No. 640,125. Patented Dec. 26, 1899.

J. C. GELLY.

HYDRAULIC RAM.

(Application filed Apr. 14, 1898.)

(No Model.) 4 Sheets—Sheet 1.

Fig. 1

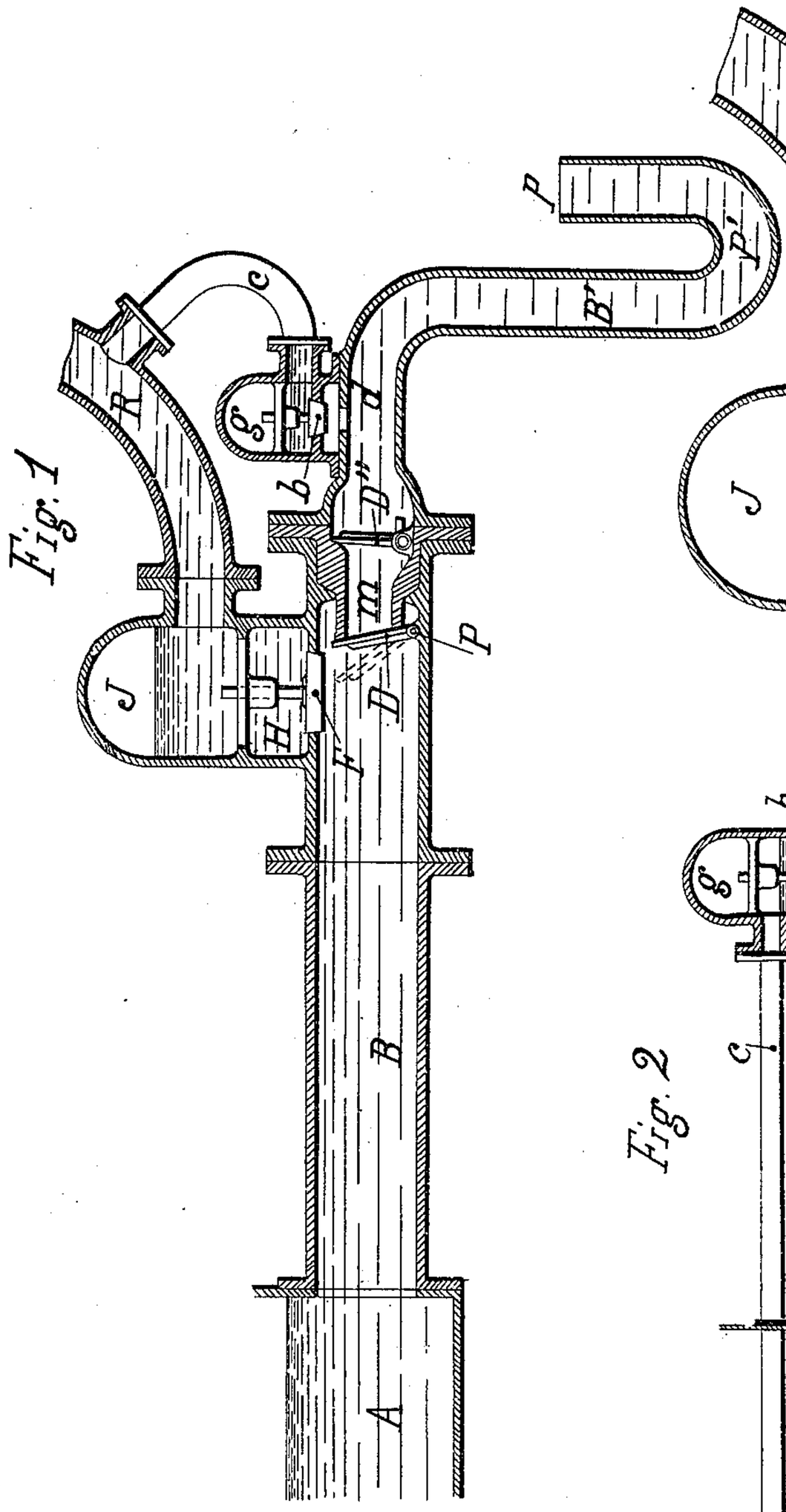
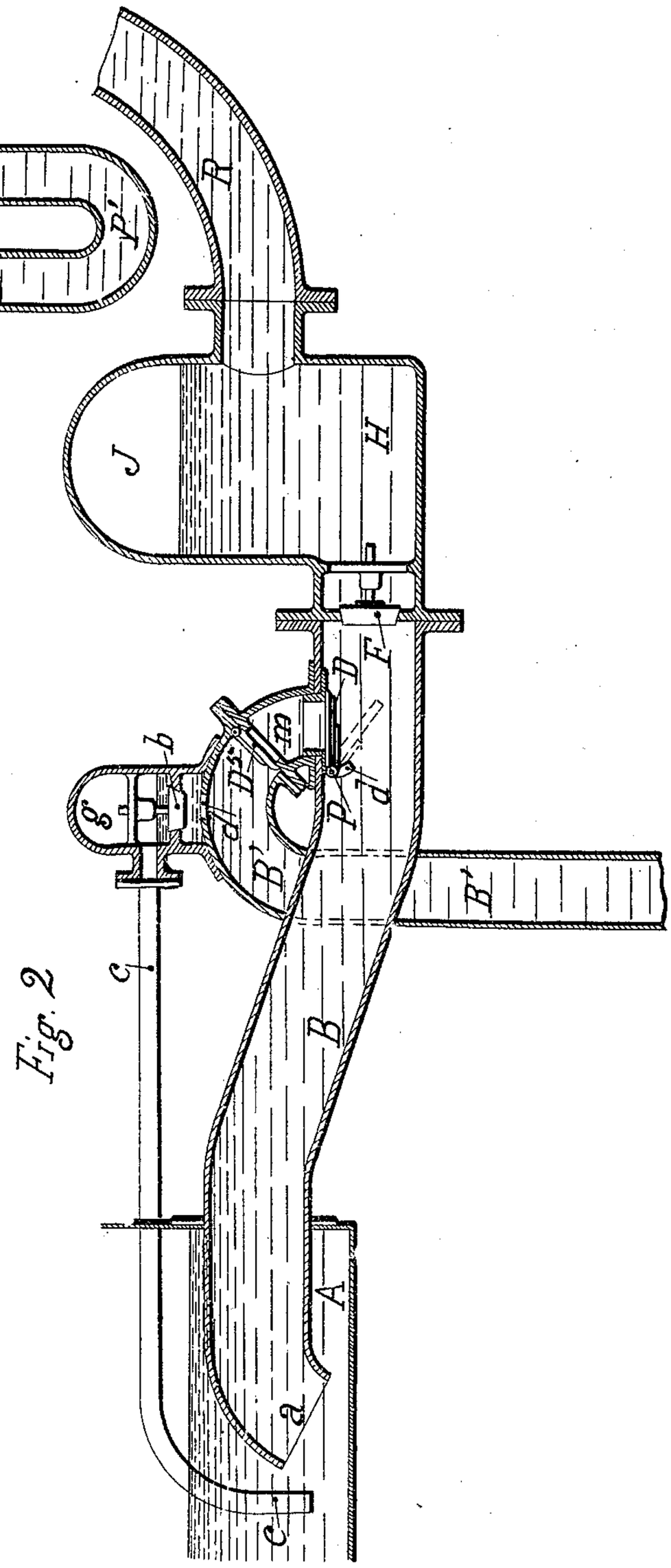


