

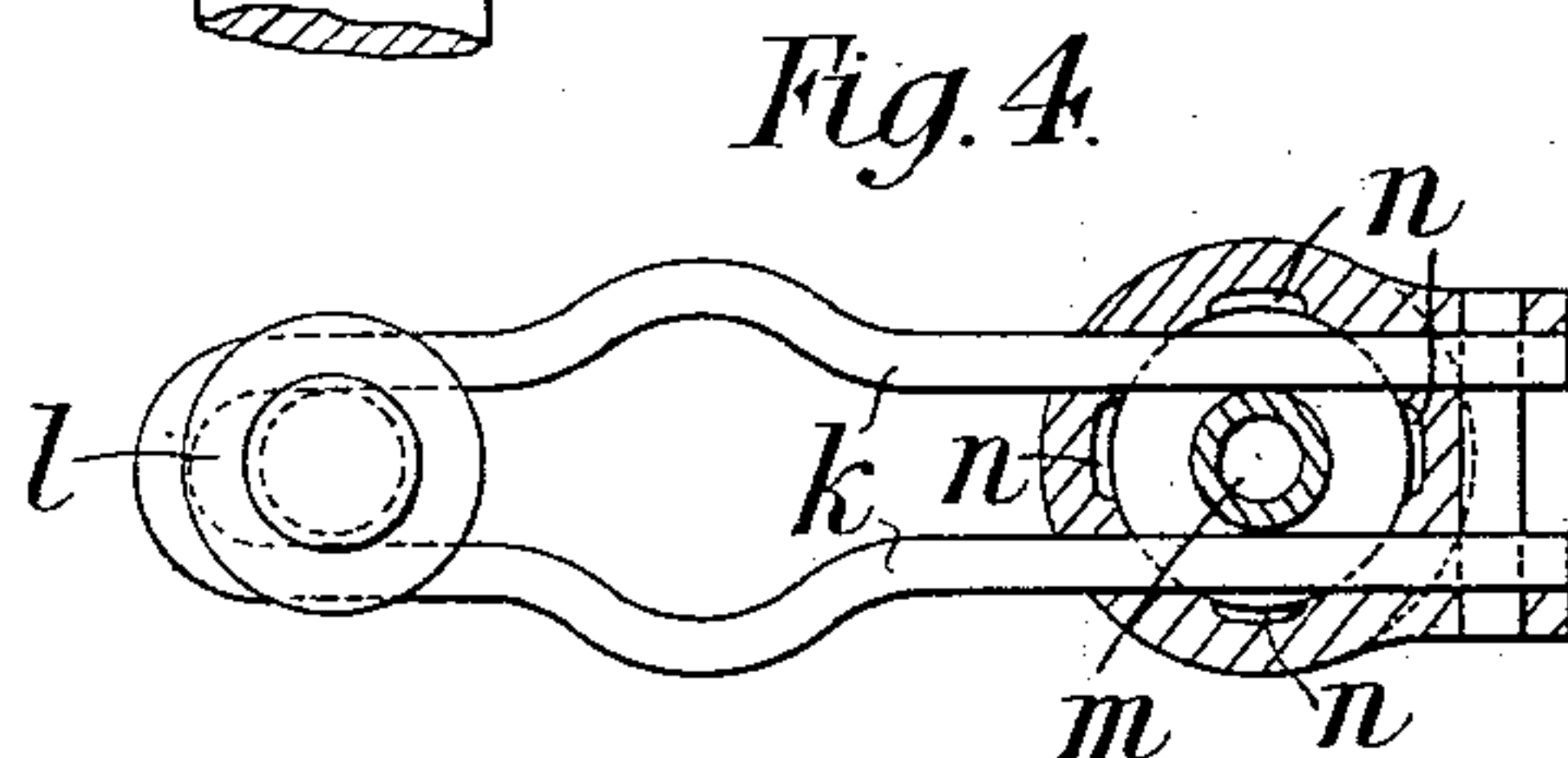
