

March 6, 1945.

R. G. LE TOURNEAU

2,370,739

LEVER PRESS

Filed May 6, 1943

3 Sheets-Sheet 1

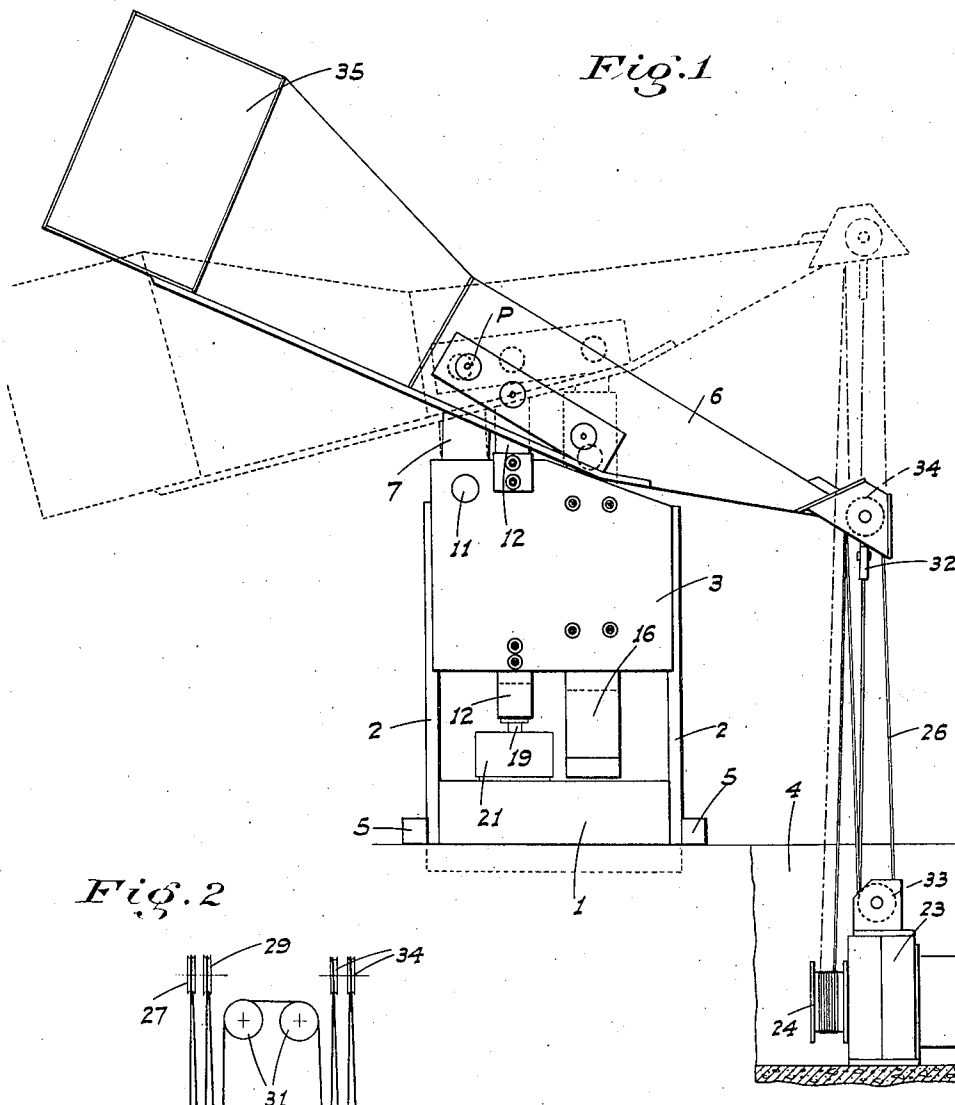
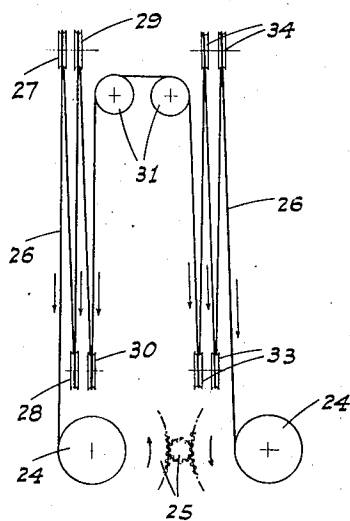


Fig. 2



Inventor
R. G. LeTourneau

334

W. H. H. H.

Attorneys

March 6, 1945.

