

No. 673,281.

Patented Apr. 30, 1901.

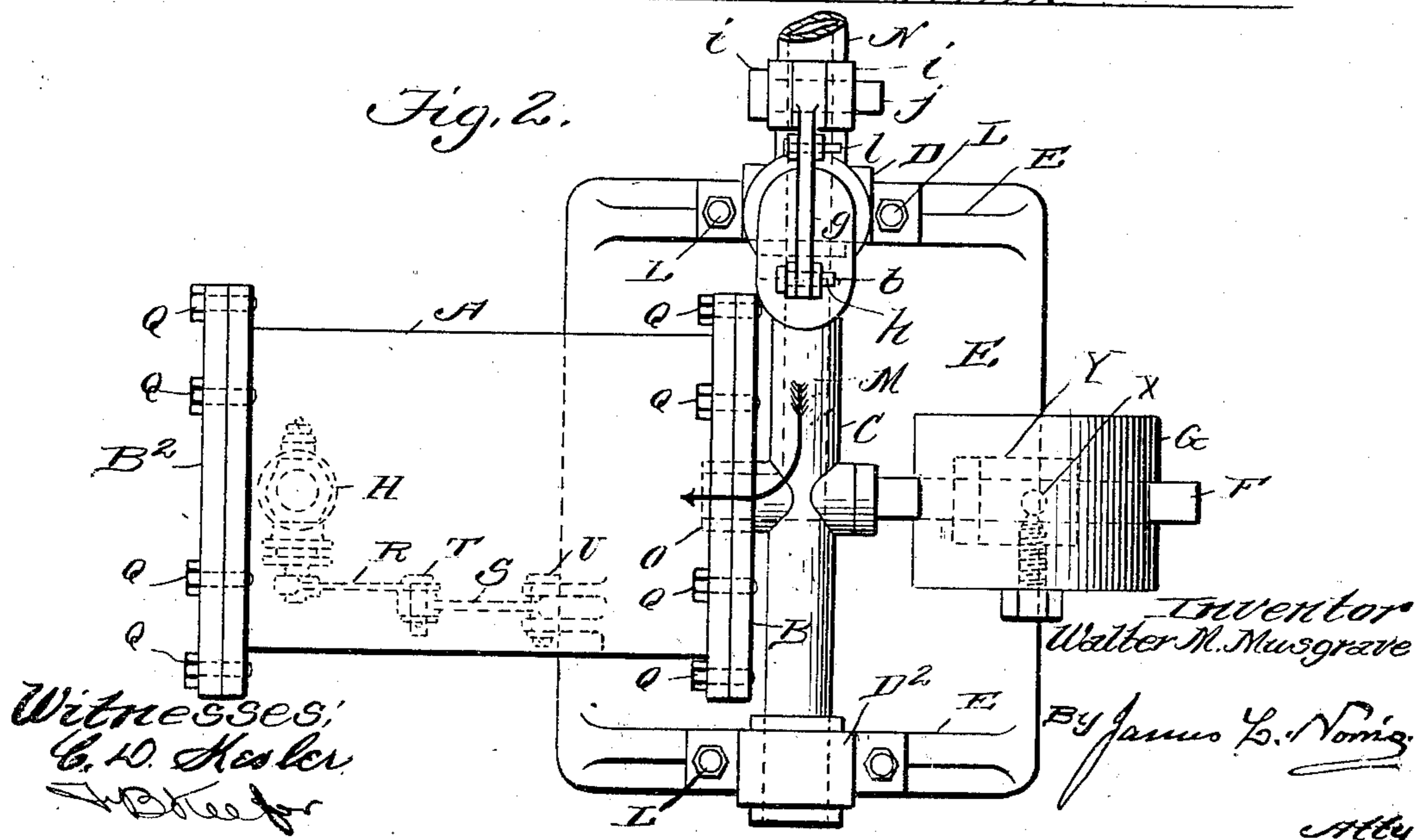
