

No. 663,453.

Patented Dec. 11, 1900.

S. MAHONY.
STEAM TRAP.

(Application filed Feb. 23, 1900.)

(No Model.)

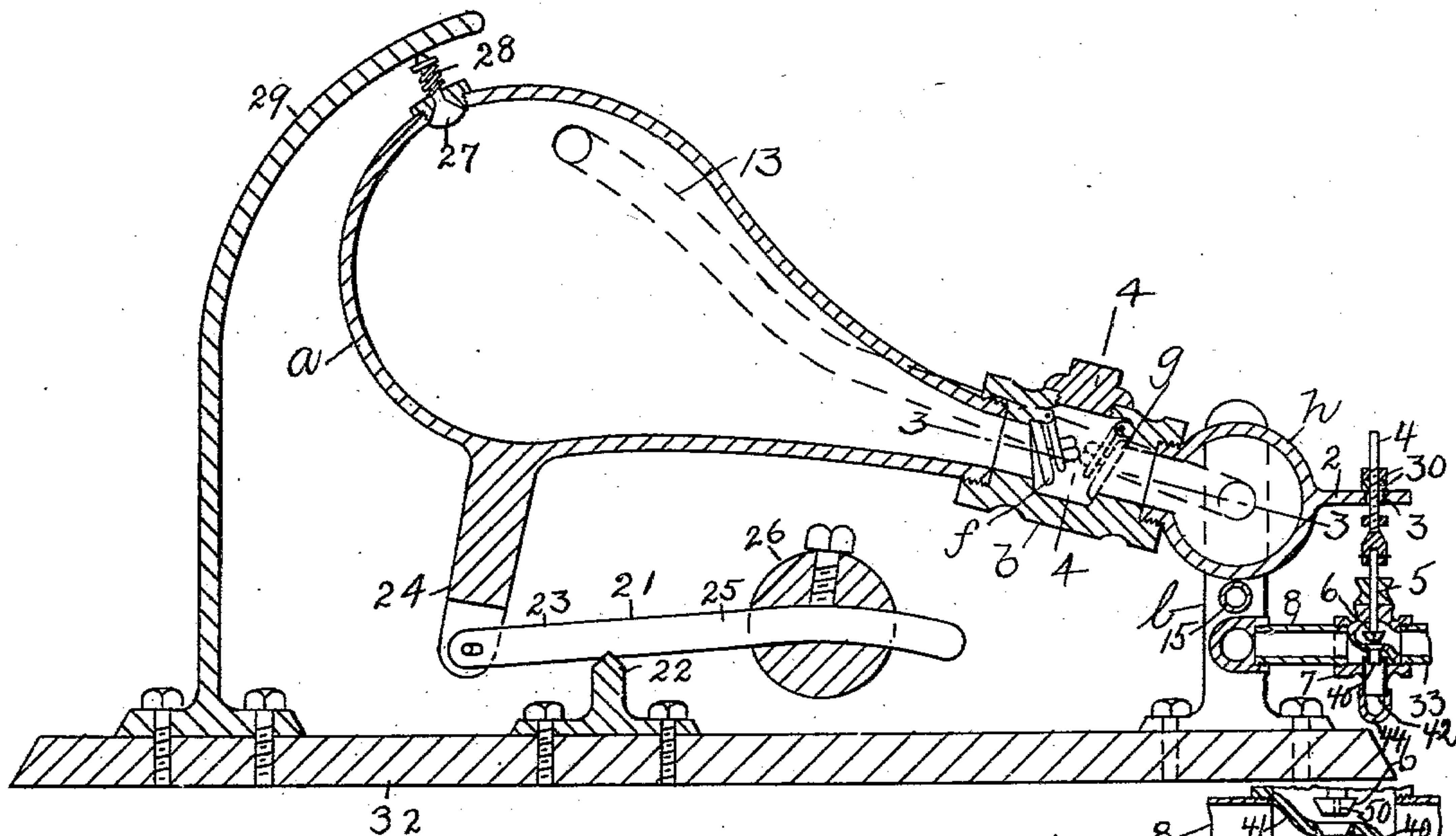


Fig. 1.