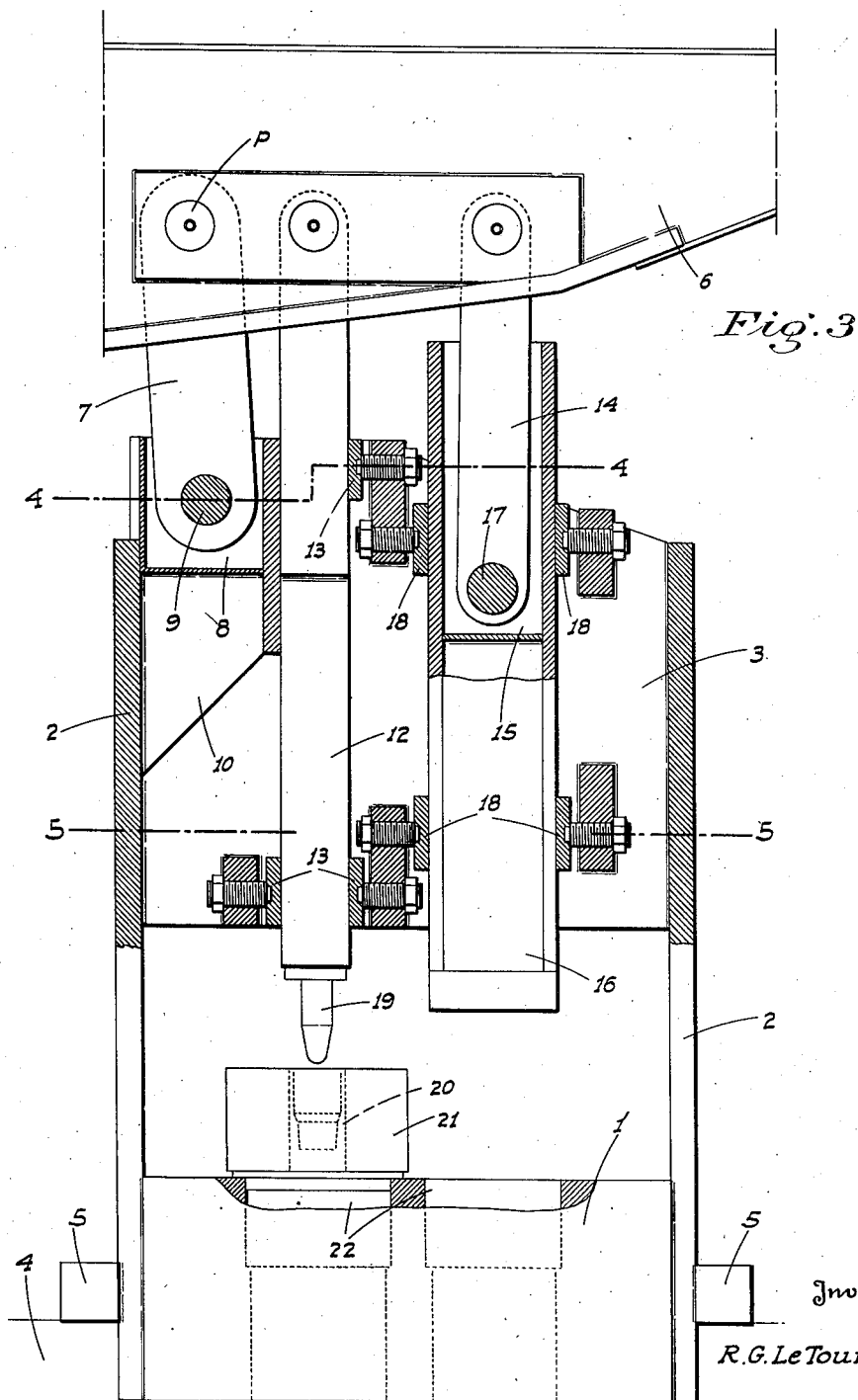
R. G. LE TOURNEAU

2,370,739

LEVER PRESS

Filed May 6, 1943

3 Sheets-Sheet 2



Inventor

R. G. Le Tourneau

334

Robert R. R. R.
Attorneys

March 6, 1945.

