No. 755,467. PATENTED MAR. 22, 1904.

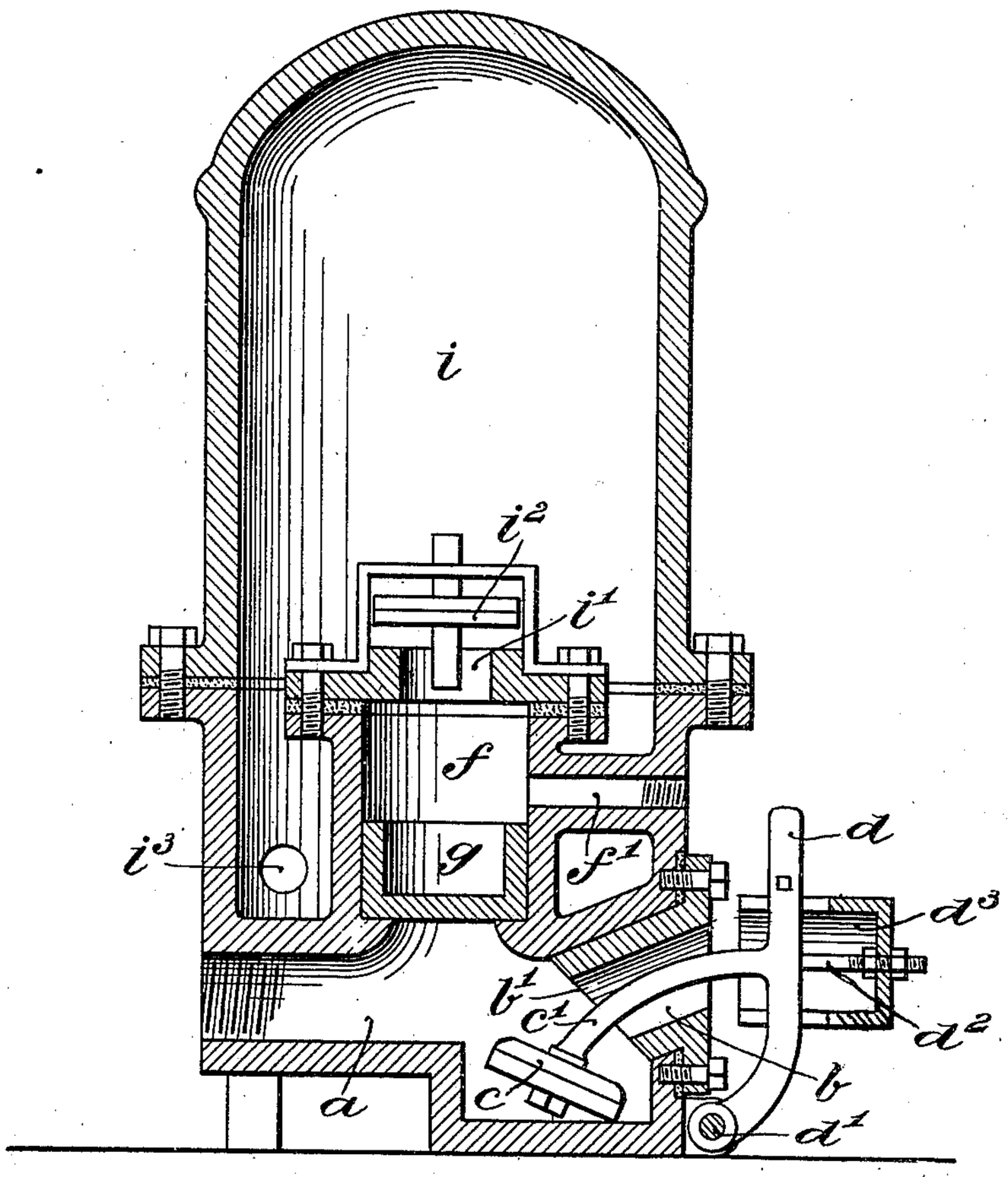
G. H. EARLE, JR. & G. B. SHAINLINE.

HYDRAULIC RAM.

APPLICATION FILED DEC. 10, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.

