June 20, 1944. R. G. LE TOURNEAU 2,351,824

CABLE OPERATED PRESS

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Fig. 1

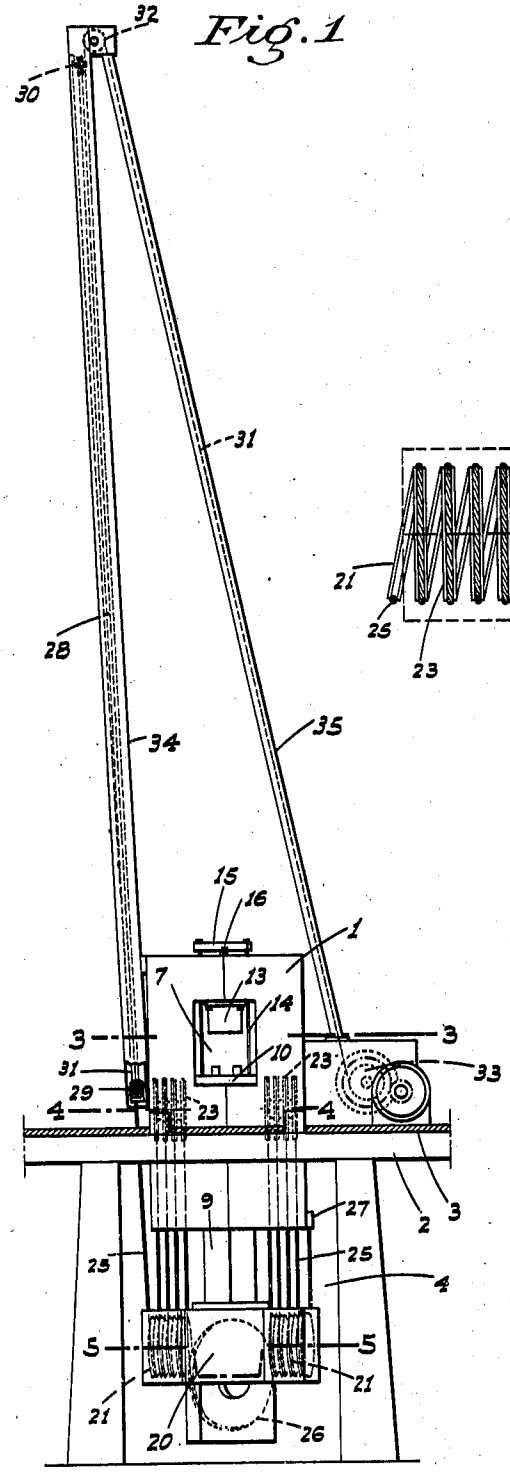
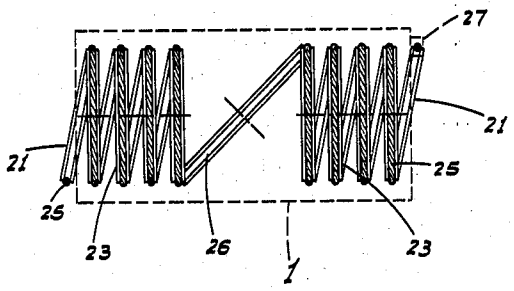


