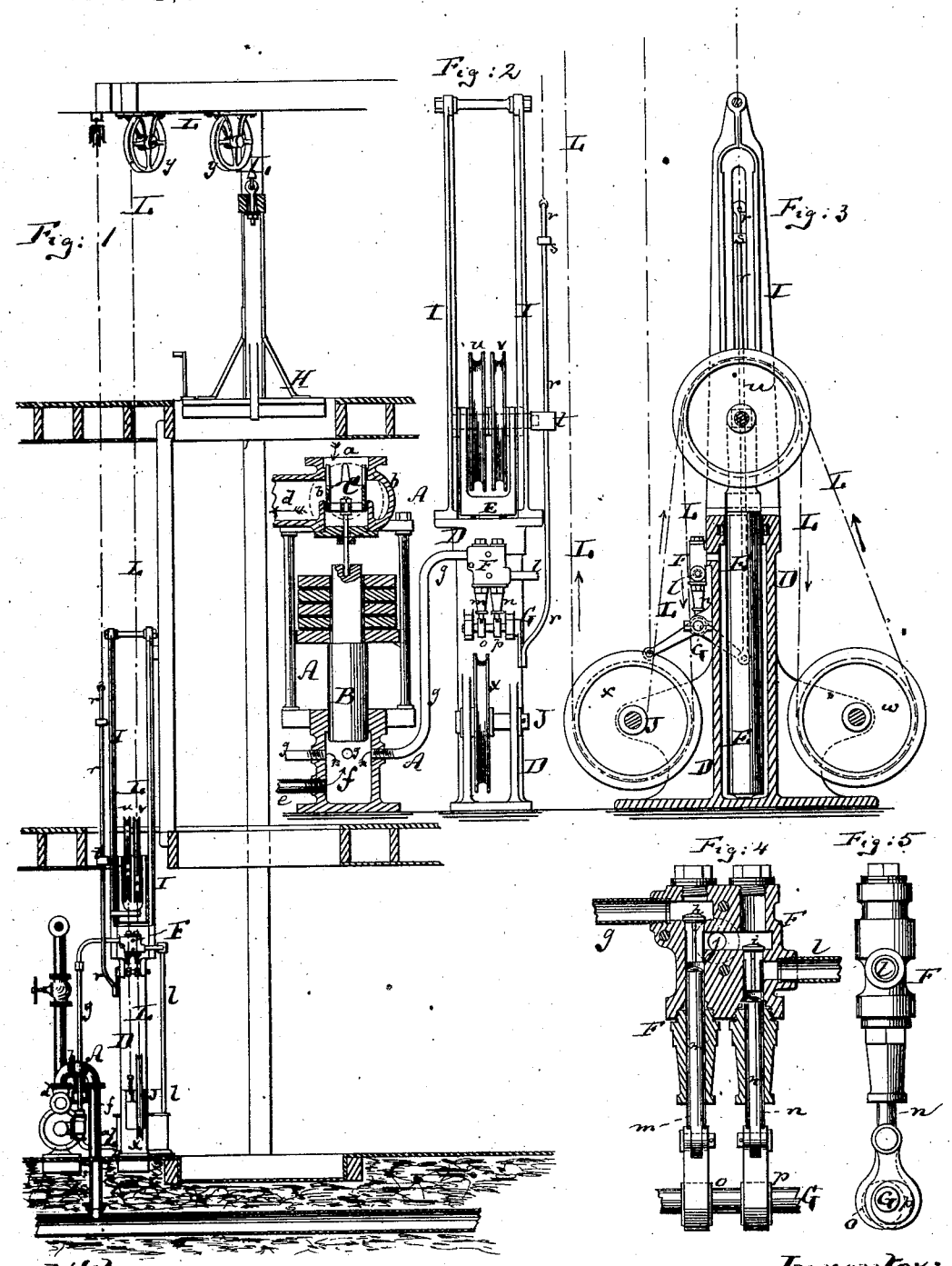
F. ROCHOW.

Hydraulic Hoisting-Apparatus.

No. 162,311. Patented April 20, 1875.



Witnesses:
A. Moraga.
E. C. Webb

Inventor:
F. Rochow
by his attorney
A. V. Briesen

UNITED STATES PATENT OFFICE.

FERDINAND ROCHOW, OF BROOKLYN, NEW YORK.

IMPROVEMENT IN HYDRAULIC HOISTING APPARATUS.

Specification forming part of Letters Patent No. **162,311**, dated April 20, 1875; application filed March 17, 1875.

