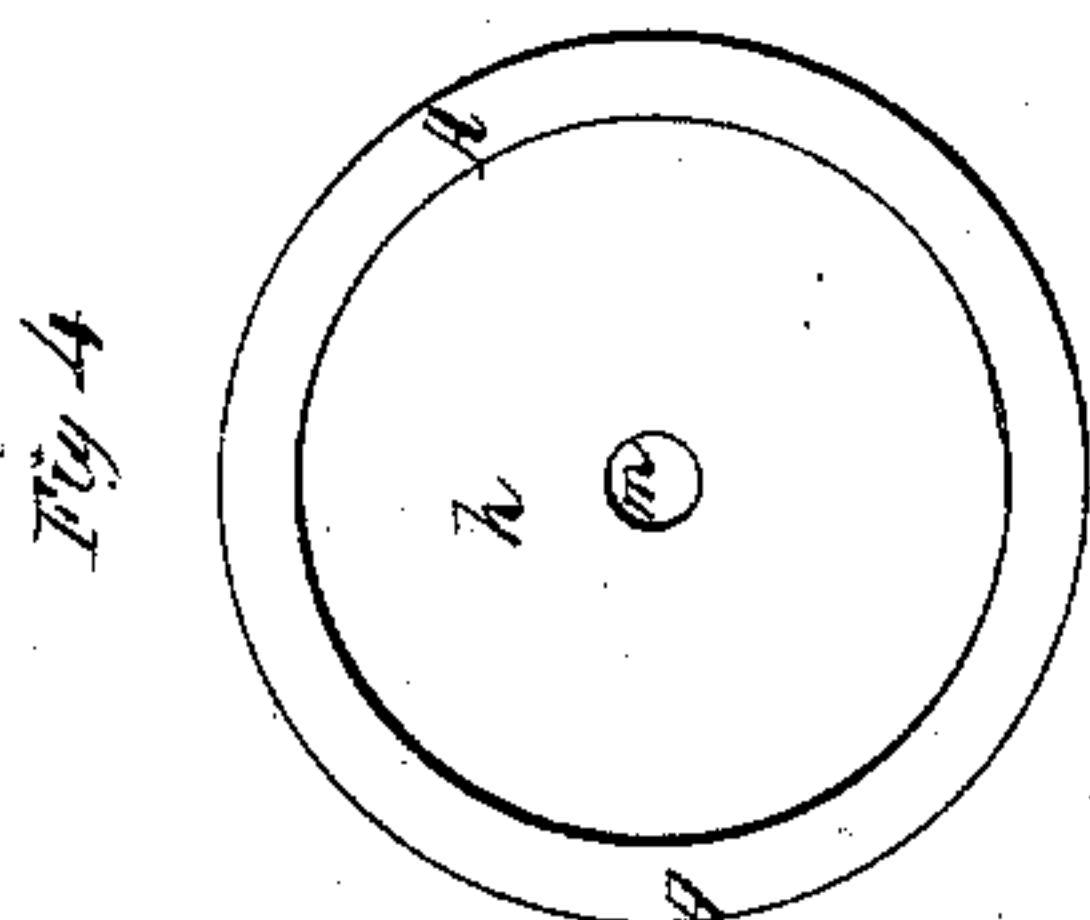
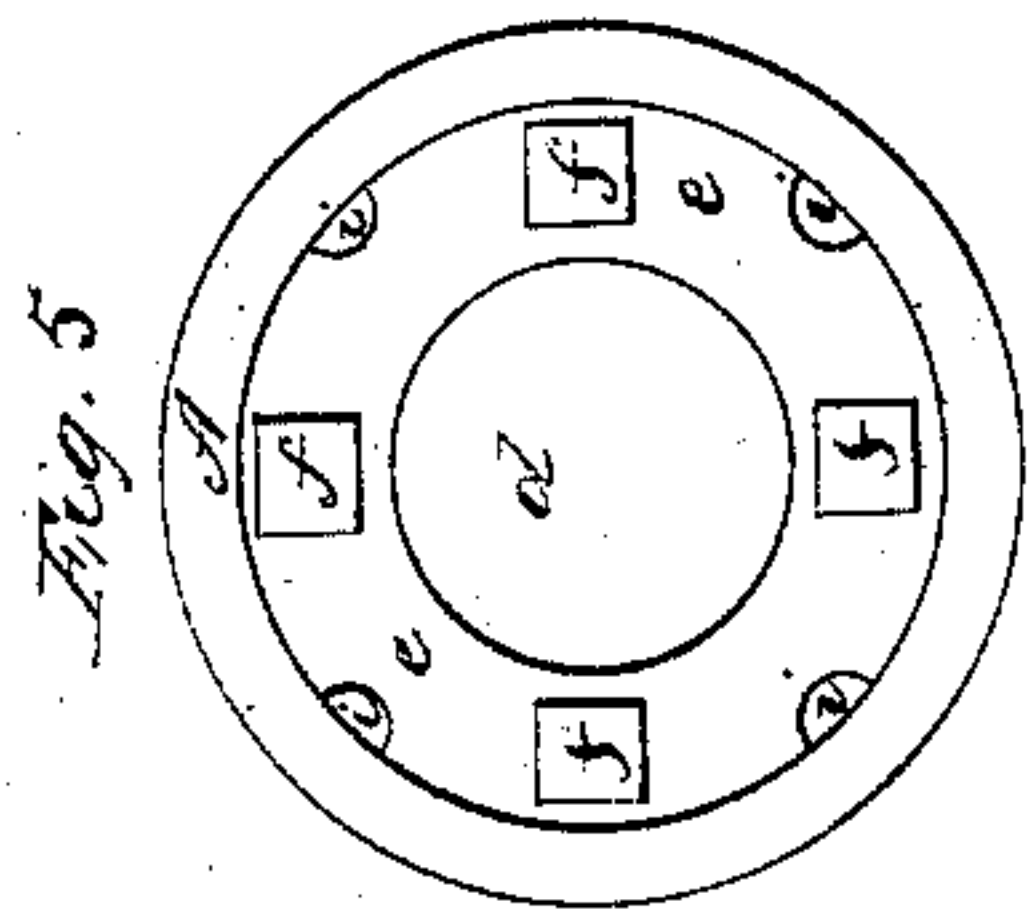