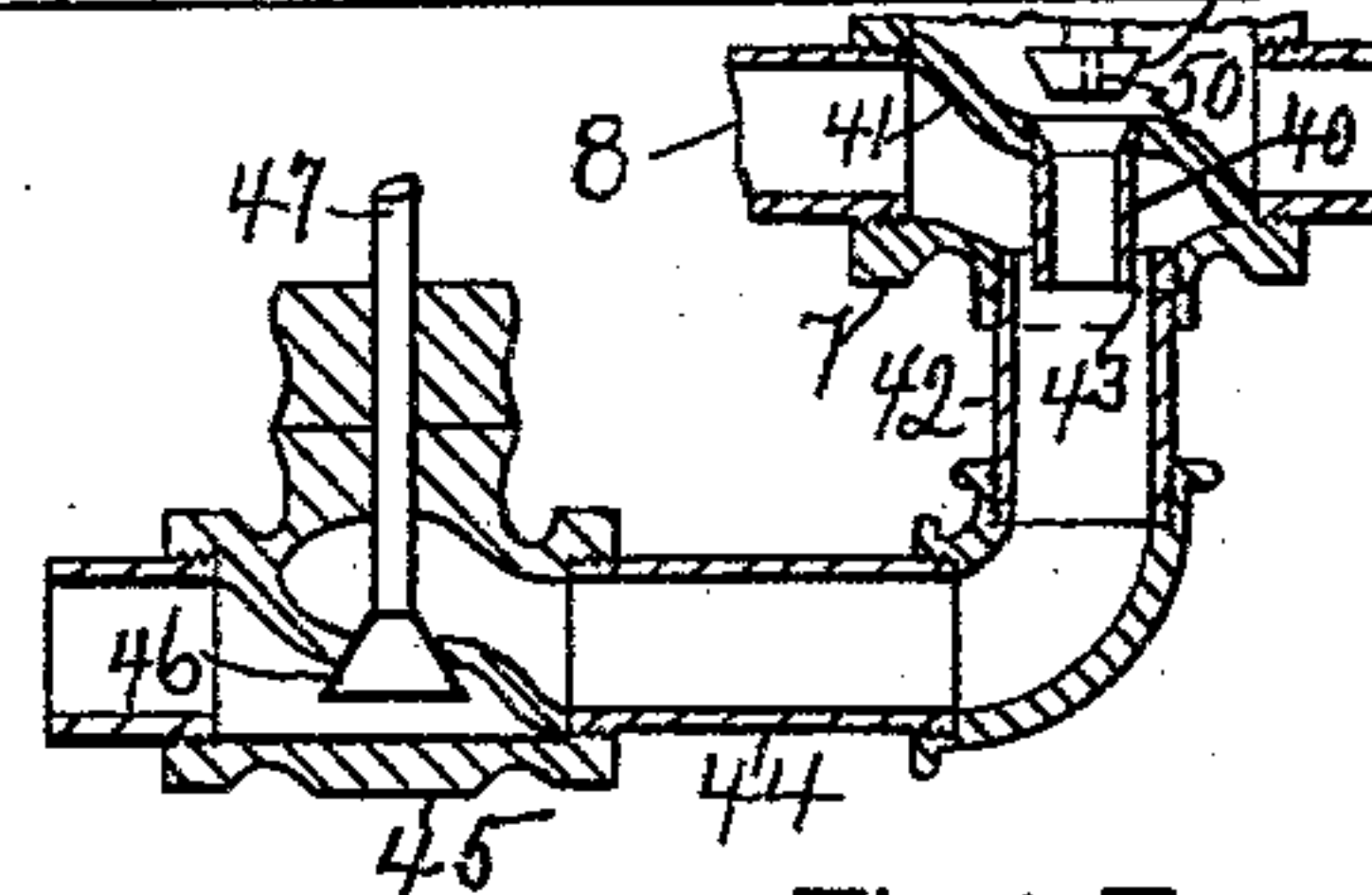


Fig. 5.

