L. G. NILSON.

HYDRAULIC RAM.

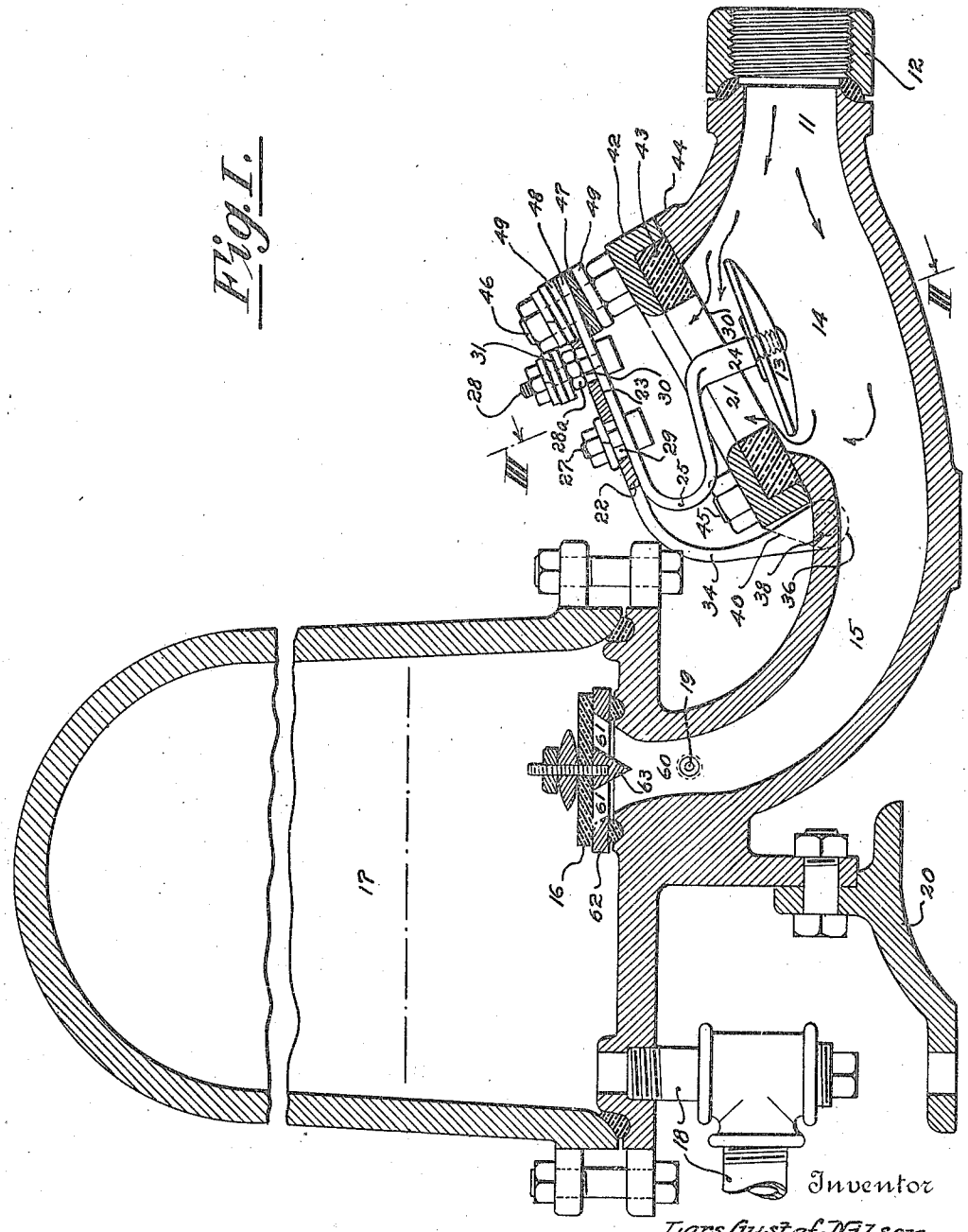
APPLICATION FILED JUNE 20, 1916.

1,249,462.

Patented Dec. 11, 1917.

2 SHEETS—SHEET 1.

Fig. I.



