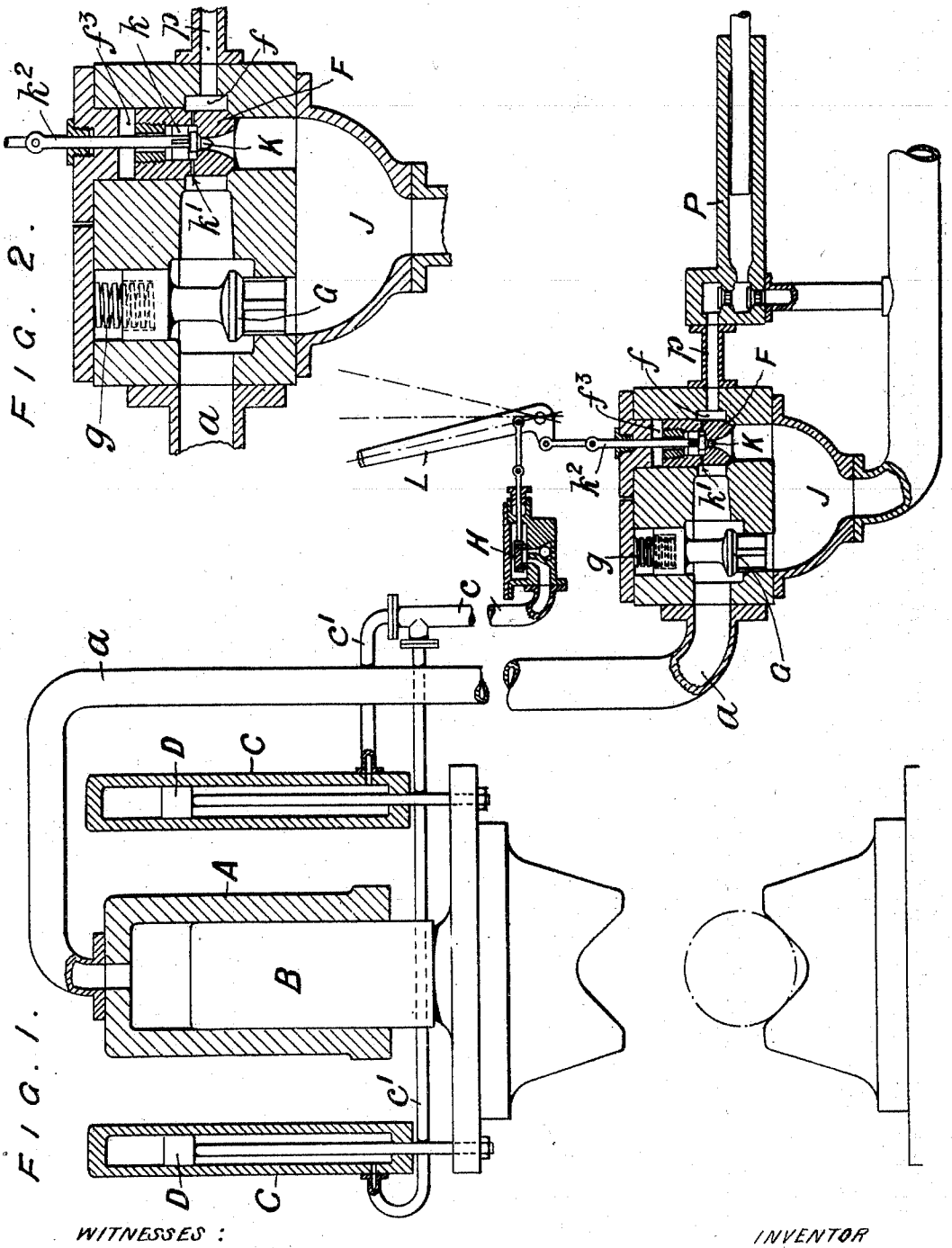
No. 764,522. PATENTED JULY 5, 1904.

E. CROWE.

HYDRAULIC PRESS.

APPLICATION FILED NOV. 3, 1903.

NO MODEL.



WITNESSES :

W. M. Avers

A. H. Davis

INVENTOR

Edward Crowe

BY Munn & Co

ATTORNEYS.

No. 764,522. Patented July 5, 1904.

UNITED STATES PATENT OFFICE.

EDWARD CROWE, OF SHEFFIELD, ENGLAND, ASSIGNOR OF ONE-HALF TO DAVY BROS., LIMITED, OF SHEFFIELD, ENGLAND, AN INCORPORATED COMPANY.

HYDRAULIC PRESS.

SPECIFICATION forming part of Letters Patent No. 764,522, dated July 5, 1904.

Original application filed June 15, 1903, Serial No. 161,538. Divided and this application filed November 3, 1903. Serial No. 179,699. (No model.)

To all whom it may concern:

Be it known that I, EDWARD CROWE, engineer and chief draftsman, a subject of the King of Great Britain, residing at Birchholm, Bushey Wood, Totley Rise, Sheffield, England, have invented certain new and useful Improvements in Hydraulic Presses, of which the following is a specification.

This invention relates to hydraulic presses for forging and for other purposes—such, for example, as bending and testing armor-plates, flanging, and the like—in which the power for lifting the press-head is supplied from an accumulator or other source independent of that from which the power is derived for causing the press-head to perform its work.