To all whom it may concern:

Be it known that I, FERDINAND ROCHOW, of Brooklyn, in the county of Kings, in the State of New York, have invented a new and Improved Hydraulic Hoisting Apparatus, of which the following is a specification:

Figure 1 is a side elevation, on a reduced scale, showing the general plan of my improved hydraulic hoisting apparatus. Fig. 2 is a sectional side elevation, on a larger scale, of the accumulator and hydraulic press connected. Fig. 3 is a vertical transverse section of the press. Fig. 4 is a detail central section through the valve-chamber of the press, and Fig. 5 a side view of said valve-chamber, Figs. 4 and 5 being drawn on an enlarged scale.

Similar letters of reference indicate corresponding parts in all the figures.

The object of this invention is to produce a mechanism for raising and lowering elevators and other suitable hoisting apparatus by means of a hydraulic press; and the invention consists, first, in a novel arrangement of a pressure-accumulator, which I interpose between the operating pump or engine and the hydraulic press, for the purpose of regulating the action of the pump by means of the action of the elevator. By this plan the pump will only be set in operation when the elevator is used, and out of operation when the same is not used.

The second feature of my invention consists in a new valve arrangement for the hydraulic press, devised with the special object of allowing the elevator to be arrested at any suitable height by the closing of the valves, or to be raised by the opening of one valve, and lowered by the opening of another valve, all as hereinafter more fully described.

Finally, my invention consists in a novel arrangement of pulleys and general mechanism for transmitting and controlling the motion of the press and its effect on the hoisting apparatus, all as hereinafter specified.

Before proceeding to more particularly describe the invention, I wish to mention that I intend to operate the hydraulic press or lifting apparatus by means of the hydraulic engine which is described in another application for a patent filed by me on the 28th day of January, 1875, and thereby to acquire the requisite power from a machine that does not necessarily act continuously, but can be regulated from the hoisting apparatus, which it sets in motion.

In the drawing, the letter A represents my improved accumulator, carrying a chamber, *b*, through which the water or other fluid operating the engine passes to the same, and constituting in itself a chamber, *f*, through which the liquid that is forced from said engine toward the hoisting apparatus is caused to pass. The water, steam, or other fluid fed to the engine passes from the pipe *a* into the chamber *b* of the accumulator, and thence through the pipe *d* to the engine working the same, in the manner described in my application above referred to; or, if a different engine be substituted, the water, steam, or other motor employed passes to such engine by the passage *a b d*. The liquid which is forced from the engine to operate the hoisting apparatus enters, by the pipe *e*, the chamber *f* of the accumulator, and passes from *f*, through the pipe *g*, to the hydraulic press.

There may be two or more hoisting apparatus in the same building in which my accumulator is placed, in which case all the pipes *g* that lead to the several hydraulic presses connect with the chamber *f* of the one single accumulator, substantially as indicated in Fig. 2. A weighted plunger, B, fits tightly into the upper part of the chamber *f*, and supports a sleeve, C, that constitutes a balanced valve working in the chamber *b*.

When the pump or other hydraulic engine is operating, and the lifting apparatus is not used, it is clear that the pressure-liquid supplied by the pump will accumulate in the chamber *f*, and will gradually raise the weighted plunger B, until finally it will, by means of said plunger B, raise the valve C into a position in which the same will shut off all communication between the openings or passages *a* and *d*. Then—that is, by such elevation of the valve C—the supply of water or other fluid to the engine will be shut off, and the engine will necessarily cease to operate. When, thereupon, the hoisting apparatus is used, it will draw its supply of liquid from the accumulating chamber *f*, and cause

the weighted plunger B to gradually descend, said plunger applying its pressure and weight in aid of the operation of the hoisting apparatus, until, by its descent, it will gradually withdraw the valve C from the mouth of the pipe *d*, and thereby allow the engine to be fed again with the water or other fluid which moves it.

Having thus described my accumulator, I will now proceed to describe the hydraulic press with which it is connected, said press being a cylindrical vessel, D, placed in an upright or other suitable position, and arranged to receive a plunger, E, which fits it tightly at the upper end, in the customary manner of hydraulic presses. The pressure-liquid passes through the pipe *g* into the valve-chamber F, which is attached to the upper part and outer side of the cylinder D.

In this chamber are arranged two valves, *h* and *i*, both self-closing upon their seats, the valve *h* being interposed between the passage of the pipe *g* and the entry *j* for the liquid into the cylinder D, while the valve *i* is interposed between such communicating opening *j* and the final discharge-pipe *l*, through which the liquid that has operated the press escapes.

