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F. D. KOEHLER & T. W. MONAHAN.

STEAM TRAP.

APPLICATION FILED JULY 18, 1900.

NO MODEL.

Fig. 1.

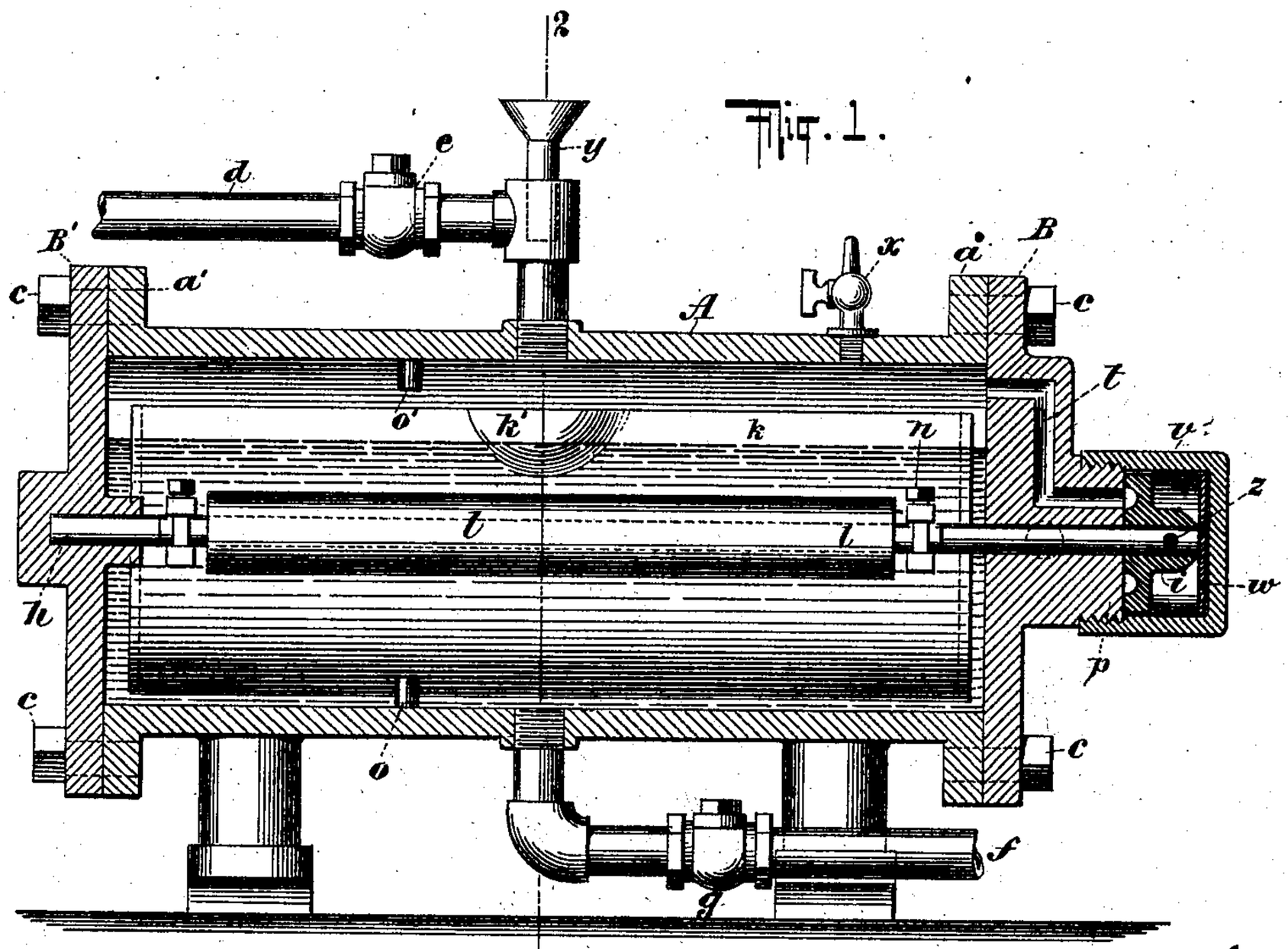


Fig. 3.