Fig. 2



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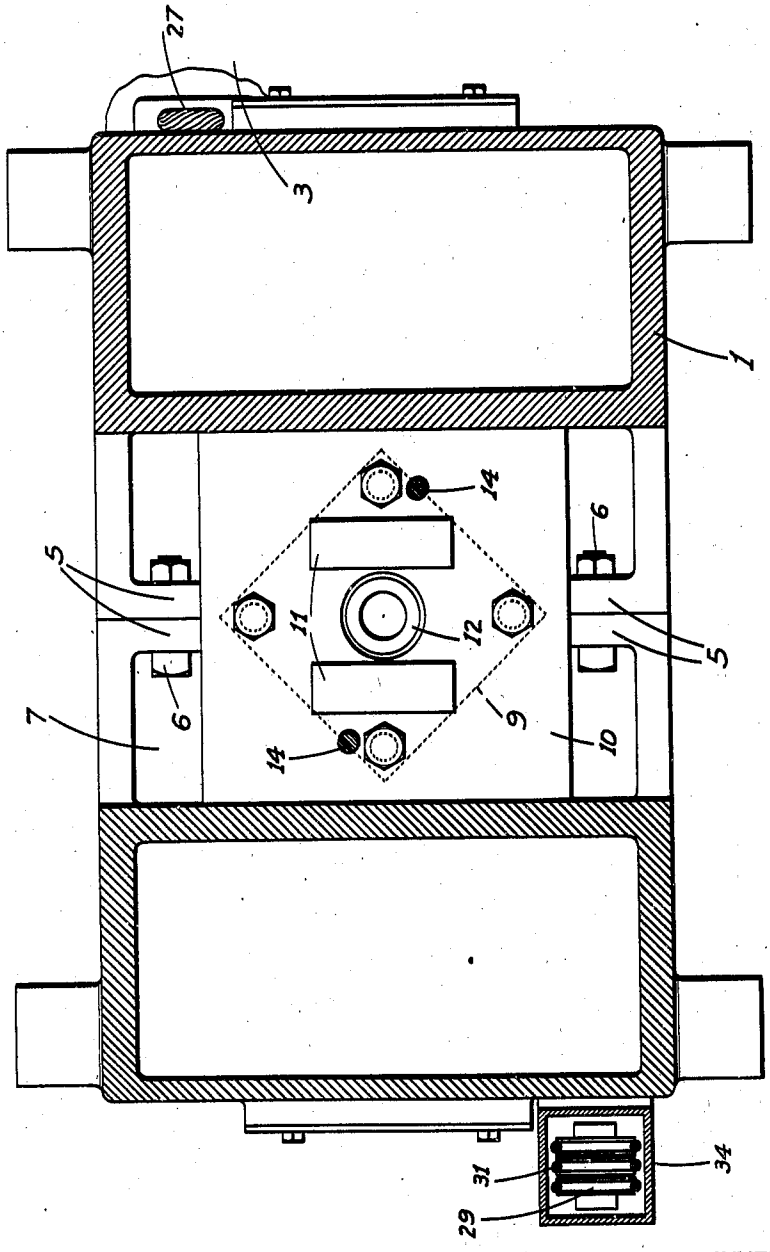


