No. 610,524. Patented Sept. 13, 1898.

W. B. CLEVELAND.

ELECTRICALLY CONTROLLED VALVE FOR HYDRAULIC PRESSES.

(Application filed Jan. 21, 1898.)

(No Model.)

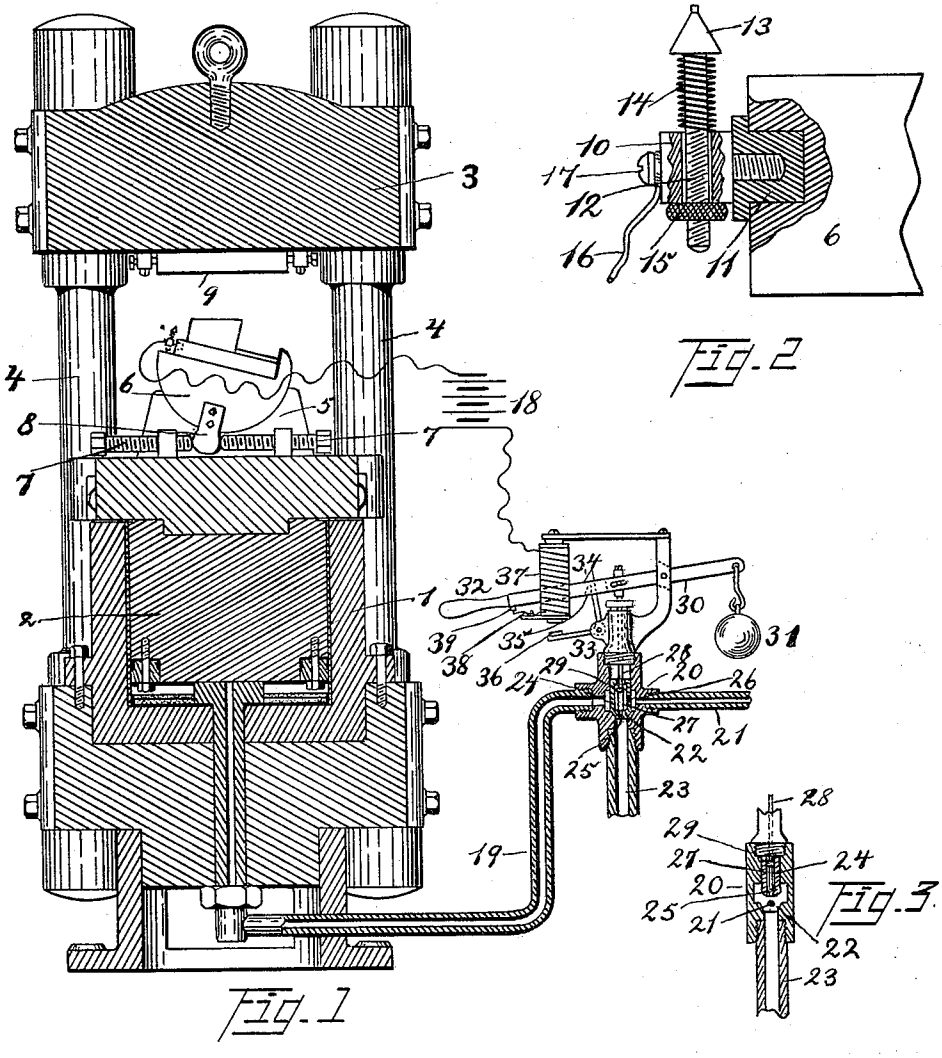


Fig. 1

Fig. 2

Fig. 3

Witnesses.
F. H. Griswold
W. C. Moore.

Inventor.
W. B. Cleveland,
by Wm. Fecher
Attorney.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

WILLIAM B. CLEVELAND, OF CLEVELAND, OHIO.

ELECTRICALLY-CONTROLLED VALVE FOR HYDRAULIC PRESSES.

SPECIFICATION forming part of Letters Patent No. 610,524, dated September 13, 1898.

Application filed January 21, 1898. Serial No. 667,383. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM B. CLEVELAND, a citizen of the United States, and a resident of Cleveland, county of Cuyahoga, and State of Ohio, have invented certain new and useful Improvements in Electrically-Controlled Valves for Hydraulic Presses, of which the following is a specification, the principle of the invention being herein explained and the best mode in which I have contemplated applying that principle, so as to distinguish it from other inventions.

