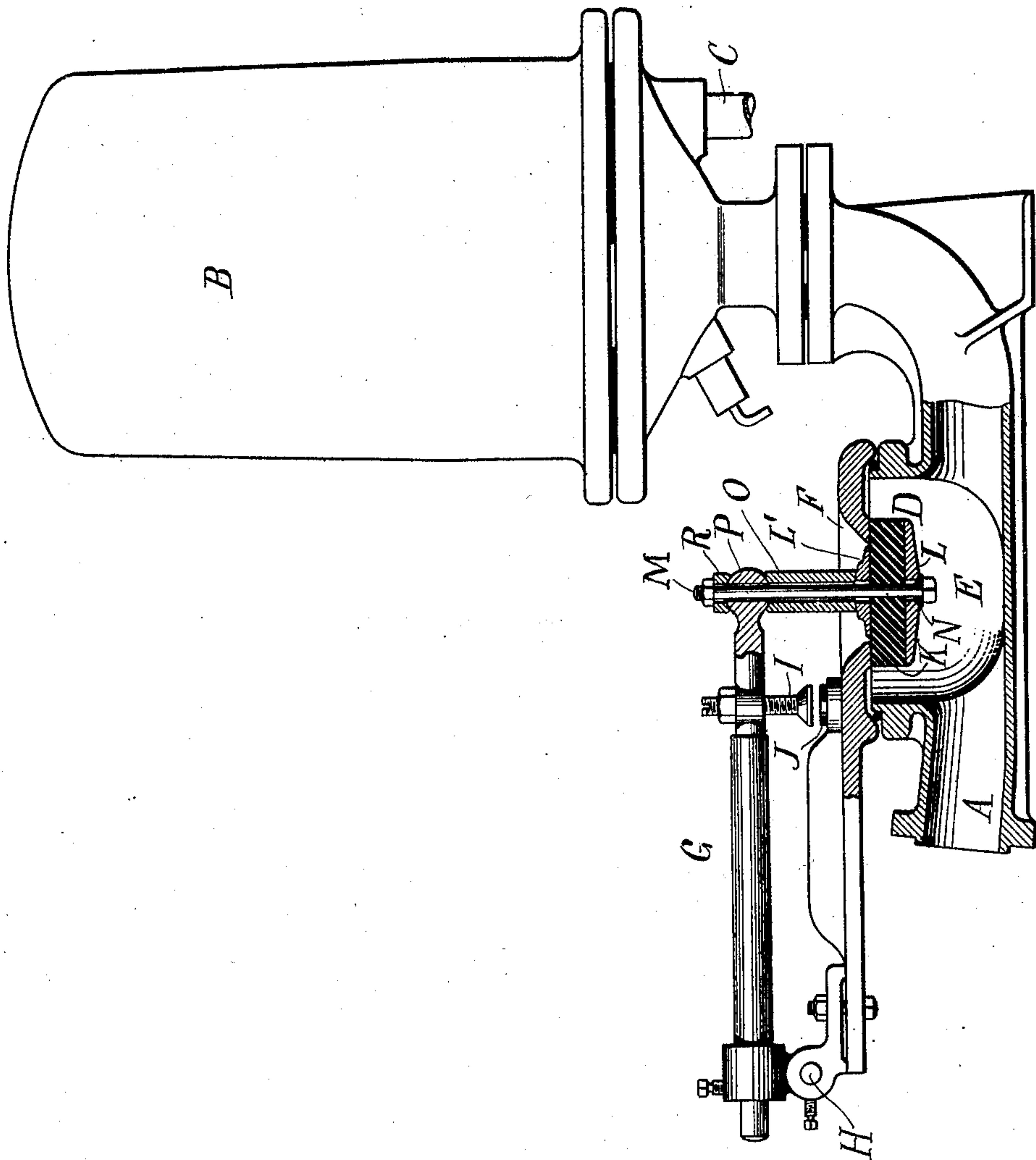


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HYDRAULIC RAM.
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Witnesses:
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UNITED STATES PATENT OFFICE.

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HYDRAULIC RAM.

976,546.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, BRADISH J. CARROLL, a citizen of the United States, residing at New York, in the county and State of New York, have invented certain new and useful Improvements in Hydraulic Rams, of which the following is a full, clear, and exact description.

This invention relates to hydraulic rams, more particularly to the mounting of the "waste" or "working" valve which enables the fluid to acquire the momentum necessary to drive it into the air chamber. It is of course important that the working valve be tightly seated when closed, as leakage at that time would impair the efficiency of the ram. Considerable difficulty has been experienced in securing this desired close fit of the valve and its seat, particularly after the apparatus has been in use for some time, as wear of the moving parts, or catching of the valve on a piece of wood, pebble, or other foreign object, tends to displace the valve and so cause it to seat improperly.

My present invention is designed to obviate this difficulty by means of a novel form of mounting, of such character that not only the original positioning of the valve may be readily and accurately effected but also that the repeated engagement of the valve with its seat will restore the valve to its proper adjustment in case it should happen to be disturbed.

To this and other ends the invention which I desire to cover consists in the novel features and combinations of elements hereinafter described.

A convenient and effective embodiment of the invention is illustrated in the annexed drawing, in which the apparatus is shown partly in section.

