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J. A. SNAVELY.

HYDRAULIC RAM.

(Application filed June 4, 1902.)

(No Model.)

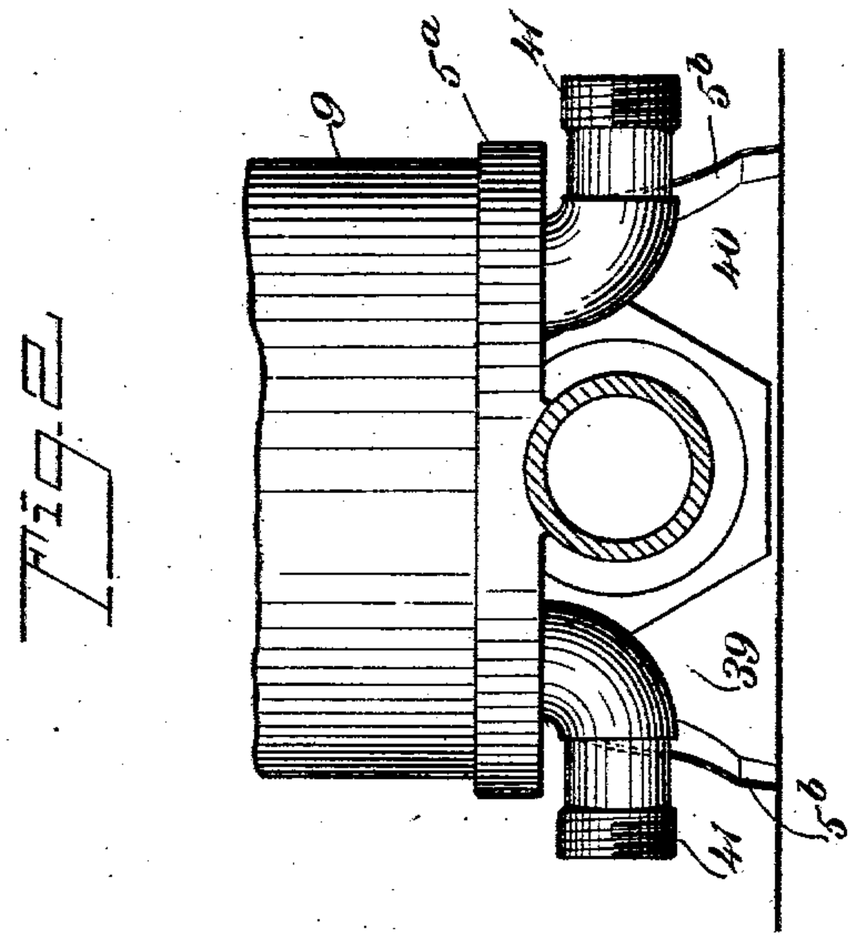

FIG. 2.

FIG. 1.

FIG. 3.

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HYDRAULIC RAM.

SPECIFICATION forming part of Letters Patent No. 715,167, dated December 2, 1902.

Application filed June 4, 1902. Serial No. 110,185. (No model.)

To all whom it may concern:

Be it known that I, JOHN ALEX. SNAVELY, a citizen of the United States, and a resident of Crockett Depot, in the county of Wythe and State of Virginia, have invented new and useful Improvements in Hydraulic Rams, of which the following is a full, clear, and exact description.

My invention relates to improvements in hydraulic rams; and one object that I have in view is the provision of valved means for controlling the intermittent flow of the current under pressure, so as to vary the number of pulsations per minute and to secure a decrease or increase in the capacity of the apparatus.

Further objects of the invention are to simplify the construction of the apparatus in minor parts with a view to increasing its durability and efficiency, while reducing the cost of manufacture, to provide means for deadening the sound and limiting the play of the waste-valve, to enable one or more discharge-pipes to be employed, and to provide a novel form of check-valve adapted to quickly seat itself after each pulsation and to serve as a buffer, so as to minimize wear.

