

No. 662,489.

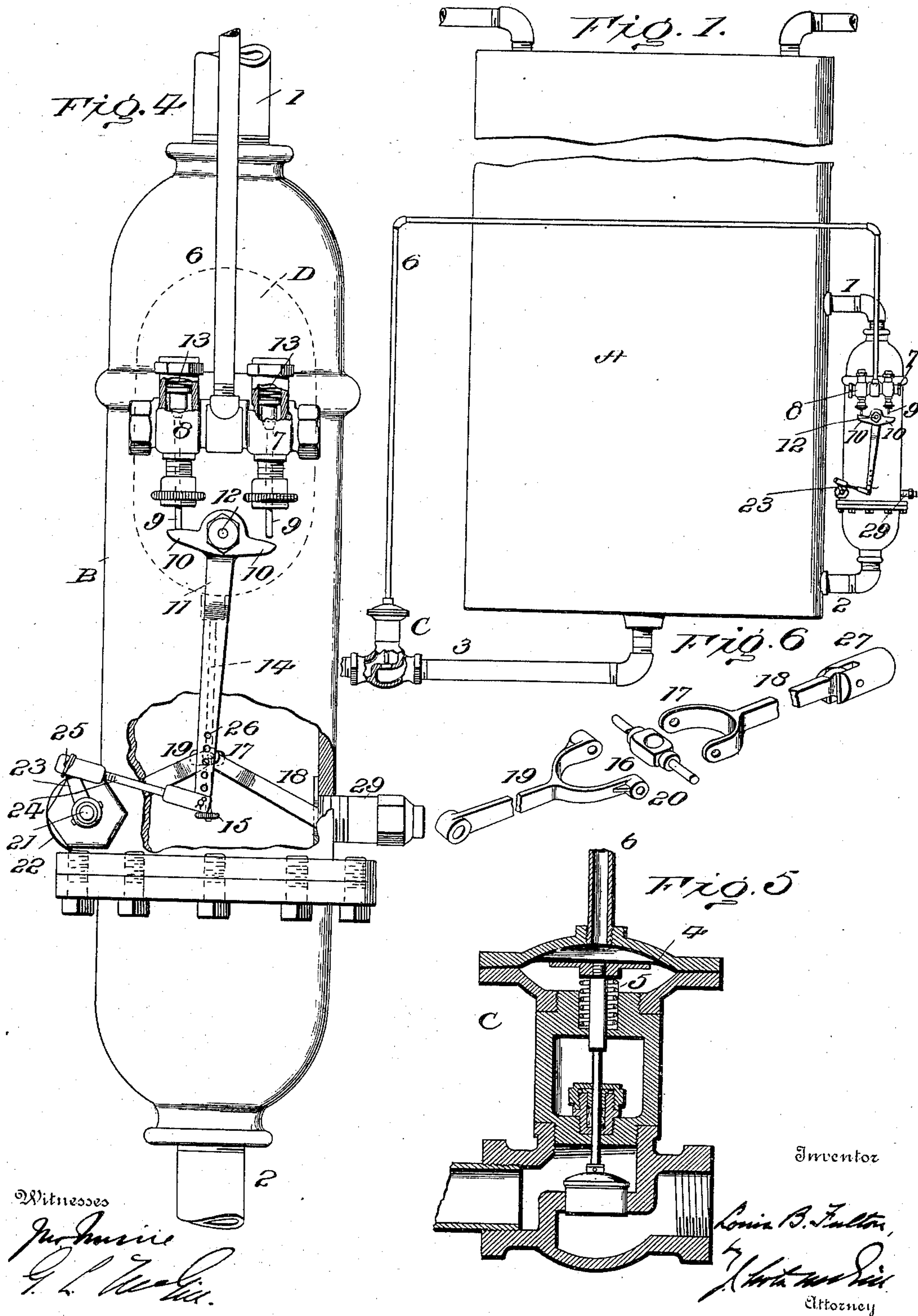
L. B. FULTON.  
STEAM TRAP.

Patented Nov. 27, 1900.

(No Model.)

(Application filed Apr. 17, 1900.)

2 Sheets—Sheet I.



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2 Sheets—Sheet 2.

FIG. 2.

FIG. 3.