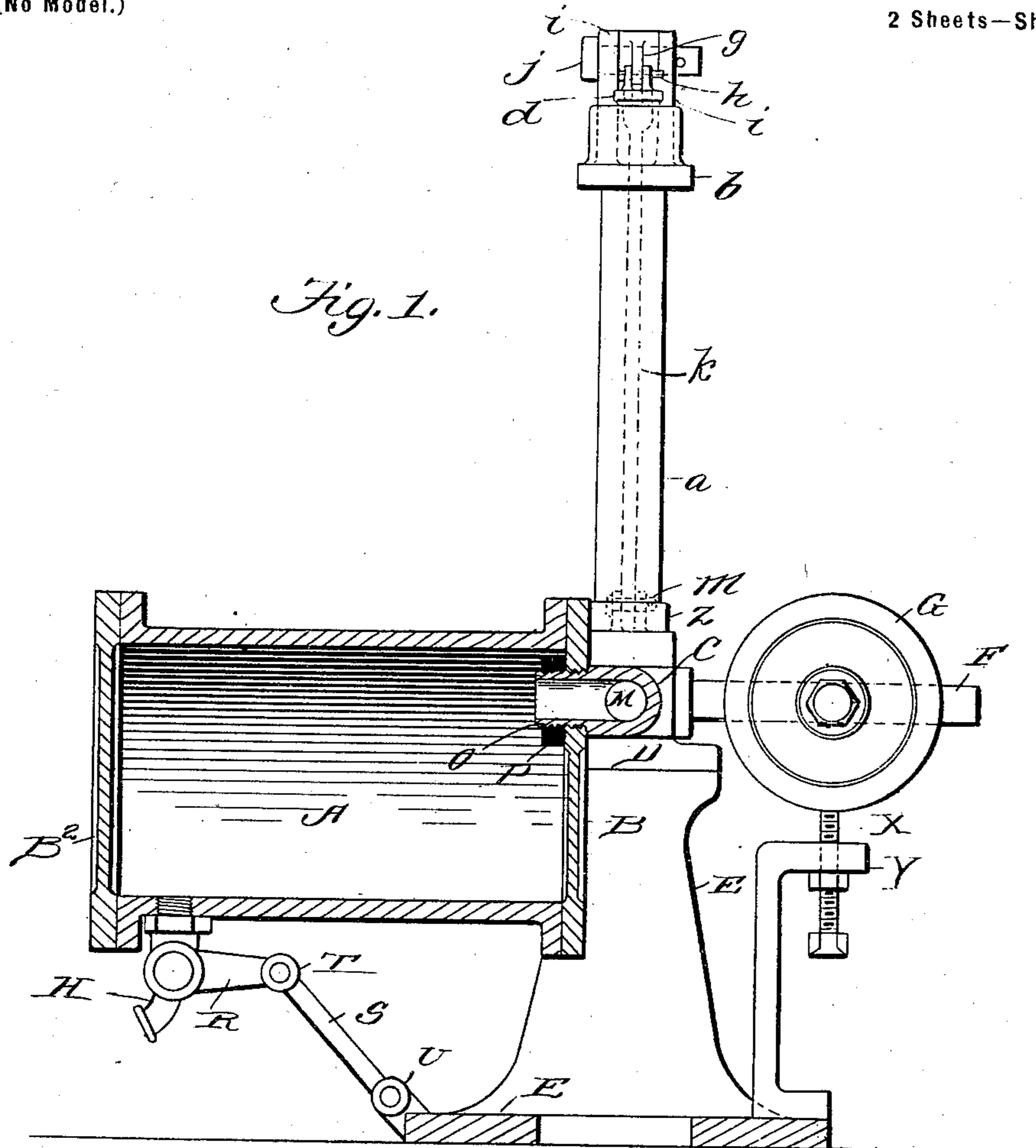
W. M. MUSGRAVE.

