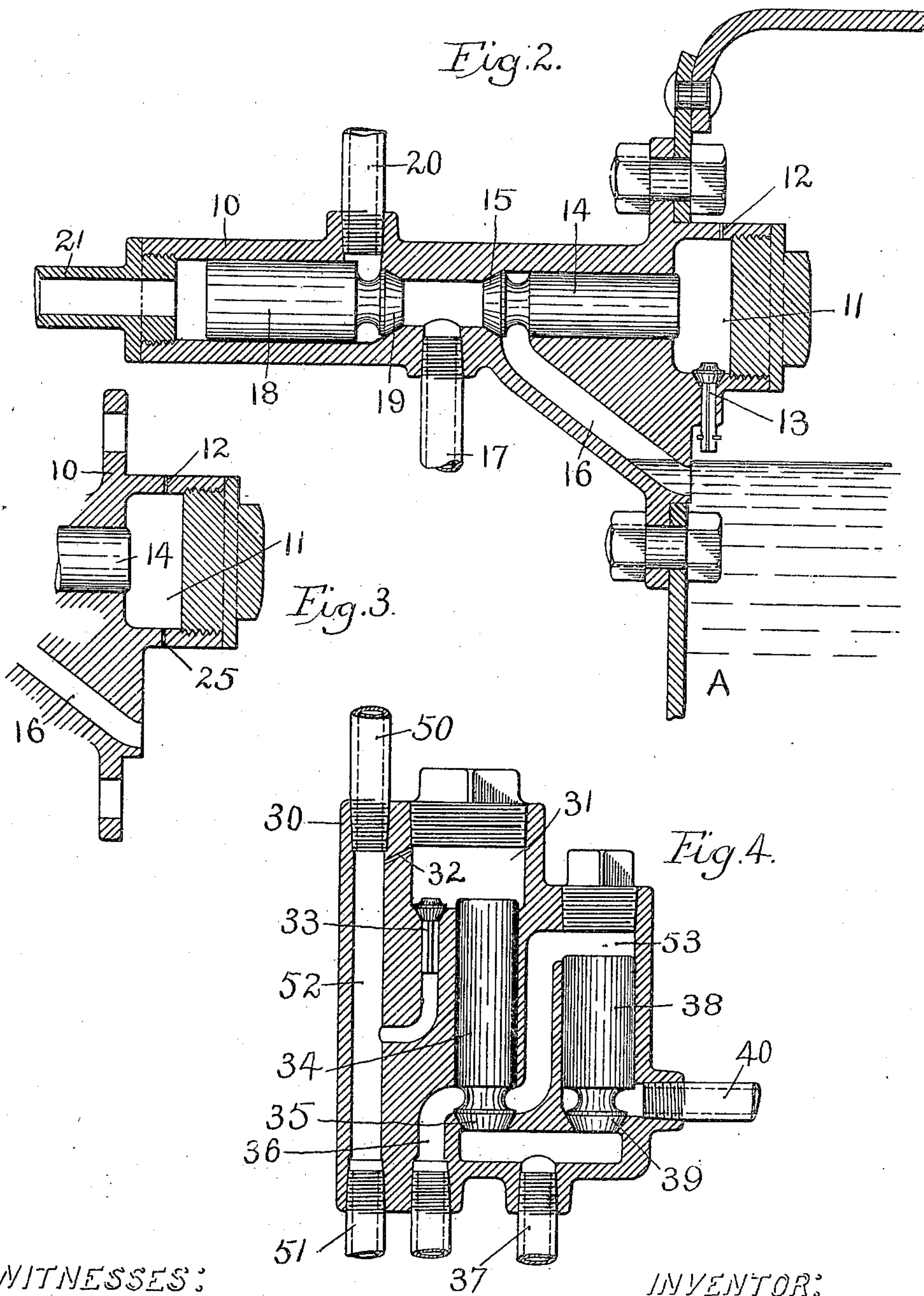
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# UNITED STATES PATENT OFFICE.

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## FEED-REGULATOR FOR BOILERS.

SPECIFICATION forming part of Letters Patent No. 688,773, dated December 10, 1901.

Application filed March 26, 1900. Renewed July 15, 1901. Serial No. 68,440. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM H. EDMONDSON, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented a new and useful Feed-Regulator for Boilers, of which the following is a specification.

This invention relates to a feed-regulator for boilers which is designed to control an intermittent or pulsating boiler-feed, so as to maintain a constant level of liquid in the boiler; and the especial object of this invention is to provide a feed-regulator for boilers having a controlling-chamber so arranged and connected that when the parts are in their normal position the feed from a pump or similar source of supply will be freely admitted to the boiler and so that when the level of liquid in the boiler rises high enough to fill the controlling-chamber with liquid the boiler-feed will be cut off.

To this end the invention consists of the feed-regulator for boilers and of the combinations of parts therewith, as hereinafter described, and more particularly pointed out in the claims at the end of this specification.