Fig. 3

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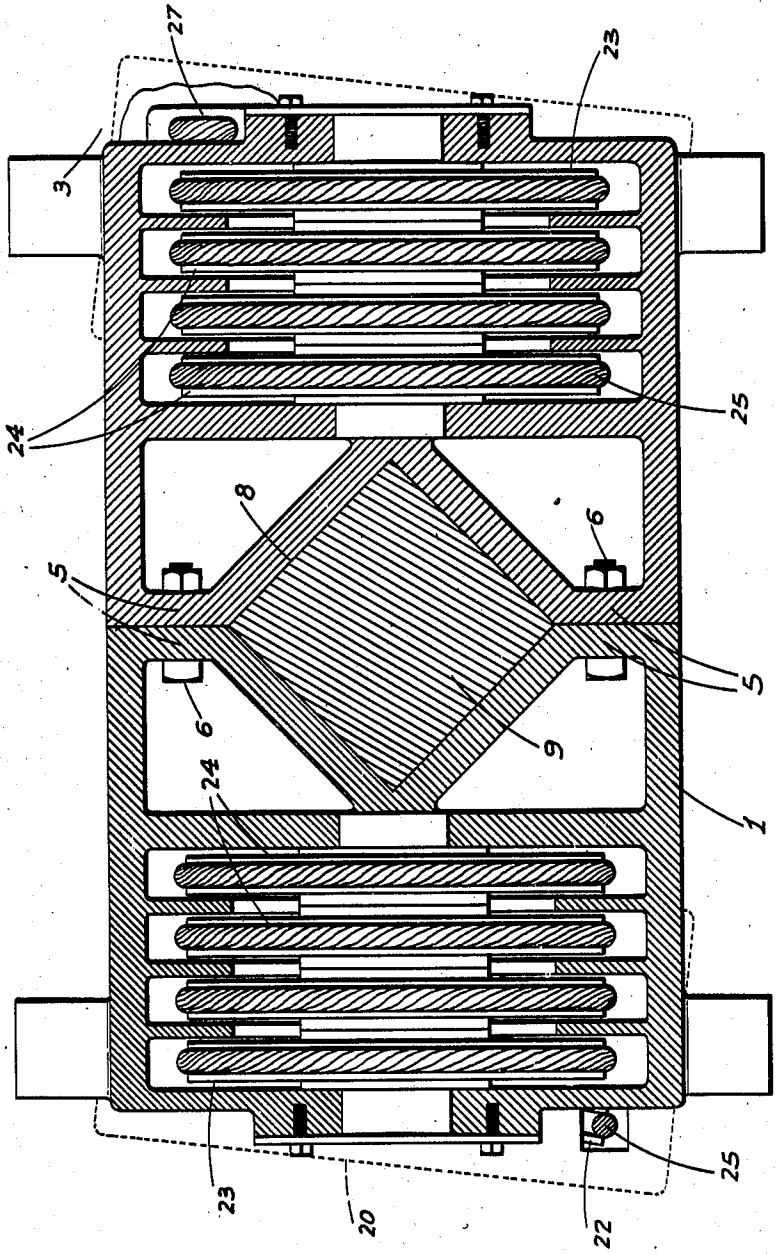


Fig. 4

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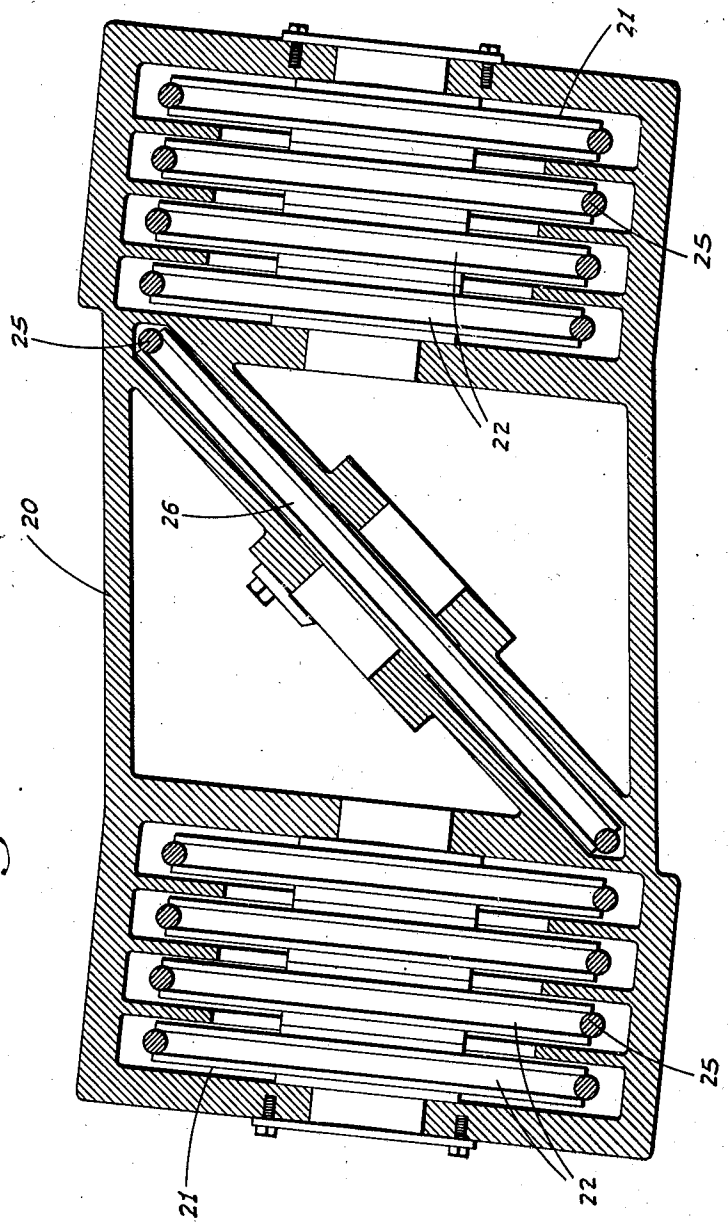