Fig. 2



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H. Lee Helms.

Inventor:

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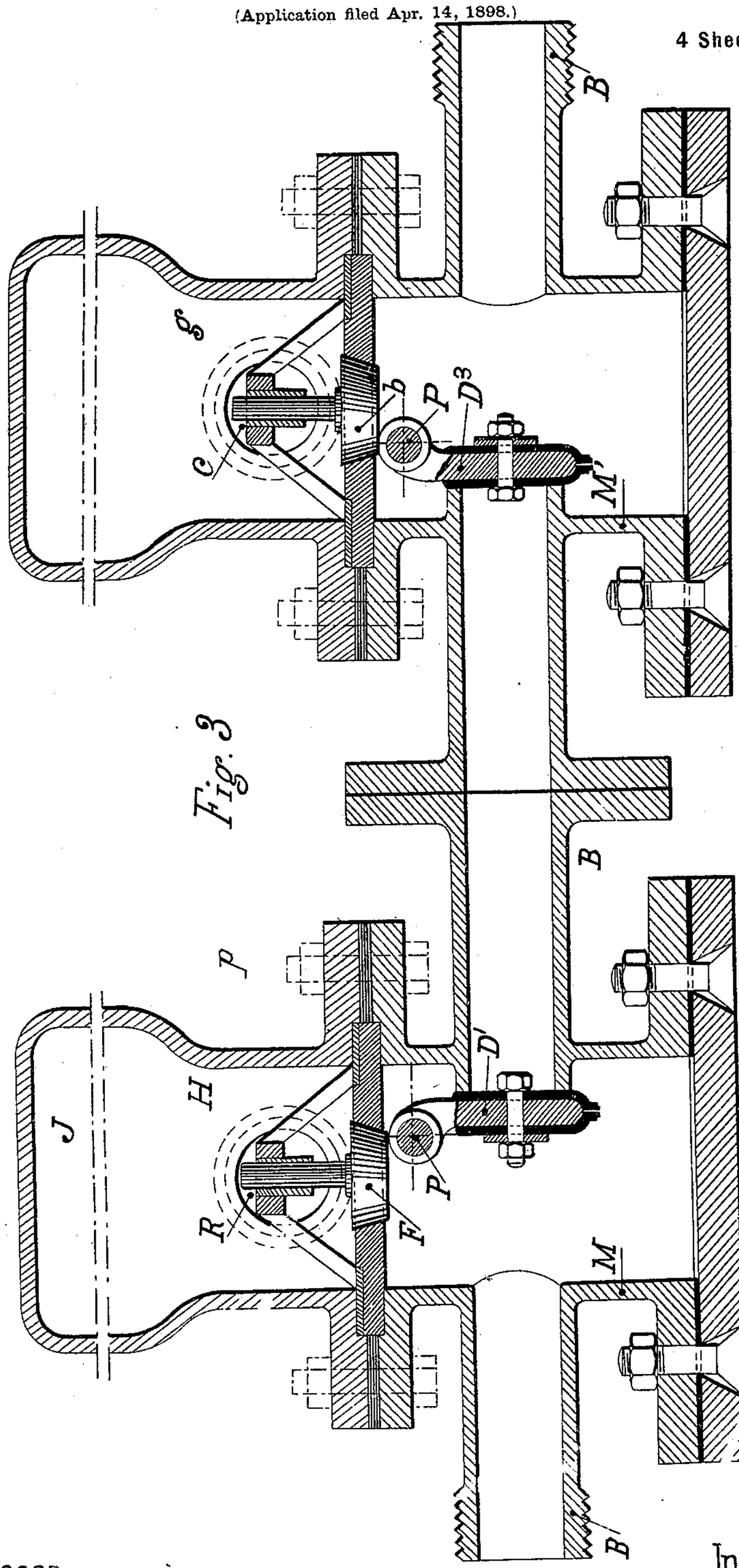

Fig. 3.

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HYDRAULIC RAM.

(Application filed Apr. 14, 1898.)