In the accompanying two sheets of drawings, Figure 1 is a diagrammatic view illustrating the application of a regulator constructed according to this invention to a boiler. Fig. 2 is an enlarged sectional view of the regulator. Fig. 3 is a fragmentary sectional view illustrating a slightly-modified form of construction; and Fig. 4 illustrates a further modified form of construction, which may be located some distance away from the boiler, if desired.

Referring to Fig. 1, which illustrates diagrammatically the manner in which this invention may be applied to a boiler, A designates a steam generator or boiler which may be of any of the ordinary or usual constructions. The boiler is supplied from a feed-tank B by means of a pump P. The pump P is continuously driven from any ordinary source of power, as shown. Secured to and extending inside the boiler A is an automatic

regulator R for maintaining a constant level of liquid in the boiler.

The construction of the regulator is most clearly illustrated in Fig. 2. As shown in this figure, the regulator comprises a casting or valve-casing 10, which is bolted to the side of the boiler and has a portion extending to the inside thereof. At its inner end the casing 10 is provided with a controlling-chamber 11. The controlling-chamber 11 is connected with the boiler-space through a contracted or substantially capillary opening 12, and may also be connected with the boiler-space by a bottom passage normally closed by a check-valve 13. Movably mounted in the casing 10 in position to be forced back into the controlling-chamber is a piston 14, carrying a feed-valve 15, which closes a feed-passage 16, opening into the boiler. The supply-pipe 17 from the pump is connected to the casing 10 near the middle part thereof. Movably mounted in the casing 10, near the outer end thereof, is a second piston 18 of a larger diameter than the piston 14. The piston 18 carries a waste-valve 19, controlling the opening from the supply-pipe 17 to a return-pipe 20, which leads back to the feed-tank B. Boiler-pressure is admitted to the outer end of the casing 10 behind the piston 18 through a pipe 21. By means of this construction the boiler-pressure will act directly on the piston 18 to hold the waste-valve closed and will act through the controlling-chamber 11 on the piston 14 to hold the feed-valve closed. On account of the difference in area between the piston 18 and the piston 14 the boiler-pressure will exert a greater force, tending to hold the waste-valve in its closed position, than is exerted by said boiler-pressure to hold the feed-valve 15 in its closed position, and on this account each pulsation or stroke of the pump will open the feed-valve 15, admitting a supply of liquid to the boiler. The controlling-chamber 11 of the regulator is located substantially at the level desired to be maintained in the boiler, so that when the liquid in the boiler rises above this level the controlling-chamber 11



will be filled thereby and can only escape back into the boiler through the contracted or substantially capillary opening 12. On this account at each pulsation or stroke of the pump the backward motion of the piston 14 will be resisted by the presence of liquid in the controlling-chamber 11, and inasmuch as liquid is practically incompressible the pump-pressure will be forced to open the waste-valve 19, permitting the supply to be returned to the feed-tank through the return-pipe 20.

In some cases instead of providing the controlling-chamber with a check-valve, as shown in Fig. 2, the controlling-chamber may be provided at its lower side with a second contracted or substantially capillary opening 25, although in practice I prefer to employ the check-valve construction shown in Fig. 2, as this permits the controlling-chamber to fill promptly when the liquid in the boiler rises above the desired level. In some cases, also, instead of employing a regulator which has to be fastened so as to project inside the boiler a regulator constructed according to this invention may be constructed so that it may be located at a considerable distance from the boiler, if desired, and I have illustrated such a construction in Fig. 4. As shown in this figure, the regulator may consist of a casing 30, having a controlling-chamber 31, which is connected to a passage 52 by a capillary or contracted opening 32 and an opening controlled by a check-valve 33. The passage 52 of the regulator is connected to the boiler by pipes 50 and 51 in the same manner that the ordinary water-gage is connected—that is to say, the pipe 51 opens into the boiler below the water-level, while the pipe 50 opens into the steam-space of the boiler, so that by means of this construction the regulator may be located at a distance from the boiler, and the level of the liquid in the passage 52 will correspond with the level of the liquid in the boiler itself. Movably mounted in the casing is a piston 34, carrying a feed-valve 35 for closing the feed-passage 36. The supply-pipe 37 from the pump is connected to the casing 30 below the feed-valve 35. At one side of the piston 34 is a second larger piston 38, carrying a waste-valve 39, which normally closes the connection between the supply-pipe 37 and the return-pipe 40. Boiler-pressure is admitted to the upper end of the piston 38 through an extension 53 of the inlet-passage 36.

The several parts of the form of regulator illustrated in Fig. 4 correspond closely with and perform the same functions as the parts in the regulator illustrated in Fig. 2, so that a detailed description of the operation of this construction is not believed to be necessary.

I am aware that numerous other changes may be made in the construction of my feed-regulator for boilers by those who are skilled in the art without departing from the scope of my invention as expressed in the claims. I am also aware that regulators constructed according to my invention may be applied to

boilers of widely-different types and may be used for controlling the feed into a boiler not only of water in the ordinary manner, but also may be used to control the feed of alcohol or other of the more volatile liquids that are sometimes employed in boilers. I do not wish, therefore, to be limited either to the form of construction herein shown and described or to the special application of my regulator which I have illustrated; but

What I do claim, and desire to secure by Letters Patent of the United States, is—

1. In a feed-regulator for boilers, the combination of a feed-pipe communicating with the boiler, a waste-pipe, a source of supply communicating with each of said pipes, valves for controlling said pipes, means whereby said valves are normally closed by the boiler-pressure, said valve in the feed-pipe being held closed when the water has reached a predetermined level in the boiler.

