

### Hydraulic Press.

N<sup>o</sup> 67719.

*Patented Aug. 13, 1867.*

*Fig. 1.*

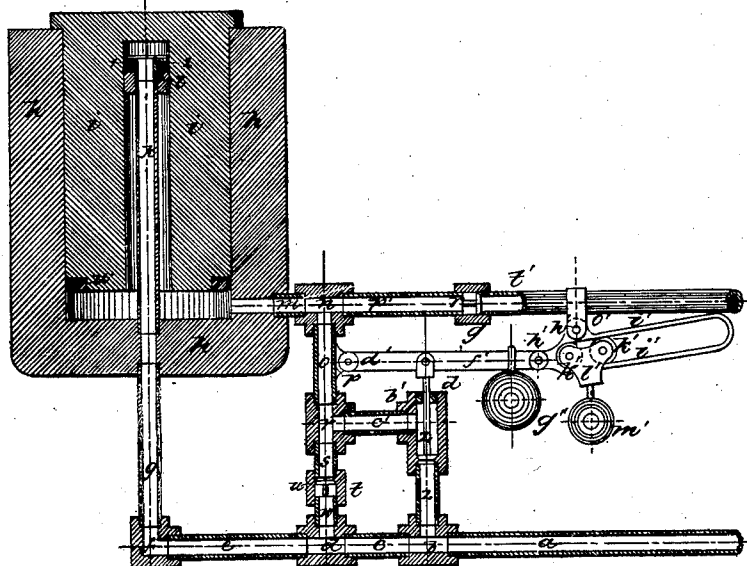
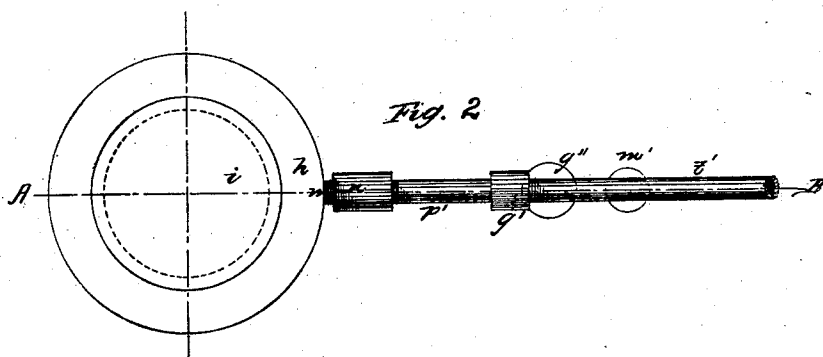


*Fig. 2*



Witnesses  
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*Letters Patent No. 67,719, dated August 13, 1867.*

## IMPROVEMENT IN HYDRAULIC PRESS.

*The Schedule referred to in these Letters Patent and making part of the same.*

### TO ALL WHOM IT MAY CONCERN:

Be it known that I, JOHN T. BURR, of Brooklyn, in the county of Kings, in the State of New York, have invented a new and improved Mode of Constructing and Operating Hydraulic Presses; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, in which—

Figure 1 is a vertical section, taken in the plane of the axis of the ram and the line A B, and

Figure 2 is a plan or top view.

As the hydraulic press has heretofore been generally constructed, much time and power are wasted in the first movement of the ram, for the reason that but little power is required to move the ram before the ultimate resistance is reached; and as the proportions of the pump piston and the ram are relatively proportioned so as to enable the piston of the pump to force water into the cylinder to move the ram against the maximum resistance, it follows that to move the ram until it meets such resistance, if the same means are employed in the beginning of the operation, there must be a serious waste of power in moving the ram until it reaches the resistance which is to be ultimately overcome. Various devices have been contrived to avoid this defect, none of which, as I am informed, have, prior to my said invention, proved to be practically useful.

The object of my invention is to avoid this defect, and to this end my said invention consists in causing the water which is forced into the cylinder by the usual pump to act against a small portion of the surface of the ram until it meets with a considerable resistance; water, in the mean time, being permitted to flow by gravity from a reservoir into the cylinder as the ram is moved; and when the ram has been moved as far as the water forced in by the pump to act against a small portion of its area will carry it, the increased pressure of the water lifts a weighted valve, which opens a communication between the pump and the cylinder in which the ram works, that the water forced in by the pump may act against the whole surface of the ram, a valve in the pipe which connects the cylinder with the water-reservoir being closed by the pressure of the water so as to prevent the water from the pump from escaping into the reservoir.

