

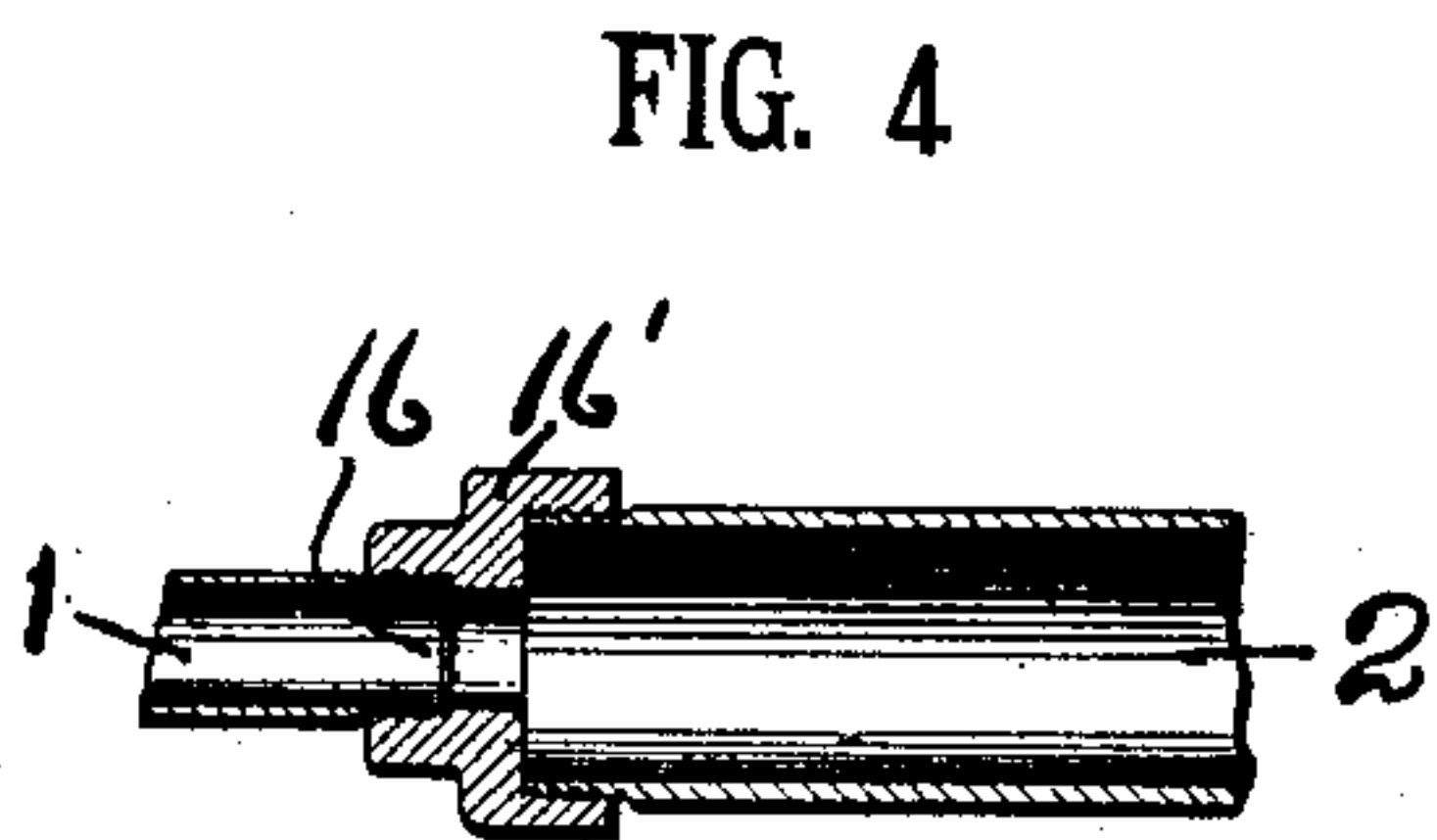
