

J. C. Strode,

Hydraulic Ram,

N^o 10,969.

Patented May 23, 1854.

Fig. 1.

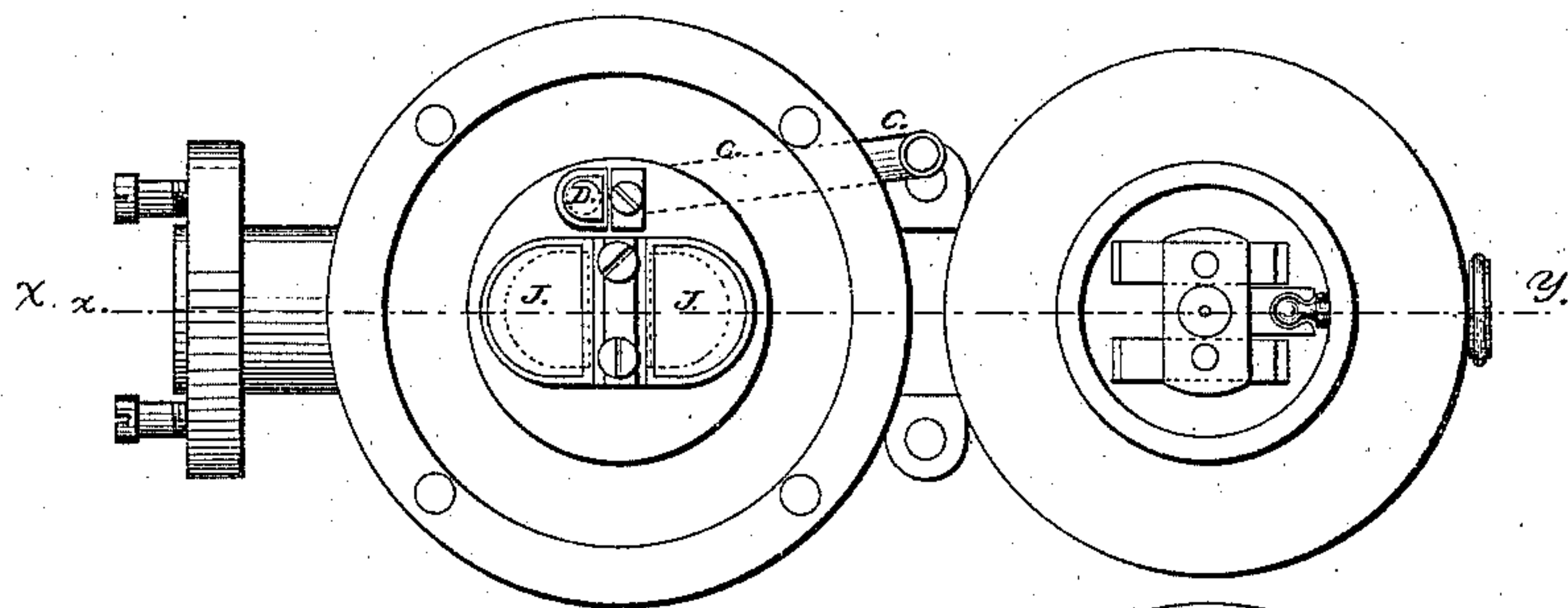


Fig. 2.