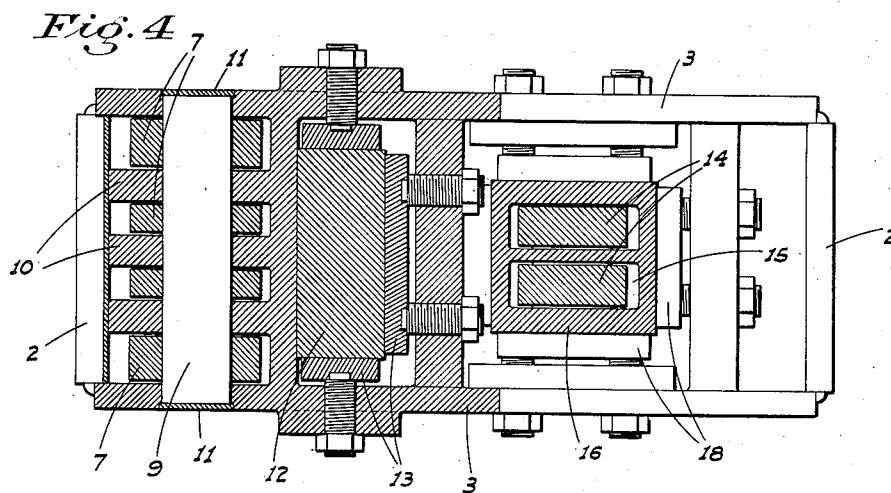
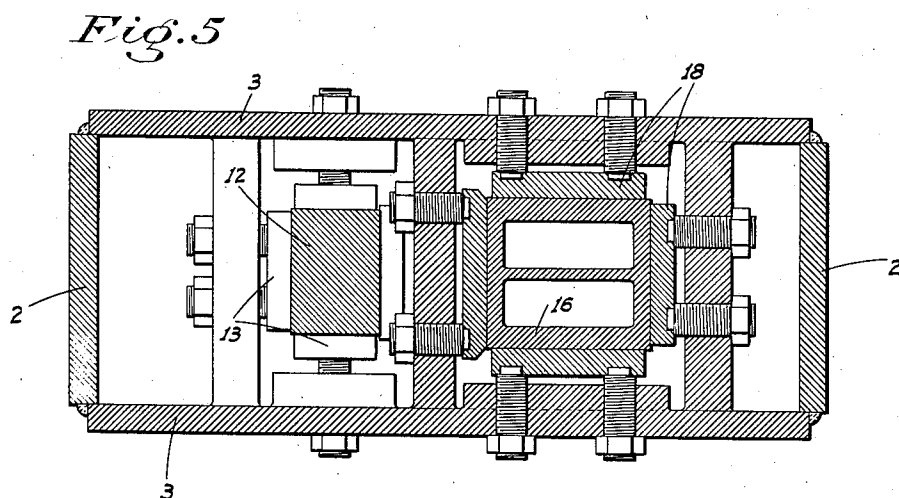
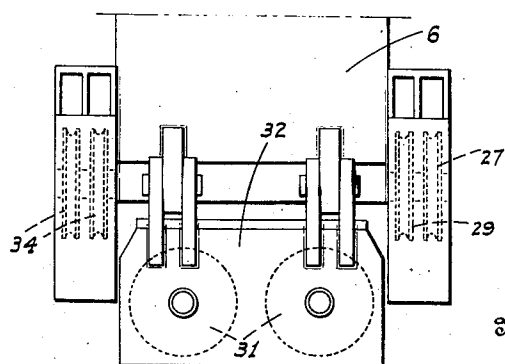
R. G. LE TOURNEAU

2,370,739

LEVER PRESS

Filed May 6, 1943

3 Sheets-Sheet 3



Inventor
R. G. LeTourneau

By

Webster & Webster

Attorneys

UNITED STATES PATENT OFFICE

2,370,739

LEVER PRESS

Robert G. Le Tourneau, Peoria, Ill., assignor to
R. G. Le Tourneau, Inc., Stockton, Calif., a corporation of California

Application May 6, 1943, Serial No. 485,813

4 Claims. (Cl. 29—33)

This invention relates to heavy-duty presses such as are used in forging operations and the like; one object being to provide a press of this character constructed so that while the power stroke is power actuated, the return stroke is gravity actuated.

Another object is to provide a press of this type in which the power is applied by means of a cable, but in such manner that the use of a very heavy cable is avoided, together with its high cost of cable replacement, and a relatively small cable and smaller, higher speed power hoist may be effectively used, thus eliminating a costly large power mechanism without detracting from the power actually produced in the press.

A further object is to provide a lever press in which the number of expensive machined parts to wear and ultimately give trouble is reduced to a minimum; there is no crankshaft to break as in the usual crank-type press, and the maintaining of the press in proper working condition is extremely easy.