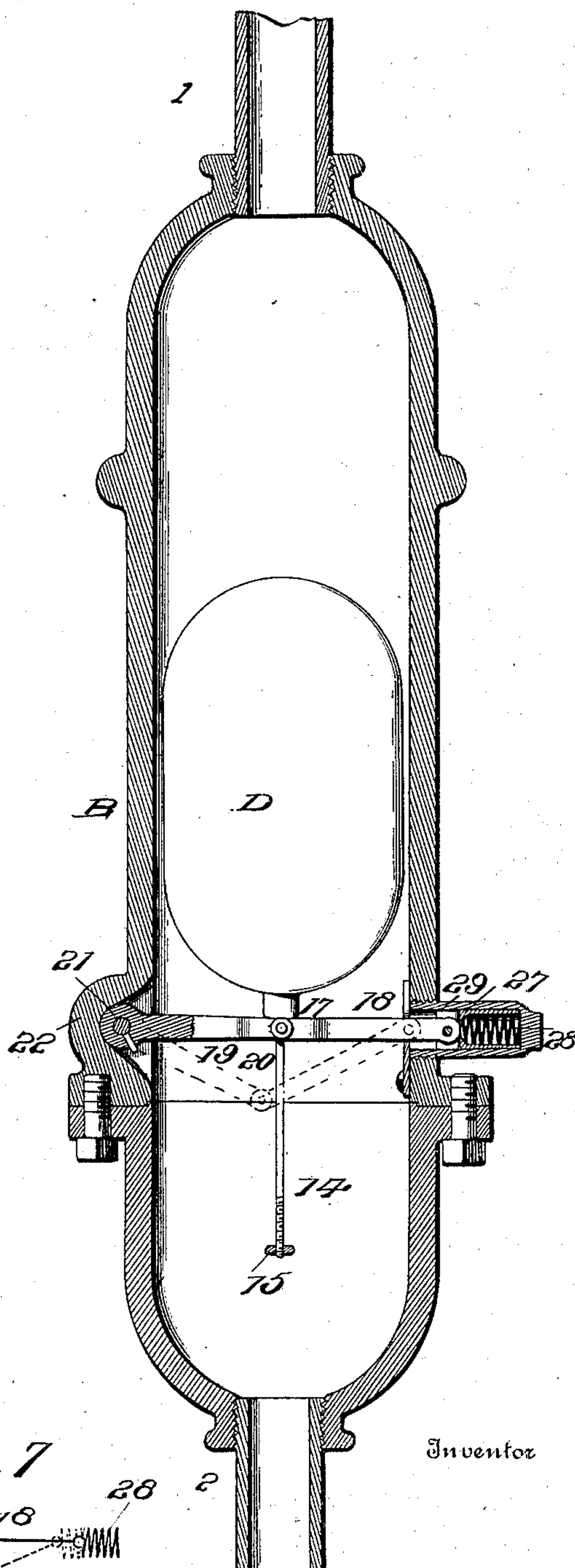
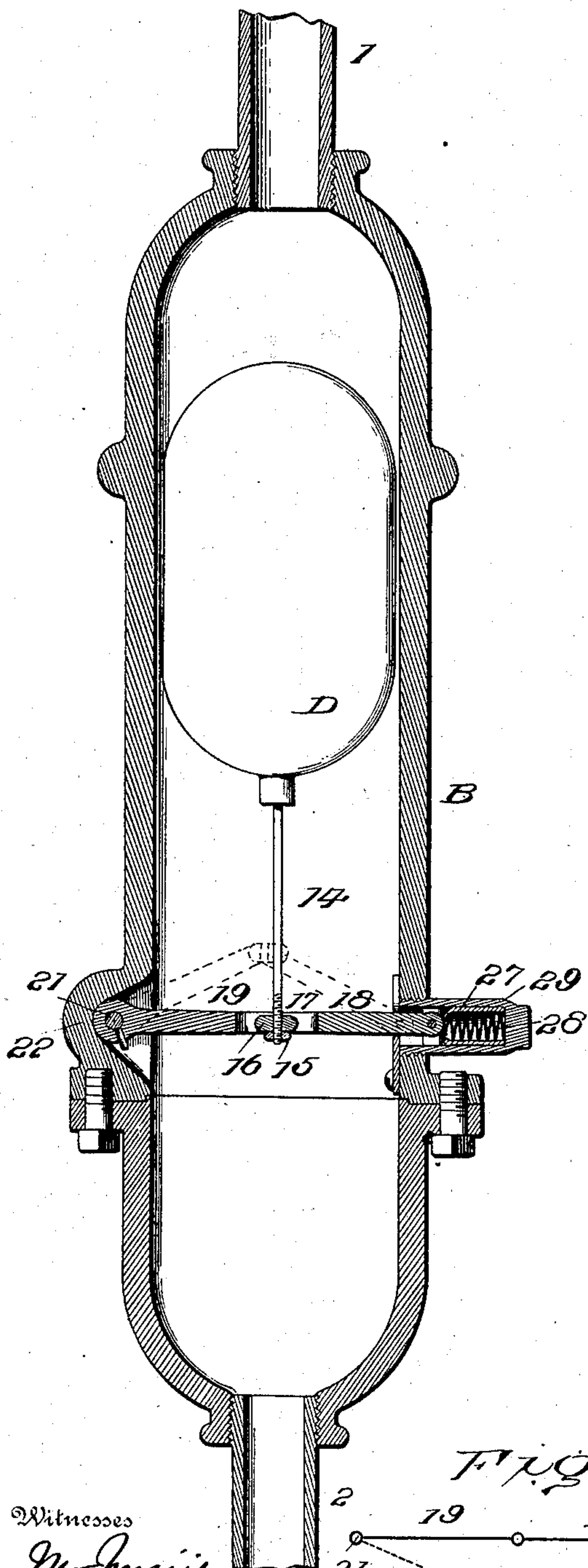