STEAM TRAP.

(Application filed Oct. 17, 1900.)

(No Model.)

2 Sheets—Sheet 1.



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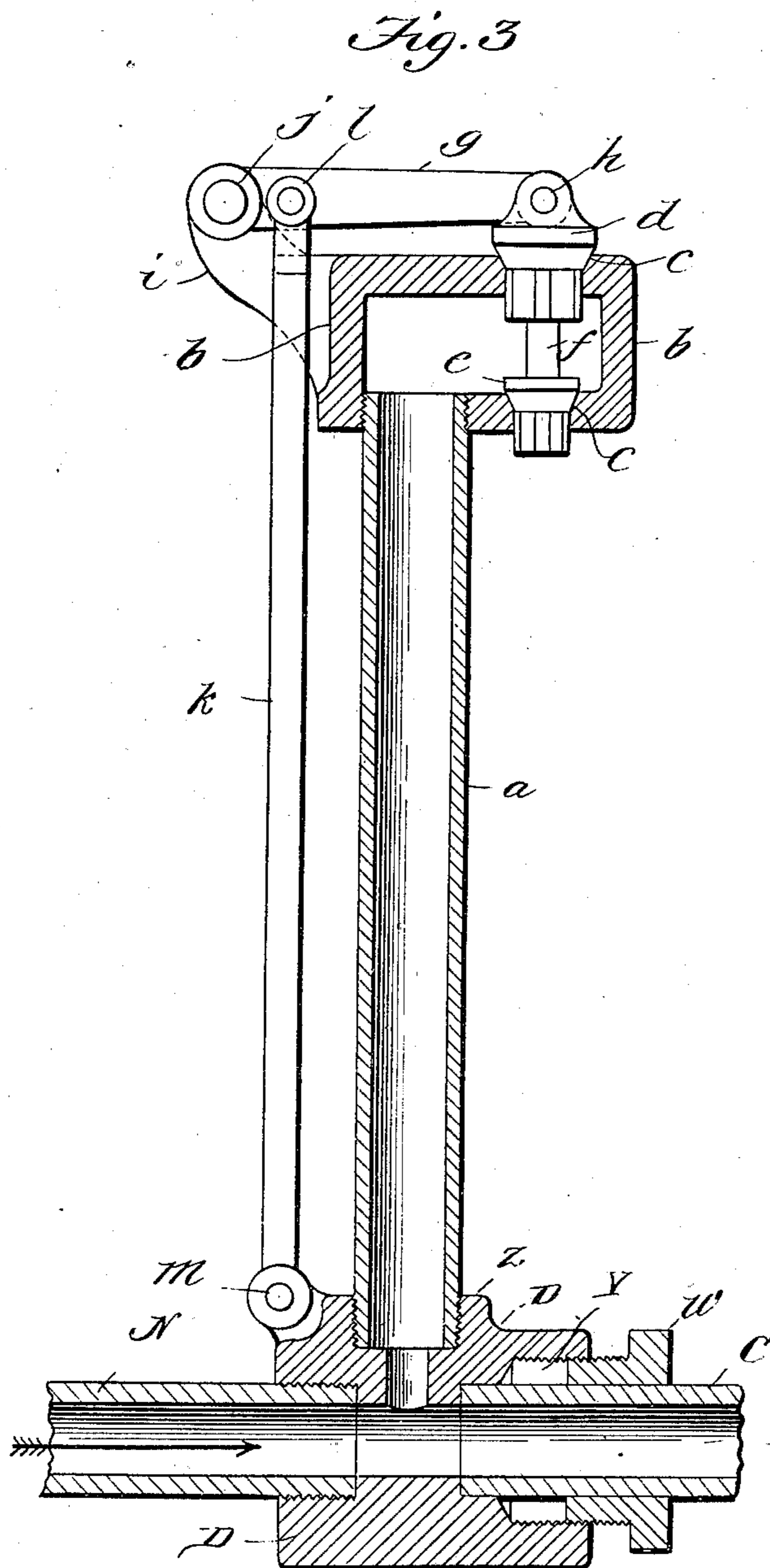
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STEAM TRAP.

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(No Model.)

2 Sheets—Sheet 2.



Witnesses:
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UNITED STATES PATENT OFFICE.

WALTER MARTIN MUSGRAVE, OF BOLTON, ENGLAND.

STEAM-TRAP.

SPECIFICATION forming part of Letters Patent No. 673,281, dated April 30, 1901.

Application filed October 17, 1900. Serial No. 33,381. (No model.)

To all whom it may concern:

Be it known that I, WALTER MARTIN MUSGRAVE, a subject of the Queen of England, residing at Bolton, in the county of Lancaster, England, have invented certain new and useful Improvements in Steam-Traps, of which the following is a specification.