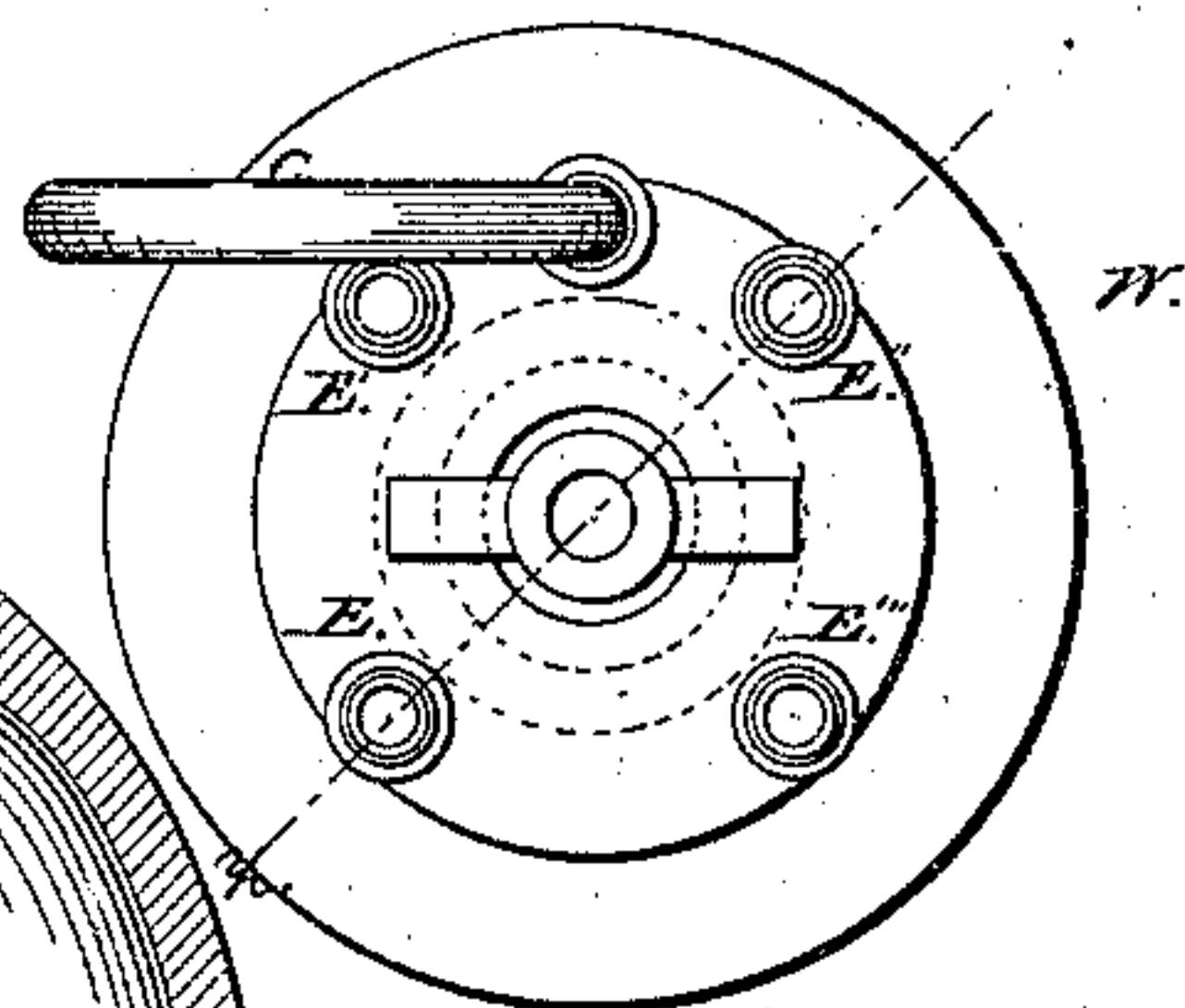


Fig. 3.

