(No Model.)

E. LOMPERT.

AUTOMATIC BOILER FEEDER.

No. 250,931. Patented Dec. 13, 1881.

Fig. 1.

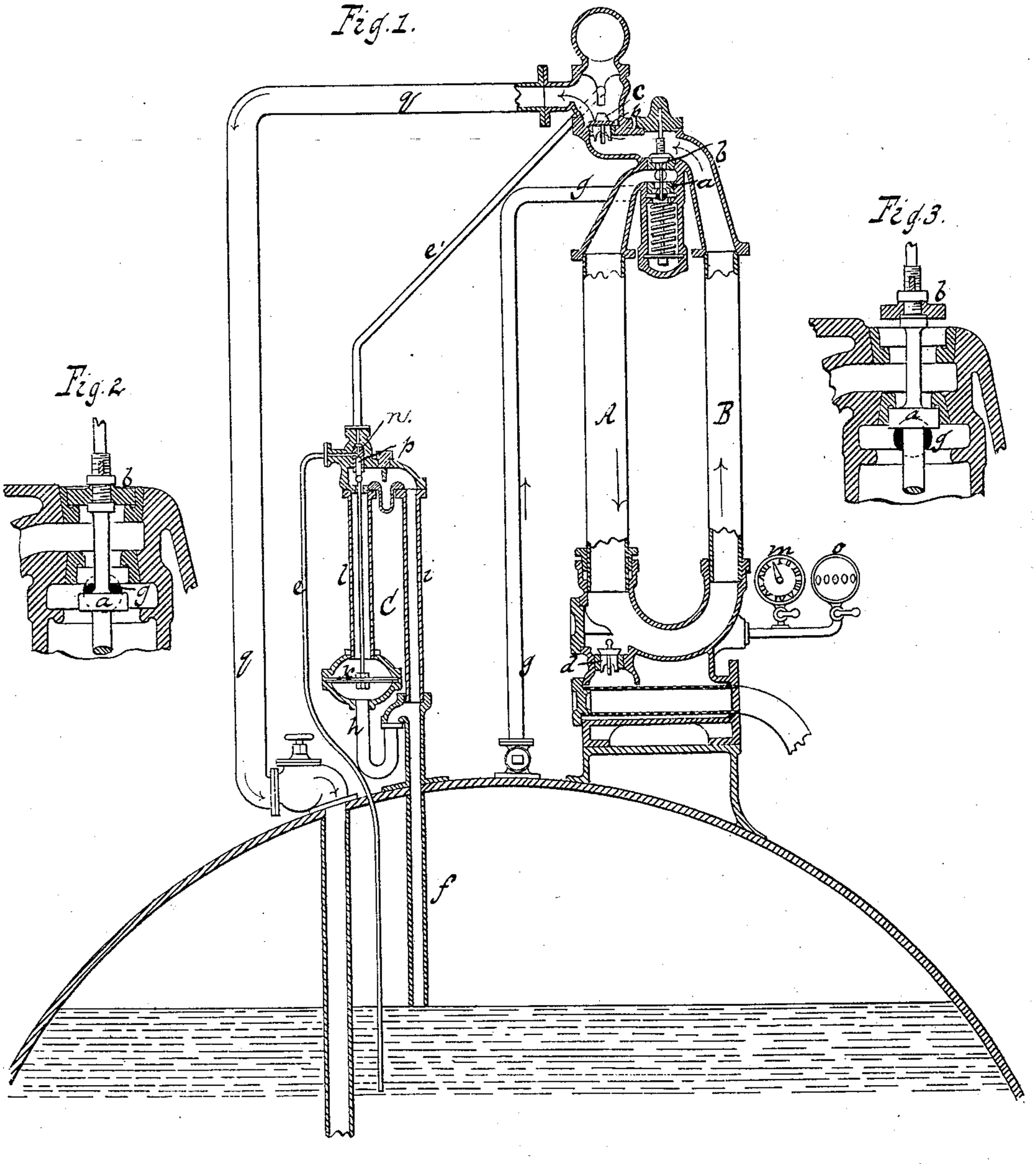

Fig. 2.