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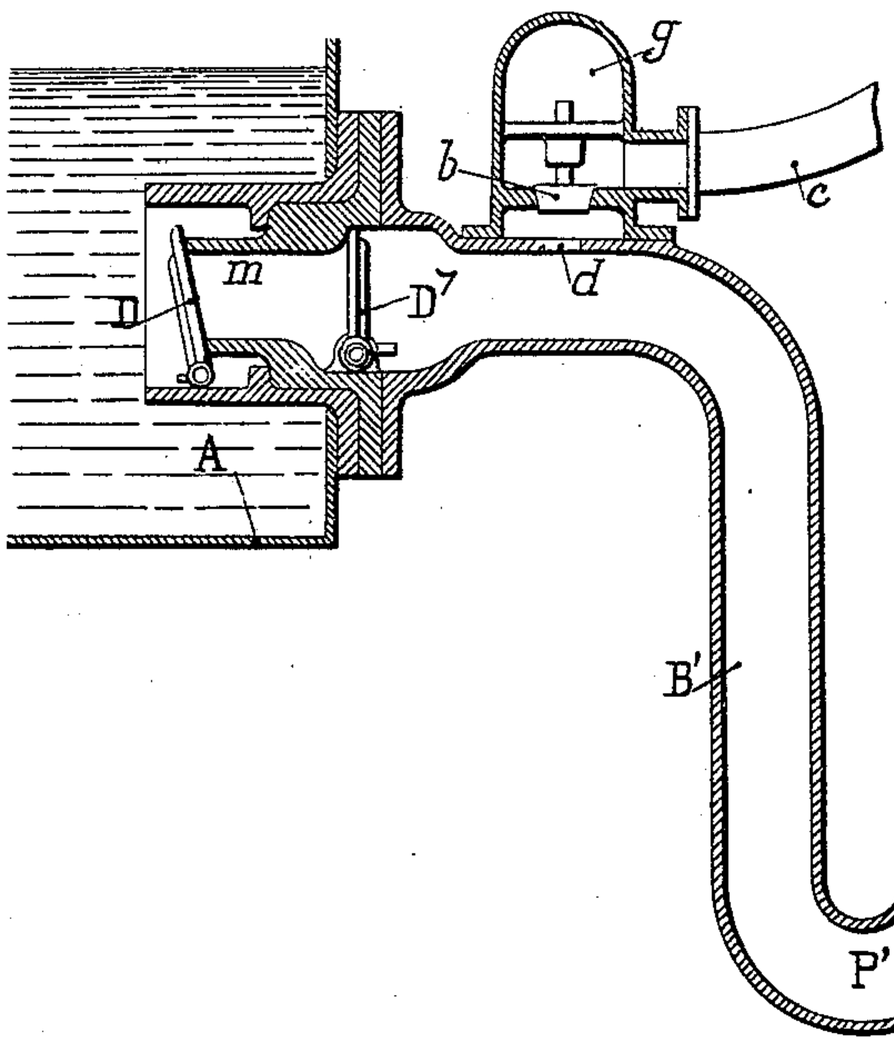
Fig. 4