The ram is formed with a small cylindrical bore extending some distance from the inner end towards the outer end; and this central bore slides on the open packed end of a pipe secured to a hole in the closed end of the cylinder; and this pipe connects with the pump so that the water forced in by the pump acts against the end of this small central bore of the ram, the area of which is smaller than the entire surface of the said ram. The lower end of the cylinder is connected by another pipe with any suitable reservoir of water, from which water will flow by gravity into the cylinder around the pipe in the central bore as the ram is forced up by the action of the water forced by the pump into the central bore; and in this pipe there is a check-valve which opens towards the cylinder, and the pipe leading from the pump to the central bore has a branch which connects with the pipe that connects the cylinder with the reservoir; and this connecting branch pipe is controlled by a weighted valve, so loaded that so long as the water forced by the pump into the central bore exerts sufficient force to move the ram the valve remains closed, and as the ram is thus forced up the cylinder below the ram will be supplied with water from the reservoir; but so soon as the motion of the ram is checked by the increasing resistance the full force of the pump increases the pressure on the water. This lifts the weighted valve in the branch pipe. The water from the pump then also passes through the part of the weighted valve into the pipe leading from the reservoir into the cylinder, closes the check-valve, and then the water from the pump is caused to act against the entire surface of the ram to develop the full power of the press.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

The cylinder *h* is bored and finished on the inside as usual, and is drilled through the bottom to receive the standing pipe *k*. This is firmly secured into the closed end of the cylinder, and is provided at the upper end with an hydraulic packing, 2, of suitable size, to act as a stationary piston. The ram *i* is bored from below to within a short distance of the top to receive the packing 2 and nuts *ll*. The ram *i* is provided with the usual hydraulic packing, *u'*. Into the bottom of the cylinder *h* the pipe *g* is secured, and connects by means of the fittings *f d b* and pipes *e c a* with the pump in the usual way. The cylinder *h* is also drilled and tapped to receive the pipe *m*, which connects with the reservoir by means of fittings *n g'* and pipes *p'* and *t'*. There is a

check-valve, *r*, which will allow the water to flow from the reservoir to the press, but not in the opposite direction. The pipes *m p'* and *g e c a* are connected by means of pipe *x*, valve *a'*, and fittings *c' r' o n*, and also by means of pipe *w*, valve *u*, and fittings *s r' o n*. The valve *a'* is somewhat like the ordinary safety-valve; having a stem, *z*, lever *f'*, fulcrum *d'*, and weight *g''*. This lever *f'* is connected to an oscillating loop, *i'*, by means of a pin, *h'*. In the loop *i'*, which is suspended from *o'* by the pin *n'*, the carriage *l'* with wheels *k' k'* and carrying weight *m'*, is free to run from end to end of the loop. The weights *g''* and *m'* are so proportioned that when no pressure is on the valve-stem *z*, and *g''* is on the end of the lever *f'*, and the weight *m'* on the outer end of the loop *i'*, the valve *z* remains down with a requisite pressure of say fifty or sixty pounds.

The operation of my press then is as follows: The water from the pump passes through *a b c d e f g* into and through the pipe *k*, causing the ram *i* to rise. At the same time the water from the reservoir flows through *t' g' p' n m* into and fills the cylinder *h* as fast as the ram *i* rises. This continues until the resistance to the ram becomes such that the pressure of water causes the valve-stem *z* to rise. This moves the lever *f'* so as to raise the weight *g''* and reverse the inclination of the loop *i' i'*, causing the weight *m'* to run down to the opposite end of the loop, thereby raising the valve *z* so that the water will flow through *c' r' o n p'*, and *m*, closing the check-valve *r* so that the pressure of the water shall act against the entire surface of the ram with a power equal to the pressure of the water multiplied by the whole area of the ram *i*, until it has raised it to the requisite height. The pipe *a* is connected with the reservoir by means of the usual stop-valve, which is not shown in the drawing. To lower the ram *i* this valve is opened and the water runs back through *m n o r' c'*, and the valve *z* having been closed by the weight *g''*, the water being there obstructed, it runs down through *s* into and through the check-valve *u*, thence through *w d c b a*, into the reservoir. The water in the cylinder and in the bore of the ram *i* has thus obtained free access to the reservoir by means of *k g f e d c b a*. The ram being down it is ready for another operation.

What I claim as my invention, and desire to secure by Letters Patent, is—

The standing pipe packed in the central bore of the ram, and connected with the pump, in combination with the pipe connecting the cylinder with any suitable reservoir or head of water, and the weighted valve, arranged as shown in connection with the pump and cylinder, the whole being substantially as and for the purpose set forth.

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Witnesses:

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