Two lifting-pins, *m n*, are arranged respectively beneath the valves *h* and *i*, and connected with eccentrics or cranks *o p*, that are mounted upon a crank-shaft, G. The eccentrics on said crank-shaft are so set, as indicated in Fig. 5, that only one of the pins *m n* can raised at one time, so that if the shaft G is turned in one direction it will lift the pin *m*, whereas if turned in the other direction it will lift the pin *n*.

When the valve *h* is on its seat, as in Fig. 4, the pressure-liquid, entering through the pipe *g*, cannot reach the cylinder D. When it is intended to raise the plunger E, the shaft G is turned by hand or otherwise, so that it will, by the eccentric *o* and pin *m*, raise the valve *h* off its seat, whereby communication is established between the pipe *g* and the cylinder D. The plunger E is now raised by the pressure-liquid which enters the cylinder D. Meanwhile the pressure of the liquid entering the cylinder D keeps the valve *i* on its seat.

When it is desired to arrest the plunger E at any position, the shaft G is turned back to lower the valve *h* upon its seat, and the pressure-liquid then serves to hold the valve *h* on its seat and prevent the further entrance of liquid into the cylinder D, while at the same time the exit of liquid from the cylinder is prevented by the valve *i*. When the valve *i* is raised by a corresponding motion of the shaft G, the weight of the plunger E will gradually crowd the liquid out of the cylinder D through the channel *j* and pipe *l*. Thus it is that when the plunger E is connected with the rope or cable L of a hoisting apparatus, in the manner indicated in Fig. 1, its ascent and descent will cause a corresponding elevation and lowering of the hoisting-platform H, and the operation and position of the platform can be controlled by a hand line or rope connected with a crank of the shaft G, which line or rope, when pulled by the operator standing on the platform H, will either serve to raise the valve *h* or the valve *i*, or to hold both valves down, according to the position or movement which it is desired to impart to the platform.

I prefer to attach, for purposes of greater safety, a rod, *r*, to the crank-shaft G, and to provide the same with a projecting shoulder or stop, *s*, at its upper portion, and to cause a sleeve, *t*, that projects from the frame connected with the plunger E, to embrace said rod *r*, so that when said sleeve, at the highest necessary position of the platform H, strikes the stop *s*, it will cause the crank-shaft G to be turned in a way that will lower the pin *m* and valve *h*, thus preventing the further ascent of the plunger E and its final discharge from the cylinder D.

The plunger E carries at its upper end a frame-work, in which are hung two loose pulleys, *u* and *v*, or a larger number, if desired. These pulleys are raised and lowered with and by the plunger. The hoisting-rope L has one end attached to a shaft, J, that hangs in bearings projecting from the cylinder D or other suitable frame-work. The rope L passes from the shaft J over the loose pulley *u*; then down on the other side of the cylinder D, around a loose pulley, *w*, back again from *w* over the pulley *v*; thence downward around a loose pulley, *x*, that is hung on the shaft J, and up to the top of the building around pulleys *y*, from which the hoisting-platform H is finally suspended. By this arrangement of the loose pulleys *u v w x* I am enabled to utilize the motion of the plunger E for an increase of motion of the platform H, more rapid motion of H being obtained by an additional number of loose pulleys on the shaft J and on the plunger-frame, &c.

With reference to the pipe *g* and its connection with the accumulator, it will be observed that when a series of such pipes *g* are connected with said accumulator, an equal number of hydraulic presses and elevators may be operated from the same pump or engine, and still the pump or engine will not be worked to excess, because, unless all the elevators are operated at the same time, in the same direction, the pump will only work on a portion of them; and if a larger number of elevators be raised at once, the pump or engine, together with the weight of the raised plunger B, will be sufficient to supply them all with the requisite power for a limited period. The accumulator will be recharged whenever the elevators descend.

I claim as my invention—

1. The accumulator A, having the weighted plunger B working in the chamber *f*, provided with pipes *e g g*, in combination with the balanced valve C, which, when raised, closes the passage *d*, substantially as and for the purpose specified.

2. In combination with a hydraulic press, the valve-chamber F, containing the valves *h i*, and connected with the pipes *g* and *l* and opening *j*, substantially as specified, the valves *h i* being arranged above lifting-pins *m n*, as and for the purpose set forth.

3. The combination of the crank-shaft G, carrying eccentrics *o* and *p*, with the lifting-pins *m n*, valves *h i*, and with the cylinder D of a hydraulic press, substantially as set forth.

4. The rod *r*, carrying the stop *s*, and connected with the crank-shaft G, that controls the valves *h i*, in combination with a sleeve or projection, *t*, on the reciprocating frame on the hydraulic plunger E, substantially as herein shown and described.

F. ROCHOW.

Witnesses:
A. MORAGA,
E. C. WEBB.