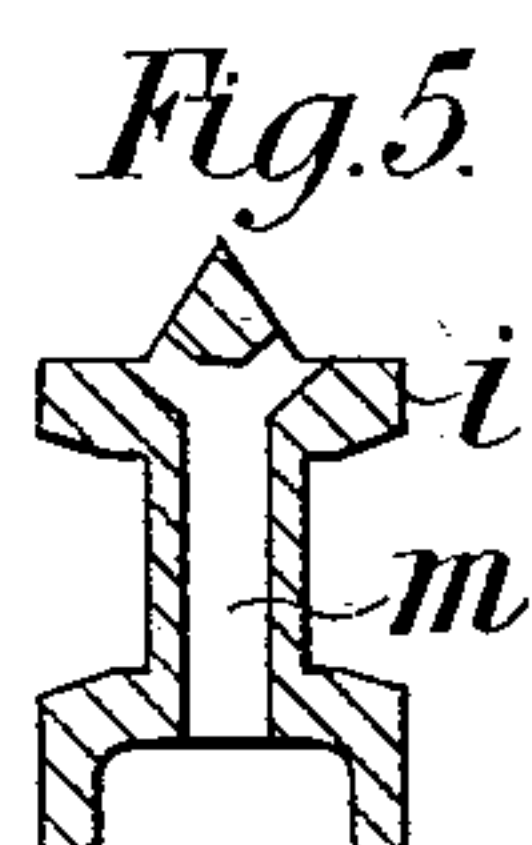
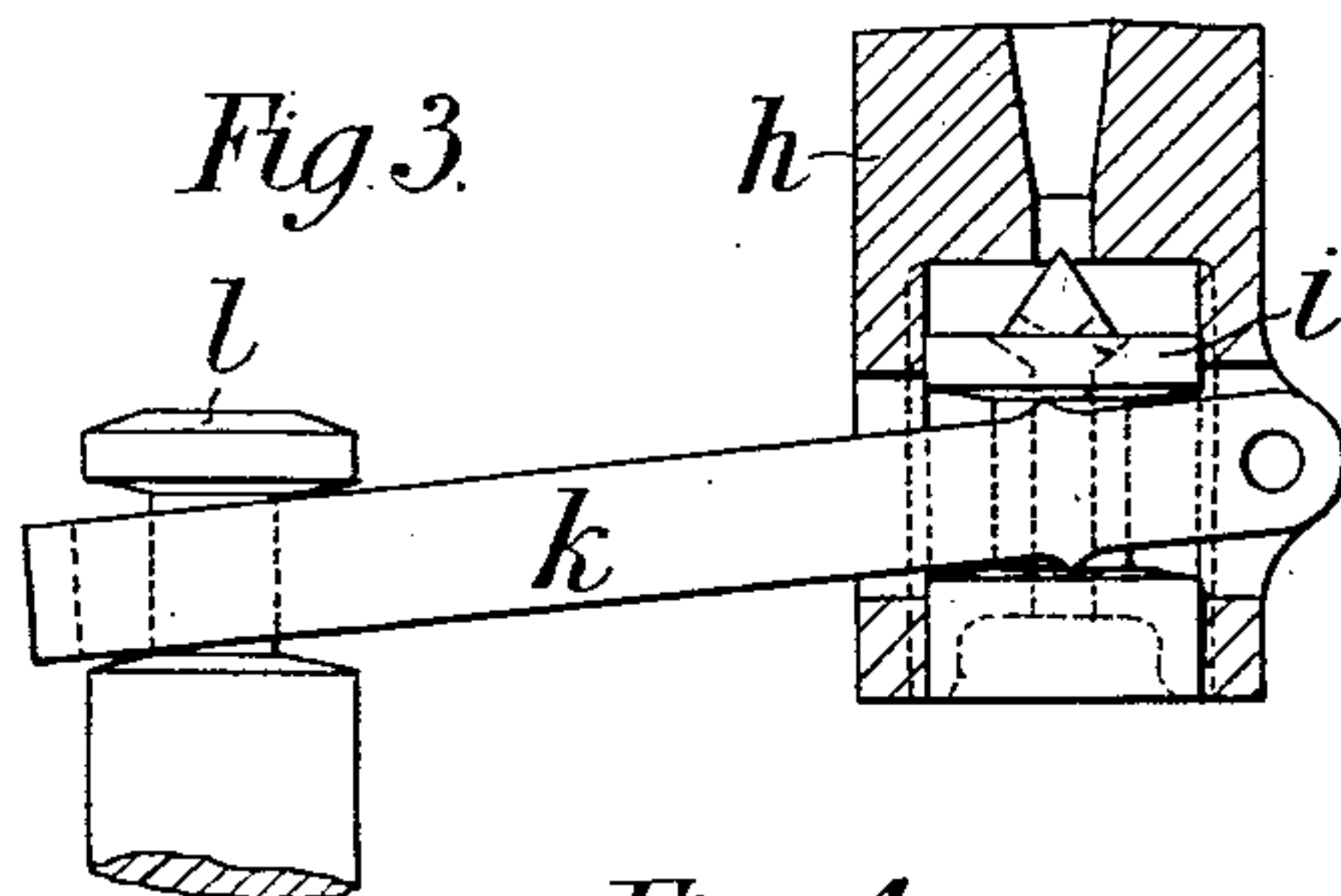