Inventor

Lars Gustaf Nilson

By his Attorney

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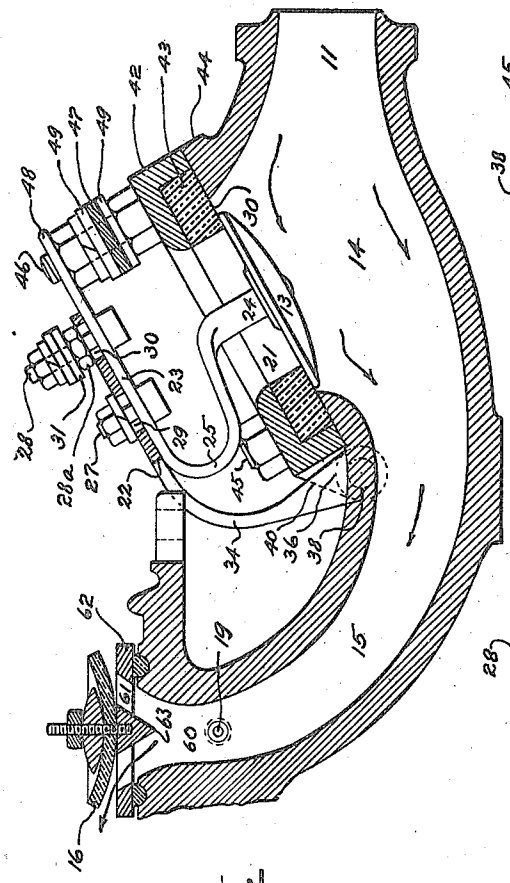


Fig. II.

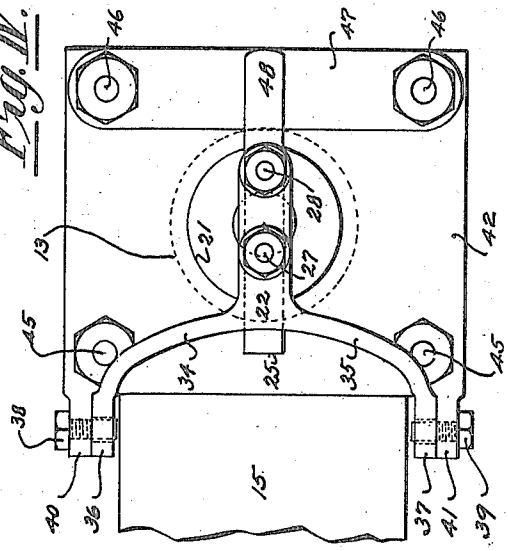


Fig. IV.

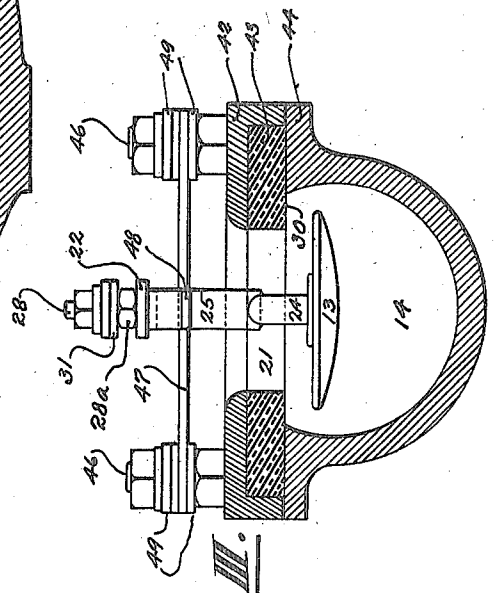


Fig. III.

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UNITED STATES PATENT OFFICE.

LARS GUSTAF NILSON, OF HOBOKEN, NEW JERSEY.

HYDRAULIC RAM.

1,249,462. Specification of Letters Patent. Patented Dec. 11, 1917.

Application filed June 20, 1916. Serial No. 104,716.

To all whom it may concern:

Be it known that I, LARS GUSTAF NILSON, a citizen of the United States, and resident of Hoboken, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Hydraulic Rams, of which the following is a specification.

This invention relates to improvements in hydraulic devices, and it appertains more especially to the structural means for increasing the efficiency and durability of rams in general.

One of the objects of the invention is to produce an improved device of the nature set forth wherein the flow of the water is diverted to the least possible extent so as to reduce the frictional resistance to a minimum.

A further object is the production of a device of the character described including an outlet valve inclined in the direction of the flow of the water, so arranged that the greatest opening thereof will be presented toward the inlet or drive pipe, thereby securing a free escape for the water that goes to waste.

Another object is to provide a device of the species mentioned with an easy and direct path for the water to the pressure chamber, so constructed that the speed of the water is accelerated to the advantage of increased flow and pressure.