This invention relates to a new or improved balanced steam-trap and expansion air-valve and apparatus connected therewith and is designed for the purpose of removing condensed water and liquid from the cylinders of steam-engines and other purposes—such as steam-pipes, exhaust-pipes, drying-cylinders, drying-tins, and the like—and consists of a cylinder mounted on a trunnion or metallic shaft provided with a passage or passages for admitting and emitting water, steam, or liquid that may be received from the cylinder or cylinders of a steam-engine, steam-pipes, exhaust-pipes, drying-cylinders, drying-tins, and the like. The trunnion or metallic shaft carrying the aforesaid cylinder is mounted in bearings located on a stand or fixing secured to the floor or other convenient position, as desired or required. The trunnion or metallic shaft is provided with a lever and a movable weight for balancing the cylinder and its connections in any desired position, the latter being effected by means of an adjusting-screw suitably mounted. The bearing carrying the inlet end of the trunnion or metallic shaft is provided with a stuffing-box and gland to make a steam and water or liquid tight joint; also, a vertical expansion-pipe, the upper end of which is fitted with a valve-box, valves, and seatings, the valves being coupled to a pivoted lever to which is attached a rod connected with the bearing carrying one end of the trunnion or metallic shaft. As the cylinder mounted on the trunnion or metallic shaft becomes filled with condensed water or other liquid it is depressed or oscillated, which action operates an outlet-valve and allows the water or liquid to escape, which lightens the weight of the cylinder and allows of the same being reset to its original position by the aid of the aforesaid balance-weight, which action closes the outlet-valve and prevents the escape of steam. The cylinder mounted on the trunnion or metallic shaft may be provided internally with a “dip-pipe,” coupled to the aforesaid trun-

nion or metallic shaft for the purpose of conveying the condensed water or liquid away through the said trunnion or metallic shaft, the outlet end of the latter being provided with a double-ported valve located in a valve-box secured to or formed with the bearing carrying the outlet end of the trunnion or metallic shaft.

The advantages accruing from this invention are that it may be worked at any pressure and made of any required size, the larger the better, being perfect in its action, and by combining the two principles on which steam-traps are generally made, the advantage of the expansion-trap being provided with a free opening while the trap is cold, its operations are insured, the discharging of water or liquid being effected absolutely by the trap. The difference in weight of the cylinder mounted on the trunnion or metallic shaft when empty and when charged with water or liquid is so great that it guarantees the positive and effectual working of the trap.

Figure 1 is a longitudinal sectional elevation of my new or improved balanced steam-trap and expansion air-valve and apparatus connected therewith; Fig. 2, a plan of Fig. 1; and Fig. 3, an enlarged sectional elevation of expansion air-valve.

In order that my invention may be readily and clearly understood, I will now proceed to describe in as succinct a manner as possible, taking each sheet of drawings in their respective order.

A represents the cylinder of my new or improved balanced steam-trap; B and B², cylinder covers or ends; C, trunnion or metallic shaft; D and D², bearings carrying trunnion or metallic shaft; E, stand or fixing; F, lever; G, movable balance-weight; H, outlet-valve; I, dip-pipe; J, double-ported valve, and K valve-box.

In all the figures the same letters are employed to indicate corresponding parts.

On the stand or fixing E are mounted the bearings D and D², secured thereto by the bolts or set-screws L. In the bearings D and D² is mounted the trunnion or metallic shaft C, provided with the passage M for conveying water, steam, or liquid by means of the pipe N, leading from the cylinder or cylinders of a steam-engine, steam-pipes, exhaust-pipes, drying-cylinders, drying-tins, and the