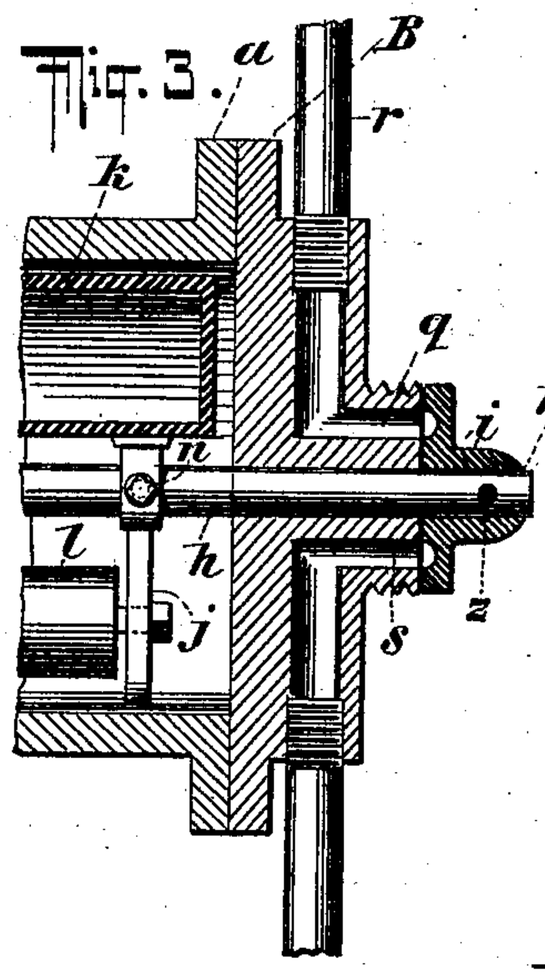


Fig. 2.

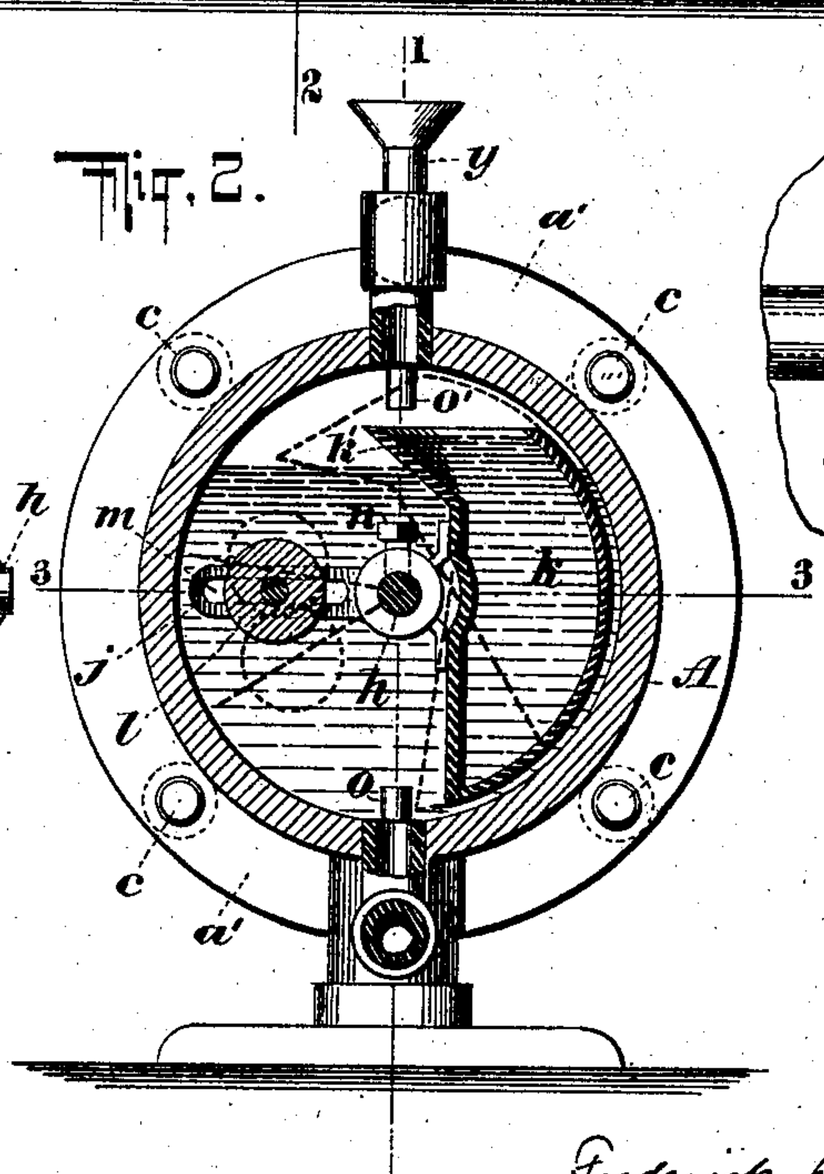


Fig. 4.