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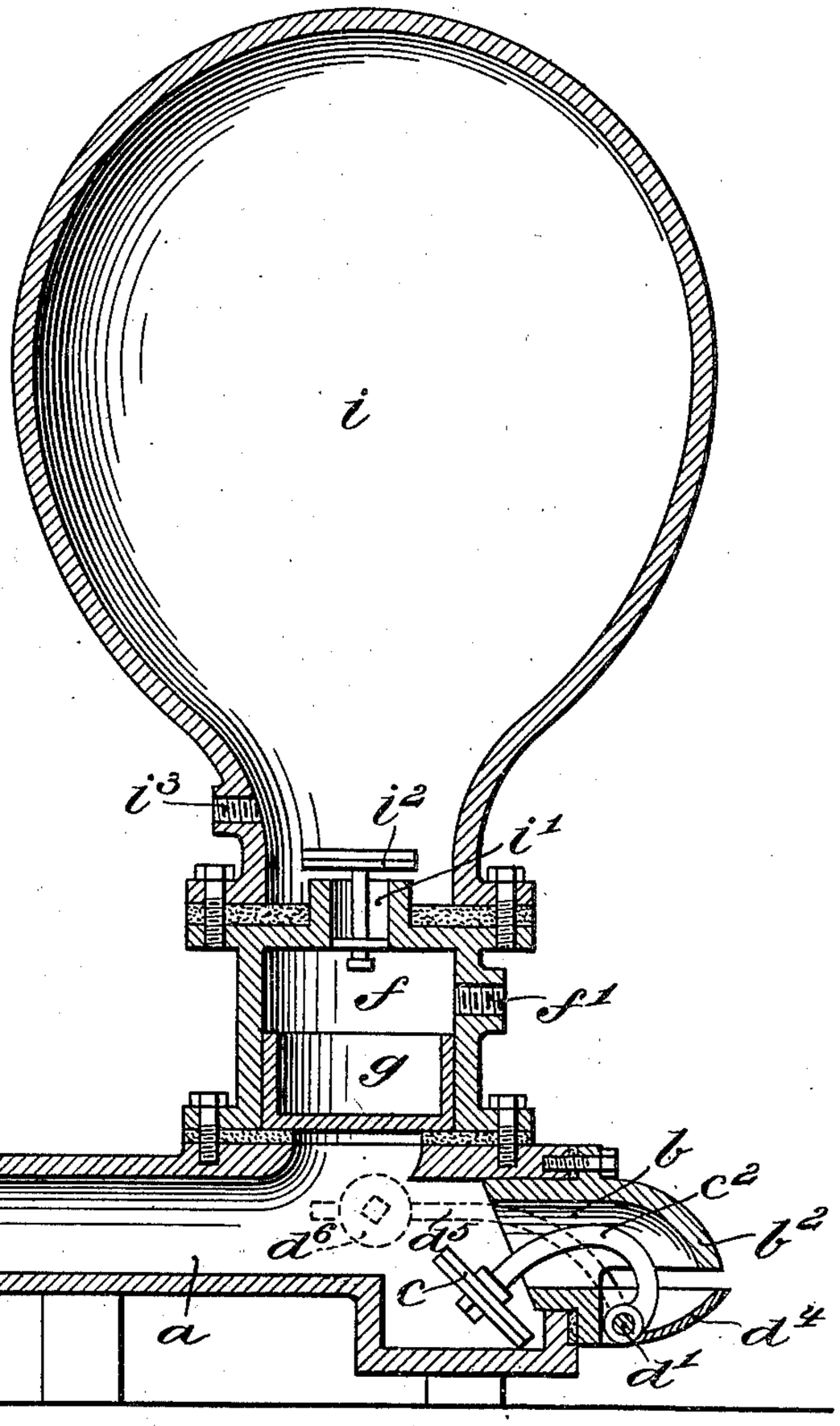
NO MODEL. 2 SHEETS—SHEET 2.

Fig. 2.

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# UNITED STATES PATENT OFFICE.

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## HYDRAULIC RAM.

SPECIFICATION forming part of Letters Patent No. 755,467, dated March 22, 1904.

Application filed December 10, 1903. Serial No. 184,605. (No model.)

*To all whom it may concern:*

Be it known that we, GEORGE H. EARLE, JR., residing at Bryn Mawr, in the county of Montgomery, and GEORGE B. SHAINLINE, residing at Wayne, in the county of Delaware, State of Pennsylvania, citizens of the United States, have jointly invented certain new and useful Improvements in Hydraulic Rams, of which the following is a specification.

Our invention has relation to a hydraulic ram; and in such connection it relates to the construction and arrangement of parts or means which constitute such ram.