FIG. 1

Witnesses

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# UNITED STATES PATENT OFFICE.

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## STEAM-TRAP.

SPECIFICATION forming part of Letters Patent No. 662,489, dated November 27, 1900.

Application filed April 17, 1900. Serial No. 13,177. (No model.)

*To all whom it may concern:*

Be it known that I, LOUIS B. FULTON, of  
Pittsburg, in the county of Allegheny and  
State of Pennsylvania, have invented certain  
5 new and useful Improvements in Steam-  
Traps; and I do hereby declare the following  
to be a full, clear, and exact description of the  
invention, such as will enable others skilled  
in the art to which it appertains to make and  
10 use the same.

This invention contemplates certain new  
and useful improvements in steam-traps.

In traps as heretofore constructed the dis-  
charge-controlling valves soon become worn  
15 and are rendered useless because they can-  
not be positively seated, the partial throt-  
tling of the water destroying their utility in  
a very short time.

The primary object of my invention is to  
20 insure a positive seating and unseating of the  
valve controlling the discharge, such valve  
being moved by pressures acting in opposite  
directions, the unseating pressure being posi-  
tively overcome by the seating medium be-  
25 fore all the water is discharged.

A further object is to provide simple mech-  
anism for insuring the positive operation of  
the parts for controlling pressure to and re-  
lieving it from the diaphragm of the dis-  
30 charge-controlling valve.

The invention will be hereinafter fully set  
forth, and particularly pointed out in the  
claims.

In the accompanying drawings, Figure 1 is  
35 a view showing the application of my trap to  
an ordinary steam-separator. Figs. 2 and 3  
are enlarged vertical sectional views showing  
the different positions of the float and the op-  
erating mechanism. Fig. 4 is a side view with  
40 parts broken away. Fig. 5 is a sectional view  
of the pressure-valve. Fig. 6 is an enlarged  
view of details. Fig. 7 is a diagrammatical  
view.

Referring to the drawings, A designates the  
45 chamber of a live-steam separator such as is  
ordinarily used in large plants for collecting  
water of condensation from steam-mains.

B is a trap-casing which is shown as con-  
50 nected to the separator by steam and water  
pipes 1 and 2, whereby the levels in the cas-

ing will correspond with those in the sepa-  
rator.

C is a discharge-controlling valve which is  
shown as located in a pipe 3, leading from the  
separator. This valve is provided with a dia- 55  
phragm 4 and a spring 5, such spring tend-  
ing, together with the pressure of the water  
against the under side of the valve, to posi-  
tively unseat the latter when pressure is re-  
lieved from the diaphragm. The application 60  
of pressure to such diaphragm will overcome  
the pressure of the spring and that of the  
water from the separator under proper con-  
ditions and effect the positive seating of the  
valve. A pressure-pipe 6 opening above the 65  
diaphragm leads from the steam-space of the  
trap-casing near the top thereof. In this pipe  
are fixed the pressure-valve 7 and relief-valve  
8, which are provided with depending stems  
9, designed to be alternately engaged by the 70  
arms 10 of a lever 11, fulcrumed at 12. Both  
of these valves are provided with springs 13,  
which, together with the pressure, serve to nor-  
mally hold them seated. They are alter-  
nately unseated by lever 11, which holds first 75  
one valve and then the other from its seat un-  
til the full discharge from or accumulation in  
the trap-casing is effected. When the valve  
7 is unseated, pressure in pipe 6 will act on  
the diaphragm of valve C and positively seat 80  
the latter. When the lever is rocked and re-  
lief-valve 8 is unseated, valve 7 being seated  
by its spring and the steam-pressure, the pres-  
sure in pipe 6 and hence pressure on the dia-  
85 phragm are relieved.

