

Sept. 27, 1927.

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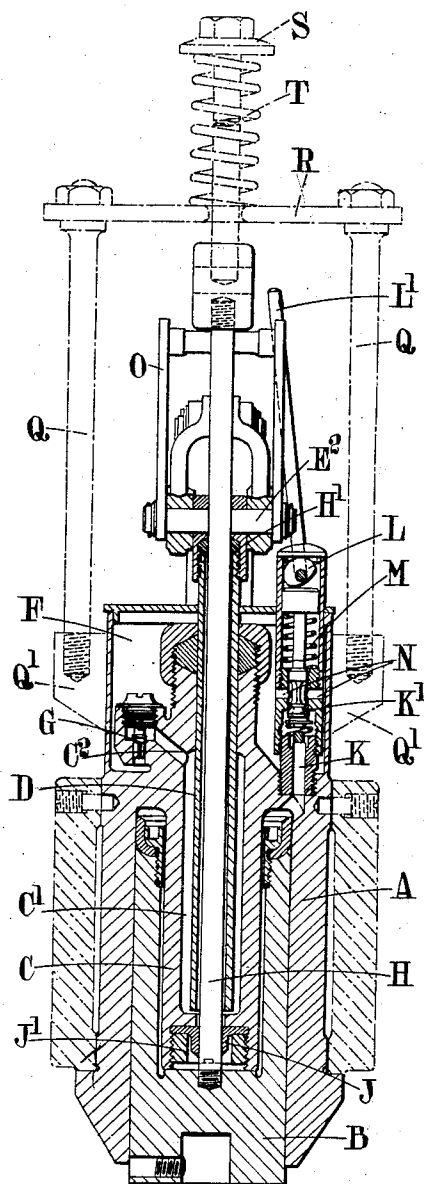
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HYDRAULIC PRESS

Filed July 8, 1925

2 Sheets-Sheet 1

Fig.1.



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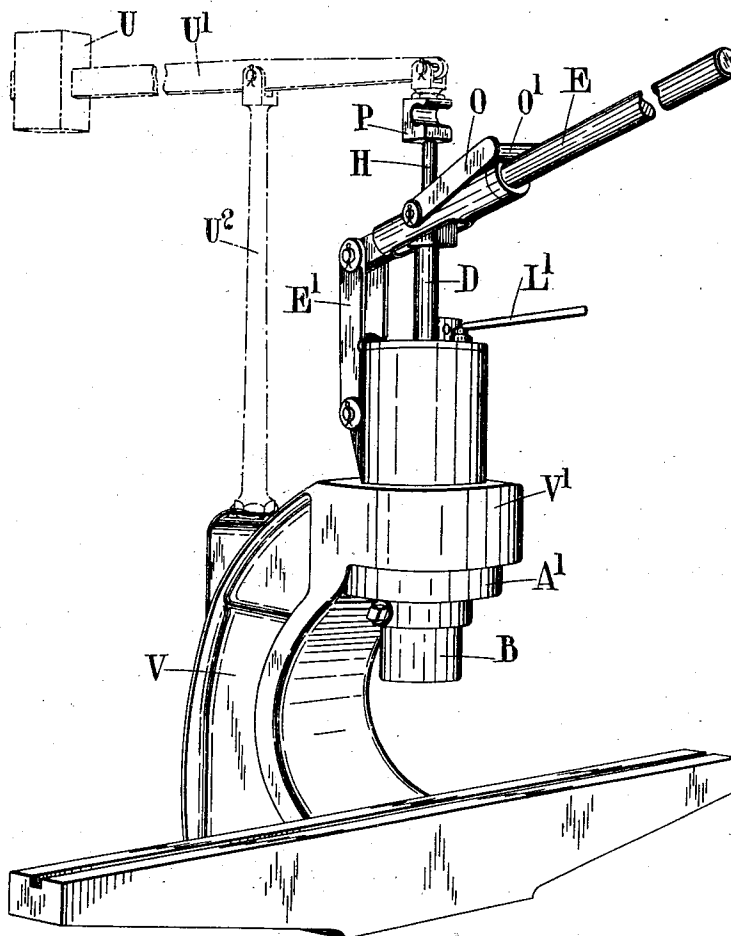
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Fig. 2.