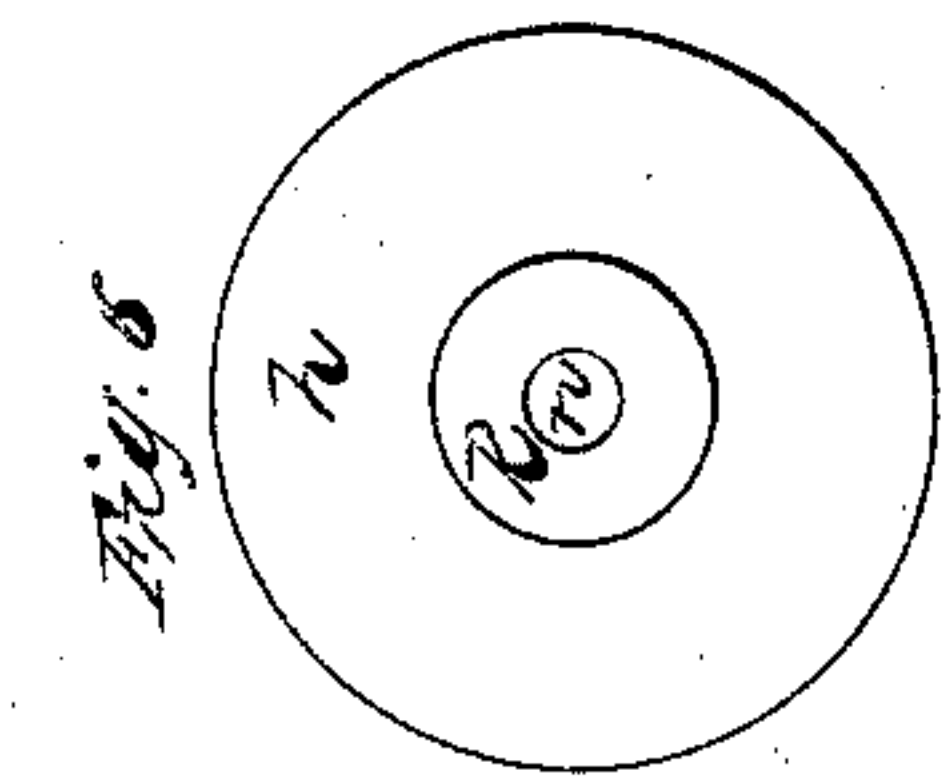