Fig. 3.

Witnesses
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ERNST LOMPERT, OF BUCKAU, NEAR MAGDEBURG, PRUSSIA, GERMANY,
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AUTOMATIC BOILER-FEEDER.

SPECIFICATION forming part of Letters Patent No. 250,931, dated December 13, 1881.

Application filed June 29, 1881. (No model.) Patented in Germany December 24, 1879.

To all whom it may concern:

Be it known that I, ERNST LOMPERT, a subject of the King of Prussia, residing at Buckau, near Magdeburg, in the Kingdom of Prussia and Empire of Germany, have invented new and useful Improvements in Automatic Boiler-Feeders, of which the following is a specification.

This invention relates to a boiler-feeder of that class which is operated by the action of the steam in the boiler, being alternately filled partly with steam, and after condensation of this steam with water drawn in by suction, each charge of water being discharged into the boiler below by the steam which enters subsequently. The precise construction of my apparatus will be hereinafter fully described.

This invention is illustrated in the accompanying drawings, in which Figure 1 represents a vertical section of my boiler-feeder. Fig. 2 is a detached section of the compound valve, which forms one of the principal elements of my boiler-feeder, on a larger scale than the previous figure, the upper valve being closed. Fig. 3 is a similar view when the upper valve is open.

Similar letters indicate corresponding parts.

In the drawings, the letters A B designate two chambers, which are situated side by side, and communicate with each other and at the top and bottom, the communication at the top being dependent upon the position of the valve *b*. This valve is connected with the steam-supply valve *a* in such a manner that if one opens the other is closed, and vice versa. Both said valves (see Figs. 2 and 3) are fitted, like pistons, into cylindrical seats, the depth of which is equal to one-half of the movement or stroke of the valves, so that neither of the valves will begin to open before the other is closed.

Fig. 1 represents my apparatus during the operation of feeding, the water contained in the chamber A being each time discharged. Valve *b* is closed and valve *a* is open. (See also Fig. 2.) The steam from the boiler enters through the pipe *g* and valve *a* into the chamber A, while the water from this chamber is driven through the chamber B, check-valve *c*, and feed-pipe *q* into the boiler.

It is obvious that the valve *b*, in order to remain closed during the feed operation, must be subjected to the action of a spring or weight, which, together with the pressure exerted by the water escaping from the chambers A B, retains said valve in its seat against the pressure of the steam entering through the pipe *g*. As the water in the chamber A sinks down the resistance offered to the advancing steam by the column of water in the chamber B increases until the pressure of the steam overcomes the resistance of the weight or spring acting on the valve *b*, and this valve is opened. As soon as it begins to rise it receives an impulse on its entire bottom surface and it moves up with a rush, thereby causing the valve *a* to close almost instantaneously. (See Fig. 3.) By this movement the communication at the top of the chambers A B is opened, the water rushes back from chamber B into chamber A, the steam condenses, and the apparatus draws in a fresh supply of water through the suction-valve *d*. When the suction has been completed the steam-valve *a* cannot open and a new feed cannot take place until the boiler-pressure is transmitted to the feed apparatus. This transmission of pressure can be effected by a separate pipe from the steam or water space of the boiler, or by leakage in the steam-valve *a* or in the valves of the feed-pipe.

In order to regulate the operation of the feed apparatus by the water-level in the boiler, different means can be employed. The simplest way is to extend the steam-pipe to the desired water-level. As soon as the water reaches this level it rises in the steam-pipe, and the feed is immediately stopped, and does not again begin until the steam-pipe becomes filled with steam. In order to prevent in this case the water from passing into the feed apparatus, a small pipe must be provided, which extends from the top part of the steam-pipe into the constant steam-space of the boiler, and which can be adjusted to admit steam enough for preventing the boiler-water from passing into the feed apparatus, and at the same time to permit the feed operation to progress, if only in a very limited degree. The same effect can also be produced by throttling the steam-pipe or the feed-pipe by the action of a float.