In devices of this class wherein the momentum of a stream of water flowing into the ram is depended upon to elevate pure water from a spring or other source into a container or reservoir and to maintain the water in the container or reservoir under pressure it often happens that the pressure of the water flowing into the ram becomes impaired and its force so reduced that the valve upon the drive-pipe fails to operate, and hence no blow or force is exerted to lift the spring-water into the reservoir.

The principal objects of our present invention are, first, to so construct and rearrange the drive-pipe valve that it may be readily adjusted according to the force of the water flowing into the ram, whereby upon a diminution of pressure of said water the drive-pipe valve may still be operated to permit the momentum of the inflowing water to cause a blow to be delivered to the piston of the ram; second, to so construct and rearrange the various parts constituting the ram as to utilize to its fullest extent the blow caused by checking the flow of the water through the ram, and, third, to so construct and rearrange the various parts or means constituting the ram as that the same may be readily assembled or taken apart for examination, repairs, or otherwise.

The nature and scope of our invention will be more fully understood from the following description, taken in connection with the accompanying drawings, forming part hereof, in which—

Figure 1 is a vertical central sectional view of a hydraulic ram embodying main features of our invention, and Fig. 2 is a similar view of a modified form of such ram.

Referring now more particularly to Fig. 1 of the drawings, $a$ represents the intake or drive pipe into which flows the water for effecting the operation of the ram, which water may be supplied from a brook, stream, or other source of supply. At the outlet end of the drive-pipe $a$ is fitted a short pipe $b$, the inner end $b'$ of which serves as a seat for a valve $c$. This valve $c$ is carried at the end of a curved arm $c'$ of a vertical lever $d$, pivoted at its lower end by means of a suitable shaft $d'$. Extending outward from the vertical lever $d$ is a bolt $d^2$, carrying a bucket $d^3$, having its open end arranged adjacent to the outlet from the pipe $b$. This bucket $d^3$ is so carried by the bolt $d^2$ as to be readily adjusted toward or away from the outlet of the pipe $b$ to compensate for differences in force or pressure of the water for operating the ram.

Centrally located within the ram is the working cylinder $f$ of the ram, the lower end of which communicates with the drive-pipe $a$ at a point close to the seat $b'$ of the valve $c$, so that no great volume of water intervenes between the valve $c$ when closed and a piston $g$, fitted to the cylinder $f$ and having a vertical range of movement therein. Communicating with the cylinder $f$ is an inlet $f'$ for water from a spring or other source of supply. The sides of the piston $g$ are so arranged that when the piston is raised they cut off or close the pure-water inlet $f'$. The upper end of the cylinder $f$ communicates with a water-reservoir and pressure-chamber $i$ through an opening $i'$, the upper end of which is provided with a check-valve $i^2$. The pure water forced under pressure into the reservoir $i$ can be led away to any desired point through an outlet $i^3$, provided at the bottom of the reservoir $i$.

In the form of ram illustrated in Fig. 2 the valve $c$ is carried by an arm $c^2$, secured directly to the shaft $d'$, and the pipe $b$ has its outer end curved downward, as at $b^2$, to direct the outflowing water onto the dish-shaped bucket $d^4$, carried directly by the shaft $d'$. At the end of the shaft $d'$ there is provided,

as illustrated in dotted lines in Fig. 2, a lever $d^5$, carrying a weight $d^6$, adjustably secured thereto and serving to move the valve $c$ from its seat when the pressure in the drive-pipe has been relieved by the movement of the piston $g$.

The operation of the ram is as follows: The outlet of the drive-pipe being normally open, the driving-water flows through said opening, where it strikes the bucket $d^3$ or $d^4$. The bucket adjusted as hereinbefore fully explained is caused to move either outward or downward, carrying with the same the valve $c$, and thereby closing the outlet to the drive-pipe $a$. The column of water flowing through the usual piping (not shown) connected to the drive-pipe of the ram has by this time acquired sufficient momentum to be expended in a blow of considerable force on the piston $g$, located in the cylinder $f$. This cylinder $f$ communicates with the drive-pipe $a$ at a point adjacent to the valve $c$ when this valve is seated. The reason for locating the cylinder in connection with the drive-pipe close to the valve $c$ when seated is that in some instances—for example, when the head or fall of the drive-water is small—any great volume of water intervening between the drive-pipe valve, the point of maximum pressure, and the piston which forces the spring-water into the reservoir would seriously affect efficient operation of the ram. When the blow of the drive-water is delivered on the piston, the piston will move upward, cutting off in its upward movement the pure-water inlet $f'$ and forcing a portion of the water confined above the piston into the reservoir under great pressure. The pressure of the drive-water being now relieved, the valve $c$ will open and the piston will return to its initial position, and the operation heretofore explained can be repeated.