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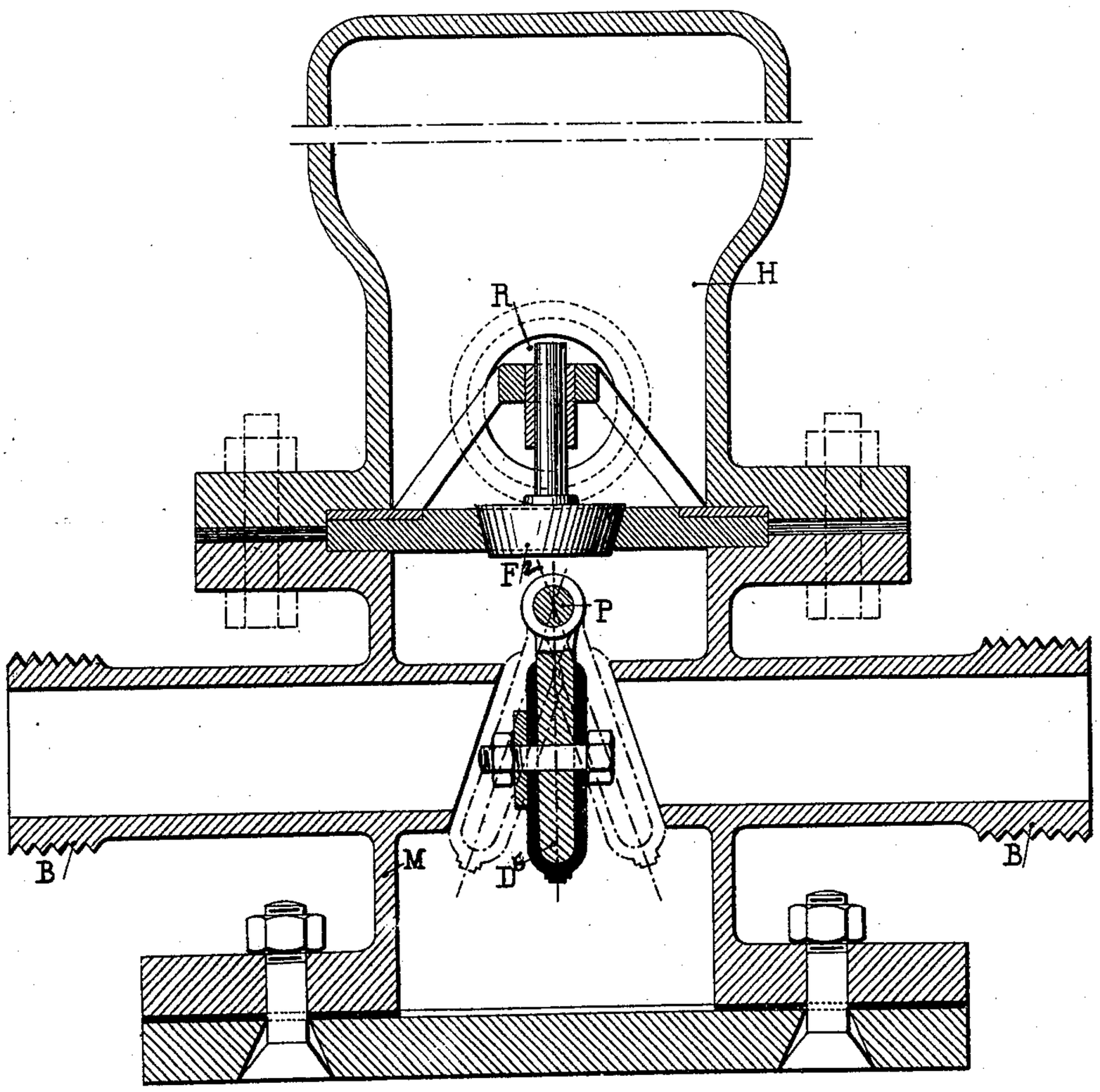
(No Model.) 4 Sheets—Sheet 4.

Fig. 5



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UNITED STATES PATENT OFFICE.

JOSEPH CHARLES GELLY, OF NOISY-LE-SEC, FRANCE.

HYDRAULIC RAM.

SPECIFICATION forming part of Letters Patent No. 640,125, dated December 26, 1899.

Application filed April 14, 1898. Serial No. 677,611. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH CHARLES GELLY, a citizen of the Republic of France, residing at Noisy-le-Sec, France, have invented certain new and useful Improvements in Hydraulic Rams, (for which I have obtained Letters Patent in France, No. 260,496, dated December 2, 1897; in Germany, No. 30,638, dated December 8, 1897; and in Great Britain, No. 29,813, dated December 20, 1897,) of which the following is a specification.

This invention relates to hydraulic rams by means of which liquids are automatically raised.

It consists mainly of a combination of two pipes, one of which constitutes a descending pipe, while the other forms a conduit, in which pipes a body of liquid is made to circulate, having a *vis viva* produced by the height of the fall and which, by means of a flap-valve placed at the inlet of the descending pipe, automatically and suddenly breaks the continuity of the current, so as to divide it into two parts, one of which—namely, that in the descending pipe—serves to give the velocity—that is to say, the *vis viva* of the liquid current for bringing the flap-valve on its seat—and owing to the recoil movement of this descending part, caused by the atmospheric pressure, to reopen the said flap-valve and raise a suitable lift-valve, through the seat of which a portion of the liquid can be raised into the rising main. The other portion of the current effects the raising of a check-valve and passes into the rising main.

The apparatus is shown on the accompanying drawings, in which—

Figure 1 shows the ordinary construction of the apparatus. Figs. 2, 3, 4, and 5 show modified arrangements.