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UNITED STATES PATENT OFFICE.

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HYDRAULIC PRESS.

Application filed July 8, 1925, Serial No. 42,153, and in Great Britain July 11, 1924.

This invention refers to improvements in hydraulic presses, and has for its object (inter alia) to provide a simple and efficient press unit, operable, for example, by repeated strokes of a hand lever, without the usual more or less complicated systems of valves and connecting passages for the pressure liquid.

The improved press, according to the present invention comprises primarily two integral chambers or cylinders the larger containing the ram and the smaller a tubular or hollow plunger. Fixed to the ram and passing freely through the tubular plunger is a ram-retracting member or rod adapted for connection in any suitable manner to the main operating lever or to other means for returning the ram to its initial position after a power stroke.

The interior of the plunger cylinder communicates with a reservoir (formed integral with the cylinders) for the pressure liquid through a passage controlled by a non-return or suction valve, which opens upon each return or idle stroke of the plunger and allows liquid to be drawn into the plunger cylinder. For convenience of description the pressure liquid will be referred to hereinafter as oil.

According to a feature of this invention the oil is transferred from the plunger cylinder to the ram cylinder, on each power stroke of the plunger, through a packing of the type known as a "hat leather," or "U leather" or similar packing hereinafter referred to as the "hat leather" secured to the plunger cylinder and surrounding and acting upon the ram retracting rod. Thus on each return stroke of the plunger a quantity of oil is sucked from the reservoir through the non-return valve, and during the power stroke of the plunger this oil is forced into the ram cylinder past the "hat leather" and is prevented thereby from returning when the plunger is again retracted.

At the end of a working stroke of the ram the pressure in the ram cylinder may be released and the oil returned to the reservoir in any suitable manner, for example by a hand-operated valve; or if desired the pressure may be automatically released at a pre-arranged point in the power stroke of the ram or when any pre-determined pressure has been reached in the ram cylinder. Arrangements for thus automatically terminating the power stroke of the ram are de-

scribed in my British Patent Specification No. 196,347.

One suitable arrangement of ram retracting means according to the present invention is as follows:—

The ram retracting rod, secured at one end to the ram as aforesaid, passes through the tubular plunger and a packing gland therein and is provided on its external end with a recess to receive a bar or pin secured to a link pivoted to the operating handle, the latter being pivoted to the base or frame of the apparatus and connected to the plunger by a cross-head in the usual or any suitable manner.

During a power stroke the pivoted link is disengaged from the ram retracting rod, leaving the operating lever free. When the power stroke is completed, the oil release valve is opened as above described, the bar or the pivoted link is inserted in the recess in the ram retracting rod, and a return stroke of the operating handle then serves to retract the ram and force the oil from the ram cylinder back into the reservoir.

In place of the arrangement just described the ram retracting rod may be spring mounted for positive return of the ram, or any convenient counterbalance arrangement may be employed.

The present invention is illustrated in the accompanying drawings, in which:—

Fig. 1 is a vertical sectional view of one form of hydraulic press in accordance with the invention, and

Fig. 2 is a view in elevation of my improved press unit mounted on one form of bed.

Referring to these drawings:—

A is the ram cylinder containing a ram B which is hollowed out to receive a smaller cylinder C in which a hollow plunger D is made to reciprocate by means of the hand lever E pivoted through links E¹ to the base of the apparatus and secured to the plunger by a bolt E².

Formed integral with the ram and plunger cylinders is a reservoir F for the pressure liquid herein referred to as oil and this reservoir F communicates with the space C¹ inside the plunger cylinder C through a passage C² controlled by a non-return valve G.