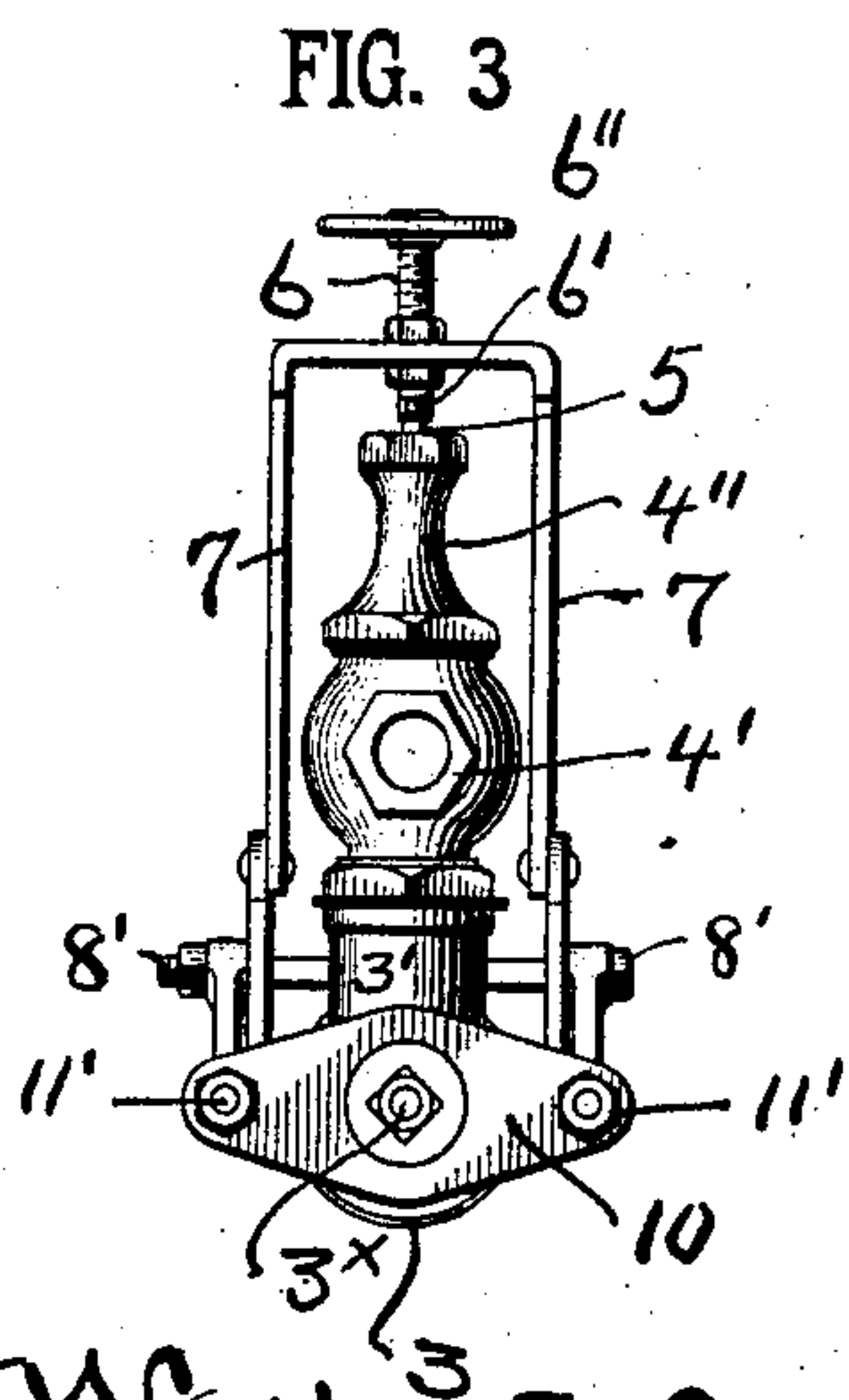
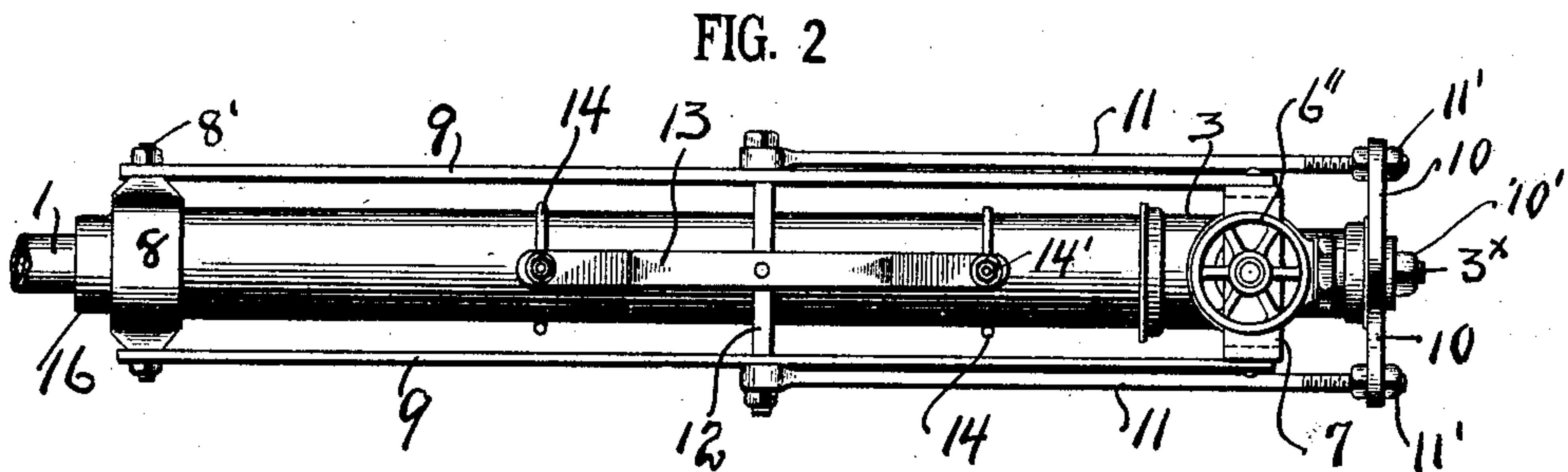