D is a float located within trap-casing B  
and caused to rise and fall by the water-lev-  
els therein. The float is provided with a  
central depending rod 14, having on its lower  
end a head or button 15, which may be ad- 90  
justed to shorten or lengthen the movement  
of the float. The rod 14 is passed through a  
nut 16, pivotally hung between the prongs 17  
of one of two toggle-arms 18 and 19, the  
prongs of the two arms being flexibly con- 95  
nected at 20. The toggle-arm 19 is keyed  
fast at its outer end on a shaft 21, extended  
longitudinally through a hollow boss 22 of  
casing B. On the outer end of this shaft is  
an arm 23, which is connected by a link 24 to 100



lever 11. The holding-pin 25 of this link may be inserted through any one of a series of holes 26 in the lever to increase or decrease the throw of the pressure and relief valves.

5 The toggle-arm 18 is pivoted at its outer end to a barrel 27, containing a coil-spring 28, which is held under compression by an inclosing-plug 29, screwed into an opening in the casing. As the float rises the head or  
10 button 15 engages the nut 16 and draws the toggle upwardly, and as the toggle-arms are brought into a straight line the spring is under its greatest compression. As these arms begin to move past the center they are  
15 thrown quickly to their upper limit of movement and so held by the spring 28. The same thing occurs when the toggle is moved downward by the descent of the float. By this construction the final movements of the toggle  
20 are independent of the float—that is, as the latter moves the toggle up or down the throw of the spring gives the toggle an accelerated movement, causing the immediate seating or unseating of the discharge-controlling valve. It is upon the final throw of  
25 the toggle that the final movement of the pressure or relief valve occurs. The initial movement of the lever 11 allows the valve previously held unseated to reseal, and upon  
30 the final throw of the toggle the other valve is unseated by the lever. When this occurs, the parts are fixedly held by the spring 28, acting on the toggle. It will be understood, of course, that these positive movements of  
35 the valve-operating mechanism may be accomplished by suitable means comprehending the use of a weight in lieu of the spring, if desired.

In practice the water-levels in the trap-casing correspond to those of the separator,  
40 and the discharge-controlling valve is normally held to its seat by pressure in pipe 6 acting on the diaphragm. As the water-level rises, carrying the float with it, the lever 11,  
45 under the movements of the toggle, is turned so as to permit, first, of the seating of the pressure-valve, and, secondly, after the final throw of the toggle, the unseating of the relief-valve, relieving the pressure from the  
50 diaphragm and allowing the discharge-controlling valve to positively open under the action of its spring and the pressure of the water against its under side. As the discharge of the water from the separator takes  
55 place the float will descend and move the toggle downward, reversing the lever 11, permitting, first, the seating of the relief-valve, and, second, causing the unseating of the pressure-valve. As pressure is thus again  
60 admitted to the diaphragm of the discharge-controlling valve the latter is immediately positively resealed as against the pressure of the discharged water and the spring 5. This  
65 reseating of the discharge-controlling valve occurs before all the water is discharged from the separator, as it is customary to retain a portion of the water therein.

Although I have shown my improved trap as applied to a separator, yet it will be understood that it is not restricted in this connection, and the pipe in which the discharge-controlling valve is located may lead directly from the trap-casing.

I claim as my invention—

1. A steam-trap comprising a discharge-controlling valve capable of being positively unseated by the discharge-pressure, a pressure-pipe through which pressure is admitted to seat such valve as against the discharge-pressure, controlling means for positively exhausting and restoring pressure in the pressure-pipe, means actuated by the water-levels in the trap, and means, primarily operated by the last-mentioned means, having a movement independent thereof for periodically and positively operating said controlling means.

2. A steam-trap comprising a casing, a float therein, a discharge-controlling valve capable of being positively unseated by the discharge-pressure, a pipe for supplying pressure to seat such valve as against the discharge-pressure, means for alternately cutting off and restoring pressure in such pipe, and means, having a movement independent of but primarily actuated by said float, for positively operating the former means, as set forth.