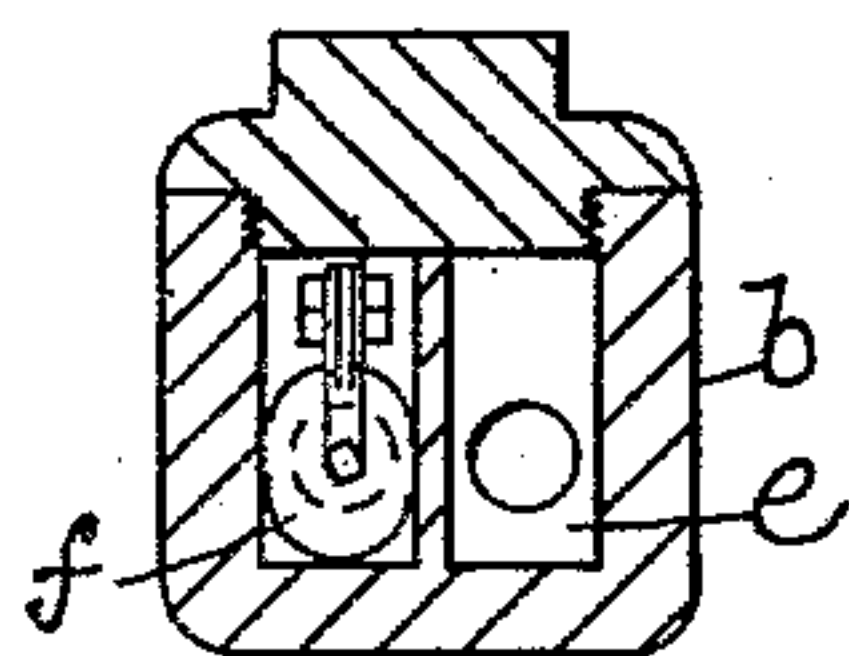


Fig. 4.