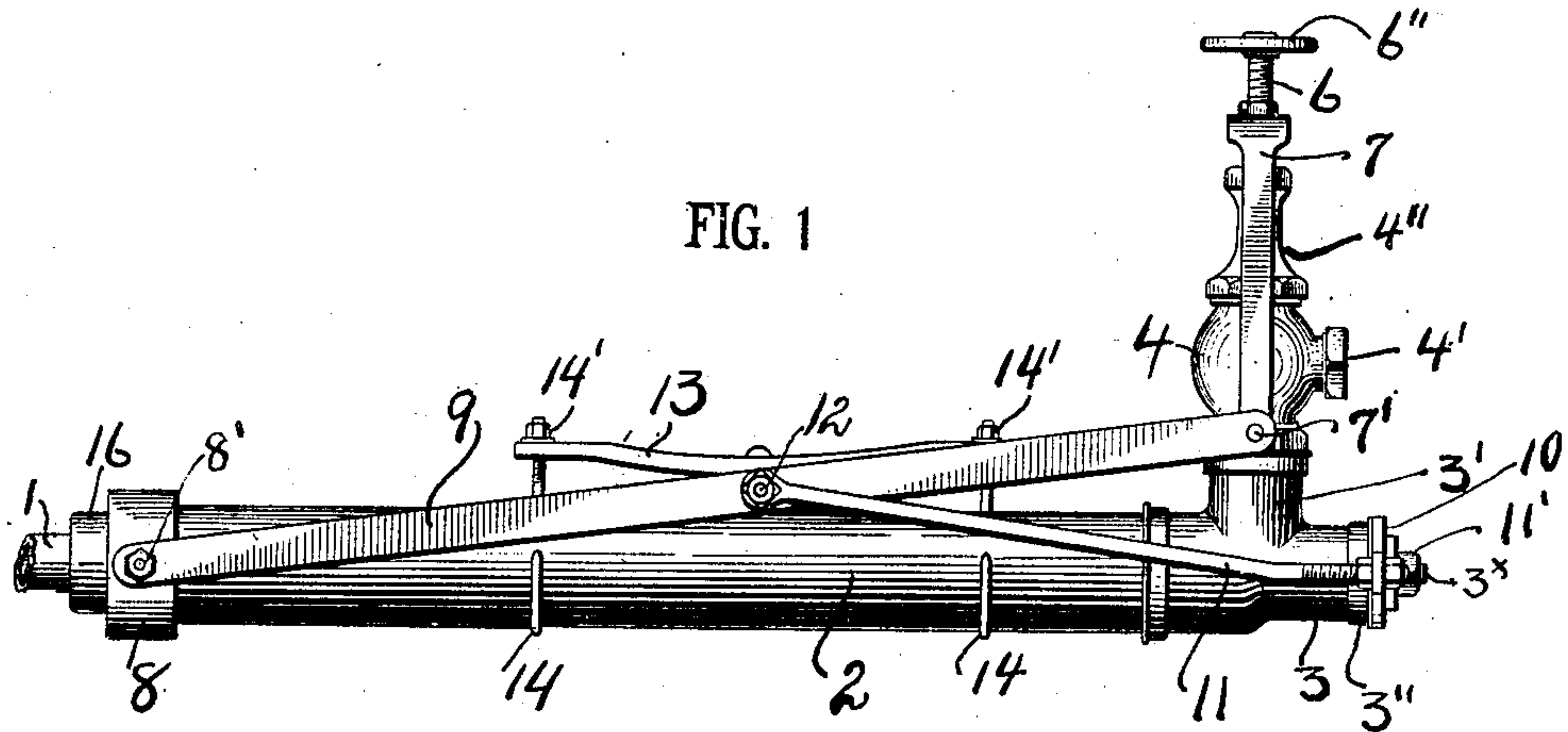
No. 897,022.