The invention has for its object to effect economy of time and power, and so increase the speed of working and the efficiency of the press. This end is attained mainly by the provision of means whereby the idle descent of the press-head onto its work may be effected quickly and by gravity alone and whereby the power of the pumps is caused to come into action automatically immediately the tool carried by the press-head encounters the work.

The present application is a division of my copending application, Serial No. 161,538, filed June 15, 1903.

Reference is to be had to the accompanying drawings, wherein—

Figure 1 shows in an elementary form the improved apparatus and arrangement of parts, the two portions of the figure being drawn to different scales. Fig. 2 shows a detail drawn to a larger scale.

The press comprises a main cylinder A and ram B (one or more) for imparting the working stroke to the press-head and lifting cylinders C and pistons D for imparting the return stroke. The pipe connections with these cylinders are controlled by valves arranged to so operate that during the idle descent of the press-head the main and lifting cylinders can be connected at the same time with their respective exhaust in such manner that the main cylinder A, being permitted to draw from the exhaust-tank, will descend freely by its own weight, the main pumps meanwhile either running light or being out of work, while during the working portion of the press-stroke pressure can be supplied to the main cylinder A and exhausted from the lifting-cylinders C and on the return stroke can be supplied to the lifting-cylinders C and exhausted from the main cylinder A alternatively.

Between the main cylinder A and the exhaust-valve F there is provided a self-closing by-pass suction-valve G, which while permitting the main cylinder to draw from the exhaust during the free descent of the press-head will be closed immediately the descent of the main ram is checked in consequence of the tool meeting the work, so that pressure then brought to bear on the main ram will cause its descent to be continued, but at a slower speed.

The upper end of the main cylinder A is connected by a pipe *a* with the valve-box of the valves G and F and through a constantly-open annular passage *f* around the latter valve with the delivery-pipe *p* from the pumps P.

Pressure from an accumulator (or other source of power independent of that from which the power is derived for causing the press-head to perform its work) is admitted to the lifting-cylinders C by way of the pipe *c* and branches *c'*, the supply to and exhaust from pipe *c* being controlled by means of a slide-valve H, worked by a lever-handle L, as shown. The lever L is also connected to the spindle k^2, controlling the action of the main exhaust-valve F, so that when the valve H is moved to admit pressure to the lifting-cylinders C the main exhaust-valve F will be opened and, alternatively, when the valve H is moved to connect the lifting-cylinders C with their exhaust the main exhaust-valve F will be closed.

The exhaust-valve F is a piston-valve of two diameters, the upper portion, which works in the cylinder f^3, being of larger diameter than the valve-face itself, so that the valve will be opened by pressure acting upon the annular

shoulder representing the difference between the two diameters when, as hereinafter explained, such pressure exceeds that normally tending to hold the valve closed.

The valve F is provided with a pilot-valve K, worked by the spindle k^2, which is connected to the lever-handle L, already mentioned, the pilot-valve K controlling an orifice leading to the exhaust from the chamber in which the valve K works. The pilot-valve face is of the same diameter as the upper part of the spindle k^2, so that the valve K itself is balanced, and therefore easy to open. The spindle k^2 carries guides k, working within a chamber in the exhaust-valve F, this chamber being in free communication with the cylinder f^3 above the valve F, while small holes k', drilled through the side of the valve F, maintain communication between the said chamber and the annular space f, surrounding the body of the valve F, as already described. The collective area of the holes k' is so much less than that of the orifice closed by the pilot-valve K that when the latter is open the water can escape more quickly than it can enter, the action being as follows: Supposing the valves F and K to be closed, the former will be kept firmly closed by the pump-pressure transmitted through the holes k' and acting on the top of valve F. On the pilot-valve K being opened the pressure tending to hold valve F to its seat will be relieved, and the pressure from the main press-cylinder A acting in the annular passage f upon the area of the valve F corresponding to the difference of its two diameters will cause the valve F to rise until the area of the relief-passage through valve K is so diminished as to equal only the collective area of the holes k', and consequently so long as there is sufficient pressure from the main press-cylinder A acting in the passage f the valve F will be caused to follow the upward motion of the pilot-valve K. When once the valve F is wide open, there will be no pressure in the system, and consequently there will be no resistance to overcome in closing this valve.

I claim—

In a downwardly-acting hydraulic press wherein working and lifting rams are connected to the press-head, the lifting-rams being operated by pressure from an auxiliary source of supply independent of that which supplies power to the working ram, the combination of a valve for controlling the exhaust from the cylinder of the working ram, the body of said exhaust-valve being formed as a plunger of two diameters fitted to work in a cylinder wherein it presents a difference of area to the action of the working pressure; a chamber within the body of said exhaust-valve in constant communication with the source of working pressure; a balanced pilot-valve fitted to work in said chamber and adapted to control an orifice leading therefrom to the exhaust; a hand-operated valve for controlling the admission to and exhaust from the lifting-cylinders of the auxiliary pressure; a mechanical connection between said valve and the pilot-valve such that when the former is in position to admit auxiliary pressure to the lifting-cylinders the pilot-valve will be closed and vice versa; and a suction-valve on a by-pass to the said exhaust-valve, adapted to be held open by the flow of water from the exhaust to the cylinder of the working ram while the exhaust-valve is closed during the idle part of the descent of the press-head and to close automatically when said flow ceases in consequence of such idle descent of the press-head being arrested, substantially as specified.

EDWARD CROWE.

Witnesses:
BAN. L. CAMPBELL,
LUTHER J. PARR.