(No Model.)

J. H. BANKS.

STEAM TRAP.

No. 271,400. Patented Jan. 30, 1883.

Fig. 1

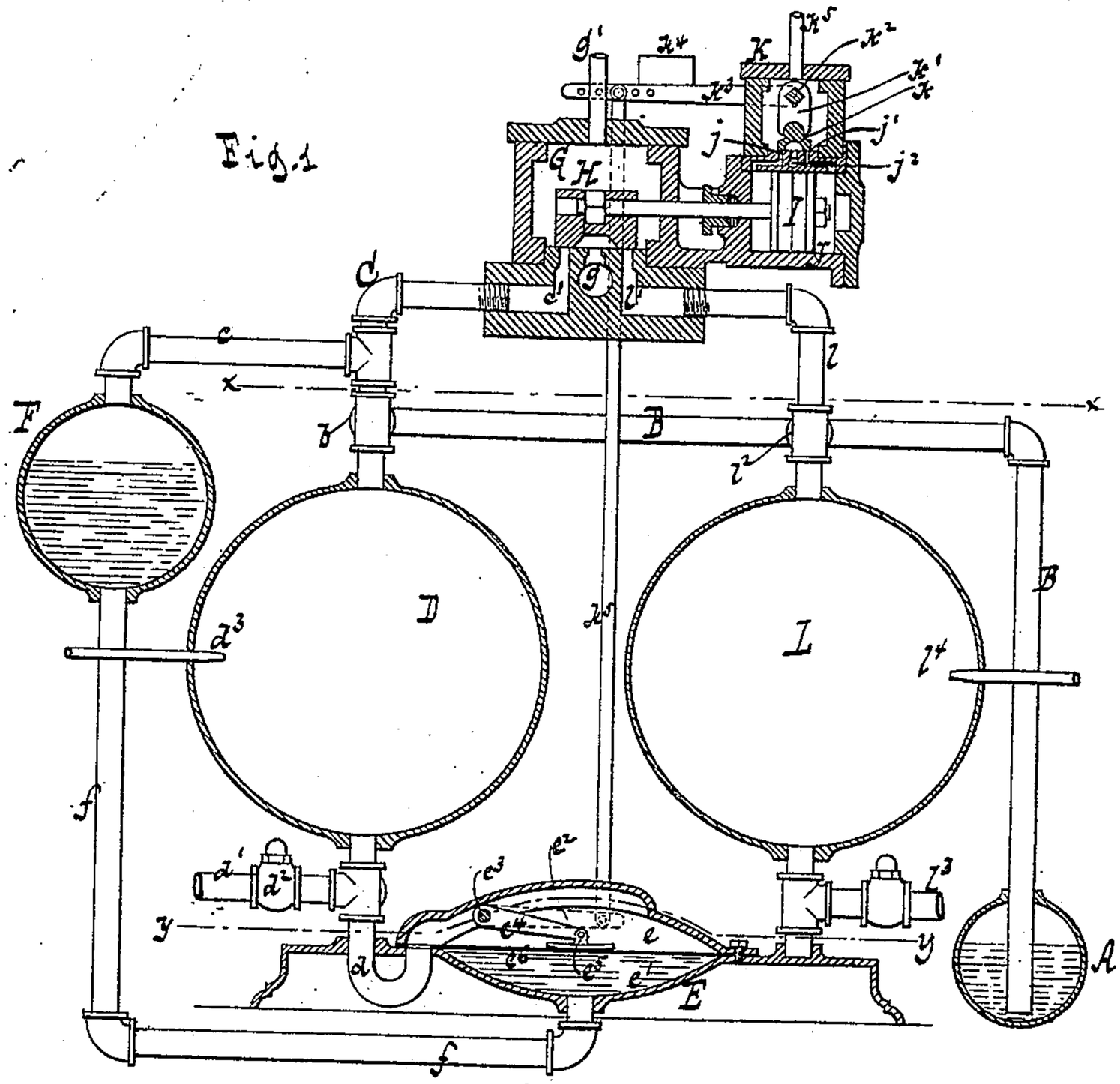


Fig. 2.