PATENTED AUG. 25, 1908.

W. F. SAYLES.

STEAM TRAP.

APPLICATION FILED MAR. 5, 1907.



Witnesses:  
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# UNITED STATES PATENT OFFICE.

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## STEAM-TRAP.

No. 897,022.

Specification of Letters Patent.

Patented Aug. 25, 1908.

Application filed March 5, 1907. Serial No. 360,648.

*To all whom it may concern:*

Be it known that I, WALTER F. SAYLES, a citizen of the United States, residing at Auburn, in the county of Providence, State of Rhode Island, have invented certain new and useful Improvements in Automatic Steam-Traps, of which the following is a specification.

My invention relates to steam traps, and more particularly to that class of traps wherein a valve is acted upon by the expansion and contraction of a pipe connected with a steam system.

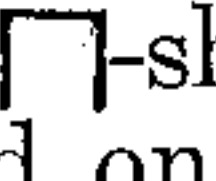
The object of my invention is to so improve this form of trap that it shall operate with a greater amplitude of movement, that the valve shall be capable of being removed from its seat or reseated without the necessity of disassembling the various parts, and to provide convenient means whereby it may be vented at will.

My invention consists in the construction and arrangement of parts illustrated in the accompanying drawings and set forth more definitely in the appended claims.

I have illustrated an embodiment of my invention in the accompanying drawings, wherein,

Figure 1 is a side view of my construction. Fig. 2 is a top view of Fig. 1. Fig. 3 is an end view. Fig. 4 is a longitudinal section of the end of the trap-pipe to show a detail of construction.

Like characters in all the several views designate like parts.

In the drawings, 2 designates a section of pipe carrying at its outlet end a reducing tee 3. To the branch 3' of this reducing tee is connected the angle valve casing 4 having the side discharge outlet 4'. The valve stem 5 of the valve within the casing 4 slides through a suitable bonnet 4'' on the top of the casing 4, and at its end is detachably connected, as by a pin 6' to the screw-threaded shaft 6 which forms a continuation of valve stem 5 and carries the hand wheel 6'' at its upper end. The threads of shaft 6 have engagement with a -shaped yoke 7, the arms of which depend on either side of the valve casing.

Rigidly mounted adjacent to the inlet end of the expansion pipe 2 is a band 8 forming a fixed yoke surrounding pipe 2 and securely fast thereon. Pivoted to this band on opposite sides thereof by bolts 8' are levers 9, 9.

These levers extend forward towards the outlet end of the expansion pipe 2, where they are pivoted to the depending ends of yokes 7 at 7'.

Attached to the opposite end of pipe 2 from the yoke 8 is a cross piece or fixed yoke 10. This may be attached by a bolt 3<sup>x</sup> projecting from a cap 3'' closing the end of the reducer 3, a nut 10' holding the yoke securely in place.