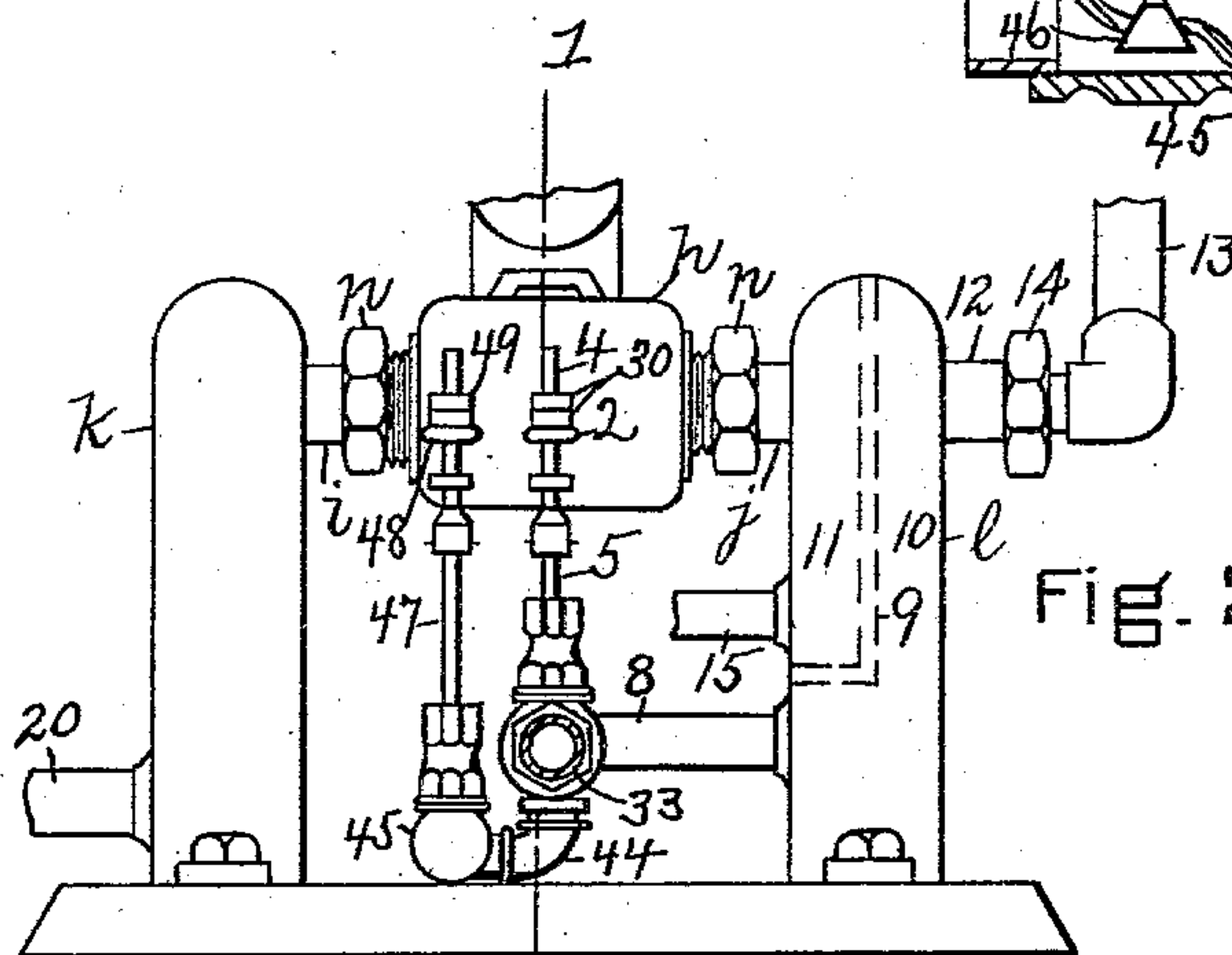


Fig. 2.