With these ends in view the invention consists of a hydraulic ram embodying novel features of construction and arrangement of parts, which will be hereinafter fully described and claimed.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a vertical sectional elevation through a hydraulic ram embodying my invention. Fig. 2 is a sectional elevation taken in the plane of the dotted line 2 2 of Fig. 1, looking in the direction of the arrow, and showing a series of branches adapted for the union of a like number of discharge-pipes; and Fig. 3 is a sectional elevation of another style of check-valve which may be used in lieu of the spring-actuated valve shown in Fig. 1.

In carrying my invention into practice I employ a base 5, which has a tubular member 6, made or cast as an integral part thereof, said tubular member forming a section of the drive-pipe, the latter being indicated at 7 and united to the tubular member by means of a flanged coupling 8, which is shown by Fig. 1 as being screw-threaded to one end portion of the tubular member 6 and having engagement with a flanged end 7^a of the drive-pipe. The base 5 is preferably embodied in the form of a flat plate or disk having an upstanding flange 5^a, in which is received the lower edge portion of the shell 9, the latter forming the usual air-chamber 10. The shell 9 is provided with a head 9^a, which may be made in one piece with said shell, or it may be cast in a separate piece therefrom, and this shell is clamped firmly upon the base by the employment of a single bolt 11. Said bolt is screw-threaded at its upper and lower extremities, the upper threaded extremity passing through an opening provided centrally in the head 9^a and receiving the capped nut 12, a washer or gasket 13 being interposed between the head and said nut in order to make an air-tight joint at the point where the bolt passes through the head of the shell.

The base 5 is provided with an upstanding yoke or stirrup 14, the same being preferably cast as an integral part of said base and disposed within the air-chamber 10, and at its crown the yoke or stirrup has a vertical opening adapted to receive the lower flanged extremity of the bolt 11. The chambered shell is clamped firmly upon the base 5 by the nuts 15 16, which are screwed on the threaded lower part of the bolt 11 and are arranged to engage with the upper and lower edges of the crown forming a part of the yoke or stirrup, said pair of nuts 15 16 coöperating with the yoke in firmly holding the bolt and the shell upon the base. If desired, any approved means may be employed to hold the lower nut 16 against turning on the lower part of the vertical bolt. Furthermore, the bolt 11 may be provided at a point intermediate of its length with the angular or polygonal section 17, adapted to receive a wrench for the purpose of turning the bolt. A gasket or washer 18 is interposed between the lower edge of the vertical shell 9 and the top face of the base 5, and this gasket is adapted to be compressed by the operation of tightening the cap-nut 12, thus preventing the leakage of air and water between the base and the vertical shell.

The tubular member 6, which is made an integral part of the base, is extended or prolonged beyond the flange 5^a at one side of the shell, and to the extremity of this extended part of the tubular member is connected an elbow 20 by means of the coupling 19. As shown by Fig. 1, the elbow is provided at its inner end with a flange 21, adapted to be embraced by an inwardly-extending flange 19^a of the coupling, the latter being screwed to the projecting end portion of the tubular member 6, whereby the elbow has a swiveled connection with the tubular member in order to communicate directly therewith. This elbow is bent or curved to have one end portion lie at an angle to the other end portion, and in practice I find that good results are attained by bending or curving the elbow at an angle of twenty or thirty degrees or at any intermediate angle between the two. The elbow is flared or enlarged somewhat toward its free or unattached end, and to said end of the elbow is coupled, as at 22, a short length of pipe 23, which contains the valve 24 and is adapted to serve as the waste overflow for the pulsating column of water. This waste-pipe is united in abutting relation to the enlarged end of the swiveled adjustable elbow, and said waste-pipe and its valve are adapted to partake of the adjustments which may be given to said elbow. The waste-pipe corresponds in diameter to the flared or enlarged part of the elbow, and at the outer end of this waste-pipe is provided a removable cap 25, having an opening or port 26, through which waste-water is adapted to flow until checked by the seating of the automatic waste-valve 24. This waste-valve is embedded in the form of a ball or sphere adapted to travel or move freely into the waste-pipe, which is necessarily inclined to the horizontal tubular branch 6 owing to the presence of the elbow 20 between the parts; but this valve is forced to its seat by the impulse or pulsation of the moving column of water, the movement of the valve in the opposite direction being opposed by the liquid contained in the waste-pipe and elbow. In the operation of the valve it is constantly turning or shifting, so that it does not strike constantly at one place against the seat which may be provided by the perforated cap 25, thus keeping the valve in a round or spherical condition. The diameter of the valve 24 exceeds the opening 26, and said valve may be made of brass, bronze, or other material suitable for the purpose. In apparatus of small capacity the ball-valve may be of solid metal; but in large-sized rams a hollow and more or less buoyant valve may be employed.