From a reservoir A, Fig. 1, containing the water or other liquid to be raised, extends a horizontal conduit B, terminating in a downwardly-directed vertical pipe B′. In the interior of the pipe B is a flap-valve D, pivoted at P to the sides of B and opening in the direction of the reservoir A, which valve bears against the end of pipe B′, which is directly connected to B. A reservoir J H, provided with a lift-valve F and a rising delivery-pipe R, is branched upon the pipe B.

In the interior of the pipe B′ is a flap-valve D″, opening in the contrary direction to D.

The pipe B′ has opening *d*, which puts it in communication with a bell or vessel *g*, having a lift-valve *b* and a pipe *c*, connected to pipe R. The action of this apparatus is as follows: Assuming the flap-valves D and D″ to be open and the lift-valve F to be on its seat, the liquid in A will flow through B and, passing through the openings of the valves D D″, will flow down the pipe B′. Its velocity, and consequently its *vis viva*, will gradually increase and at a certain moment will close the valve D. The liquid contained in B, by virtue of the velocity and *vis viva* it has attained, will open the valve F and will partly fill the reservoir J H, where it will compress the air and will eventually rise up the pipe R. When the *vis viva* of the liquid in B is exhausted, the pressure of the liquid above the valve F will close said valve. On the other hand, the body of the liquid in the pipe B′, which has been suddenly separated from the body in B, also continues its downward flow through the pipe, thereby producing a vacuum behind it near the valve D at *m*; but at this moment the atmospheric pressure, only acting at *p* on the lower end of the body of liquid, behind which is a vacuum, causes this body to rise again and forces it back in the pipe B′, and this recoil of the liquid will force the valve D open, closing the valve D″, which has for its object to prevent the body of liquid in B′ from reëntering B and to cause it to be directed against the valve *b*, which is thus raised, so that through its seat a portion of the liquid passes into the bell *g*, whence it flows up the pipe *c* into the pipe R. The valve *b* will then close, owing to the difference of pressure acting on its sides, after which the continuous flow through the pipes B B′ will recommence and the above-described action will be repeated. The reservoir A can either be at a higher or a lower level than or on the same level with the valve D. If it is at a lower level, then, for facilitating the starting of the apparatus, it may be necessary to close by means of a cock the discharge end of the pipe B′ and to provide a check-valve at the entrance of the pipe B, and, lastly, to fill the entire conduit

B B′ with liquid. On then opening the cock on B′ the body of liquid is started in motion.

The pipes B B′ may either be of the same or of different diameters and may have any desired relative position. Thus they may be connected directly end to end, as at Fig. 1, or the one may be branched on the other at any angle, as at Fig. 2, or they may be connected indirectly by the interposition of one or two closed boxes of any suitable form, such as M M′, Fig. 3, in which are arranged the flap-valves D′ D^3, as also the lift-valves F′ and b', with which boxes are connected the reservoir J′ H′ and the bell g', Fig. 3.

The pipes B B′ may be straight or serpentine, either in elevation or in plan. The pipe B′ need not be vertical, but its lower extremity must be below both the valve D and the upper surface of the liquid in the reservoir A. The two valves D D″ must open in contrary directions, D in the direction of the reservoir A—that is, toward the side of the entrance of the liquid in the pipe B—while D″ opens in the direction of the discharge. The valve D may be placed in the pipe B or at the end thereof, as at Fig. 1, or laterally above, as at D^4, Fig. 2, or below or in a box M, as at D′, Fig. 3. The seat of the valve D must be at the entrance of the descending pipe B′, the lower or discharge end of which must be below the upper surface of the liquid in tank A.

The valve D″ may be placed in the pipe B′, as shown in Fig. 1 and at D^5 in Fig. 2, in any suitable manner, or in a box M′, as shown at D^8, Fig. 3. It increases the useful effect of the apparatus; but in the case where the water is to be returned to the source or to be raised at a small height it may be omitted.