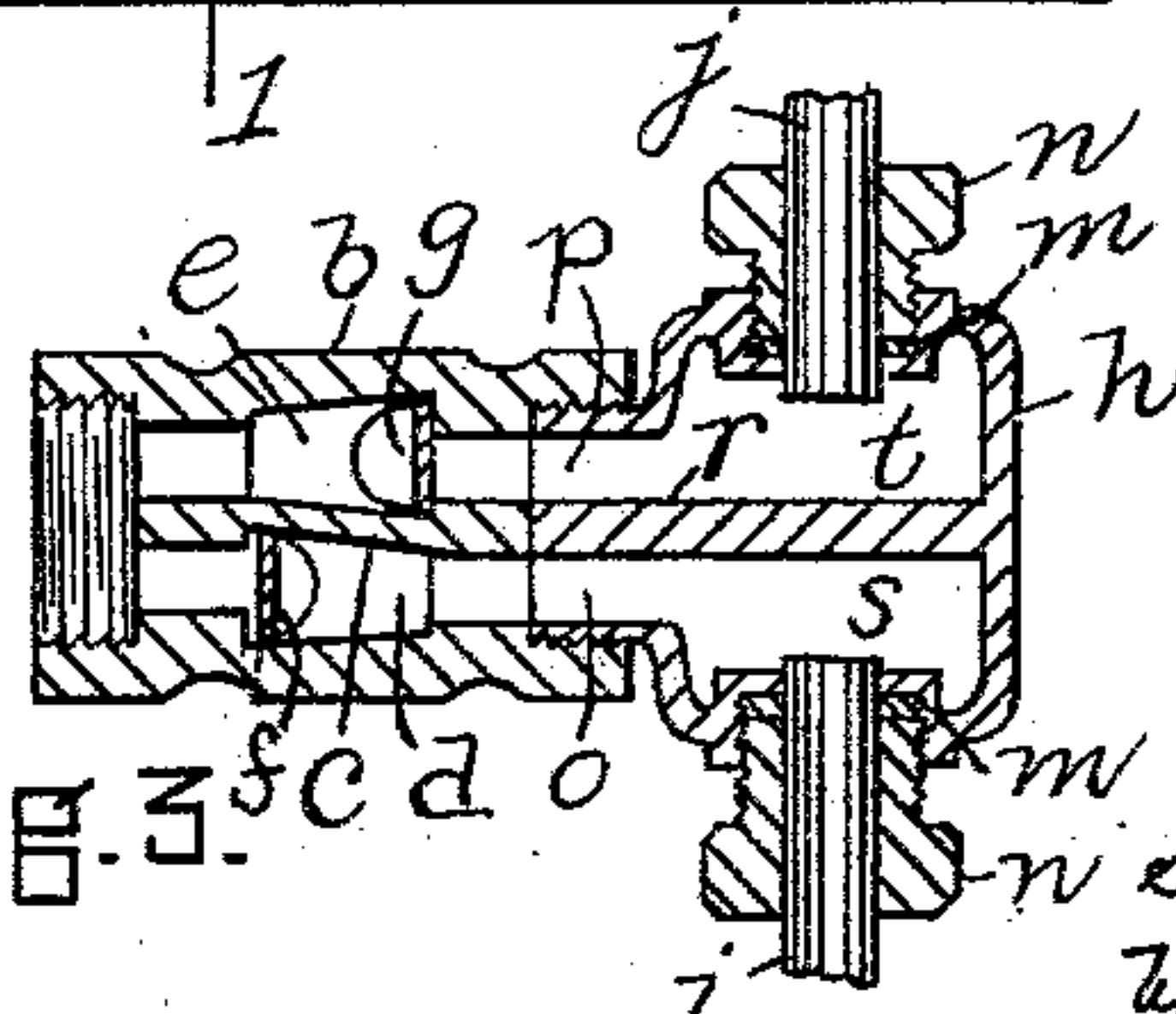


Fig. 3.

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STEAM-TRAP.

SPECIFICATION forming part of Letters Patent No. 663,453, dated December 11, 1900.

Application filed February 23, 1900. Serial No. 6,230. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL MAHONY, a citizen of the United States, residing in Revere, in the county of Suffolk and State of Massachusetts, have invented an Improvement in Steam-Traps, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention relates to steam-traps of that class employed to return water of condensation to a boiler.

The invention has for one of its objects to simplify and improve the construction of steam-traps, so that a complete trap may be assembled in the workshop ready to be connected up with a minimum amount of time and labor and by comparatively inexpensive help. For this purpose I employ a fitting provided with check-valves which operate in opposite directions and interpose said fitting between the bulb or receiver and a casing which is pivotally mounted to operate the steam-supply valve and which communicates with hollow standards or uprights with which the steam-supply pipe and the water inlet and outlet pipes are connected and all of which parts may be assembled together in the workshop except the water inlet and outlet pipes for said hollow standards.

Another feature of this invention consists in providing steam-traps of the class referred to with means whereby a vacuum may be produced in the receiver, as will be described.

These and other features of this invention will be pointed out in the claims at the end of this specification.

Figure 1 is a longitudinal section of a steam-trap embodying this invention, taken on the line 1 1, Fig. 2; Fig. 2, an end elevation of the steam-trap shown in Fig. 1, looking toward the left, with parts omitted; Fig. 3, a sectional detail on the line 3 3, Fig. 1; Fig. 4, a sectional detail on the line 4 4, Fig. 1; and Fig. 5, a sectional detail, on an enlarged scale, to be referred to.

Referring to the drawings, *a* represents the bulb or receiver for the water of condensation from a steam-heating system and which is to be returned to the steam-boiler. (Not shown.)

The receiver *a* is connected to a valve fit-

ting or casing *b*, divided, as shown, by a partition-wall *c* to form two longitudinal passages *d e*, provided with suitable ports at their opposite ends which are controlled by oppositely-operating check-valves *f g*, suitably pivoted to said fitting. The fitting *b* is connected to a pivotally-mounted casing *h*, which, as herein shown, is mounted to turn on pipe-sections *i j*, connected with hollow standards or uprights *k l*, the casing *h* being rendered steam-tight on said pipe-sections by suitable packing *m* and nuts *n*.