To deaden the noise due to the impact of the metallic valve against the metallic cap, I may employ a washer 27, of rubber or other suitable material, and, if desired, this noise-deadening washer may have a thin metallic face-plate applied thereto in a position for engagement with the valve. The enlarged waste-pipe allows a larger-sized ball-valve to be used, and consequently admits of the use of a comparatively large opening in the cap, thus permitting as much water to escape as the drive-pipe can carry. The rolling valve is prevented when the ram is stopped from passing into the elbow by the employment of a stop located between the inclined waste-pipe and said elbow, and this stop is preferably embedded in the form of a screw 28, which is attached to the inclined pipe by screwing it into a threaded hole within said pipe, the screw lying in the path of the rolling valve.

The base 5 may be provided with suitable legs 5^b, adapted to sustain the same in a proper raised position, and in this base is provided an opening 29, the latter being disposed within the limits of the upstanding yoke or stirrup and establishing communication between the tubular member 6 and the air-chamber 10. This opening 29 may be controlled by a suitable form of check-valve, one style of which is shown by Fig. 1 and another by Fig. 3.

The check-valve 30 of Fig. 1 is provided with an upstanding stem 31, which is loosely fitted into a guide-sleeve 32, that is screwed to the lower threaded extremity of the vertical bolt 11 at a point below the lower check-nut 16, firmly attaching the guide-sleeve to the bolt and retaining it in proper position within the yoke or stirrup. A coiled spring 33 is fitted loosely around the sleeve in order that its upper end may be seated against the check-nut 16, while its lower end bears upon the check-valve 30, and this spring serves to quickly close the valve on the recedence of the column of water, and it also serves as a buffer to reduce some of the wear on the parts of the apparatus during the service thereof. The check-valve 30 is provided with a gasket or compressible facing 34, which is held in place by means of the washer 35 and a screw 36, the latter passing through suitable holes in the washer and the gasket and embedded in the check-valve.

In Fig. 3 of the drawings I have shown a valve which is made of rubber or other elastic material, and in this type of valve the spring and the gasket are omitted, although the elastic valve 39^a is made in one piece with a stem 38, that is slidably fitted in a guide-tube 32^a, which is attached to the lower extremity of the bolt or rod 11. This valve is simpler and cheaper than that shown in Fig. 1, and on the inflow of water said valve moves freely in an upward direction and is adapted to be compressed, so as to afford plenty of room for the free ingress of water into the chamber 10.

The discharge-pipe may be united or coupled to the shell 9 in the usual way, so as to have communication with the air-chamber 10, thus resembling an ordinary or common hydraulic ram; but in Fig. 2 I have shown a peculiar form of the base which makes provision for the attachment of two or more

drive-pipes. The base is adapted to be provided with a series of offstanding discharge branches 39 40, which are shown as extending in opposite directions from the tubular member 6 and leading from opposite sides of the vertical shell 9, said branches having threaded outer ends 41 for the attachment of the proper number of discharge-pipes. It is evident, however, that only one discharge-pipe may be coupled to one of the branches, and in this event the other branch is adapted to be closed by the application of a threaded cap to the nut 41, said cap preventing leakage of water from the ram and affording a convenient means for drawing off the water from the chamber 10 and the discharge-pipe when it is desired to cut the apparatus out of service.