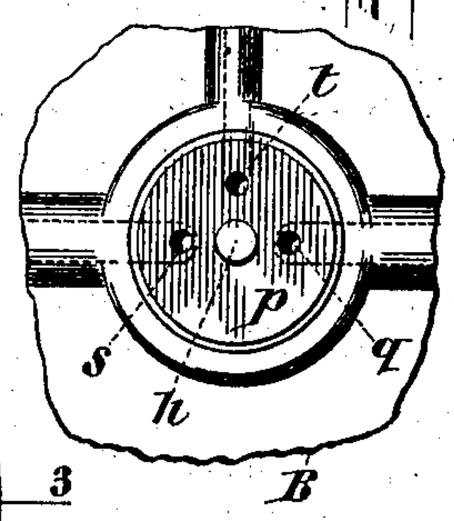
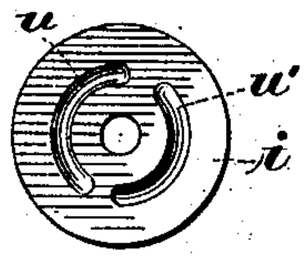


Fig. 5.



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STEAM-TRAP.

SPECIFICATION forming part of Letters Patent No. 720,701, dated February 17, 1903.

Application filed July 18, 1900. Serial No. 24,048. (No model.)

To all whom it may concern:

Be it known that we, FREDRICK D. KOEHLER and THOMAS W. MONAHAN, citizens of the United States, residing in the borough of Richmond, New York city, State of New York, have jointly invented a new and useful Improvement in Steam-Traps, of which the following is a specification.

Our invention relates to steam-traps adapted to return water of condensation from the pipes of the system to the boiler or generator. It may also be used as a gravity-pump.

The object of our invention is to provide a simple inexpensive mechanism of few parts which will not easily get out of order, which is positive and certain in operation, which is free from packed joints or stuffing-boxes, which requires no lubrication, and which will operate, if necessary, in a chamber or pit liable to be filled with refuse-water.

In the drawings, Figure 1 is a vertical sectional view of the trap on line 1 1 of Fig. 2. Fig. 2 is a vertical section on line 2 2 of Fig. 1. Fig. 3 is a horizontal sectional view of one end, showing the valve connections in part. Fig. 4 is a view of the seat of the three-port valve, showing the ports. Fig. 5 is a view of the rocking valve looking outward.

Referring to the drawings, A is the main chamber of the trap, with the two flanges *a* and *a'*, adapted to receive the caps or heads B B', which are secured thereto by screw-bolts *c*. The joints should be ground or made tight in any desired way.

From the top of chamber A the pipe *d* leads to the radiators or steam-pipes of the system from which it is desired to take the water of condensation, or the pipe *d* may lead to a receiver in which the water of condensation collects. In the pipe *d* is the check-valve *e*, which is closed by preponderance of pressure in the chamber A and opened by preponderance of pressure on the other side of the valve. From the bottom of the chamber A the pipe *f* leads directly to the boiler. It is provided with the check-valve *g*, which is closed by pressure toward the chamber A and opened by excess of pressure in the chamber A.

In the center of the cap B' is journaled the shaft *h*, which extends through the cap B and carries the valve *i*, which will be described hereinafter. Fixed upon the shaft *h* are the arms *j*, carrying on one side of the shaft *h* the bucket *k*, open at the top and bulged at *k'*, so as to protrude under pipe *d*, and on the other side of the shaft *h* the counterweight *l*, which is adjustably secured in the slots *m* by the bolts *n*. The stops *o o'* limit the rocking movement of the bucket *k* on the shaft *h*, as described hereinafter.

The cap B is provided with three small ports, terminating in the smooth valve-seat *p*, which forms a part of the valve *i*. The port *q* leads from the valve *i* to a pipe *r*, connected directly with the boiler. The port *s* leads from the valve *i* to the atmosphere. The port *t* leads from the valve *i* to the top of the chamber A. The valve *i* is fixed on the shaft *h* and rocks therewith. It has two ducts *u* and *u'*. The duct *u* is adapted to connect the port *q* with the port *t*, thus affording communication between the pipe *r*, leading to the boiler, and the top of the chamber A. The duct *u'* is adapted to connect the port *s* with the port *t*, thus affording communication between the top of the chamber A and the atmosphere. The cap *v* is tightly secured on the cap or head B, as shown, or screw-bolts may be employed. It has a spring-plate *w*, which when in position contacts with the end of the shaft *h*, but should not bind it so as to prevent its rocking. In the top of chamber A is a small cock *x*, which vents to the atmosphere.