Having thus described the nature and objects of our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. In a hydraulic ram, the combination with a drive-pipe having an outlet, a valve adapted to seat with the inner end of said outlet and carrying an arm and pivoted lever provided with a bucket adjustably connected with said lever and movable with said valve, of a cylinder in communication with the drive-pipe at a point in proximity to the valve, when seated, and a piston in said cylinder adapted to force water from a different source than through the drive-pipe, into a reservoir, substantially as and for the purposes described.

2. In a hydraulic ram, the combination with a drive-pipe having an outlet provided with a removable section or pipe, a valve adapted to be seated with one end of the removable section or pipe of said outlet, said valve carried by an arm and a pivoted lever provided with a bucket adjustably connected with said lever and movable with said valve, of a cylinder communicating with the drive-pipe at a point in proximity to the valve, when seated, and a piston in said cylinder adapted to force a fluid from a different source than through the drive-pipe into a reservoir, substantially as and for the purposes described.

3. In a hydraulic ram, the combination with a drive-pipe having a valve-closed outlet, and a valve for opening and closing said outlet carried by an arm and pivoted lever, and having a bucket adjustably connected with said lever and movable with said valve, of a cylinder communicating with said drive-pipe at a point close to said outlet and a vertically-operating piston in said cylinder, substantially as and for the purposes described.

4. In a hydraulic ram, the combination with a drive-pipe having an outlet, a valve for opening and closing said outlet, carried by an arm and pivoted lever, and having a bucket adjustably connected with said lever and movable with said valve, of a cylinder communicating with said drive-pipe at a point close to said outlet, and a vertically-operated piston in said cylinder, substantially as and for the purposes described.

5. In a hydraulic ram, the combination with a drive-pipe having a valve-closed outlet and a valve for opening and closing said outlet carried by an arm and pivoted lever having a bucket operated by said valve, of a cylinder connected with the drive-pipe, and a piston adapted to be operated therein to force a fluid from a different source than through the drive-pipe into a reservoir, substantially as and for the purposes described.

6. In a hydraulic ram, the combination with a drive-pipe provided with a valve-seated outlet and a valve for opening and closing said outlet, carried by a curved arm integral with a vertically-pivoted lever carrying a movable bucket, of a cylinder in communication with said drive-pipe, a piston vertically movable in said cylinder, a separate source of supply of fluid to a reservoir, and a check-valve interposed between said cylinder and reservoir, substantially as and for the purposes described.

7. In a hydraulic ram, the combination with a drive-pipe having an outlet provided with a valve connected with a pivoted lever having connection with an adjustable bucket, of a cylinder wherein a piston is adapted to be afforded vertical movement, a fluid-inlet in said cylinder communicating with a reservoir carried by said cylinder, and a check-valve interposed between said cylinder and reservoir, substantially as and for the purposes described.

8. In a hydraulic ram, the combination with a drive-pipe, the outlet whereof is provided with a valve controlled as to its range of movement by an arm and pivoted lever carrying a bucket, the latter adapted to be adjusted toward and away from said lever, of a cylinder provided with a piston movable therein and

having an outlet for fluid communicating through said cylinder with a reservoir and a valve-controlled device interposed between said cylinder and reservoir, substantially as and for the purposes described.

9. In a hydraulic ram, the combination with a drive-pipe closed at one end by a valve having an operating-arm formed integral with a lever mounted on and movable with a shaft, and a bucket controlling said lever, of a cylinder provided with a piston, an inlet for fluid independent of the fluid-inlet of the drive-pipe to a reservoir, and a valve device interposed between said cylinder and reservoir to control the flow of fluid thereto, substantially as and for the purposes described.

10. In a hydraulic ram, the combination with a drive-pipe closable at one end by a valve having an operating-arm connected with a lever, said lever mounted on a counterweighted movable shaft, a bucket connected with said lever by an arm on which it is adapted to be adjusted, of a cylinder carrying a reservoir, a piston movable in said cylinder and a check-valve device interposed between said cylinder and reservoir, substantially as and for the purposes described.

In testimony whereof we have hereunto set our signatures in the presence of two subscribing witnesses.

GEORGE H. EARLE, JR.
GEORGE B. SHAINLINE.

Witnesses:
ERNEST E. TREVOST,
FRED E. BRUST.