The annexed drawings and the following description set forth in detail one mechanical form embodying the invention, such detail construction being but one of various mechanical forms in which the principle of the invention may be used.

In said annexed drawings, Figure 1 represents a vertical section of a hydraulic press provided with my improvements; Fig. 2, a detail view of the contact; and Fig. 3, a transverse section of the valve-chamber, showing the valve raised.

The press has the plunger-cylinder 1, the plunger 2, the top platen 3, and upright posts 4 of the construction usual in hydraulic presses. A concave bed 5 is secured upon the top platen of the plunger, and a die 6, having a convex under side, rests in said bed and may have its upper die-surface adjusted at any angle in its relation to the upper die by means of adjusting-screws 7, bearing from opposite sides against a projecting lug 8 upon the end of the die. It may be necessary to have one lug and two screws at each end of the die. The concave and convex surfaces of the bed and die are illustrated as cylindrical; but the surfaces may be spherical, in which case lugs and adjusting-screws at various points of the sphere may be employed to adjust the die at the proper angle. The top platen of the press has an upper die 9 secured upon its lower face. A vertically-perforated eye 10 has its screw-threaded shank secured into an insulating-plug 11, fitted into the side of the lower die, and a contact-pin 12, having a conical and shouldered head 13 and screw-threaded lower end, slides in said eye and is forced upward by a spring 14, surrounding the pin, and held at its desired height by a nut 15 upon its screw-threaded end. A wire 16 is secured to the guide-eye by means of a binding-screw 17 and has its other end connected to a battery 18 or other source of electricity. The water or other liquid under high pressure is conducted to the bottom of the plunger-cylinder through a pipe 19, leading from a valve-chamber 20, having a pipe 21 entering it from the opposite side, which pipe leads from the source of liquid-supply under high pressure. A valve-seat 22 is formed in the bottom of the valve-chamber, and a waste-pipe 23 leads from the bottom of the chamber beneath the seat. A hollow valve 24 slides vertically within the valve-chamber to fit upon the seat, and said valve has an opening in its bottom (indicated at 25) and an opening 26 in its side. A primary valve 27 has its stem 28 sliding through the upper end of the hollow controlling-valve, has a shoulder 29 upon its stem, which catches against the top of the hollow valve, and has its lower end fitted to close the bottom opening in the hollow valve when depressed. The upper end of the valve-stem is movably connected to a lever 30, which is fulcrumed above the valve-chamber and has a weight or spring 31 attached to one arm to depress the arm and a handle 32 upon the other arm. A bell-crank trigger 33 is pivoted upon the top of the valve-casing and has a shoulder 34 upon one arm, which shoulder engages a projection 35 upon the lever, said projection being indicated by dotted lines in Fig. 1. The armature 36 of an electromagnet 37 is secured upon the other arm of the bell-crank trigger. One terminal of the coil of the electromagnet is connected to the source of electricity, and the other terminal is connected to a contact 38, secured upon and insulated from the magnet, against which contact a contact 39 upon the lever may bear when the arm of the same having the projection is depressed against the weight and so as to have the projection engaged by the bell-crank trigger, the armature-arm of which is sufficiently heavy to tilt the trigger into engagement with the projection upon the lever.

In practice the blank or blanks to be pressed are placed upon the lower die, which has been adjusted at the proper angle in its rela-