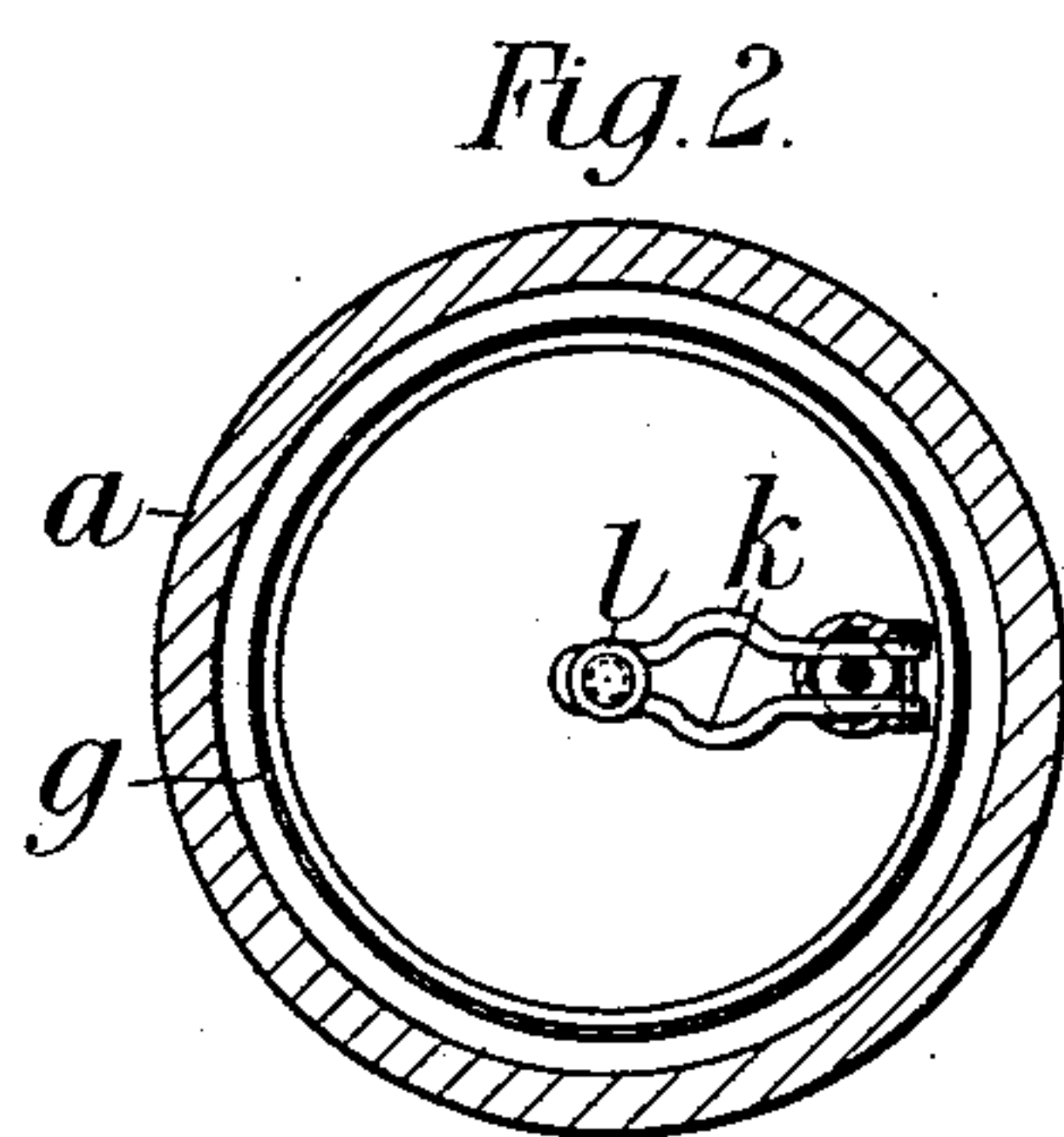