The hollow casing *h* is provided with two ports or passages *o p*, communicating, respectively, with the ports or passages *d e* in the valve-fitting *b*, and in the present instance the ports or passages *o p* are shown as separated by a partition-wall *r*, which extends across the casing *h* and divides the same into two chambers *s t*.

The hollow casing *h* has an arm or projection 2, provided with a slot or eye 3, through which a rod 4 is extended, said rod being pivotally connected at its lower end to the stem 5 of a valve 6 in a fitting 7, connected by a pipe 8 to the hollow standard or upright 1, which is separated by a partition-wall 9 into two passages 10 11, the pipe 8 communicating with the passage 10, which is also connected by pipes 12 13 with the receiver *a* near the top or highest part thereof. The pipe 13 is fitted to turn in the pipe 12 and is rendered steam-tight by a suitable packing-nut 14.

The passage 11 in the standard 1 has connected to it a pipe 15, which in practice is connected to the steam-heating plant or system.

The hollow standard *k* has connected to it a pipe 20, which is connected with the boiler (not shown) and returns the water from the trap into the boiler.

The receiver *a* has connected to it a counterbalancing-lever 21, pivoted on an upright 22 and having one arm 23 connected to an arm 24, attached to the receiver, and having its other arm 25 provided with an adjustable weight 26. The receiver *a* may be provided with a steam-outlet port, with which coöperates a valve 27, which is seated by a spring 28 and is opened by an arm 29, with which the stem of the valve may make contact when the receiver is moved upward by the counterbalance 26.

In operation with the trap as thus far described water of condensation from the steam-heating system flows into the receiver *a* through the pipe 15, passage 11, pipe *j*, into the chamber *t* in the casing *h*, and thence through the port *p* and passage *e* in the valve-fitting into the receiver, the valve *g* being opened by the pressure of the water of condensation and the valve *f* being at such time closed.

The check-valve *f* is held closed by the pressure of steam in the boiler. The water of condensation continues to flow into the receiver *a* and gradually fills the same until the weight of the water in the receiver overcomes the weight 26, whereupon the receiver *a* begins to be lowered, which turns the casing *h* on the pipes *i j* and raises the arm 2 until it engages the check-nut 30, and thereafter further downward movement of the receiver opens the valve 6 and admits steam or boiler pressure into the receiver through the pipe 8, passage 10 in the uprights 1, and pipes 12 13. The steam admitted into the receiver above the water therein closes the valve *g* and counterbalances the pressure on the valve *f*, thus permitting the latter to be opened by the water in the receiver, which flows out of the receiver to the boiler through the passage *d* and port *o* into the chamber *s* in the casing *h* and thence through the pipe *i*, upright *k*, and pipe 20. When the water has been exhausted from the receiver, the weight 26 moves the said receiver upward and brings the stem of the valve 27 against the arm 29, thus opening the said valve and permitting the steam in the receiver to pass out therefrom, the valves 6 *f* being at such time closed and the valve *g* opened.

In many instances it may be desired to produce a vacuum in the receiver, as such a trap may be employed in situations where the trap above described cannot be used to advantage. For this purpose the trap is provided with means for producing a vacuum in the receiver when the water of condensation has been discharged from the said receiver. The means herein shown for producing the vacuum referred to consists of a tube or sleeve 40, (see Fig. 5,) depending from the partition-wall 41 in the valve-fitting 7, a second sleeve or tube 42 extended up through the bottom of said fitting and having its upper end projecting beyond the lower end of the tube 40, so as to form an annular passage 43, and a pipe 44 attached to the tube or sleeve 42 and connecting it with a valve-fitting 45, containing an upwardly-closing valve 46, having its stem 47 extended upward and through an arm or projection 48 from the casing *h*, the stem 47 being provided with a nut 49 above the arm 48. The steam-valve 6 is provided with a substantially small opening 50 through it, or the said opening may be made in the partition-wall of the valve-fitting. The outlet side of the valve-fitting 45 communicates with the atmosphere and the valve 46 controls communication of the receiver *a* with the atmos-

phere. When the vacuum attachment is used, the valve 27 may be omitted; but I prefer to provide the receiver with the valve 27, and when the vacuum attachment is added to lock the valve 27 to its seat in any suitable manner and omit the upright arm 29.