*J. Avery, Jr.,*  
*Steam Trap,*

*No. 17,069,*

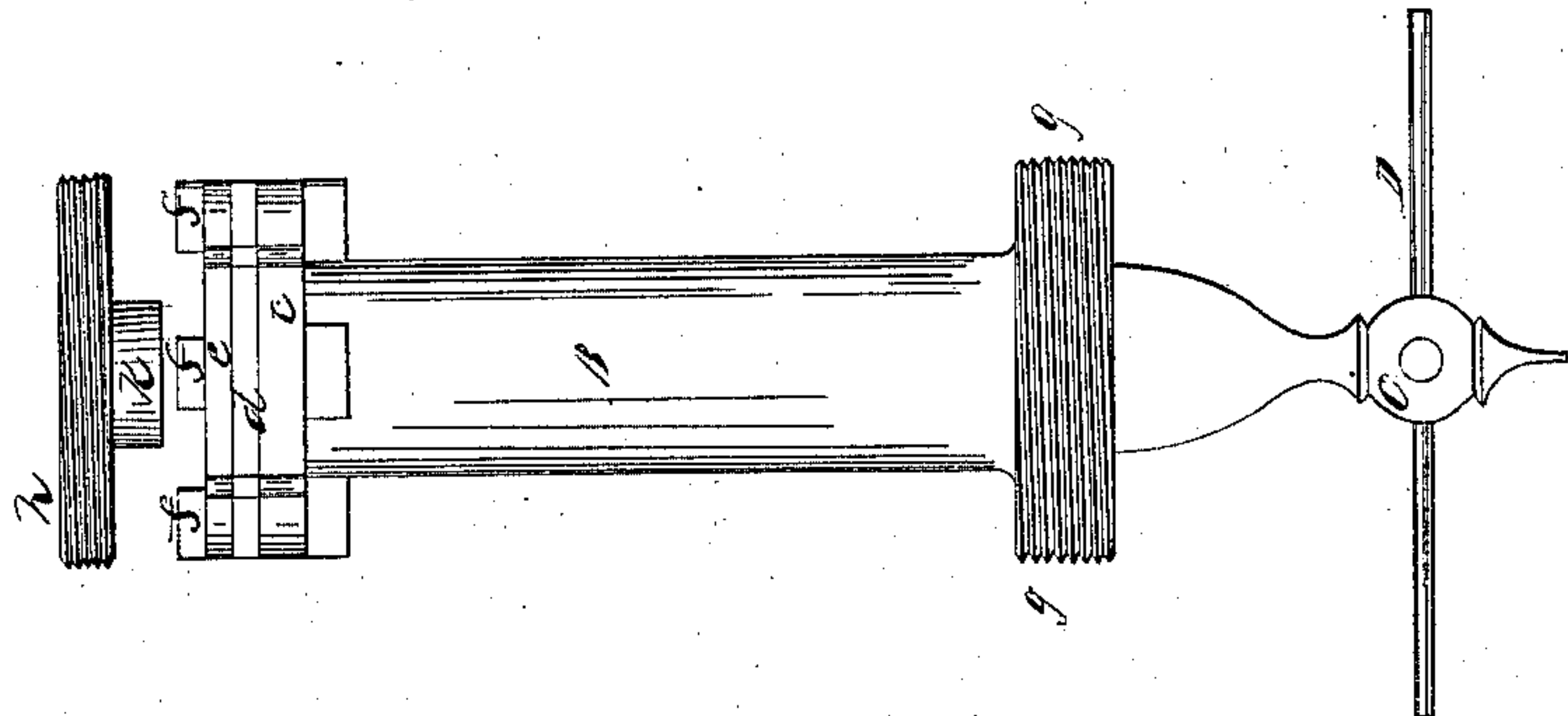