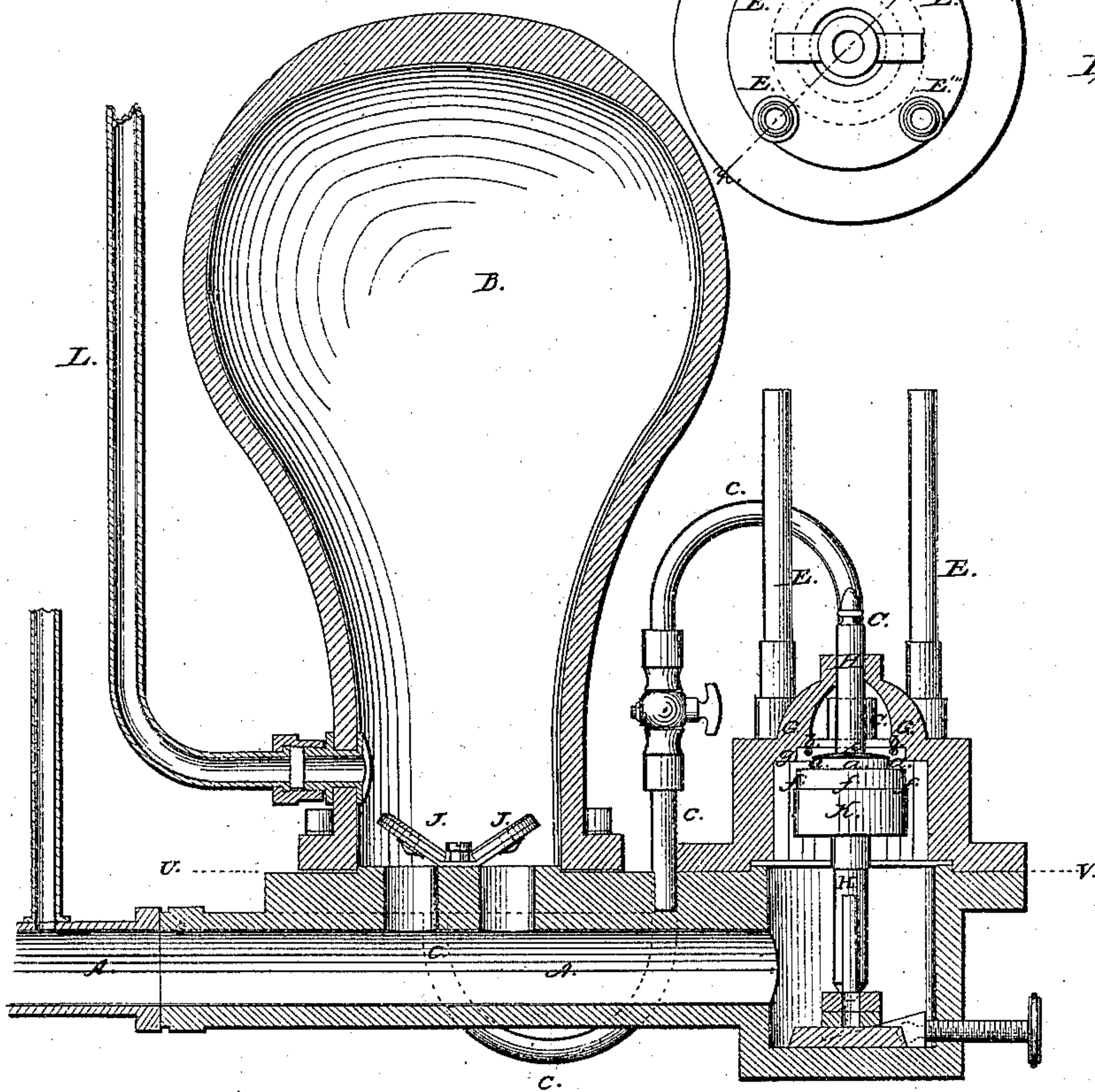
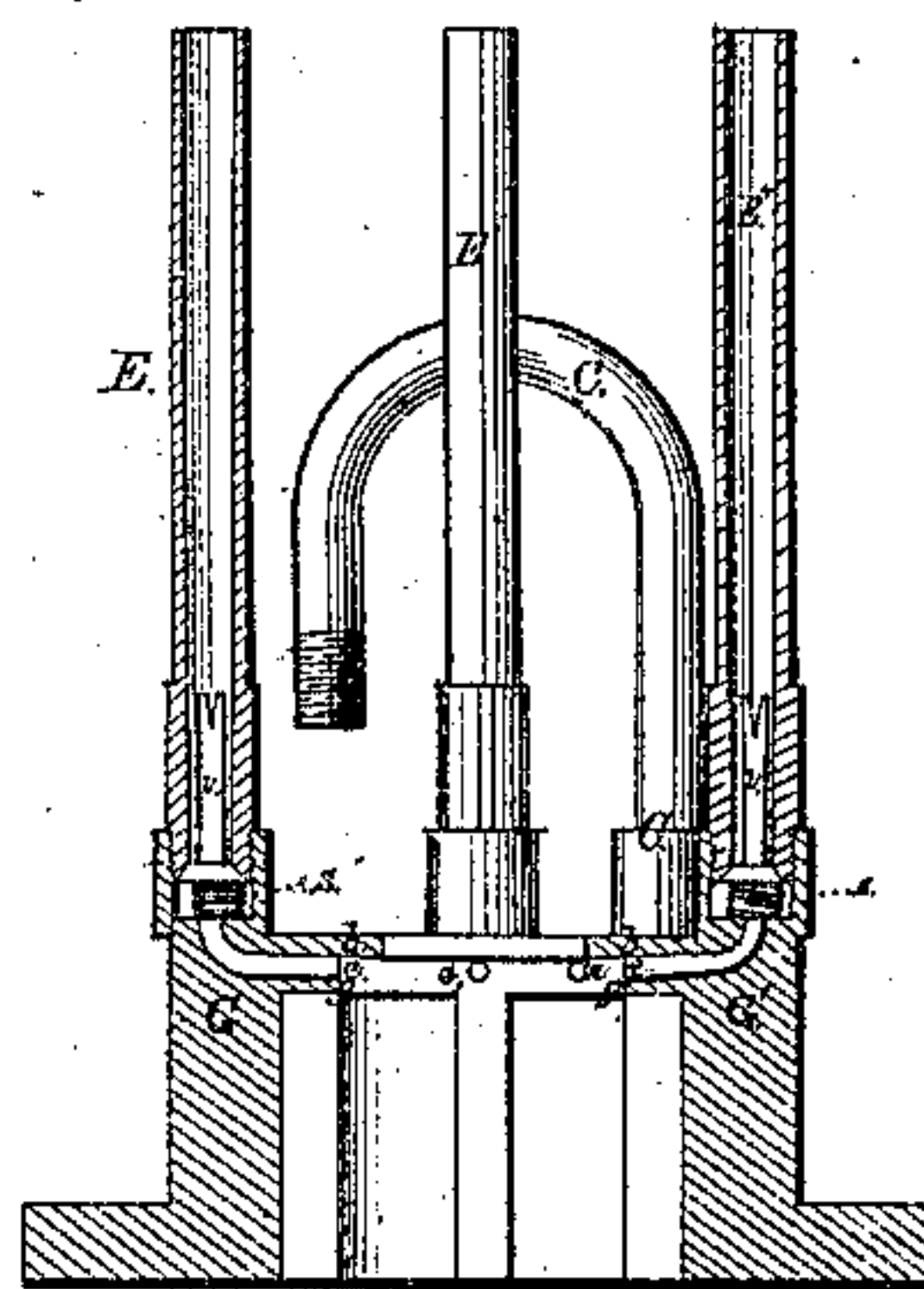