If for the transmission of pressure to the apparatus after each suction, as mentioned above, a separate conduit is provided, it is sufficient, instead of throttling all the working steam of the apparatus and the feed-water, respectively, to cut off only the separate conduit, since by these means, after each suction, the operation of the apparatus is stopped. This method I have employed in my apparatus by means of the diaphragm mechanism C. The chamber containing the diaphragm *k* is connected by pipes *l h* with a pipe, *i f*, which extends into the boiler to the desired water-level. This pipe, therefore, is filled with water or with steam, according to the water-level in the boiler being above or below its mouth. As long as the pipe *i* contains steam the diaphragm *k* is exposed to the full pressure of the water remaining in the pipes *l* and *h*, and it is caused to move the valve *n* away from its seat. This valve, being made in the form of a piston, prevents the passage of the steam from the pipe *i;* but it opens the conduit *e e'* leading from the water-space of the boiler to the feed apparatus. The boiler-pressure is therefore transmitted to the feed apparatus immediately after each suction by means of an opening, *p*, in the valve *n*, and a constant feed takes place; but as soon as water rises in the pipe *i* the pressure of the columns of water on the diaphragm *k* is balanced, and the valve *n* is closed by the boiler-pressure acting upon its back, aided, if requisite, by a spring. The conduit *e e'* is closed, and after the next succeeding suction the operation of the feed apparatus stops.

The diaphragm mechanism is also used as an alarm. In this case the valve *n* serves simply as an escape, which allows the steam from the pipe *i* to pass to an alarm-whistle whenever the water in the boiler sinks below the desired level. The water-pipes *l h* preserve the diaphragm *k* from becoming heated, so that sensitive unmetallic diaphragms—such as india-rubber, rubber cloth, or leather—can be used.

My apparatus can also be used as a pump for raising various liquids.

In order to have a sure control of the operation of my apparatus, I apply a double control by means of a counting device, *m*, and a vacuum-gage, *o*. The first receives its motion by a diaphragm, one face of which communicates with the feed apparatus, while the opposite face is exposed to the atmosphere. For each feed, therefore, a fluctuation of the diaphragm, and consequently a forward motion of the counting mechanism, takes place. Since the apparatus furnishes a uniform quantity of water for each feed, this counting device can be used for measuring the quantity of the feed-water. By the vacuum-gage the pressure existing in the feed apparatus can be observed at any moment.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a water-feeder for steam-boilers, the two upright chambers A and B, arranged adjacent to each other and in communication at their lower portions, with their upper portions connected as described, in combination with valves *a* and *b*, arranged in valve-chambers at or near the upper ends of said chambers, and automatically operating to control the communication between the chambers at that point, a steam-supply pipe, *g*, leading from the boiler, and a water-supply pipe, *q*, leading to the boiler, the whole being arranged to operate substantially as described.

2. The combination, substantially as hereinbefore described, of the two chambers A B, valves *a b*, steam-pipe *g*, feed-pipe *q*, valve *n*, and conduit *e e'*.

3. The combination, substantially as hereinbefore described, of the two chambers A B, valves *a b*, steam-pipe *g*, feed-pipe *q*, valve *n*, conduit *e e'*, and diaphragm *k*.

4. The combination, substantially as hereinbefore described, of the two chambers A B, valves *a b*, steam-pipe *g*, feed-pipe *q*, valve *n*, conduit *e e'*, diaphragm *k*, and pipes *i f l h*.

5. The combination, substantially as hereinbefore described, of the two chambers A B, valves *a b*, steam-pipe *g*, feed-pipe *q*, vacuum-gage *m*, and counting device *o*.

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

ERNST LOMPERT.

Witnesses:
WILLIAM C. FOX,
FR. LUREWIG.