The operation of the vacuum-trap is the same in general as above described, except that when the receiver is empty or substantially empty and is full of steam the valve 46 is at such time open and the steam-valve 6 is closed; but by means of the passage or opening 50 a sufficient amount of live steam is permitted to pass down through the sleeve 40 and out to the atmosphere, and this current of steam will draw the steam and air from the receiver through the pipes 13 12, passage 10, pipe 8, through the passage 43 into the sleeve or tube 42, and thence through the valve-fitting 45, thus creating a vacuum in the receiver into which the water of condensation then flows and lowers the receiver, which lifts the air-valve to its seat, thus stopping the action of the ejector. It will thus be seen that water of condensation under atmospheric pressure will flow into the receiver when the vacuum is produced therein, thus dispensing with the use of pumps to return the water to the boiler.

By reference to the drawings it will be seen that the complete steam-trap may be assembled together and mounted on the base 32 in the workshop, so that the trap as practically one piece can be sent to the place where it is to be installed, which is effected by connecting the steam-supply pipe 33 with the valve-fitting 7 and the pipes 15 20 with the hollow standards *l k*, which work can be done by comparatively inexperienced or cheap help without danger of deranging or disturbing the working parts of the trap, thus effecting a considerable saving in the cost of installation and also insuring efficiency in operation of the trap.

I claim—

1. In a steam-trap, the combination of the following instrumentalities, viz: a receiver, a pivotally-mounted casing, and an intermediate valve-fitting connecting said receiver with said casing and provided with separate ports or passages, oppositely-operating check-valves in said fitting controlling said ports or passages, a water-inlet communicating with one of said passages, and a water-outlet communicating with the other of said passages, substantially as described.

2. In a steam-trap, the combination of the following instrumentalities, viz: a receiver, a valve-fitting to which said receiver is connected, provided with separate ports or passages, oppositely-operating check-valves controlling said passages, a hollow casing connected to said fitting, hollow standards pivotally supporting said casing, valve-fitting and receiver, one of said standards having two passages, means to connect one of said passages with the hollow casing, and means

to connect the other passage with said receiver, a steam-inlet pipe connected with one of said hollow standards, a valve in said steam-inlet, means attached to said hollow casing to operate said steam-inlet valve, and a water-inlet pipe connected to one hollow standard and a water-outlet pipe connected to the other hollow standard, substantially as described.

3. In a steam-trap, the combination with a receiver, a steam-inlet therefor, a valve to control the admission of steam into the receiver, an air-outlet communicating with said receiver, and means coöperating with the steam-supply and said air-outlet to produce a vacuum in said receiver when the steam-valve is closed, substantially as described.

4. In a steam-trap, the combination with a movable receiver, a steam-supply connected therewith, a valve controlling said steam-supply, an air-outlet communicating with said receiver, a valve controlling said air-outlet, and means intermediate of said steam and air valves to produce a vacuum in the receiver, substantially as described.

5. The combination with the movable receiver of a steam-trap, of a steam-inlet for the receiver, an air-outlet to the atmosphere communicating with the steam-inlet to the receiver, a valve to control the admission of the steam into said receiver, and means to permit the passage of steam through the air-outlet when the receiver is substantially empty, for the purpose specified.

6. In a steam-trap, the combination with a receiver, of a valve-fitting provided with a steam-supply and with a steam-outlet communicating with the receiver, a valve in said fitting controlling the passage of steam into the receiver, an air-outlet pipe connected to the said fitting and communicating with both the steam-supply and with the receiver when the valve is seated, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

SAMUEL MAHONY.

Witnesses:

JAS. H. CHURCHILL,
J. MURPHY.