F. S. KINNEY.
Hydraulic-Press.

No. 196,233. Patented Oct. 16, 1877.

Fig. 1

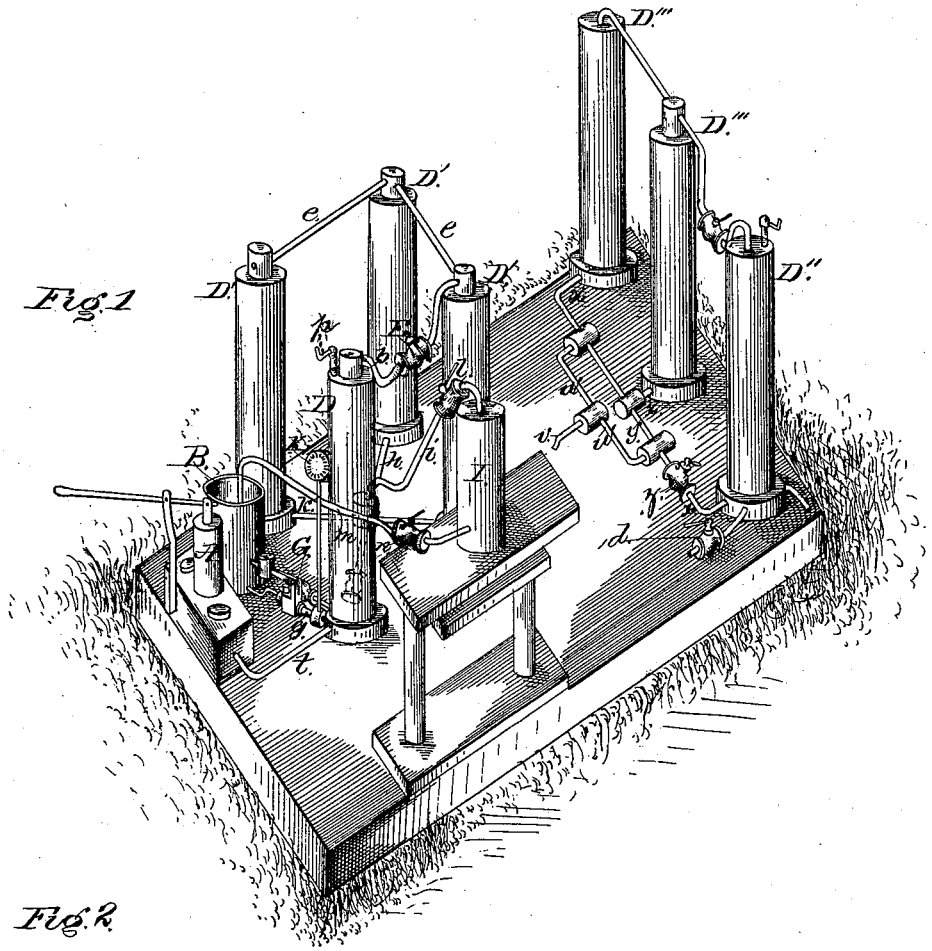
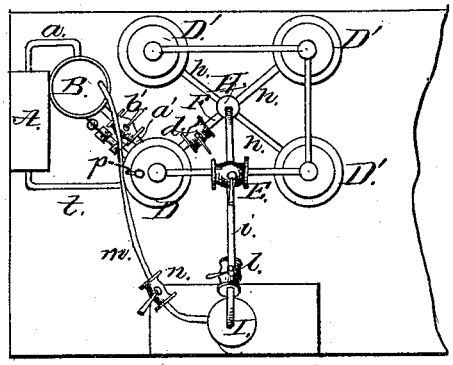


Fig. 2



Witnesses;
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UNITED STATES PATENT OFFICE.

FRANCIS S. KINNEY, OF NEW YORK, N. Y.

IMPROVEMENT IN HYDRAULIC PRESSES.

Specification forming part of Letters Patent No. **196,233**, dated October 16, 1877; application filed September 17, 1877.

To all whom it may concern:

Be it known that I, FRANCIS S. KINNEY, of New York, in the county of New York and State of New York, have invented a new and useful Improvement in Hydraulic Presses, of which the following is a specification, reference being had to the accompanying drawing.

The invention relates to an improved hydraulic press operated by means of compressed air in such manner as to equalize the pressure.

The invention, in the present instance, is applied by means of the arrangement of pipes and valves, through which the water, under air-pressure, is equally drawn from two or more magazines, pipes, or tanks, as hereinafter more particularly described.

Referring to the accompanying drawing, Figure 1 is a perspective view of a device containing an incorporation of the elements of the invention, and Fig. 2 is a top view of a portion of same.

In the accompanying drawing, A represents a water force-pump which is susceptible of continuous operation, and which takes its supply of water or other fluid from the tank B, wherewith the pump is connected by the pipe *a*, the opposite or discharge side of the pump being connected by the pipe *t* with the base or lower part of the compression or charging chamber D, the upper end of which is provided with the cock *p*, and connected by a pipe, *b*, with the adjacent receiving chamber or magazine D′, in such manner that the orifices of the pipe *b* are above the highest interior part of either chamber. This pipe is preferably bowed or curved downward, and at its lower part provided with the stop-cock or check-valve, or combined stop-cock and check-valve, E, so that any water in the pipe may gather about and seal the valve E against the reflux of air. The base or lower part of the compression-chamber D is provided with a pipe, F, leading to a centrally-located joint or small chamber, H, between which and the chamber D is provided, on the pipe F, a stop-cock, *d*, this chamber being also connected with the tank B by means of the tank-pipe *a′*, provided with the stop-cock *b′*, to permit the return of the water to the tank. The upper ends of the chambers or magazines D′ are connected by the pipes *c* in a manner similar to the arrangement of the pipe *b*, the lower ends of the magazines D′ having the pipes *h*, connecting them with the joint H, from which the pipe *i*, provided with the stop-cock *l*, leads to the cylinder of the ram I above the head thereof, from the base of which cylinder extends a second pipe, *m*, provided with the stop-cock *n*, leading to the tank B.