Pivoted to the levers 9 at about their middles are rods 11, 11 which extend to the closed branch of the tee and are there attached to the ends of yoke 10, preferably by screw-threading the ends of the rods where they pass through the yoke and clamping the same to the yoke by means of nuts 11' on either side thereof. Preferably the rods 11 are attached to the levers 9 by means of the transverse spreader 12, the ends of said spreader passing through the levers 9 and the ends of the rod 11, and carrying bolts on the outside thereof. This spreader thus not only forms the pivotal joint of the rods and levers but also the bearing for a slightly bowed resilient bar or spring 13 which normally acts to depress the levers 9. This spring extends longitudinally along the pipe 2, is attached at its middle to the transverse bar 12, and at its ends is provided with hangers 14, 14 which embrace the pipe 2. The hangers are screw-threaded into the ends of the spring 13 and provided with nuts 14' whereby the ends of the spring may be drawn nearer to the pipe and thus the force of the spring on levers 9 may be increased. At the inlet end of the expansion pipe 2 is a strainer 16, preferably located within the coupling 16'.

The operation of my device is as follows: When water collects in the pipe 2, or as it cools with the condensation of the steam, the pipe 2 contracts, thus drawing the brackets or yokes 8 and 10 towards each other. The rods 11 thus being drawn inward, force up the free ends of levers 9 which thus carry up the yoke 7 and the attached valve stem 5 and 6. This lifts the valve from its seat on the interior of casing 4 and allows the water to escape through outlet 4'. As the water leaves and steam enters the pipe 2, the pipe expands, thus drawing outward on the rods 11 and drawing the levers 9 downward, closing the valve in casing 4.

The advantages of my invention reside particularly in the increased movement of



the valve incident to a very slight change in the length of pipe 2 due to changes in its temperature. The lift of the valve may be easily controlled by changing the point of attachment of the rods 11 to the levers 9. As shown in the drawing, the proportion of the levers is such that the valve-connected end has a movement fifteen times greater than the amount of contraction and expansion of pipe 2 and its attached tee 3. Another important advantage lies in the fact that the yoke 7 may be swung backward leaving the valve box free to be cleaned or the valve re-seated. The valve may be withdrawn and the valve case and bonnet detached without disassembling the valve-regulating mechanism.

The construction of the spring 13 is such that it may be readily tightened to bear on the levers 9 with any degree of pressure, and thus hold the valve firmly to its seat against any pressure of steam. At the same time it may be so adjusted as to allow the valve to open under sudden increase of pressure.

By means of the hand wheel 6" and screw 6, the valve may be set to open whenever any desired temperature is reached. To set the trap the wheel 6 is turned by hand to raise the valve from its seat. The water in the trap will then be expelled through the outlet 4'. After the water has been expelled and some steam blown through, the pipe 2 and tee 3 will have expanded to their normal condition. The operator then reverses wheel 6 until the valve is seated.

Having described my invention what I claim is:

1. A steam trap comprising an expansion pipe adapted to expand or contract in accordance with the changes in the temperature of its contents, and having an outlet therefrom, a valve closing said outlet, a lever pivoted at one end to said expansion pipe and having a connection at its free end to said valve, a spring holding said lever depressed, hooks engaging around the expansion pipe, the ends of said hooks being engaged with the ends of the spring, nuts on the ends of the hooks whereby the pressure of the spring may be increased, a rod secured to the other end of said expansion pipe, the free end of said rod being pivoted to the said lever.

2. A steam trap comprising an expansion pipe adapted to expand or contract in accordance with the changes in the temperature of its contents, and having an outlet therefrom, a valve closing said outlet, oppositely disposed levers pivoted at one end to said expansion pipe and having a connection at their free ends to said valve, oppositely disposed rods secured to the other end of said expansion pipe, the free ends of said rods being pivoted each to one of said levers by a transverse pivot bolt, and a spring having

means on its ends for engaging with the expansion pipe and bearing at its middle upon said transverse pivot bolt.

3. A steam trap comprising an expansion pipe adapted to expand or contract in accordance with the changes in the temperature of its contents and having an outlet therefrom, a vertical valve closing said outlet, a valve stem on said valve, a yoke to which the valve stem is connected having arms extending downward nearly to the expansion pipe, oppositely disposed levers pivoted at one end to and extending in the direction of the expansion pipe and pivoted thereto and having a connection at their free ends to the downwardly depending arms of said yoke, and oppositely disposed resilient rods rigidly secured to the other end of said expansion pipe, the free ends of said rods being pivoted each to one of said levers between the pivotal point thereof, and their connection to the yoke.