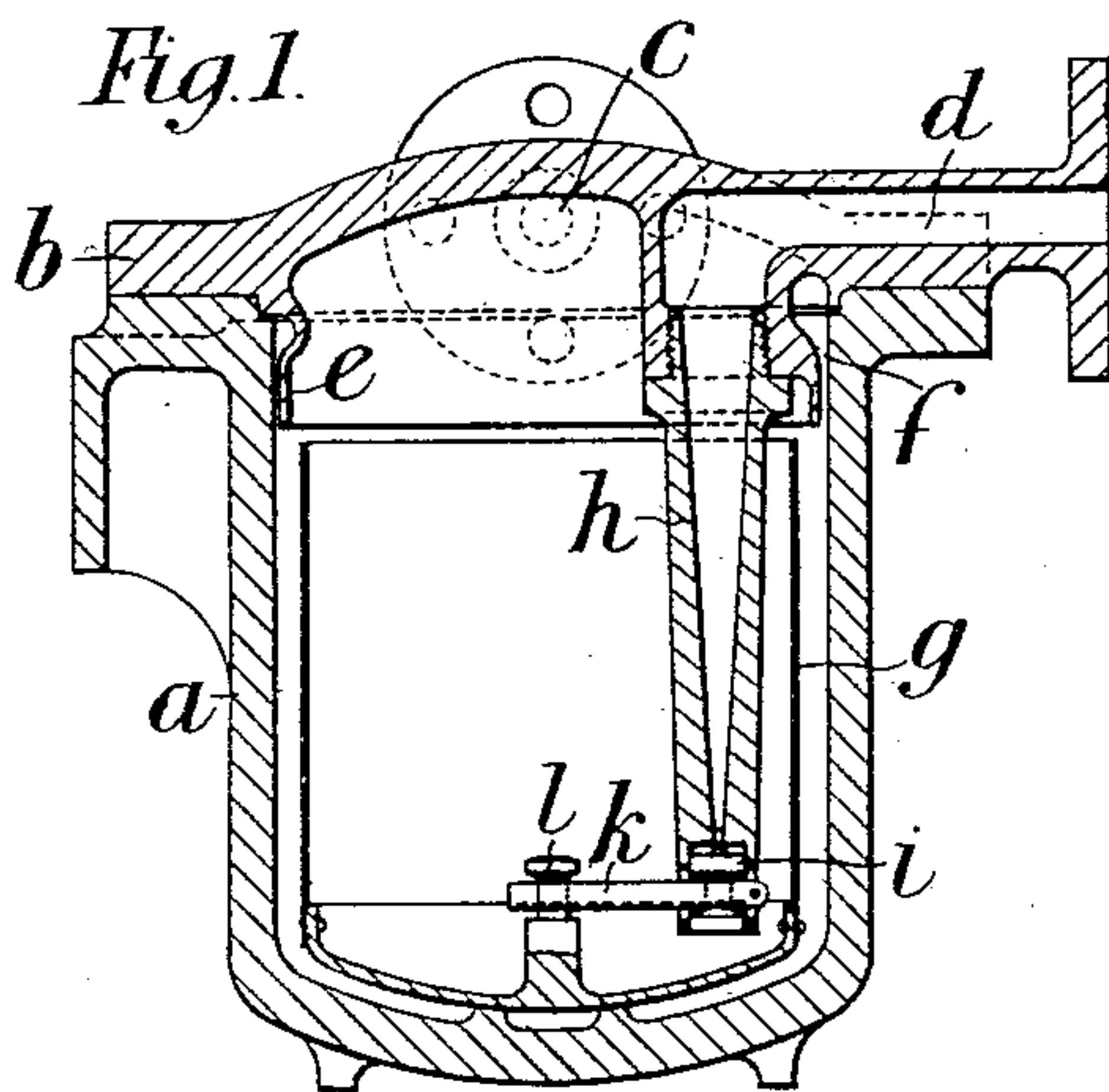
No. 751,703.