Still another object is the provision of a device of the type specified having a resilient support for the outlet valve positively clamped in position, which will not shake loose from any vibrations to which it may be subjected.

A still further object is to afford an apparatus of the kind referred to, which shall have an outlet valve positively loaded by direct application of fixed weights, the amount whereof, is determined once for all when the device is adjusted for operation, thereby lessening the liability of a shiftable load shaking loose or being tampered with by unauthorized or inexperienced persons.

An additional object is to combine the outlet valve with a yielding abutment serving as means for limiting the opening thereof.

A general object is the design of a ram composed of few movable parts which shall be simple and strong, as well as convenient to assemble and replace, and amenable to low cost of manufacture.

Other objects and advantages will become apparent as the specification proceeds.

With the aforesaid objects in view, the invention consists of the improvements, novel construction, arrangements and combinations of parts hereinafter described, defined in the subjoined claims, and illustrated in their preferred embodiments by the annexed drawings, wherein like elements are designated by the same reference characters throughout.

In the said drawings:—

Figure 1 is a longitudinal sectional elevation of a ram embodying the invention under consideration;

Fig. 2, is a fragmentary view similar to the preceding with some of the elements shown in a changed position;

Fig. 3 is a section of the device taken irregularly on the line 3—3 of Fig. 1, looking in the direction of the arrows; and

Fig. 4, is a fragmentary top plan view of the right hand portion of Fig. 1.

In these several views the numeral "11" denotes an inlet to the ram from the usual drive or supply pipe, of which a coupling flange 12 is shown, and through which pipe the water is led from a suitable source; 13, an outlet valve for controlling the escape or overflow of the water; 14, a housing for the valve 13 standing in communication with the inlet 11 at one end; and 15, a duct leading from the other end of the housing 14, which duct conveys the water past a delivery valve 16, into a pressure chamber 17, whence it is conducted out by means of a delivery pipe 18. Air is admitted into the upper end of the duct 15 through a valve controlled aperture 19. One of the supporting feet for the ram is shown at 20. The operation of the parts above enumerated as belonging to the ram is so well known as not to require any lengthy description herein. Suffice it therefore to say that when the water entering the ram from the inlet pipe has acquired enough impetus it closes the outlet or main valve 13. With the water thus suddenly shut-off, the momentum of the moving column thereof strikes the portion of the water already in the duct 15 beyond the outlet valve, and

forces part of the same by the delivery valve into the pressure chamber. When the impact of the moving water has been absorbed and counteracted by the pressure of the air and water in the chamber 17 which closes the delivery valve 16, the pressure below the outlet valve is also equalized, due to the reaction of the water in the forward part of the duct 15, permitting the said outlet valve to drop on account of its weight. One cycle thus follows another automatically and ceaselessly. The proportion of the water pumped to that which overflows depends upon the difference of the supply and delivery heads.

Although the annexed drawings and description refer specifically to a single acting ram, no limitation in that sense is intended, as both double acting and compound rams incorporating the improvements of the present invention are contemplated as well.

It will be noticed from Figs. 1 and 2 that the main valve 13 coacts with an outlet opening 21 which is located adjacent to the inlet from the drive or supply pipe, in such a position that it is inclined toward the direction of the flow of the water. The latter is thereby diverted in the least possible extent from its natural path, and not forced to make a right angled turn as ordinarily is the case in the prevalent types of rams. To attain still further freedom of escape for the waste water, the main or outlet valve 13 is arranged to present its greatest opening toward the drive pipe, which again is different from the common practice. With this purpose in view a lever 22 is pivoted beyond the opening 21 at the far side thereof with respect to the inlet end of the ram. To this lever is fixed a supporting stem 23 for the valve. Preferably the said stem consists of resilient material, and one end thereof is securely entered into the body of the valve, as by screwing, after which it is riveted over the underside of the latter. The lower portion 24 of the stem is relatively rigid, while its middle portion 25 is flattened to a comparatively thin web to increase its flexibility. The said middle portion is also bent U-shape, in offset formation to one side, rearwardly as shown, which still further enhances its capability of flexure.

The particular advantage of a flexibly or resiliently mounted valve which is still positively maintained in position, is that, should foreign substances of any kind such as slivers or pebbles, carried along with the water from the drive pipe, happen accidentally to become lodged between the valve and its seat, the flexible stem will allow of a certain amount of distortion, without undue strain, and as soon as the obstruction is washed away, the valve will again seat itself normally. This construction dispenses with the use of interengaging convexed and concaved surfaces held frictionally together, which may shift and prevent the valve from seating properly.