*Patented Apr. 21, 1857.*



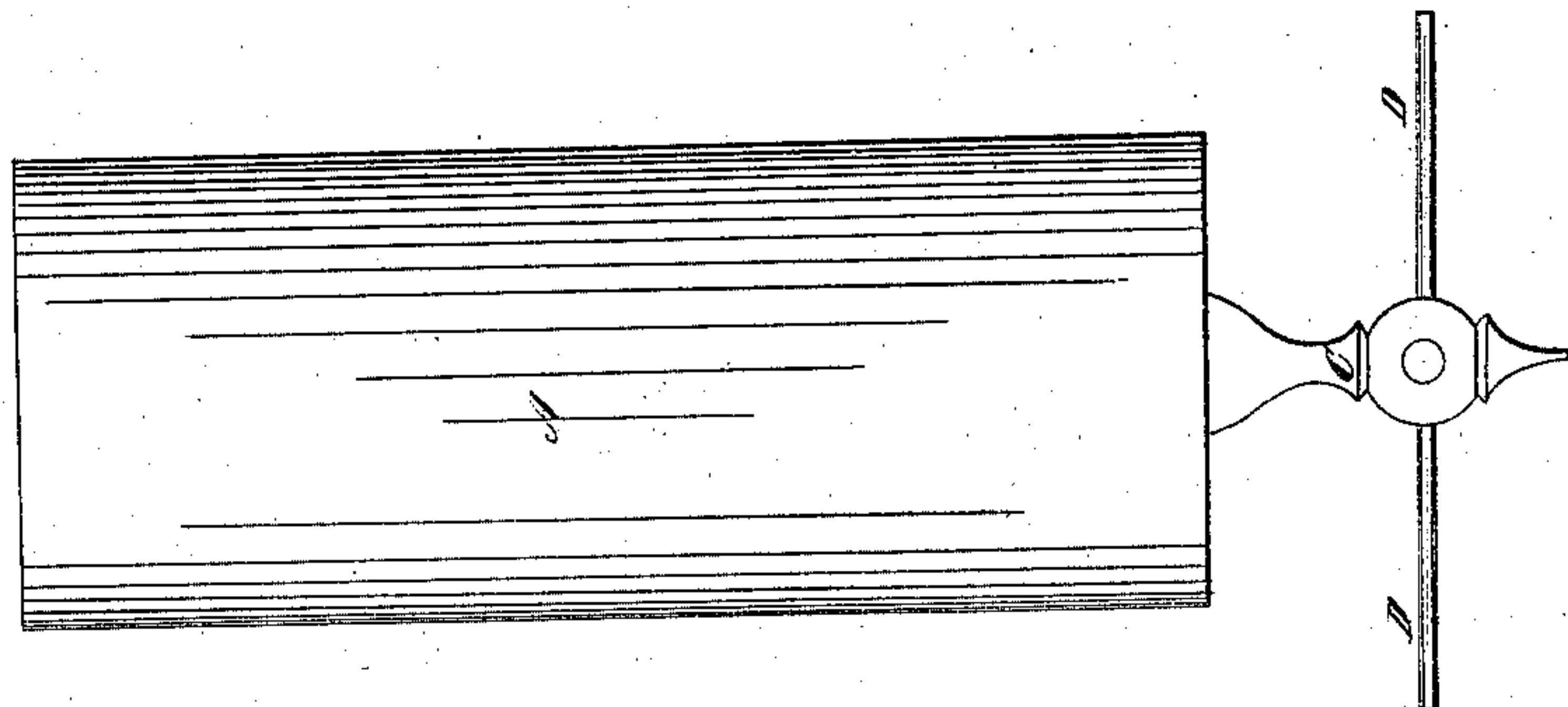