Fig. 5

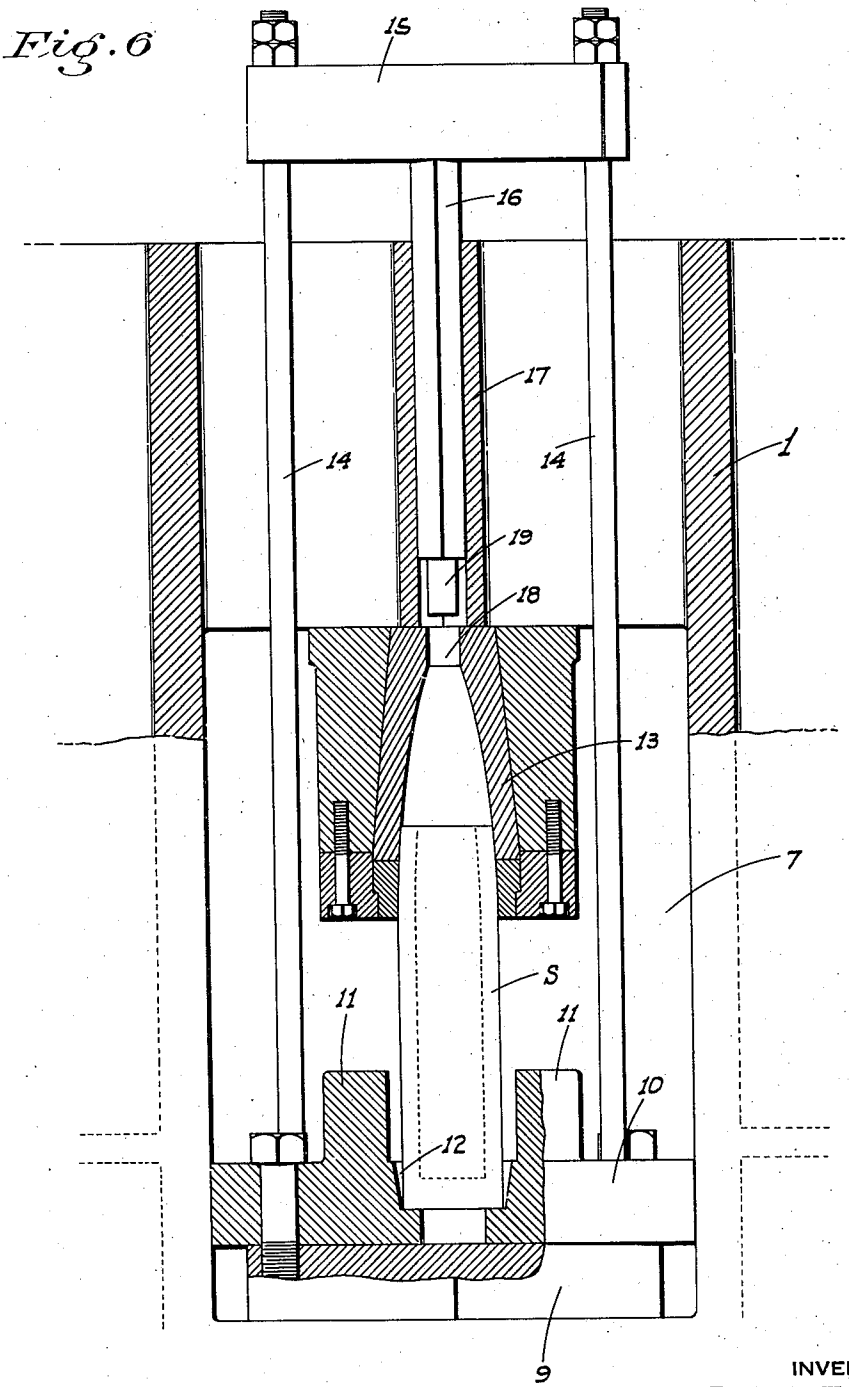
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CABLE OPERATED PRESS