The upper portion of the stem is maintained flat and constitutes an attachment to the underside of the lever 22. As shown, bolts 27, 28 serve to clamp the last named elements one to the other. These bolts pass through clearance holes 29, 30, provided therefor in the lever 22. By virtue of this construction, a ready and secure means is had for alining and holding the valve against its seat 30 with relation to the opening 21 therein, when the different parts of the ram are assembled. In the accompanying drawings one of the bolts is shown extended up to provide an anchorage for weights 31, which may be in the nature of ordinary metallic washers, impaled upon the bolt 28 for instance. Lock washers of the split spring type may be interposed between the nuts of the bolts 27, 28 and the weights to keep the former from working loose owing to the successive impacts transmitted to them through the stem from the valve 13. The object of having replaceable washers which can be applied directly over the valve, or removed therefrom, is to adjust the frequency of the beats or pulsations of the latter. By reason of the fact that different heads and quantities of water are encountered in practice when installing rams, it becomes necessary at certain times to add weight to the valve to make it work slower, while by removing the washers the valve is caused to operate quicker, which, for other occasions, may be more desirable. An adjustment of this character should be made only once, when the ram is put up and adjusted. Experience has shown that it is better to have a fixed regulation than one susceptible of being altered as may be done with a slidable weight, the latter being too easily tampered with by unauthorized or inexperienced persons.

As before mentioned, the lever 22 is pivoted in rear of the valve 13, but in line with the duct 15 which it straddles on the outside thereof. To this end the rear portion of the lever is bifurcated as at 34, 35 and hubs 36, 37 are formed with the latter. These hubs are journaled upon the ends of trunnion bolts 38, 39 received in ears 40, 41 respectively, which ears project in a rearward direction from a bonnet or housing plate 42. The latter is recessed to receive a body or filler 43, of rubber or other suitable material, which serves as a tightening gasket between the bonnet plate and the upper face of a rim 44 surrounding the outside of the valve housing 14 on top, as well as for a seat against which the valve 13 strikes in its upward position to shut-off the communication through the opening 21 therein. To securely hold the bonnet or housing plate 42 in position,

and tightly force the gasket 43 against the rim 44, two pairs of bolts 45, 46 may be employed. The latter pair which is located at the upper and forward corners of the plate are extended beyond the other pair of bolts, to constitute a support for a bridge or buffer strip 47. This bridge or strip is designed to receive the impact from a projecting end 48 of the flattened valve stem 23 when the valve 13 attached to the other end thereof drops into its lowermost position. Both the end 48 and the bridge 47 may be made resilient to cushion and lessen the force of the blows. Adjustment of the bridge 47 in height relatively to the valve's seat 30, determines the amount that the valve is permitted to drop, it being understood that a heavily weighted valve generally requires a longer stroke or movement, and the reverse for a light valve. The adjustment for the bridge strip 47 may conveniently be effected in a similar manner to the loading of the valve, namely, through the instrumentality of interposed washers 49. The accompanying drawings show that these washers can be placed above the bridge, as fillings under the nuts of the bolts 46. When adjustment is desired the positions of these washers are simply interchanged, the washers being placed either above or below the bridge strip, as the case may be, to elevate or depress the same, for the purposes already described.

It will be noted that the walls which encompass the inlet 11, the valve housing 14, and the duct 15 have all been given curves of smooth and gradual sweep so as to reduce to a minimum the frictional resistance against the water flowing therethrough. Furthermore it will be observed that near the rearward terminal the duct 15, is constricted for a certain distance as at 60. This is to obtain the effect of a Venturi tube, according to which, the speed and the pressure of the fluid at the contracted area is increased, so that the same amount will pass the given point in the same period of time as in other portions of the conduit. The principle mentioned is especially advantageous in the present instance, in that it accelerates the speed of the water entering the pressure chamber 17, through ports 61 in a valve plate 62, underlying the delivery valve 16. The water, in order to reach the said ports 61, first encounters a conical depending deflector 63, which evenly distributes the same between the aforementioned ports, of which there may be two or more according to size and design of the ram.

While a certain preferred embodiment of this device has been shown and described, it will be understood that changes in the form, arrangements, sizes, proportions and details thereof may be made without departing from the scope of the invention as defined by the appended claims.