The operation of the ram is similar to other well-known machines of its class; but the action of the cut-off is about as follows: The ball-shaped valve being in proper position, the column of water is admitted and at once drives the ball to its seat, the latter suddenly checking the moving column of water. The recoil of the column at once allows the ball to roll down the inclined tube until it is caught by the returning current, the ball-valve being again forced to its seat, so that the action is repeated indefinitely. During the recoil of the column of water due to the check it receives by the seating of the valve the pressure of the column overcomes the resistance of the check-valve and some of the water passes into the chamber 10, so as to compress air therein, the same recoiling and forcing the water through the discharge pipe or pipes to the proper height.

It will be noticed that the inclination of the waste-pipe to the tubular branch 6 may easily be varied by adjusting the swiveled elbow 20, and this adjustment of the elbow on the inclined pipe may be effected by pushing the parts to one side or the other, thereby moving the inclined pipe more or less to an inclined position, such adjustment of the inclined pipe taking place without the employment of adjusting screws or springs. The angular disposition of the inclined waste-pipe to the horizontal tubular member 6 determines the number of pulsations which may be secured in the moving column of water, and by raising the inclined pipe to its highest limit afforded by the elbow 20 the number of pulsations can be reduced to as low as fifteen per minute, while the adjustment of the pipe toward the horizontal position allows the number of pulsations to be increased up to one hundred per minute or less. The employment of the elbow having a bend of twenty or thirty degrees does not materially deflect or retard the movement of the column of water to any appreciable extent as compared with other rams, wherein the current is deflected to at least ninety degrees, thus enabling the column of water to recover sooner, thereby striking more strokes per minute, and consequently raising a greater volume of water with the same energy.

Changes in the form, proportion, and minor details of the parts may be made without departing from the spirit or sacrificing the advantages of my invention, and I therefore reserve the right to make such alterations as fall within the scope of the invention as defined by the annexed claims.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. In a hydraulic ram, the combination with a drive-pipe and a valved controlled reservoir, of an inclined waste-pipe in communication with said drive-pipe and shiftable to different angular positions relative thereto, and a waste-valve operable in said inclined waste-pipe.

2. In a hydraulic ram, the combination with a drive-pipe and a valved air-chamber, of an inclined waste-pipe in communication with said drive-pipe and shiftable to different angular positions relative thereto, and having a seat at the discharge-opening in the waste-pipe, and a spherical valve fitted in the waste-pipe to roll or travel therein and adapted to be moved by the column of water against said seat of the waste-pipe.

3. In a hydraulic ram, the combination with a drive-pipe and a valved air-chamber, of an elbow having a swiveled connection with said drive-pipe, an inclined waste-pipe united to said elbow and adjustable therewith to different positions relative to the drive-pipe, and a waste-valve operable in said waste-pipe.

4. In a hydraulic ram, the combination with a drive-pipe and a waste-valve, of an air-chambered shell communicating with said drive-pipe and confined in place by a single bolt or rod, a yoke to which said bolt or rod is attached, a sleeve secured to the bolt or rod, a check-valve controlling the communication between the drive-pipe and the air-chamber and having a stem fitted slidably in said sleeve and the spring actuating against said check-valve and held in place by the sleeve.

5. In a hydraulic ram, a base having an upstanding flange, and a tubular member made integral therewith, said base having a series of discharge branches, one of which is adapted to be closed by a suitable cap, combined with a shell fitted to the base, a yoke extending upwardly from the base and fitted in the shell, a single bolt attached to the shell and the yoke, a drive-pipe coupled to the tubular member, and an inclined waste-pipe having a valve and adjustably connected to the other end of the tubular member.

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

JOHN ALEX. SNAVELY.

Witnesses:
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A. L. SNAVLEY.