Filed Feb. 2, 1942 5 Sheets-Sheet 5

Fig. 6



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2,351,824

UNITED STATES PATENT OFFICE

2,351,824

CABLE OPERATED PRESS

Robert Gilmore Le Tourneau, Peoria, Ill., assignor to R. G. Le Tourneau, Inc., a corporation

Application February 2, 1942, Serial No. 429,178

7 Claims. (Cl. 100—70)

This invention relates in general to a heavy-duty power actuated industrial press and in particular is directed to, and it is the principal object to provide, a press structure which is operative to multiply relatively low power to a tremendous working force, as is necessary for press forming or fitting of metal parts; the press structure being especially designed for press-forming the taper or nose portion on ordnance shells from hollow blanks, although the press obviously may be adapted to many other purposes.

Another object of the invention is to provide a power press which is cable actuated; a novel cable arrangement being embodied to provide the desired multiplication of power.

A further object of the invention is to provide a power press which includes a body, a fixed working die and a unique ram or plunger assembly for carrying the work into engagement with said die.

An additional object is to provide means to automatically drive the finished part out of the forming die upon retraction of the press plunger.

A further object of the invention is to provide 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 an elevation of the improved power press.

Figure 2 is a diagrammatic plan view of the sheave block arrangement in the body and ram assembly.

Figure 3 is an enlarged cross section on line 3—3 of Fig. 1.

Figure 4 is an enlarged cross section on line 4—4 of Fig. 1.

Figure 5 is an enlarged cross section on line 5—5 of Fig. 1.

Figure 6 is an enlarged sectional elevation showing the pressing chamber and the cooperating work engaging press parts.

Referring now more particularly to the characters of reference on the drawings the press comprises a vertically elongated body 1 which is rectangular in plan and as here shown is supported intermediate its ends by horizontal beams 2 to which it is rigidly secured, these beams being at the level of the operating deck 3, which is also the shop floor. The press below this deck depends into a pit 4.

The body 1 is formed in two vertical sections, as shown, and these sections are secured together by means of matching inturned flanges 5 secured together by bolts 6. Above the operating deck 3 the body 1 is formed intermediate its ends with a pressing chamber 7 open to both sides of the body and suitably walled. Below the pressing chamber 7 the body 1 includes a vertical guideway 8 preferably square in plan; such guideway being open at the top to the pressing chamber and at the bottom to the lower end of the body. A ram or plunger 9, likewise square in cross section, is slidably disposed in the guideway 8 with a close running fit; the upper end of said plunger being fitted with a rectangular plunger head 10 which is adapted to be raised and lowered in guided relation in the pressing chamber under the influence of the plunger 9.

The top of the plunger head 10 is formed with upstanding work guides 11 which are spaced apart in parallel relation and on opposite sides of a centrally disposed upwardly opening work supporting socket 12 in said head.