A ram retracting rod H is screwed into the ram B and passes freely up through the hollow plunger D and a gland H¹. In the lower end of the plunger cylinder C a "hat

leather" packing J is secured by means of a threaded ring J¹ screwed into the cylinder C. This "hat leather" packing J controls the passage of oil from the space C¹ to the interior of the ram cylinder A, the oil under pressure being forced down by the plunger D past the "hat leather" J and is prevented from returning by the co-operation of the "hat leather" with the ram retracting rod H.

Leading from the interior of the ram cylinder A is a passage controlled by a valve K¹ operated by a cam L provided with a hand lever L¹. The valve is positively opened by means of the lever L¹ and cam L against the reaction of a compression spring M which closes the valve when the lever is returned to normal position. Opening of the valve K¹ releases the pressure in the ram cylinder and permits return of the oil to the reservoir F through passages N.

In both figures of the drawings the operating lever E is shown provided with a pair of pivoted links O connected by a cross-head O¹ for engagement in a recess in a block P secured to the top of the ram retracting rod H. During the power stroke of the ram this cross-head O¹ is disengaged from the block P and the ram is driven down by repeated strokes of the plunger D, oil being drawn from the reservoir F into the plunger cylinder upon each return stroke of the plunger D, and then forced into the ram cylinder past the "hat leather" packing J on each subsequent power stroke of the plunger D. At the end of the ram stroke the valve K¹ is opened, the cross-head O¹ is engaged with the block P and an upward stroke of the lever E retracts the ram and forces the oil back into the reservoir F.

In Fig. 1 spring retracting means are indicated in broken lines as an alternative to the cross-head O¹ and links O. As shown in broken lines two pillars Q are screwed into bosses Q¹ cast integral with the body of the press the pillars carrying a cross-head R between which and a head S on the end of the ram retracting rod is mounted a compression spring T.

In Fig. 2 is shown in broken lines an arrangement for retraction by means of a counterbalance weight U preferably adjustable along a lever U¹ pivoted to a pillar U² and secured to the end of the ram retracting rod.

Also as shown in Fig. 2 the press unit is mounted in a base V by means of a stout collar V¹ with which engages an enlarged part A¹ of the press unit, formed to take the upward stresses against the collar V¹ in use.

Thus according to the present invention I provide a simple and very efficient self-contained and portable hydraulic press, one characteristic feature of which is the simple "hat leather" packing serving in place of a

more complicated valve to control the passage of oil to the ram cylinder.

What I claim is:—

1. An hydraulic press comprising two integral cylinders of different internal diameter, a ram operating in the larger cylinder and a hollow plunger in the smaller cylinder, an integrally formed reservoir for the pressure liquid communicating with the interior of the smaller cylinder through a passage controlled by a non-return valve opening upon the idle stroke of the plunger and closing upon the power stroke thereof, a ram retracting rod passing freely through the hollow plunger and secured to the ram, a packing secured to the plunger cylinder and acting upon the ram retracting rod to allow the passage of the pressure liquid to the ram cylinder during the power stroke of the plunger and prevent the return of the pressure liquid to the plunger cylinder, a valve for releasing the pressure in the ram cylinder and permitting return of the pressure liquid to the reservoir, and means for reciprocating the plunger.

2. An hydraulic press comprising two integral cylinders of different internal diameter, a ram operating in the larger cylinder and a hollow plunger in the smaller cylinder, an integrally formed reservoir for the pressure liquid communicating with the interior of the smaller cylinder through a passage controlled by a non-return valve opening upon the idle stroke of the plunger and closing upon the power stroke thereof, a ram retracting rod passing freely through the hollow plunger and secured to the ram, a packing secured to the plunger cylinder and acting upon the ram retracting rod to allow the passage of the pressure liquid to the ram cylinder during the power stroke of the plunger and prevent the return of the pressure liquid to the plunger cylinder, a valve for releasing the pressure in the ram cylinder and permitting return of the pressure liquid to the reservoir, an operating lever for reciprocating the plunger, and means for raising the ram retracting rod.