The drive pipe A is connected with the usual air chamber B, provided with a suitable check valve, not shown, constructed to prevent the water from flowing back into the drive pipe. The air chamber also has a delivery pipe C for conveying the water to the point of utilization. The waste or working valve D works in a chamber E, and is arranged to bear on a seat F at the top of the valve chamber. For this purpose the valve is mounted on a horizontal lever or arm G, pivotally supported at H and provided with an adjustable stop I arranged to strike a resilient or yielding base J and

so limit the downward movement of the lever. The drive pipe being connected with a suitable elevated source or "head" of water and the working valve depressed (by gravity), the water pours out past the valve, through the seat, thereby acquiring a certain amount of momentum, sufficient to carry the valve upward against its seat. The water, thus diverted, is carried by its momentum up into the air chamber, relieving the pressure on the working valve and permitting the same to fall again, whereupon the operation described is repeated. In this way the air in the air chamber is compressed, and the water therein forced to the point of utilization by the air pressure.

It is clear that the working valve in closing should fit tightly on its seat, since, as before stated, leakage would impair the efficiency of the ram. My present invention is designed to provide a mounting for the working valve which will enable this desired close fit to be secured and maintained.

In the embodiment illustrated in the drawing the body, K, of the valve, is mounted between a lower supporting disk L and an upper clamping disk L', and extending upwardly through these three parts is a binding bolt or tie rod M, the apertures through which the bolt passes being somewhat larger than the latter, as shown. Between the head of the bolt and the lower disk is a washer N, the upper surface of which is spherically convex, cooperating with a correspondingly concave seat on the disk L around the aperture through which the bolt passes. The top of the upper disk L' is also spherically convex, cooperating with the similarly concave lower end of a short tubular member or stem O loosely encircling the bolt. The upper end of this member is likewise spherically concave, to fit the spherical lower face of the end of lever G, which end is preferably in the form of a ball, as shown at P. Between the lever-end and the bolt nut is a washer R concave on its lower face to fit the upper side of the ball, and the apertures in the ball and washer are larger than the bolt so as to allow more or less play of the latter.

The spherical engaging surfaces described permit adjustment of each part in every direction. In assembling the device, the parts are arranged as shown, but the nut on the bolt M is not set up, so as to leave all the

parts loose. Hence when the lever is raised the valve disk K will seat itself accurately on the seat F. The nut is now tightened, binding all the parts firmly together and
 5 leaving the valve in proper adjustment. If in the operation of the ram this adjustment should be disturbed the subsequent impacts in closing will cause the valve to right itself, and even if the parts should work loose their
 10 universal adjustability will permit the valve to close properly. In any event mere tightening of the binding nut while the valve is held closely to its seat will restore the original adjustment.

15 From the foregoing it will be seen that my invention provides a self-adjusting working or waste valve, which has no tendency to get out of adjustment but on the contrary always tends to keep itself in the proper relation to its seat.

20 The embodiment specifically described herein is simple and thoroughly effective for its purpose, but it is to be understood that the invention is capable of being embodied in other forms without departure from its proper spirit and scope.

I claim:

1. In a hydraulic ram, the combination with a drive pipe, and a valve seat, of a
 30 working valve cooperating with said seat, a movable support for the valve, and means for attaching the valve to its support, comprising a plurality of universally adjustable members and means for binding said parts,
 35 valve, and support rigidly together in adjusted position.

2. In a hydraulic ram, the combination of a movable support, a working valve, a universally adjustable member between the
 40 valve and the support, and a binding bolt for securing the parts rigidly together in adjusted position.

3. In a hydraulic ram, in combination, a movable support having a convex face, a
 45 working valve having a stem provided with a concave face fitting said convex face, a binding bolt serving to bind said parts rigidly together in adjusted position, and a seat for the valve.

4. In a hydraulic ram, in combination, a 50 movable support having opposite convex faces, a working valve having a stem provided with a concave face fitting one of the convex faces on the support, a concave washer fitting the other convex face on the 55 support, and a binding bolt extending through the stem, support, and washer.

5. In a hydraulic ram, in combination, a movable support, a working valve provided with a concave seat, a binding bolt extending 60 through the valve and the support, and a convex washer between the head of the bolt and the valve and fitting the said concave seat.

6. In a hydraulic ram, in combination, a 65 working valve comprising a disk of yielding material, a lower supporting disk having a central aperture and a concave seat around the aperture, a convex washer fitting said seat, an upper clamping disk having a 70 central aperture and a convex face around the aperture, an upwardly extending tubular stem having concave ends the lower of which engages said convex face on the upper disk, a movable support having a lower convex 75 face fitting the upper concave end of the tubular stem, and having an upper convex face, a concave washer fitting the upper convex face of the support, and a binding bolt extending through the valve disks, the stem, 80 washers, and supports, and binding the same firmly together.

7. In a hydraulic ram, a horizontal supporting lever having a ball end provided with a vertical aperture, an apertured washer 85 having a concave face fitting the upper side of said ball end, a tubular stem having an upper concave face fitting the under side of said ball end, a working valve, and a binding bolt extending from the valve through 90 the stem, ball end and washer.

In testimony whereof I affix my signature in the presence of two subscribing witnesses.

BRADISH J. CARROLL.

Witnesses:

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 S. S. DUNHAM.