The tube c may be connected to the tube R, as shown in Fig. 1, or to the reservoir A, as at c', Fig. 2, or it may be led to any desired locality. In certain cases it may be advantageous to provide the discharge end of pipe B′ with a bend P′ or to let it dip into a receptacle.

The results obtained by means of the valves D and D″ may also be obtained by a single valve D^6, Fig. 5. This valve is placed in a closed box M, containing only a check-valve F^2, and oscillates between the openings of the tubes B B′, so as to close the one or the other, according to the direction of the flow.

In the apparatus shown in Figs. 1, 2, and 3 both the direct motion of the body of liquid and its recoil motion are utilized. When it is desired to utilize the recoil motion only, the arrangement shown at Fig. 4 is used. The tube B, containing the directly-acting body of water, is then omitted, and there is interposed between the reservoir and the descending column B′ a box or pipe containing the valve D^7.

The advantage of the above-described apparatus consists in doing away with all springs, weights, or counterweighted levers and other secondary devices for transmission such as have heretofore been employed for operating the valves in apparatus of this kind.

In addition the apparatus cannot become submerged at the low-water level. The water is raised to a greater height than with the ordinary hydraulic ram installed in the low-water level, while the improved apparatus can be placed at the high-water level.

The apparatus can be applied to all kinds of sources of supply even with small delivery. With very small supplies it may be fed continuously by the aid of a siphon-bend a at the supply, as at Fig. 2.

The principal advantage of this apparatus consists in dividing the body of liquid into two parts for the purpose of utilizing simultaneously the direct motion of the one part and to produce and utilize the inverse movement of the other part for elevating a portion of the liquid of each of the two bodies or to force them separately or both together into a turbine or other similar motive-power machine; also, the weight of the body of liquid which escapes from the discharge end of the descending pipe may be utilized in a suitable apparatus.

Having now described my invention, what I claim is—

1. In a hydraulic ram, the combination of a tank or reservoir, a conduit leading therefrom, comprising an inlet-pipe and a descending discharge-pipe, the latter having its outer end constructed or arranged to receive atmospheric pressure from above, check-valve mechanism for controlling the outflow and backflow of liquid in said pipe, and a delivery-pipe provided with a check-valve and communicating with said conduit as and for the purpose set forth.

2. In a hydraulic ram, the combination of a tank or reservoir, a conduit leading therefrom, comprising an inlet-pipe and a descending discharge-pipe, the latter having its outer end constructed or arranged to receive atmospheric pressure from above, a valve for checking the outward flow of liquid in said pipe, a valve for checking the backflow of liquid in said pipe, and delivery-pipes provided with check-valves and communicating respectively with said inlet and discharge pipes as and for the purpose set forth.

3. In a hydraulic ram, the combination of a tank or reservoir, a conduit leading therefrom, comprising an inlet-pipe and a descending discharge-pipe, the latter having its outer end constructed or arranged to receive atmospheric pressure from above, a valve seated in said conduit and controlling the supply end of said discharge-pipe, a check-valve in said discharge-pipe opening toward the discharge end thereof, and a delivery-pipe communicating with said conduit and provided with a check-valve, as and for the purpose set forth.

4. In a hydraulic ram, the combination of a tank or reservoir, a conduit leading there-

from, comprising an inlet-pipe and a descending discharge-pipe, the latter having its outer end constructed or arranged to receive atmospheric pressure from above, a valve controlling the supply end of said discharge-pipe and opening toward the supply, a valve controlling the backflow in said discharge-pipe and opening toward the discharge, a valve-controlled reservoir communicating with said inlet-pipe and a similar reservoir communicating with said discharge-pipe, as and for the purpose set forth.

5. In a hydraulic ram, the combination of a descending discharge-pipe having its outer end constructed or arranged to receive atmospheric pressure from above, a valve controlling its supply end, an outwardly-opening check-valve in said pipe, and a valve-controlled reservoir communicating with said pipe, as and for the purpose set forth.

In witness whereof I have hereunto set my hand in presence of two witnesses.

JOSEPH CHARLES GELLY.

Witnesses:

GEORGES DELOM,

EDWARD P. MACLEAN.