Having described my invention what I desire to secure by Letters Patent and claim is:—

1. A hydraulic ram including, in combination, a pressure chamber, a valved conduit discharging thereinto, an inlet leading to said conduit, and a waste water valve pivoted intermediate said inlet and conduit in such a manner that its widest opening is inclined toward the inlet.

2. A hydraulic ram including, in combination, a chamber having a self-closing admission, a passage arranged to deliver a stream of water through the latter, a discharge for the overflow water inclined toward the entrance to said passage in advance of said chamber, and a valve for said discharge pivoted between it and said admission above the passage so as to present the wider opening on the side nearest to said entrance.

3. A hydraulic ram including, in combination, an air and fluid chamber, a valved channel leading into the same, a waste water passage lateral to said channel and inclined toward the entrance thereto, and a valve adapted to control said passage pivoted on the far side thereof in proximity to said entrance end of the channel.

4. A hydraulic ram including, in combination, a pressure chamber, a conduit arranged to discharge a stream of water thereinto, an overflow passage in one side of said conduit inclined toward the inlet thereof, a valve controlling said passage, and means for pivotally supporting said valve intermediately of the discharge end of the conduit and the side of the overflow passage remote from said inlet so as to enable the valve to present its widest opening to the latter.

5. A hydraulic ram including, in combination, a pressure chamber, a conduit delivering water thereto, a discharge passage for waste water lateral to said conduit, a valve for said discharge, and a lever to which said valve is attached pivotally straddling the conduit intermediate the discharge and the pressure chamber.

6. A hydraulic ram including, in combination, a pressure chamber, a conduit conveying water thereinto, an outlet passage for waste water at one side of said conduit, a valve for said outlet, an apertured cover overlying the latter and having ears straddling the conduit on the far side with relation to the entrance thereto, and a bifurcated lever for said valve having pivotal connections with said ears.

7. A hydraulic ram including, in combination, a water channel, an inlet thereto, a discharge passage for overflow water lateral to said channel, a pressure chamber beyond said discharge, and a duct intermediate of the channel and chamber constructed

and arranged on the principle of a Venturi tube operating to accelerate the flow into the latter.

8. A hydraulic ram including, in combination, a water conduit, a discharge passage for waste water adjoining the entrance to the said conduit, a pressure chamber, a duct connecting the conduit with the latter, said duct having a constricted area adjacent to said chamber operating to accelerate the flow of water thereinto on the principle of a Venturi tube, and a valved plate registering with said area.

9. A hydraulic ram including, in combination, a pressure chamber, a water conduit leading thereto, a passage affording egress for waste water from said conduit, a valve adapted to control said passage, and a pivotally connected resilient support for said valve.

10. A hydraulic ram including, in combination, a pressure chamber, a duct communicating therewith, an outlet for waste water from said duct, a valve positioned to control said outlet, a pivotal lever for said valve, and a resilient connection between the latter and said lever.

11. A hydraulic ram including, in combination, a pressure chamber, a duct conveying water to the same, an overflow passage for said duct, a valve controlling said passage, a lever for said valve, a housing for the valve's seat to which said lever is pivoted, members extending up from said housing opposite to the point of attachment of the lever, and a resilient element adjustable on said members transversely to the path of movement of the lever disposed transversely across the path of said connection, and means for adjusting said member to predetermine the travel of the valve.

12. A hydraulic ram including, in combination, a pressure chamber, a channel leading water thereinto, an outlet for waste water from said channel, a valve controlling said outlet having a projecting stem, a pivotal lever to which said stem is attached, a bridge arranged across the path of oscillation of said lever, supporting means for said bridge, and spacers capable of being transposed for the adjustment of the bridge on said supporting means.

13. A hydraulic ram including, in combination, a pressure chamber, a duct conveying water thereto, a flanged overflow passage for waste water from said duct, an apertured plate overlying said passage and having a recess in its underside, a gasket provided with an opening registering with the aperture in said plate, the outer portion of the gasket constituting a tightening medium between the flange of the overflow passage and the plate, being lodged in the recess thereof, and a valve controlling the opening in the gasket, the inner portion of the latter around the opening therein serving as a seat for said valve.

Signed at the borough of Manhattan in the county of New York and State of New York this 17th day of June A. D. 1916.

LARS GUSTAF NILSON.

Witnesses:
H. C. KARLSON,
W. H. GEE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."