like. The trunnion or metallic shaft C is provided with the screwed or threaded projection O, to which is secured the cylinder-cover B by the nut P. The other end of the cylinder
 5 A is fitted with the cylinder-cover B², being secured in the usual manner by bolts or set-screws. The under side of the cylinder A is provided with the outlet-valve H, fitted with the lever R, coupled to the rod S by the pin
 10 or center T, the other end of the rod S being coupled to the base of the stand or fixing E by the pin or center U. The bearing D, carrying the end of the trunnion or metallic shaft C, is provided with the stuffing-box V and
 15 gland W for the purpose of making a tight joint and allow of the oscillating movements of the said trunnion or metallic shaft C and the cylinder A and cylinder-covers B and B², attached thereto, the other end of the said
 20 trunnion or metallic shaft C being mounted in the bearing D² on the stand or fixing E. The trunnion or metallic shaft C is fitted with the lever F, on which is mounted the adjustable or movable weight G for balancing the
 25 cylinder A and its connections in any desired position, the latter being effected by means of the adjusting-screw X in the fixing Y, secured to the base of the stand or fixing E. The bearing D is provided on its upper side
 30 with the boss or projection Z, in which is screwed the vertical expansion-pipe *a*, on the upper end of which is located the valve-box *b*, provided with the seatings *c*, on which are disposed the valves *d* and *e*, coupled together
 35 by the stem *f*. To the upper side of the valve *d* is secured the lever *g* by the pin or center *h*, the lever *g* being pivoted to the arms *i* on the side of the valve-box *b* by the pin or center *j*. To the lever *g* is attached the rod *k* by
 40 the pin or center *l*, the rod *k* being secured to the bearing D by the pin or center *m*. When steam is shut off from the cylinder A, the expansion-pipe *a* contracts, and owing to the fixed length of the rod *k* the lever *g* raises
 45 the valves *d* and *e* from their seats *c*, which allows of atmospheric air being admitted through the pipe *a* to the cylinder A, thus destroying the vacuum and preventing water or liquid being drawn into the cylinder or cyl-
 50 inders of a steam-engine, steam-pipes, exhaust-pipes, drying-cylinders, drying-tins, and the like without closing the trap. Immediately steam enters the inlet-pipe N and the trunnion or metallic shaft C atmospheric
 55 air is forced from the cylinder A through the expansion-pipe *a* into the valve-box *b* and out through the valves *d* and *e*, and as the expansion-pipe *a* is gradually lengthened by heat from the steam the valve-seats *c*, in and on
 60 the valve-box *b*, are forced against the fixed valves *d* and *e*, thereby enabling the rest of the work to be effectively performed by the trap.

Having now particularly described and as-
 65 certained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is—

1. In an apparatus of the character described, a rocking cylinder, an outlet-valve connected thereto and operated thereby, and
 70 expansible means for admitting atmospheric pressure to said cylinder.

2. In a steam-trap, a hollow trunnion, a counterbalance-weight connected to one side thereof, a rocking cylinder connected to the
 75 opposite side thereof, in communication therewith, and operated thereby, an outlet-valve connected directly to said cylinder and operated thereby, and means in communication
 80 with said trunnion for automatically admitting atmospheric pressure to said cylinder.

3. In an apparatus of the character described, a rocking cylinder, a hollow trunnion connected thereto, communicating with
 85 the interior of said cylinder and connected to a supply-pipe, an outlet-valve operated by said cylinder, an expansible pipe in communication with said trunnion, and means oper-
 90 ated by said pipe for admitting atmospheric pressure to said cylinder.

4. In an apparatus of the character described, a cylinder, a hollow trunnion connected thereto, communicating with the in-
 95 terior thereof and connected to a supply-pipe, bearings for said trunnion, an outlet-valve operated by said cylinder, a lever carrying an adjustable weight attached to said
 100 trunnion, means for limiting the movement of said lever, and expansible means connected to said trunnion for admitting atmospheric pressure to said cylinder.

5. In an apparatus of the character described, a cylinder, a hollow trunnion at-
 105 tached to said cylinder and in communication with the interior thereof, a counterbalance-lever connected to said trunnion, an outlet-valve for the said cylinder, connected directly thereto and operated thereby, and a
 110 valve mechanism connected to said trunnion for admitting atmospheric pressure to said cylinder.

6. In an apparatus of the character described, a hollow trunnion mounted in suit-
 115 able bearings and connected to a supply-pipe, a cylinder suitably secured to said trunnion, a counterbalance-lever connected to said trunnion, an outlet-valve operated by said cylin-
 120 der, an expansible pipe connected to said trunnion and carrying valve-seatings, valves adapted to engage said seatings, and means for operating said valves.

7. In an apparatus of the character described, a cylinder in communication with a
 125 source of supply, a counterbalance-lever, an outlet-valve operated by said cylinder, a valve, and means for automatically admitting atmospheric pressure to said cylinder.

In testimony whereof I have hereunto set my hand in presence of two subscribing wit-
 130 nesses.

WALTER MARTIN MUSGRAVE.

Witnesses:

EDMUND CHADWICK,
 JAS. STEWART BROADFOOT.