4. A steam trap comprising an expansion pipe adapted to expand or contract in accordance with the changes in the temperature of its contents, and having an outlet therefrom, a valve closing said outlet, a valve stem on said valve, a yoke having screw threaded connection with said valve and having arms on either side thereof extending downward nearly to the expansion pipe, oppositely disposed levers pivoted at the inlet end to said expansion pipe and having a connection at their free ends to the downwardly depending arms of said yoke, and oppositely disposed rods secured to the other end of said expansion pipe, the free ends of said rods being pivoted each to one of said levers between the pivotal point thereof and their connection to the yoke.

5. A steam trap comprising an expansion pipe adapted to expand or contract in accordance with the changes in the temperature of its contents, and having an outlet therefrom, a valve closing said outlet, a valve stem on said valve, a yoke having screw threaded connection with said valve and having downwardly extending arms on either side thereof, oppositely disposed levers pivoted at the inlet end to said expansion pipe and having a connection at their free ends to the downwardly depending arms of said yoke, oppositely disposed rods secured to the other end of said expansion pipe, the free ends of said rods being pivoted each to one of said levers between the pivotal point thereof and their connection to the yoke, a bar connecting the two levers, and a spring acting on said bar to depress the levers against the expansion of the said expansion pipe.

6. A steam trap comprising an expansion pipe adapted to expand or contract in accordance with the changes in the temperature of its contents, and having an outlet therefrom, a valve closing said outlet, a valve



stem on said valve, a yoke having screw threaded connection with said valve and having downwardly extending arms on either side thereof, oppositely disposed levers 5 pivoted at the inlet end to said expansion pipe and having a connection at their free ends to the downwardly depending arms of said yoke, oppositely disposed rods secured to the other end of said expansion pipe, the 10 free ends of said rods being pivoted each to one of said levers between the pivotal point thereof and their connection to the yoke, a bar connecting the two levers, a bowspring,— its middle bearing upon said bar, hooks at- 15 tached to the ends of said bowspring and engaging the expansion pipe, and nuts on said hooks for depressing the ends of said spring.

7. A steam trap comprising an expansion pipe adapted to expand or contract in accordance with the changes in the temperature of its contents and having an inlet at one end, a tee closing the other end of said expansion pipe, a closure on the end of said tee, a valve casing attached to the branch of said tee and 25 having an outlet therefrom, a valve in said casing acting to close said branch to prevent outlet of fluid therefrom, a spindle on said valve having sliding engagement with the walls of said casing and screw threaded at its 30 upper end, a yoke engaging with the screw threaded portion of said valve spindle, oppositely disposed levers on either side of said expansion pipe and pivoted to the end thereof, of, pivotal connection between the free ends 35 of said levers and the valve yoke, oppositely disposed rods on either side of the said expansion pipe, the outer ends of said rods being attached to the closed end of said reducing tee, and the inner ends of said rods being 40 pivotally attached to the said levers, a transverse bar joining the two levers and forming the pivotal connection of the rods to said

levers, and a spring connected to said expansion pipe and acting to depress the said levers.

8. A steam trap comprising an expansion 45 pipe adapted to expand or contract in accordance with the changes in the temperature of its contents, and having an inlet at one end, a tee closing the other end of said expansion pipe, a closure on the end of said tee, 50 a laterally projecting bracket on the end of said tee, a valve casing attached to the branch of said tee and having an outlet therefrom, a valve in said casing acting to close said branch to prevent outlet of fluid there- 55 from, a spindle on said valve having sliding engagement with the walls of said casing and screw threaded at its upper end, a yoke engaging with the screw threaded portions of said valve spindle, a hand wheel on said spin- 60 dle above the said yoke, oppositely disposed levers on either side of said expansion pipe and pivoted to the end thereof, pivotal connections between the free ends of said levers and the valve yoke, oppositely disposed rods 65 engaging with the laterally projecting brackets on the end of said reducing tee, bolts on said rods acting against said bracket for holding said rods in position, the inner end of said rods being pivotally attached to said levers, 70 a transverse bar joining the two levers and forming a pivotal connection of the rods to said levers, and a spring connected to said expansion pipe and acting to depress the said levers. 75

In testimony whereof, I have signed my name to this specification in the presence of two subscribing witnesses, this twenty-third day of February 1907.

WALTER F. SAYLES.

Witnesses:

PHILIP A. RAND,  
HARVEY D. CORNELL.