3. A steam-trap comprising a casing, a float therein, a discharge-controlling valve, a pipe for supplying pressure to seat such valve, means for positively cutting off and restoring pressure in such pipe, means primarily moved by the float for operating the pressure-controlling means, and auxiliary means for positively moving said float-operated means independently of the float, substantially as set forth.

4. A steam-trap comprising a casing, a float therein, a discharge-controlling valve, a pipe for supplying pressure to seat such valve, means for cutting off and restoring pressure in such pipe, means for operating the latter means comprising a toggle primarily moved by the float, and means for positively moving and holding such toggle, as set forth.

5. A steam-trap comprising a casing, a float therein, a discharge-controlling valve, a pipe for supplying pressure to seat such valve, two valves, one for admitting, and the other for relieving, pressure in such pipe, and means for alternately operating said valves, as set forth.

6. A steam-trap comprising a casing, a float therein, a discharge-controlling valve, a pipe for supplying pressure to seat such valve, two valves, one for admitting and the other for relieving pressure in such pipe, and means for alternately operating said valves comprising a toggle adapted to be primarily moved by the float, and means for positively moving and holding such toggle, as set forth.

7. A steam-trap comprising a casing, a float therein, a discharge-controlling valve, a pipe for supplying pressure to seat such valve, two



valves, normally held seated by pressure, one for admitting and the other for relieving pressure in such pipe, a lever for alternately positively unseating said valves, and a connection between said lever and float, as set forth.

8. A steam-trap comprising a casing, a float therein, a discharge-controlling valve capable of being positively unseated by the discharge-pressure, a pipe for supplying pressure to seat such valve as against the discharge-pressure, valve mechanism for alternately admitting and relieving pressure in such pipe, a lever for positively operating such valve mechanism, and means actuated by but having a movement independent of said float for operating said lever, as set forth.

9. A steam-trap comprising a casing, a float therein, a discharge-controlling valve, a pipe for supplying pressure to seat such valve, valve mechanism for admitting and relieving pressure in such pipe, a lever for operating such valve mechanism, and means actuated by said float for operating said lever, comprising a toggle adapted to be primarily moved by the float, and means for positively moving and holding such toggle, as set forth.

10. A steam-trap comprising a casing, a float therein, a discharge-controlling valve, a pipe for supplying pressure to seat such valve, two valves, one for admitting and the other for relieving pressure in such pipe, a lever for alternately engaging said latter valves, and means for operating said lever comprising a toggle adapted to be moved by the float, and means for positively moving and holding such toggle, as set forth.

11. The combination with the casing and the valve-controlling mechanism, of the float in said casing, the toggle primarily moved by such float, and means for accelerating the final movements of and holding said toggle, as set forth.

12. The combination with the casing and the valve-controlling mechanism, of a float located in said casing, the toggle primarily moved by such float, and a spring for accelerating the final movements of and holding the toggle, as set forth.

13. The combination with the casing and the valve-controlling mechanism, of a float located in said casing, the toggle primarily moved by such float, a spring acting on the

toggle, for accelerating the final movements of and holding the latter, and means for regulating the tension of such spring, substantially as set forth.

14. The combination with the casing and the pressure-controlling-valve mechanism, of a lever for operating such valve mechanism, the float within the casing, a toggle actuated by the float, a shaft to which the toggle is connected, and a connection between such shaft and the lever, substantially as set forth.

15. The combination with the casing and the pressure-controlling-valve mechanism, of a lever for operating such valve mechanism, a float within the casing, a toggle actuated by the float, a shaft to which the toggle is connected, an arm on said shaft, and a link connecting said arm to said lever, substantially as set forth.

16. The combination with a chamber for receiving water of condensation, of a discharge-controlling valve designed to be automatically unseated by such water, of a trap having steam and water connections with such chamber, a pressure-pipe leading from said trap to and above said valve, valve mechanism for cutting off and restoring pressure in such pipe, a float operated by the water-levels in said trap, and means actuated by said float for operating said valve mechanism, substantially as set forth.

17. The combination with a chamber for receiving water of condensation, having an outlet-pipe, of a valve fitted in said pipe designed to be unseated by the water, a diaphragm, a pressure-pipe opening adjacent to such diaphragm for admitting pressure to positively seat said valve, a trap having steam and water connections with said chamber and to which the pressure-pipe is connected, valve mechanism for cutting off and restoring pressure in such pressure-pipe, a float operated by the water-levels in the trap, and means actuated by such float for operating said valve mechanism, substantially as set forth.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

LOUIS B. FULTON.

Witnesses:

GRAFTON L. MCGILL,  
FRANK S. MAGUIRE.