tion to the face of the upper die. The handle-arm of the lever is thereupon depressed, closing the valve against the waste-seat and allowing the trigger to engage the projection. The liquid under high pressure will now pass through the inlet-pipe, the valve-chamber, and through the supply-pipe to the plunger-cylinder, forcing the plunger upward. The contact-pin has been adjusted by means of its nut to form contact with the upper die when the blanks have been sufficiently pressed, and the moment contact is made the electric circuit is closed from the source of electricity through the wire 16, the contact, the frame of the press, the supply-pipe and valve-casing, the lever and its contact, the coil and its contact, and back to the other terminal of the source of electricity. The current energizes the magnet, which attracts the armature and releases the trigger from the lever, which will be rocked by the weight or spring. The movement of the lever raises the valve-stem and lifts the small primary valve from its seat within the large controlling-valve, thereby admitting a small quantity of the water under pressure in the valve-chamber and under the plunger to escape through the opening in the side of the valve and through the hollow valve and its bottom opening into the waste. This will relieve the controlling-valve from a portion of the immense pressure upon it, which pressure is so great that the force of the weight cannot raise it, and under this reduced pressure the controlling-valve may be raised by the weight and the waste-opening uncovered, allowing water from beneath the plunger to escape through the waste and the plunger to descend. The circuit is broken as soon as the lever is disengaged from the trigger, breaking the circuit at the lever-contacts before the contact 13 separates from the upper die, thereby locating the flash at said lever-contacts instead of at the die-contact, and also preventing waste of electric energy. By means of this valve-operating device the exact thickness to which the blanks are to be compressed may be adjusted without heavy and solid stops on the die to take surplus pressure, and the blanks may be compressed to a fixed thickness under varying pressure instead of under a constant pressure, as in presses usually employed, where the press is adjusted to relieve the actuating fluid when a certain given pressure is attained and where the surplus pressure in the case of a blank which compresses under a less pressure than such given pressure is taken up by heavy stops which are required to prevent the dies from being forced together beyond their endurance and beyond the degree of thickness desired for the pressed article. Some blanks, owing to variations in their original thickness and in their density of metal, require varying pressure to bring them to a fixed thickness, which conditions are provided for by my releasing contact device. The plunger is released at exactly the proper moment by simply adjusting the amount of projection of the contact from the moving plunger, whereby this excess pressure upon the articles to be pressed and undue straining of the press-frame are avoided.

Other modes of applying the principle of my invention may be employed for the mode herein explained. Change may therefore be made as regards the mechanism thus disclosed, provided the principles of construction set forth respectively in the following claims are employed.

I therefore particularly point out and distinctly claim as my invention—

1. In combination with a hydraulic press, a valve controlling the liquid under the plunger, and an electromagnet connected to said valve to control the same and having a source of electricity for its coil and having the contact-terminals of said coil respectively upon the stationary and moving element of the press, substantially as set forth.

2. In combination with a hydraulic press, a valve controlling the waste from said press, and an electromagnet connected to said valve to control the same and having a source of electricity for its coil and having the contact-terminals of said coil respectively upon the stationary and moving element of the press, substantially as set forth.

3. In combination with a hydraulic press, a valve controlling the liquid for the plunger and having means for automatically moving it to open the waste and for positively moving it to close the waste, a trigger connected to retain the valve in its waste-closing position, an electromagnet having one terminal of its coil connected to the press, an armature for said magnet and connected to the trigger to release the same when attracted, a contact insulated from the press and connected to the other terminal of the magnet-coil and supported to close the coil-circuit when the plunger is at the extreme of its pressure stroke, and a source of electricity in the coil-circuit, substantially as set forth.

4. In combination with a hydraulic press, a valve controlling the plunger-actuating fluid, an electromagnet connected to said valve to control the same and having a source of electricity for its coil, and a current-controlling contact device for the magnet-circuit supported upon one of the elements of the press to be actuated by the movable element of the press at the extremity of its pressure stroke, substantially as set forth.

5. In combination with a hydraulic press, a valve controlling the liquid for the plunger and having means for automatically moving it to open the waste and for positively moving it to close the waste, a trigger connected to retain the valve in its waste-closing position, an electromagnet having one terminal of its coil connected to the press, an armature for said magnet and connected to the trigger to release the same when attracted, a contact supported upon and insulated from the plun-

ger and connected to the other terminal of the magnet-coil, and a source of electricity in the coil-circuit, substantially as set forth.

6. In combination with a hydraulic press, a valve which closes the waste for the liquid from beneath the plunger, a lever fulcrumed to have one arm movably connected to the valve and having a projection upon said arm and having means for automatically rocking it to raise the valve from its seat, a source of electricity, an electromagnet having one terminal of its coil connected to said source of electricity and having the other terminal connected to a stationary contact, a bell-crank trigger having a shoulder upon one arm engaging the projection upon the lever, and an armature for the magnet upon the other arm, a contact upon the lever and bearing against the stationary contact of the coil-terminal when the lever projection is engaged, and a contact supported upon and insulated from the plunger and connected to the source of electricity and constructed to form contact with the press-frame when the plunger is at the extreme of its pressing stroke, substantially as set forth.

In testimony that I claim the foregoing to be my invention I have hereunto set my hand this 17th day of January, A. D. 1898.

WILLIAM B. CLEVELAND.

Witnesses:
WM. SECHER,
R. N. LOWE.