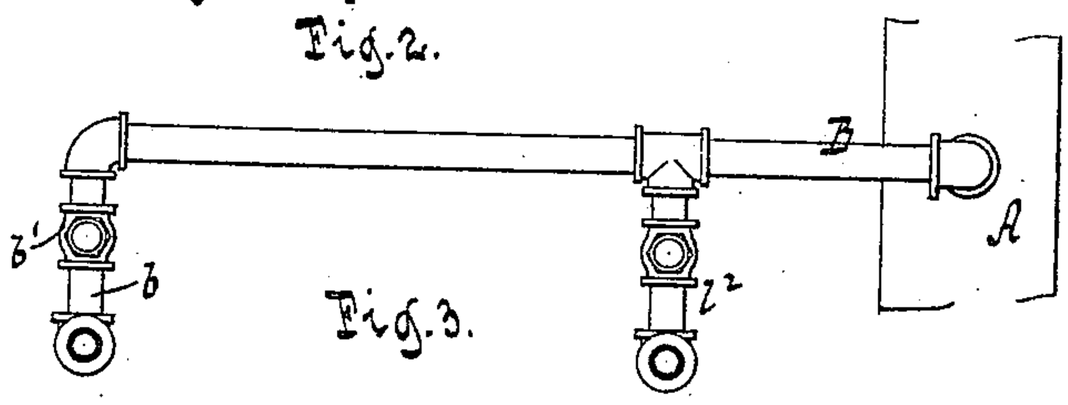
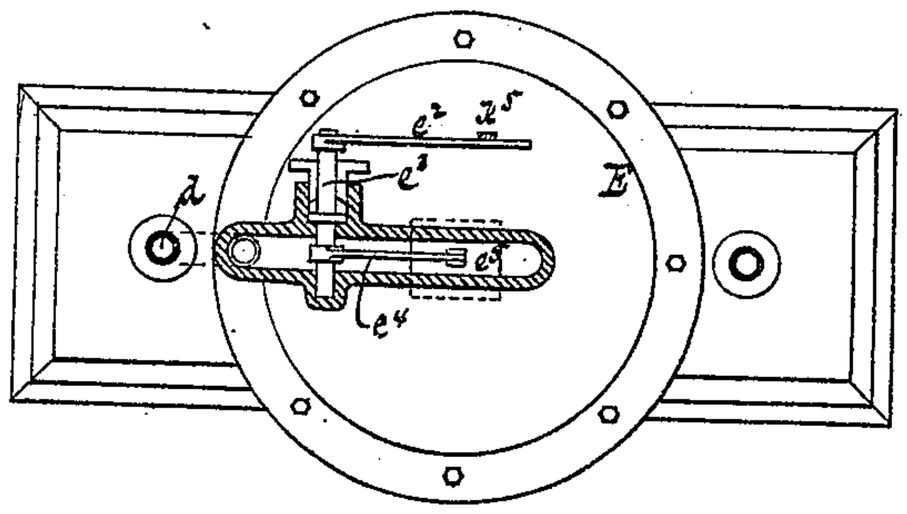


Fig. 3.



WITNESSES:

Otto Hupfeld

William Miller.

INVENTOR

Joseph Henry Banks

BY Van Santvoord & Hauff

ATTORNEYS

UNITED STATES PATENT OFFICE.

JOSEPH H. BANKS, OF NEW YORK, N. Y.

STEAM-TRAP.

SPECIFICATION forming part of Letters Patent No. 271,400, dated January 30, 1883.

Application filed October 24, 1882. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH HENRY BANKS, a citizen of the United States, residing at New York, in the county and State of New York, have invented new and useful Improvements in Steam-Traps, of which the following is a specification.

This invention relates to that class of steam-traps which are applied to steam heating apparatus, and which serve to return the water of condensation from the heating-coils to the boiler.

The novel and peculiar construction of my trap is pointed out in the following specification and illustrated in the accompanying drawings, in which—

Figure 1 represents a vertical section. Fig. 2 is a horizontal section in the plane *x x*, Fig. 1, showing the pipe-connection. Fig. 3 is a horizontal section in the plane *y y*, Fig. 1.

Similar letters indicate corresponding parts.