From the above it is plain that the fluid in each of the chambers D D′ is equally supplied by the pipes *h* leading into the chamber or joint H, whence it may be led and applied to the ram I through the pipe *i*.

Operation: In operating this device the cocks *l* and *n* are first closed, and the charger or compression-chamber D allowed to fill with air by opening the stop-cock *p* near its top, which cock is closed as soon as the chamber is filled. The valve E above and the valves *b′* and *d* below are also closed, making the chamber air-tight. The pump A is now operated, forcing water into the base of the compression-chamber D, in which, as the water rises, the air is compressed to any desired density. This body of compressed air constitutes a charge. The valve E is now opened, or, if it be a check-valve or a combined check-valve, it opens itself, and thus the charge of air, with a small quantity of water, passes into the pipe *b*, wherein the water settles about the lower parts, and thus operates to seal the valve when closed, the air passing onward into the magazine D′. The valve E is now closed, and is sealed by the presence of the water against the reflux of air from the magazine. The stop-cocks *p* and *b′* are opened, allowing the water from the chamber D to flow back into the tank B through the pipe *a′*, leaving the charge of air securely stored in the magazine D′.

The above operations are repeated until the magazines D′ are charged with air of the desired density, the water being drawn from the chamber D after the introduction of the last charge into the magazine.

The machine is now ready for the process of equalizing the air-pressure in all the chambers D D′, and to this end the stop-cock *p* is closed and the valves *b′ d* are opened, keeping the latter open until the air begins to escape, which indicates that any water that may have collected in the bottom of the several cham-

bers is removed, when the valve is closed and the air is equalized, passing through the lower pipes, which connect with the chamber or joint H. The device is now charged with air, the only water in it being in lower portions of the curved pipes connecting the heads of the chambers.

The valve *b'* being closed, the pump A is started, forcing the water equally into each of the several chambers and pipe *i*, whence the pressure may be equally led by the water passing through the pipe *i* to the cylinder of the ram, the valves *b* and *n* being first opened to permit any air that may have collected in the pipe *i* to escape.

It is plain that, if it is desired to use one or more of the chambers D' as compression-chambers in connection with the compression-chamber D, the pipes *e* may be curved and provided with valves similar to the valve E, the pipes *h* at the base of the adjunct chambers being provided with stop-cocks.

In order that the pump may work continuously, and without danger of bursting the compression-chamber D, a pipe, *g*, is led from the base of this chamber to the tank B, upon which is provided a safety-valve, G, arranged to allow the escape of either water or air when the desired pressure is exceeded. Upon this pipe *g* is also secured the pipe *k*, leading to the hydraulic gage K. In the position shown the safety-valve is kept sealed by the presence of water in or about it.

It is obvious that two or an indefinite number of chambers may be used, and that they may be arranged in any convenient position; also, that the pipes connecting the upper ends of the chambers may be bowed or straight, as desired; also, that two or more of the chambers can be used as compression-chambers, without departing from the nature of the invention and its characteristic elements. The devices being charged, it is plain that the pressure continues a long time, and that any loss of air may be readily supplied.

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

1. A compression-chamber and one or more magazine-chambers, having their upper parts connected by suitable means to permit charging and equalization, and their bases connected to a common receiver, whence the pressure is supplied, substantially as set forth.

2. The compression-chamber D, having the stop-cock *p*, and provided with a pipe and stop-cock check-valve, or combined stop-cock and check-valve, connecting it with the magazine-chamber D', the pipe F and stop-cock *d* connecting with the joint H or receiver, the pipe *a'* and stop-cock *b'* connecting with the tank B, and the pipe *t* connecting with a pump capable of continuous operation, substantially as set forth.

3. As a means of equalizing pressure, a common joint, H, or receiver, having pipes leading to the base of chambers wherein water under pressure is confined, and a pipe or pipes leading to the ram-cylinder of a hydraulic press, substantially as set forth.

4. The cylinder of a hydraulic press, having a pipe above, whence pressure is derived, and a pipe below, whence resistance is relieved, substantially as set forth.

5. A valve or stop-cock placed in the lower parts of a curved pipe, intermediately between two chambers, for compressing or storing compressed air, substantially as set forth.

6. The compression-chamber D, having the cock *p*, and provided with the pipe *b* or other suitable duct, and with the pipe F, having the stop-cock *d*, in combination with the joint H and one or more pipes, *h*, connecting with one or more chambers, D', either separate or connected, substantially as shown and described.

7. In combination with a continuously-acting pump, a chamber in which the air is compressed by a rising column of water, which chamber is connected with the supply-tank by means of a pipe provided with a safety-valve, substantially as stated and shown.

In testimony that I claim the foregoing improvement in hydraulic presses as above described I have hereunto set my hand this 12th day of September, 1877.

FRANCIS S. KINNEY.

Witnesses:

C. H. O. HOUGHTON,

WM. MILNE, Jr.