A work engaging die unit is fixed on the body and depends into the pressing chamber from the top thereof and in vertical alinement with the work supporting socket 12. In the present instance the die unit 13 is of the type employed to press form the taper nose on ordnance shell blanks, a blank for one such shell being shown at S in Fig. 6. The shell blank seats in socket 12 and with upward movement of the plunger and plunger head, effected in the manner hereinafter described in detail, the shell blank is forced into the die unit 13 to give the nose thereof the desired configuration.

In order to release the work from the die unit after press forming, the following mechanism is employed:

Parallel rods 14 disposed on opposite sides of and outwardly of work guides 11 and die 13 extend vertically from plunger head 10 upwardly through the body and above the body are connected by a cross head 15. A rigid push-out pin 16 is fixed on said cross head centrally of the ends thereof and depends into a guide sleeve or bore 17 open at its lower end to the upper end of the die unit 13, the upper end of the latter being open as at 18 so that the lower end 19 of push-out pin 16 may pass therethrough, strike the upper end of the work and release the latter from the die unit 13. The push-out pin 16 is

of such length that the lower end 19 strikes the work as the plunger head approaches the lower end of its stroke.

A tremendous upward force or working pressure is applied to the plunger 9 and plunger head 10 by means of the following mechanism:

At its lower end the plunger 9 is formed with a rigid cross housing 20 of slightly greater length than the width of body 1. At opposite ends the cross housing 20 is chambered as shown in Fig. 5, and each chamber has journaled therein a sheave assembly indicated generally at 21 in Fig. 1, and each such assembly includes a plurality of cable sheaves 22. Corresponding upper sheave assemblies, indicated generally at 23 in Fig. 1, are mounted within the body 1 intermediate its ends and in vertically alined relation with the sheave assemblies 21; the upper sheave assemblies 23 each including a plurality of sheaves 24 suitably journaled within the body on opposite sides of plunger 9.

An operating cable 25 extends from a lead end alongside body 1 downwardly and is thence threaded back and forth, or is reeved about the corresponding sheaves 22 and 24 of sheave assemblies 21 and 23 on one side of the body, thence passes beneath a diagonally journaled change-over pulley 26 mounted in cross housing 20 between the sheave assemblies 21, and from this change-over pulley the cable threads back and forth about the sheaves 22 and 24 of sheave assemblies 21 and 23 on the other side of the body; the dead end reach of the cable being dead-ended as at 27 on the adjacent side of body 1 at its lower end.

The sheave assemblies 21 are disposed with their axes canted in a horizontal plane whereby to permit the lead end or pull reach of cable 25 to extend along one side of the body, and the dead-end reach to extend to a point on the other side of the body while maintaining proper vertical alinement between corresponding ones of the sheaves in lower assemblies 21 and upper assemblies 23.

The pull reach of cable 25 has a pull-up or actuating force applied thereto by means of a primary power multiplying cable arrangement in the form of a relatively long block and tackle 28 whose lower block 29 is floating and which is connected with said full reach. The upper block 30 is fixed at a point a considerable distance above the press body 1 and the pull cable 31 for block and tackle 28, and which may be relatively light weight, extends about a fixed top sheave 32 and thence passes downwardly to a power hoist 33 of conventional type mounted on the operating deck 3 on the opposite side of body 1 relative to the lead end of cable 25; this power hoist including of course a reasonable brake which when released permits cable 31 to freely run off the hoist drum. The block and tackle 28 is preferably enclosed in a hollow mast 34 supported from body 1 and the cable 31 likewise extends through a tubular mast member 35.

With operation of the power hoist 33, cable 31 runs onto the hoist drum, effecting a shortening of the block and tackle 28 elevating the lower and floating block 29 thereof. As a result, the pull reach of cable 25 is drawn upward, shortening the leads between the lower sheave assemblies 21 and upper sheave assemblies 23, causing the plunger 9 to slide upward in its guide and raising the plunger head 10 therewith.