Another object is to provide a lever press so arranged that it may include two rams disposed to move through strokes of different length with each pressing or power stroke of the press. By reason of this feature it is possible to do two-stage work, such as initial piercing with the short-stroke ram and deep drawing with the long-stroke ram. The one press thus becomes a two-stage complete pressing unit whereby for instance an ordnance shell forging can be made from a billet in two strokes of the press, with the press actually producing complete forging every time its rams descend on the power stroke.

A further object of the invention is to produce a simple and inexpensive device and yet one which will be exceedingly effective for the purpose for which it is designed.

These objects I accomplish by means of such structure and relative arrangement of parts as will fully appear by a perusal of the following specification and claims.

In the drawings similar characters of reference indicate corresponding parts in the several views:

Figure 1 is a side elevation of my improved double ram press, showing the rams lowered.

Figure 2 is a diagram showing the reeving of the operating cable between the power hoist and the press beam or lever.

Figure 3 is a fragmentary enlarged sectional elevation of the press, showing the rams raised and indicating only the short stroke ram as being actually used.

Figure 4 is a sectional plan of the press on the line 4—4 of Fig. 3.

Figure 5 is a similar view on the line 5—5 of Fig. 3.

Figure 6 is an end view of the walking beam and cable sheaves thereon.

Referring now more particularly to the characters of reference on the drawings the press comprises a bed 1 having upstanding end plates 2 which, some distance above the bed, are arranged in rigid connection with side plates 3. These side plates, together with the adjacent portions of the plates 2, form a hollow rectangular frame structure through which the rams project in guided relation, as will be hereinafter shown. The press is supported in superimposed relation to a pit 4 by transverse floor engaging base beams 5.

Extending lengthwise of the press above the frame structure is a walking beam 6, preferably of hollow box beam form in section. Intermediate its ends this beam is connected by depending pivoted links 7 with the frame structure adjacent one end thereof. These links depend into an oil-tight sump 8 formed beneath the plates 3 adjacent said end at the top, and are pivotally mounted thereon by a cross pin 9 engaging the plates 3 and also webs 10 disposed intermediate the links 7 (see Fig. 4). The pin 9 at its ends is sealed in by discs 11 secured in the ends of the pin bores in the plates 3.

A short stroke ram 12 is pivoted on and depends from the walking beam 6, a short distance from the links 7 and projects through the hollow frame structure intermediate its ends to a termination below the plates 3. The ram is guided for straight-line vertical movement by vertically spaced adjustable guide units 13, which as here shown are of substantially the same construction and mounting as shown in my copending application for patent, Serial No. 441,291, filed May 1, 1942, now Patent No. 2,342,946, issued February 29, 1944.

Pivoted on and depending from the walking beam beyond the ram 12 is a link unit 14 which depends into an oil-tight sump 15 formed in the long stroke ram 16. The links are pivotally connected to the ram by a cross pin 17, the ends of which are sealed in the same manner as the pin 9. The ram 16 is guided for straight-line vertical movement by vertically spaced adjustable guide and wear plate units 18 of the same character as the units 13. In order that the guide units 13 and 18 may be disposed to engage the respective rams without said rams being spaced

unduly far apart, said guide units are set in different horizontal planes relative to each other, as shown in Fig. 3.

Each ram is arranged at its lower end for detachable connection with a suitable punch, such as indicated at 19, adapted to cooperate with a work holding die 20 mounted on a holder 21 of suitable construction seated on the bed 1 of a depending opening 22 in the bed alined with the respective ram. In the present instance only the ram 12 is shown as being utilized in a forging operation.

The walking beam 6 extends some distance beyond the end of the press structure furthest from the links 7 and at the same end is connected to a power mechanism to pull the corresponding portion of the walking beam down about the upper pivot P of the links 7 as an axis, and consequently lower the rams. This mechanism comprises a two-drum power winch unit mounted in the pit 4 directly below said end of the walking beam and whose drums 24 are connected by gearing 25 (see Fig. 2) so that both drums will rotate in the same direction. A continuous cable 26, secured at its ends on the drums, extends upwardly from the leading or downwardly moving side of one drum to and about a pulley 27 on the walking beam, down to and about a pulley 28 fixed with the winch, back up to another pulley 29 on the walking beam parallel to and adjacent the pulley 27, and then to and about a pulley 30 mounted parallel to and adjacent the pulley 28. From this pulley the cable extends upwardly to and over equalizing pulleys 31 mounted in a transversely extending housing 32 swung from the walking beam, and then about and between other sets of pulleys 33 and 34 which correspond to pulleys 28—30 and 27—29, and thence to the other drum 24 on its leading or downwardly moving side.