2. In a feed-regulator for boilers, the combination of a feed-pipe, a valve controlling said feed-pipe, a waste-pipe and a valve controlling same, a source of supply communicating with each of said pipes, means whereby said valves controlling the feed and waste pipes are normally closed by the boiler-pressure, said valve controlling the waste-pipe having a larger area exposed to the boiler-pressure than the valve in the feed-pipe, whereby greater force is required to open the valve in the waste-pipe than to open the valve in the feed-pipe, substantially as described.

3. In a feed-regulator for boilers, the combination with a feed-pipe communicating with the boiler and a source of supply, a waste-pipe communicating with said feed-pipe and the source of supply, a valve in each of said pipes normally closed by the boiler-pressure, said waste-valve having a larger area exposed to the boiler-pressure than the feed-valve, whereby greater force is exerted to hold the waste-valve closed than to hold the feed-valve closed, and separate means for holding said feed-valve closed when the water in the boiler has reached a predetermined level, substantially as described.

4. In a feed-regulator for boilers, the combination of a controlling-chamber located substantially at the level desired to be maintained in the boiler, a feed-passage opening into the boiler, and a valve for said feed-passage, said parts being arranged so that the presence of liquid in the controlling-chamber will prevent the pressure of a pulsating supply from opening the feed-valve, substantially as described.

5. In a feed-regulator for boilers, the combination of a controlling-chamber, a feed-passage opening into the boiler, a valve therefor, a return or waste passage, and a return-valve, said parts being arranged so that it normally requires more pressure to open the waste-valve than the feed-valve, and so that the presence of liquid in the controlling-chamber will prevent the pressure of a pulsating



supply from opening the feed-valve, substantially as described.

6. In a feed-regulator for boilers, the combination of a controlling-chamber located substantially at the level desired to be maintained in the boiler, and having a contracted connection therewith, a feed-passage opening into the boiler, and a valve for the feed-passage, said parts being arranged so that the presence of liquid in the controlling-chamber will prevent the pressure of a pulsating supply from opening the feed-valve, substantially as described.

7. The combination of a boiler, a feed-pump, and a feed-regulator for the boiler comprising a feed-valve and a controlling-chamber, said parts being arranged so that the presence of liquid in the controlling-chamber will prevent the pump-pressure from opening the feed-valve, substantially as described.

8. In a feed-regulator for boilers, the combination of a controlling-chamber located substantially at the level desired to be maintained in the boiler, and having a contracted connection therewith, a feed-passage opening into the boiler, and a valve for said feed-passage having a piston extending into the controlling-chamber, said parts being arranged so that the presence of liquid in the controlling-chamber will prevent the pressure of a pulsating supply from opening the feed-valve, substantially as described.

9. In a feed-regulator for boilers, the combination of a controlling-chamber, a feed-passage opening into the boiler, a valve therefor, a return or waste passage, and a return-valve, said parts being arranged so that the boiler-pressure will normally exert a greater force tending to hold the waste-valve closed than to hold the feed-valve closed, and so that the presence of liquid in the controlling-chamber will prevent the pressure of a pulsating supply from opening the feed-valve, substantially as described.

10. The combination of a boiler, a feed-tank, a pump, and a feed-regulator comprising a controlling-chamber, a feed-valve located in the passage from the pump to the

boiler, and a waste-valve located in a passage leading back to the feed-tank, said parts being arranged so that it normally requires more pressure to open the waste-valve than the feed-valve, and so that the presence of liquid in the controlling-chamber will prevent the pressure of a pulsating supply from opening the feed-valve, substantially as described.

11. In a feed-regulator for boilers, the combination of a casing having a controlling-chamber with a contracted connection with the boiler-space, a piston movably mounted in the casing, and operating the feed-valve, and a piston of larger area movably mounted in the casing and operating the waste-valve, said parts being connected so that boiler-pressure will act directly on the waste-valve piston, and will act on the feed-valve piston through the controlling-chamber, whereby it will normally require more pressure to open the waste-valve than the feed-valve, and so that the presence of liquid in the controlling-chamber will prevent the pressure of a pulsating supply from opening the feed-valve, substantially as described.

12. The combination of a boiler, and a feed-regulator comprising a casing having a controlling-chamber extending into the boiler-space, and having a contracted connection therewith, a piston movable into the controlling-chamber, and carrying a feed-valve, and a larger piston carrying a waste-valve, boiler-pressure being admitted to the outer end of the casing to act directly on the piston 18, whereby it normally requires more pressure to open the waste-valve than the feed-valve, and whereby the presence of liquid in the controlling-chamber will prevent the pressure of a pulsating supply from opening the feed-valve, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

WILLIAM H. EDMONDSON.

Witnesses:

FREDERICK B. MARLOW,  
PHILIP W. SOUTHGATE.