With the cable arrangement herein described, the plunger is elevated with a tremendous working force or pressure, assuring ease of press forming or press fitting of parts in the die unit 13. It will also be seen that due to the cable arrangement described, a downward pressure is exerted on the body and die equal to the upward pressure exerted on the ram, so that there is no tendency to lift the body from its fastenings.

When a pressing operation has been completed, the power hoist 33 is shut off and the hoist drum brake released, which permits the plunger assembly to move downward gravitationally and retract from the die.

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. In a power press which includes a body, a plunger slidably mounted thereon, and power means to advance the plunger; said means comprising a cross member on the plunger some distance from its head, a pair of block and tackle units connected between opposite ends of the cross member and corresponding points on the body, said units being in series and including a single cable, a change over pulley journaled on the cross member and about which pulley the cable passes in guided relation between the units, means dead ending one end of the cable adjacent one unit, the other end of the cable extending from the other unit, and a power source connected with said other end of the cable in pulling relation.

2. A power press comprising a body, a plunger slidably mounted on the body and projecting therebelow, sheave assemblies mounted on the body on opposite sides of the plunger, corresponding sheave assemblies mounted in connection with the projecting portion of the plunger and vertically alined with the first named assemblies, a single cable reeved between the sheaves of alined assemblies on one side of the plunger and thence being reeved between the sheaves of the alined assemblies on the other side of the plunger, a changeover pulley on which the cross reach of the cable runs, and means dead-ending one end of the cable; the other end of the cable being adapted to be connected with and pulled by a power source.

3. A structure as in claim 2 in which the axis of the sheave assemblies on the plunger are canted in a horizontal plane whereby to dispose the sheaves so that the dead-end reach and the pull reach of said cable may extend upward in planes laterally out relative to the other reaches of the cable between said assemblies.

4. A power mechanism for a press which includes a body and a press actuating cable having a pull reach extending upwardly from the body; said power mechanism comprising a block and tackle unit having an upper block above the body and a lower floating block, the latter being connected to said pull reach, a power source connected to the pull reach of said block and tackle unit, and a mast upstanding from the body and from which the upper block of said block and tackle unit is suspended; the pull reach for said block and tackle unit extending downward and

both said reach and unit being enclosed in legs of the mast.

5. In a power press which includes an upstanding body and press actuating means including an upwardly extending pull cable; a mast secured in connection with and projecting upwardly from the body and an elongated block and tackle unit connected between the upper portion of the mast and the adjacent end of the pull cable; the block and tackle unit including a relatively long pull reach, the mast being a unit including separate hollow members connected together at their upper ends, the block and tackle unit being suspended within one of said members and the pull reach extending downwardly within the other member.

6. In a power press which includes a body, an outwardly projecting plunger slidably mounted thereon, and power means to advance the plunger; said means including a pair of spaced, longitudinally extending block and tackle units connected between the projecting portion of the plunger and the body, said units being reeved in series by a single cable, and a change-over pulley journaled in connection with said portion of the plunger adjacent the outermost blocks of said units, said pulley being of relatively large diameter and disposed so that the cross reach of said cable runs onto said change-over pulley at points relatively close to adjacent sheaves of said outermost blocks.

7. In a power press which includes a body, an outwardly projecting plunger slidably mounted thereon, and power means to advance the plunger; said means including a pair of spaced, longitudinally extending block and tackle units connected between the projecting portion of the plunger and the body, said units being reeved in series by a single cable, and a change-over pulley journaled in connection with said portion of the plunger adjacent the outermost blocks of said units, said outermost blocks being disposed with the axis thereof canted in a plane transversely of the direction of movement of the plunger, and said change-over pulley being of relatively large diameter and disposed with its axis at a different angle in said plane so that said pulley extends diagonally and the cross reach runs thereonto at points relatively close to adjacent sheaves of said outermost blocks.

ROBERT G. LE TOURNEAU.