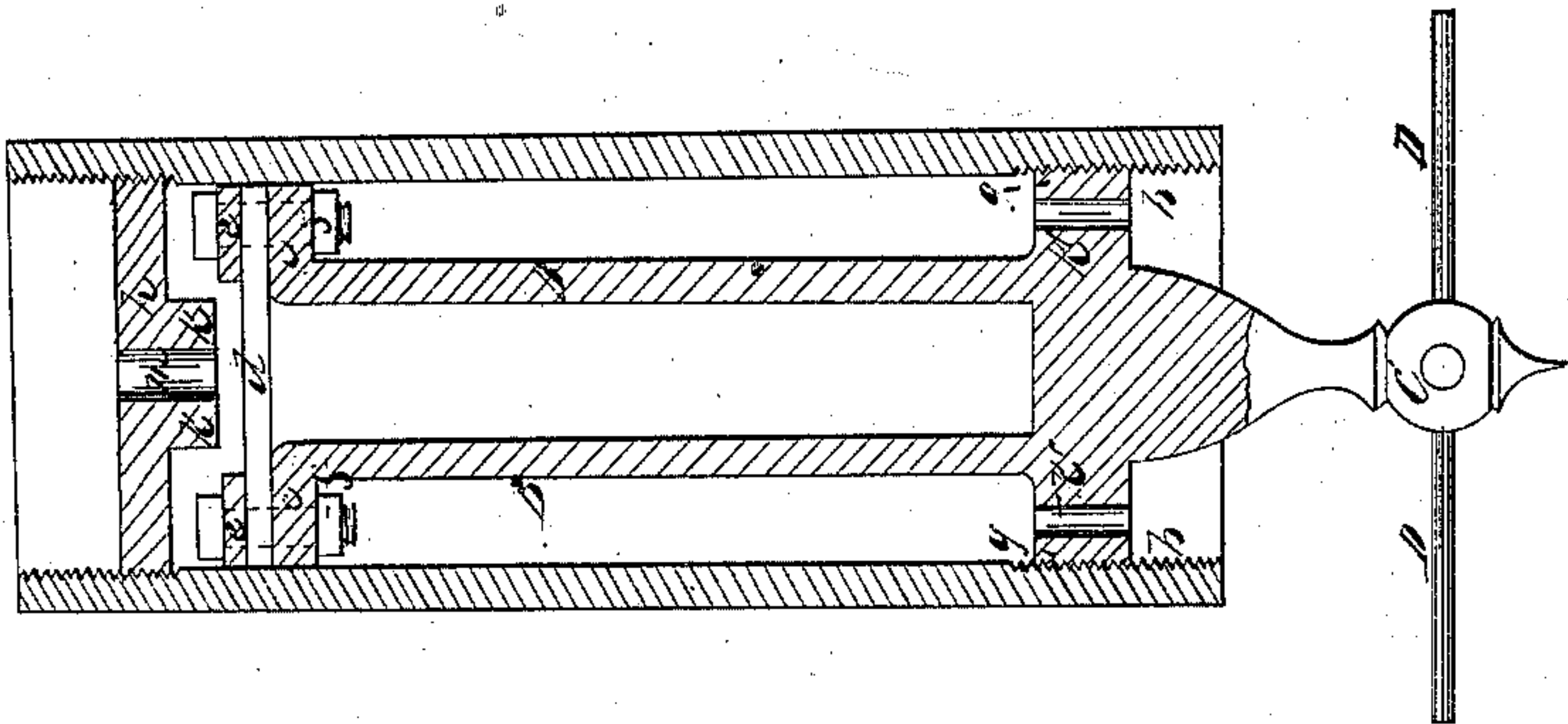
*Witnesses.*