Fig. 4.



UNITED STATES PATENT OFFICE.

JOSEPH C. STRODE, OF WEST CHESTER, PENNSYLVANIA.

HYDRAULIC RAM.

Specification of Letters Patent No. 10,969, dated May 23, 1854.

To all whom it may concern:

Be it known that I, JOSEPH C. STRODE, of West Chester, in Chester county and State of Pennsylvania, have invented a new and
5 useful Improvement in the Construction of Hydraulic Rams; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part
10 of this specification, in which—

Figure 1 is a horizontal section of the hydraulic ram on the line U V of Fig. 2. Fig. 2 is a vertical longitudinal section on the line X Y of Fig. 1. Fig. 3 is a horizontal
15 section of the top of the puppet valve chamber. Fig. 4 is a vertical section of the puppet valve chamber on the line Z W of Fig. 2.

Similar letters of reference indicate corresponding parts in each of the several figures.

My invention consists in carrying a pipe from the upper valve seat of the puppet valve to the bottom of the air chamber for
25 the purpose of transferring the shock produced by the rising of the puppet valve to the air chamber, and my improvement also consists in placing a series of short vertical tubes extending from the upper valve seat
30 of the puppet valve. These tubes are open at their upper extremity to the external air for the purpose of preventing the formation of a partial vacuum by the descent of the puppet valve.

35 Fig. 2 represents a vertical section through the air chamber the puppet valve chamber and the puppet valve of the ram. B represents the ordinary air chamber. A, A represents the driving pipe. L represents
40 the ascension pipe. J, J are the valves opening upward from the driving pipe into the air chamber. K represents the puppet valve on its spindle H, H. G G' represents the top of the puppet valve chamber. The valve
45 K in this as in other rams heretofore described has a recess *a, a* extending around its upper portion. The recess *a, a* slides in perfect contact like a piston within the surface *b, b* in the top G, G', and the upper part
50 of the puppet valve *f, f* slides in a similar way within the surface *g, g* in the top G G'.