In the drawings, the letter A designates the drum or reservoir in which the water of condensation accumulates. From this drum extends a pipe, B, which connects by a branch, *b*, with a pipe, C, extending from a receiver, D. In the branch *b* is a check-valve, *b'*, Fig. 2. The receiver D connects by a pipe, *d*, with the upper compartment, *e*, of a diaphragm-chamber, E, and from the pipe *d* extends a branch pipe, *d'*, to the boiler, (not shown in the drawings,) which supplies the steam. The branch pipe *d'* is provided with a check-valve, d^2. From the pipe C extends a branch pipe, *c*, into the top of a drum, F, and from the bottom of this drum extends a pipe, *f*, into the bottom of the diaphragm-chamber E, so as to form a communication between the lower compartment, *e*, of the chamber E and the interior of the drum F. The upper end of the pipe C communicates by a channel, *c'*, with a steam-chest, G, on the bottom of which is seated the "equalizing" valve H, which is constructed like a slide-valve, and beneath it is the exhaust-port *g*. Motion is imparted to said valve by a piston, I, which works in a cylinder, J. This cylinder communicates by steam-ports *j j'* with a steam-chest, K, and by an exhaust-port, j^2, with the open atmosphere. On the bottom of the steam-chest K is seated a slide-valve, *k*, to which motion is imparted by a lever, *k'*, mounted on a rock-shaft, k^2, which extends through the side of the steam-chest K, and carries on its outer end a lever, k^3. This lever is loaded with a weight, k^4, and it connects by a rod, k^5, with a lever, e^2, mounted on a rock-shaft, e^3, which has its bearings in the cover of the diaphragm-chamber E. On this lever, in the interior of the chamber E, Fig. 3, is mounted a lever, e^4, the inner end of which is pivoted to a foot-piece, e^5, that rests upon the elastic or flexible diaphragm e^6. The steam-chest K receives steam from the boiler through a pipe, k^5, and the steam-chest G through a pipe, *g'*.

At the moment the different parts are in the position shown in Fig. 1 the column of water, acting from the drum F upon the under side of the diaphragm e^6, forces this diaphragm up against the action of the weight k^4, the slide-valve K is moved to uncover the steam-port *j'*, the piston I moves the equalizing-valve H so as to bring the port *c'*, and consequently the interior of the receiver D, in communication with the exhaust-port *g*. At the same time a small jet of water rushes into the receiver D through the nozzle d^3, the remaining steam in the receiver D is condensed, a partial vacuum is formed therein, and the condensed water from the drum A rushes up through pipes B *b* and fills the receiver D. The pressure of the water on both sides of the diaphragm e^6 becomes now equalized, and the weight k^4 depresses the diaphragm. The slide-valve *k* is thereby moved so as to uncover the steam-port *j*, and the piston I moves the equalizing-valve H so as to uncover the steam-port *c'*. Steam has free access from the chest G to the receiver D, and the water contained in this receiver is forced out through pipe *d'* into the boiler. As soon as the receiver is empty the column of water from the drum F forces the diaphragm up and the action already described is repeated.

In order to increase the capacity of the apparatus, I have applied a second receiver, L, which connects by a pipe, *l*, and port *l'* with the steam-chest G, by a branch pipe, l^2, Fig. 2, with the pipe B, and by a pipe, l^3, with the boiler. There is no connection with the diaphragm-chamber E. When the equalizing-valve brings the port *l'* in communication with the exhaust-port *g* the receiver L receives water from the drum A, and when the equalizing-valve uncovers the port *l'* the steam from the

steam-chest G forces the water contained in the receiver L back into the boiler. The steam remaining in the receiver is condensed by a jet of water admitted through a nozzle, l^4. Both the nozzles d^3 and l^4 connect with a water-tank or reservoir. (Not shown in the drawings.) These nozzles, however, are not absolutely necessary, since the condensed water in the drum A is under a certain pressure not quite equal to the boiler-pressure, and the water from this drum is forced into the receivers whenever the same are brought in communication with the exhaust-port *g*.

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

1. The combination of a reservoir, A, for the water of condensation, a receiver, D, connected with the reservoir by a pipe, B, a chamber, E, divided by a horizontal diaphragm, a water-drum, F, pipes connecting the receiver and water-drum with the chamber above and below the diaphragm, respectively, and the receiver having a pipe, d', to connect with a boiler, a steam-chest, G, connected with the receiver and the drum, and the equalizing slide-valve H, arranged in the steam-chest, and controlled by the position of the diaphragm, substantially in the manner and for the purposes described.

2. The combination, substantially as hereinbefore described, of the receiver D and its connections with the reservoir A and with the steam-boiler, the diaphragm-chamber E, the drum F, the equalizing-valve H, the steam-piston I, working in the cylinder J, and the slide-valve *k*, which is actuated by the diaphragm e^6 and weight k^1.

3. The combination, substantially as hereinbefore described, of the receiver D and its connections with the reservoir A and with the steam-boiler, the diaphragm-chamber E, connected to the receiver L, the drum F, and the equalizing-valve H, the position of which is controlled by the diaphragm e^6 and the receiver L.

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

JOSEPH HENRY BANKS. [L. S.]

Witnesses:

W. HAUFF,

E. F. KASTENHUBER.