PATENTED FEB. 9, 1904.

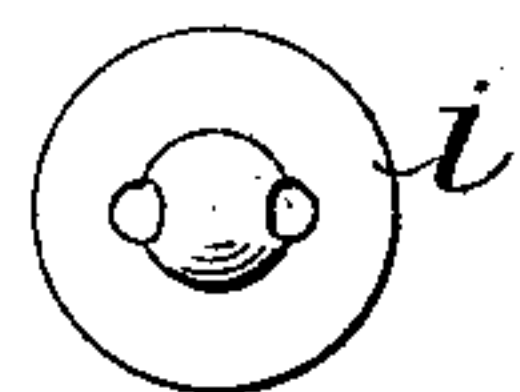
R. WARRINER.  
STEAM TRAP.

APPLICATION FILED SEPT. 10, 1903.

NO MODEL.



*Fig. 6.*



Witnesses  
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# UNITED STATES PATENT OFFICE.

ROBERT WARRINER, OF LONDON, ENGLAND.

## STEAM-TRAP.

SPECIFICATION forming part of Letters Patent No. 751,703, dated February 9, 1904.

Application filed September 10, 1903. Serial No. 172,643. (No model.)

*To all whom it may concern:*

Be it known that I, ROBERT WARRINER, a subject of the King of Great Britain, residing at 129 Embleton road, Lewisham, London, England, have invented new and useful Improvements in Steam-Traps, of which the following is a specification.

My invention relates to an improved steam-trap or apparatus for automatically draining water of condensation from steam-pipes, separators, cylinders, or other vessels or appliances under steam-pressure.

According to my invention the vessel into which the water drains is provided with a hollow float into the interior of which the end of the discharge-pipe depends, the said discharge-pipe having at its lower end a valve which is opened through the medium of a lever when the hollow float drops, owing to its becoming filled with water, and closes when the contents have been more or less discharged, the said lever enabling a much larger valve to be used than is possible when the valve is operated directly by the float.

In the accompanying drawings, Figure 1 is a sectional elevation of my improved trap, and Fig. 2 is a sectional plan. Fig. 3 is a view drawn to a larger scale than Figs. 1 and 2, illustrating the arrangement of the discharge-valve and means for operating the same. Fig. 4 is a plan of the part shown in Fig. 3. Figs. 5 and 6 are respectively a vertical section and a plan of the discharge-valve detached.

*a* is the receiving vessel, which, as shown, is provided with a cover *b*, having formed in it a branch or junction pipe *c*, which is connected to the pipes or apparatus to be drained, and a branch *d*, through which the water of condensation is discharged. The said cover *b* is also advantageously provided with a flange *e*, which projects down into the vessel *a* and is of such a diameter that an annular passage or space *f* is formed between the said flange *e* and the inner walls of the receiver *a* and into which space the water of condensation flows from the branch *c*, as hereinafter described.

*g* is the hollow float, which is open at the top, and *h* is the depending pipe connected with the discharge-pipe *d* and having at its

lower end the valve *i*, the operation of which to open and close the passage through the said depending pipe *h* is controlled by the float *g*, operating the valve by means of the lever *k*. This bifurcated lever *k* is pivoted at one end on the depending pipe *h* and at the other end arranged in connection with a stud *l* upon the bottom of the float in a manner which will be clearly understood by reference to Figs. 3 and 4, whereby as the float rises the valve *i* will close the passage through the depending arm and open the said valve as it falls.

The valve *i*, which is shown detached in Figs. 5 and 6, is advantageously formed with a central passage *m*, and recesses *n n*, Figs. 3 and 4, are formed in the lower end of the pipe *h* around the valve for the purpose of allowing of the ready passage of the water past the valve.

Suitable guides (not shown) are provided for retaining the hollow float *g* in a vertical position.

In the operation of the apparatus the water of condensation, which flows through the branch *c*, passes through the annular passage *f* into the vessel *a* and lifts the float, and as the water continues to accumulate it flows over the upper edges of the float and more or less fills the same until such time as the float is caused to sink, whereupon the valve *i* will be opened by the lever *k*, so that the steam-pressure upon the surface of the water will force the said water past the valve *i* and through the passage in the depending pipe *h* to the discharge-passage, the discharge continuing until such time as the float is lightened to a sufficient extent to permit it to rise and again close the valve.

It is to be understood that I do not confine my invention to the particular form of valve used nor to the form of lever for operating the same, as it will be obvious that the shape of these can be modified.

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

1. A steam-trap comprising a receiving-tank provided with a closed top, an annular flange depending therefrom and adjacent to the sides



of said tank, an inlet-pipe in said top exterior to and in line with said flange, a discharge-pipe in said top located within said flange, a hollow float within said tank of less diameter  
5 than said flange, a depending portion of said exhaust-pipe extending into said hollow float and having its end adjacent to the bottom thereof, a valve located in the lower end of said depending portion, and operative con-  
10 nections between said valve and float whereby as the latter rises and falls the former respectively closes and opens substantially as and for the purpose described.

2. A steam-trap comprising a receiving-tank  
15 provided with a closed top, an annular flange depending therefrom and adjacent to the sides of said tank, an inlet-pipe in said top exterior to and in line with said flange, a discharge-pipe in said top located within said flange, a  
20 hollow float within said tank of less diameter

than said flange, a depending portion of said exhaust-pipe extending into said hollow float and having its end adjacent to the bottom thereof, a valve located in the lower end of said depending portion, said valve being provided  
25 with a central passage closed at its upper end but provided with diverging outlets, recesses in said depending portion around said valve and a lever connected to said valve and having one extremity pivoted to said depending  
30 portion and its other extremity secured to said float whereby as said float is raised and lowered, said valve will be respectively closed and opened through the medium of said lever, substantially as and for the purpose described. 35

ROBERT WARRINER.

Witnesses:

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