*John Avery*  
*Ferdinand Rodloff*

*Fig. 3*



*Fig. 2*



*Inventor:*

*John Avery*



# UNITED STATES PATENT OFFICE.

JOHN AVERY, JR., OF LOWELL, MASSACHUSETTS.

## STEAM-TRAP FOR RELIEVING STEAM-PIPES OF WATER.

Specification of Letters Patent No. 17,069, dated April 21, 1857.

*To all whom it may concern:*

Be it known that I, JOHN AVERY, Jr., of Lowell, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Steam-Traps; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1, represents a side view of my steam trap. Fig. 2, represents a central vertical section. Fig. 3, represents a side view of the mercury holder. Fig. 4, represents a top view of the case. Fig. 5, represents a top view of the mercury-holder. Fig. 6, represents a bottom view, of plate *h*, in Fig. 2.

Similar letters of reference where they occur in the several figures, denote like parts of the contrivance in all of them.

My invention relates to a contrivance, to be attached to any steam pipe or way, so that it will allow the water of condensation to discharge itself, but at the same time prevent an escape of the steam.

To enable others skilled in the art to make and use my invention, I will proceed to describe the same with reference to the drawings.

I make use of the expansion of a column of mercury (it being expanded by the heat of the steam) to raise an elastic diaphragm, so as to close an orifice through which the condensed water escapes until the steam acts upon the mercury, which raises the diaphragm and closes the orifice. The condensed water is then retained until the mercury contracts by cooling—the diaphragm sinks, and the orifice is opened, which allows the water of condensation to escape as will be explained.

The apparatus consists of a case A, having a thread *a*, cut on its inside, by which it may be attached to the steam pipe or vessel. This case A, contains a mercury holder B, which may be made of wrought iron, and provided with a flange *c*, upon which the diaphragm *d*, is held by the ring *e* and screw bolts *f*, *f*.

The mercury holder B, has a projection *g*, on its lower end, which has a thread cut upon it, by which it is screwed into the bottom of the case A also provided with a screw thread *b*. This mercury holder B, contains a column of mercury, which gives move-

ment to the diaphragm *d*, by its expansion when heated by the steam.

A plate *h*, is screwed into the top of the case A, having a collar *k*, on its under side, and an opening *m*, through its center.

When thus arranged and in use, the mercury holder being first adjusted by its screw, so as to leave a space of about 1/16 of an inch between the diaphragm and collar *k*, the condensed water passes out through the grooves *i*, *i*, (Fig. 5) in the flange *c*, and *k'*, *k'*, in the projection *g*. When the steam heats and expands the mercury in the holder sufficiently to raise the diaphragm and close the orifice *m*, the water of condensation is then retained until the mercury contracts by cooling, and the orifice *m* is opened, and the water of condensation escapes.

C, is a prolongation of the mercury holder, and by means of a rod D, passing through its lower end, said mercury holder can be adjusted in the case to enlarge or diminish the distance between the diaphragm, and the collar *k*, and its opening *m*. The plate *h*, may also be furnished with counter-sinks, into which the prongs of a key may be inserted to raise or lower it in the case.

The operation of the steam trap is as follows: When the engine is at rest, and the fires go down, the mercury contracts by being cooled, and falls within its holder. This allows the elastic diaphragm *d*, to also drop from the collar *k*, as seen in Fig. 2. There is then a continuous opening through the trap by means of the openings *m*, the holes *i*, (in the ring *e*, diaphragm *d*, and flange *c*) as seen in Fig. 5, thence through the space between the mercury holder B, and the case A, and the passages *k'* in the head or projection *g*. The water of condensation can thus, as soon as the engine cools off, pass off through said openings. But whenever steam is generated, or the boilers heated up, the mercury expands by said heat, and as the column rises, it forces the diaphragm *d*, up against the collar *k*, and holding it there, entirely closes up the opening *m*, so that nothing can pass through the trap, until the mercury again is cooled, and contracts enough to allow the diaphragm by its elasticity to leave the collar *k*. And thus so long as steam is generating the trap is closed, and it cannot of course escape through the trap. But whenever the mer-



cury cools enough to contract within its holder, then the diaphragm also leaves the opening *m*, and the water of condensation can pass off. And the adjustment between  
5 the mercury, diaphragm, and collar *k*, may be so made by the screws at each end of the case, as that but a few degrees difference in temperature may close and open the trap.

I am aware that a pipe coupling has been  
10 so made, that the expansion of a long pipe, may be made to close, or partially close the opening between it and its fellow. But it is not convenient except for certain purposes to have this long pipe, and a short one  
15 will not, on account of its limited expansibility, serve the purpose. Besides this only regulates the flow of water or steam, and

does not admit of allowing the water of condensation to pass off, while the steam is retained, and is not a steam trap in the sense 20 in which, I claim a steam trap, and I therefore make no claim to such an arrangement of coupling.

Having thus fully described the nature of my invention what I claim therein as new 25 and desire to secure by Letters Patent is—

In combination with the outer case A, the inclosed mercury holder B, and diaphragm, and openings *m*, *k'*, for the purpose herein set forth and explained.

JOHN AVERY, JR.

Witnesses:

JOHN B. STRAW,  
CARLOS NUDD.