3. An hydraulic press comprising two integral cylinders of different internal diameter, a ram operating in the larger cylinder and a hollow plunger in the smaller cylinder, an integrally formed reservoir for the pressure liquid communicating with the interior of the smaller cylinder through a passage controlled by a non-return valve opening upon the idle stroke of the plunger and closing upon the power stroke thereof, a ram retracting rod passing freely through the hollow plunger and secured to the ram, a packing secured to the plunger cylinder and acting upon the ram retracting rod to allow the passage of the pressure liquid to the ram cylinder during the power stroke of the plunger and prevent the return of the pres-

sure liquid to the plunger cylinder, a valve for releasing the pressure in the ram cylinder and permitting return of the pressure liquid to the reservoir, an operating lever for reciprocating the plunger, and means acting upon the ram retracting rod to retract the ram.

4. An hydraulic press comprising two integral cylinders of different internal diameter, a ram operating in the larger cylinder and a hollow plunger in the smaller cylinder, an integrally formed reservoir for the pressure liquid communicating with the interior of the smaller cylinder through a passage controlled by a non-return valve opening upon the idle stroke of the plunger and closing upon the power stroke thereof, a ram retracting rod passing freely through the hollow plunger and secured to the ram, a packing secured to the plunger cylinder and acting upon the ram retracting rod to allow the passage of the pressure liquid to the ram cylinder during the power stroke of the plunger and prevent the return of the pressure liquid to the plunger cylinder, a valve for releasing the pressure in the ram cylinder and permitting return of the pressure liquid to the reservoir, an operating lever for reciprocating the plunger, and means for retracting the ram.

5. A hydraulic press comprising two integral cylinders of different internal diameter, a ram operating within the larger cylinder, a hollow plunger operating with the smaller cylinder and adapted to force oil therefrom to the larger cylinder, means for releasing the pressure in the larger cylinder, and a lifting rod carried by the ram and extending outwardly through the upper end of the hollow plunger, and means for raising the lifting rod when the pressure in the larger cylinder is relieved.

6. A hydraulic press comprising two integral cylinders of different internal diameter, a ram operating in the larger cylinder, a hollow plunger in the smaller cylinder and adapted to force fluid therefrom to the larger cylinder, means for supplying oil to the

smaller cylinder, a ram retracting rod carried by the ram and passing through the upper end of the hollow plunger, means for relieving the pressure in the larger cylinder, and means carried by the retracting rod for raising the ram when the pressure in the larger cylinder has been relieved.

7. A hydraulic press comprising two integral cylinders of different internal diameters, a ram operating in the larger cylinder, a hollow plunger in the smaller cylinder, a reservoir communicating with the smaller cylinder, a check valve for preventing the fluid from passing from the smaller cylinder to the reservoir, a passage communicating with the larger cylinder and the reservoir, a normally operating valve in said passage, a ram retracting rod secured to the ram and passing out through the upper end of the hollow plunger, means for operating said rod, and a packing secured to the inner cylinder and cooperating with the retracting rod and constructed to allow the fluid to pass from the smaller cylinder to the larger cylinder on the downward movement of the hollow plunger.

8. A hydraulic press comprising two integral cylinders of different internal diameter, a ram operating in the larger cylinder, a fluid tank in communication with the smaller cylinder, a check valve in said communication to prevent the fluid from passing back to the tank, a hollow plunger in the smaller cylinder, means for operating said plunger, a ram retracting rod carried by the ram and passing through the upper end of the plunger, means for raising said rod, a packing secured to the plunger and acting upon the ram retracting rod to allow the fluid to pass from the smaller cylinder to the larger cylinder on the downward movement of the plunger, and a passage leading from the larger cylinder to the reservoir and a normally operating valve in said passage for relieving the pressure in the larger cylinder to allow the retracting rod to elevate the ram.

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