By reason of this arrangement and with both drums being thus driven and rotating at the same speed, an equal pulling action on the cable is had at both drums and a great leverage on the walking beam is obtained; any discrepancy in the pull being compensated for at the equalizing pulleys 31.

In order to retract the rams after a power or working stroke, the end of the walking beam opposite that to which the cable is connected is formed with a relatively large receptacle 35 in which the counterweight material such as concrete, sand, water or the like may be placed. In this manner when the power is released from the drums this weight acts to unwind the cable from the drums and reverse the position of the walking beam to raise the rams.

Either ram alone may be used, depending on the type of work being done, but as stated in the preamble the provision of short and long stroke rams in a single press gives the advantage of two separate presses of ordinary character.

By reason of the specific mounting of the link pins 9 and 17 and the oil sumps in which these pins are disposed, frequent lubrication of these relatively inaccessible pins is unnecessary, as a supply of oil to last for considerable time may be poured into the sumps from the top. The various pivot pins in the walking beam, however, may be lubricated in the ordinary manner by means of grease fittings applied to one end of the pins, since such pins are always exposed and accessible.

The two-drum and double cable line is used for the following reasons: (1) an equalized cable

pull is exerted on the walking beam so that one side thereof is not subjected to a greater strain than the other. (2) The need of a large cable, with its reduced flexibility and greater initial and maintenance cost is avoided. (3) Relatively small winch-drum gears may be used which are within the capacity of regular commercial gear cutting machines to produce, and (4) there is less bearing load on the pinion bearings of the winch unit, since the tooth thrust is equalized by the bull gears on opposite sides of the pinions.

From the foregoing description it will be readily seen that I have produced such a device as substantially fulfills the objects of the invention as set forth herein.

While this specification sets forth in detail the present and preferred construction of the device, still in practice such deviations from such detail may be resorted to as do not form a departure from the spirit of the invention, as defined by the appended claims.

Having thus described my invention what I claim as new and useful and desire to secure by Letters Patent is:

1. A press comprising a work supporting bed, a frame structure above and rigid with the bed, a lever on top of and extending lengthwise of the structure for movement in a vertical plane, a vertical ram slidably mounted in the structure for movement toward and from the bed and pivotally connected to the lever immediate its ends, a substantially vertical link connecting the structure and lever at a point on the latter spaced from the point of pivot connection of the ram therewith, another vertical ram slidably mounted in the structure beyond the first named ram with respect to the lever pivot, a substantially vertical link extending between and pivotally connecting the lever and said other ram, and power means engaging the lever adjacent one end to swing the same in a direction to lower the rams.

2. A press comprising a work supporting bed, a frame structure above and rigid with the bed, a lever on top of and extending lengthwise of the structure for movement in a vertical plane, and projecting beyond one end of the structure, pivot means connecting the lever and structure, a vertical ram slidably mounted in the structure for vertical movement and connected to the lever at a point between the pivot thereof and the projecting end of the lever, and a power mechanism to pull said end of the lever down; said mechanism comprising a winch unit below the lever at said end and having a pair of driven cable drums spaced horizontally in a direction transversely of the lever, a pair of transversely spaced pulleys on the lever, a pair of transversely spaced pulleys on the winch unit, another intermediate pulley on the lever and a cable extending from the leading side of one drum to and between one of each of the first and second named pairs of pulleys, then about the intermediate pulley, thence to and about the other pulleys of the second and first named pairs of pulleys and thence to the leading side of the other winch drum.

3. A press comprising a work supporting bed, a frame structure above and rigid with the bed, a lever on top of and extending lengthwise of the structure for movement in a vertical plane, and projecting beyond one end of the structure, pivot means connecting the lever and structure, a vertical ram slidably mounted in the structure for vertical movement and connected to the lever

at a point between the pivot thereof and the projecting end of the lever, and a power mechanism to pull said end of the lever down; said mechanism comprising a winch unit below the lever at said end and having a pair of driven cable drums, a cable taking from the leading side of both drums, and a pulley system on the lever and winch and between which the cable is reeved to increase the leverage and also compensate for any difference in the cable drive at the drums.

4. A press comprising a work supporting bed, a frame structure above and rigid with the bed,

5 a vertical ram slidable in the structure, a lever above the structure and ram, a link pivotally connecting the ram and the lever at a point intermediate the ends of the latter, a link pivotally connecting the structure and lever at a point on the latter spaced lengthwise from the point of pivotal connection of the first named link therewith, another ram slidable in the structure parallel to the first named ram and directly pivoted on the lever between the points of connection of the links therewith; and means to swing the lever in a direction to lower the rams.

ROBERT G. LE TOURNEAU.