In the use of rams having the puppet valve to slide in accurate contact with the sides of the valve seat two difficulties have
55 been experienced. First as the puppet valve rises a portion of the water was inclosed

within the recess *a, a* and as the water could neither escape above nor below it formed an inclosed and compact mass between the puppet valve and its upper seat and by
60 reason of the inelasticity of the water the shock of the puppet valve was communicated directly to the metal. Secondly, when the puppet valve commenced to fall a partial vacuum was formed at the recess *a, a*
65 between the puppet valve and its seat and this partial vacuum caused the puppet valve to stick to its upper seat. For these reasons puppet valves sliding in perfect contact with the inner surface of the top of the
70 chamber have not come into use for hydraulic rams. In order to overcome the first difficulty and remove the shock of the puppet valve from the metallic casing I make an opening *c* in the top of G G' which opening
75 communicates with the annular recess *g, g*, and I connect with this opening a tube C, C, C, which curves over the outside of the valve chamber, as shown by the lines C C C, Figs. 2 and 4, and passes up into the bot-
80 tom of the air chamber, as shown at Figs. 1 and 2. This tube has a valve D, Fig. 1, at the point where it terminates in the air chamber. This valve opens upward into the air chamber B. The operation of the tube
85 C C C and valve D is as follows: When the puppet valve H rises the water inclosed within the recess *a, a* is forced out through the aperture *c* and through the tube C C C and valve D into the air chamber B. The
90 elasticity of the air in the air chamber B resists the escape of the water through the tube C C C and thus the air in B acts as an elastic cushion to receive the upward thrust of the puppet valve and relieves the valve
95 chamber G G' from the shock. As soon as the valve K has reached its upper seat then the water ceases to press through the tube C C C and the elastic force of the air in B closes the valve D and prevents the return
100 of the water through C, C, C.

In order to prevent the valve K from sticking to its upper seat by reason of the formation of a partial vacuum at the recess
105 *a, a* in the valve K I make a series of small openings *e e' e''*, Figs. 2 and 4, around the recess *g, g* in the top of the valve chamber. These openings communicate with a corresponding series of vertical tubes E E' E'' E'''
110 These tubes E E' E'' E''' extend above the level of the surrounding water and are attached to the top of G G' by a

screw and nut. A small valve with a vertical stem is placed in the lower end of each tube E E' E'' E''', and a small spring s is placed in a cavity just below the nut. This
5 spring s presses the valve v up and closes the lower openings of each of the tubes E E' E'' E'''. These parts are shown most distinctly in Fig. 4. These tubes E E' E'' E''' operate
10 as follows: When the valve K begins to descend, the atmospheric pressure forces the surrounding air to enter through E E' E'' E''' to supply the partial vacuum at g g. The atmospheric pressure overcomes the resistance of the springs s, s, s, which are pur-
15 posely made weak enough. As soon as the air enters through the tubes E E' E'' E''' the valve K ceases to adhere to its upper seat and falls. The equilibrium of the atmospheric pressure being then restored the
20 springs s, s, s, react and close the lower extremities of the tubes E E' E'' and prevent the water from escaping through these tubes.

By this improved arrangement the puppet

valves of hydraulic rams can be made to slide in perfect contact with the top of the
25 chamber without producing a destructive shock on the metallic parts of the chamber and without the puppet valves sticking to the upper seat, as hereinbefore described.

Having thus described my improvement, 30 what I claim as my invention and desire to secure by Letters Patent is:

1. The arrangement of the tube C C C in combination with the upper part of the puppet valve chamber and with the air chamber 35 B in the manner and for the purpose substantially as hereinbefore described.

2. The arrangement of the tubes E E' E'' E''' in combination with the top of the puppet valve chamber in the manner and for 40 the purpose substantially as hereinbefore described.

JOSEPH C. STRODE.

Witnesses:

J. E. SHAW,

CHARLES D. FREEMAN.