The removable funnel *y* fits in a T-joint in the pipe *d*, as shown. The valve *i* is secured in position on the shaft *h* by the key *z*, so that it can be readily removed and renewed.

The operation of the device is as follows: The trap should be located three or four feet above the surface of the water-level of the boiler. To start the automatic operation of the trap, a valve (not shown) in pipe *r* is first closed, shutting off boiler-pressure from the trap. A valve (not shown) in pipe *d* is also closed. The cock *x* is opened. Water is poured through funnel *y* to fill the bucket *k*. The cock *x* is then shut, the funnel *y* removed and a plug (not shown) screwed tightly in its place, and the valves (not shown) in pipes *d* and *r* reopened. The weight of the bucket and water therein is greater than the counterweight *l*. The shaft *h* therefore rocks on its journals until the bucket contacts with the

stop *o*. The position of the valve *i* is now such that communication from the chamber A to the atmosphere is open through the port *t*, the duct *u'*, and the port *s*. This allows the water of condensation to flow either under the influence of gravity or pressure through the pipe *d* and check-valve *e* into the chamber A. The excess of boiler-pressure over atmospheric pressure keeps the check-valve *g* closed. The water flows into the chamber A, its buoyancy lessening the effect of the bucket *k* and water therein until the counterweight overbalances the same. The shaft *h* then rocks (until the bucket *k* contacts with stop *o'*) and with it the valve *i*, first shutting off communication with the atmosphere and then opening communication between the top of the chamber A and (through port *t*, duct *u*, and port *q*) pipe *r*. The direct boiler-pressure in chamber A now closes the check-valve *e*. As both pipe *r* and pipe *f* connect directly with the boiler, the pressure in the top of chamber A becomes equal to that in pipe *f*. The weight of the water in chamber A overbalances the pressure and opens the check-valve *g*, allowing the water to flow directly by gravity from chamber A to the boiler. As the water recedes from chamber A the bucket *k* is again lowered, rocking the shaft *h* and shifting the valve *i*. This first shuts off the boiler-pressure from the pipe *r* and then opens communication with the atmosphere, allowing check-valve *e* to open again, and the operation will be repeated automatically and indefinitely. The two extreme positions of the bucket *k* and counterweight *l* are shown by dotted lines in Fig. 2. By using a funnel *y* smaller than the opening in the T-joint the air from chamber A will escape through said opening when the bucket is being filled. The cock *x* may thus be dispensed with. In large-size traps we may employ a weight attached to the top of the bucket or to an arm extending upward from the shaft *h*. This weight when vertically above the shaft will be ineffective; but as it passes that position in either direction it will quicken the rocking of the shaft and prevent centering of the valve *i* in a position where neither of its ducts communicate from the port *t*. The steam from pipe *r* led through the port *q* spreads itself about the two contacting surfaces of the valve and takes the place of other lubricant. It also serves to keep the valve free from dirt. As the steam from pipe *f* escapes from the valve *i* into the cap *v* the steam-pressure on both sides of the valve *i* is equalized, partially balancing the valve *i*, which is held to its seat by the spring-plate *w*.

Our invention is not limited to the precise arrangement shown for rocking the valve *i*. In place of the open bucket *k* we might employ a closed vessel. The counterweight might be dispensed with, the only essential being that the water is allowed to fill the chamber to a considerable depth before the shaft *h* and valve *i* thereon are rocked by the buoyancy of the apparatus fixed to the shaft.

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

1. In a steam-trap, a single chamber, a bucket and counterweight therein adapted to be rocked on their shaft by changes in the level of the water in said chamber outside said bucket and a three-port rocking valve carried on said shaft, substantially as shown and described.

2. In a steam-trap, a single chamber, a shaft carrying a bucket rocked by changes in the level of the water in said chamber outside said bucket and a three-port rocking valve controlled by the rocking of said shaft, substantially as shown and described.

3. In a steam-trap, a chamber, and a bucket and rock-shaft therein, said shaft carrying a single rocking control-valve having ducts *u* and *u'* coacting with the ports *q*, *s* and *t*, substantially as shown and described.

4. In a steam-trap, a bucket, counterweight and control-valve *i*, all carried on and rocking with the same shaft, said control-valve *i* having the ducts *u*, *u'* coacting with the ports *q*, *s* and *t* of the valve-seat *p*, substantially as shown and described.

5. A steam-trap, consisting of a single stationary chamber, having connections with the pipes of the system, the boiler and the atmosphere and a rock-shaft carrying a bucket, counterweight and control-valve which rock with said shaft, said control-valve having the ducts *u*, *u'* which coact with the ports *q*, *s* and *t* of the valve-seat, substantially as shown and described.

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