

No. 634,245.

Patented Oct. 3, 1899.

W. J. MUNCASTER.

PRESS FOR BENDING AND STRAIGHTENING METAL BARS, &c.

(Application filed Mar. 6, 1899.)

(No Model.)

3 Sheets—Sheet 1.

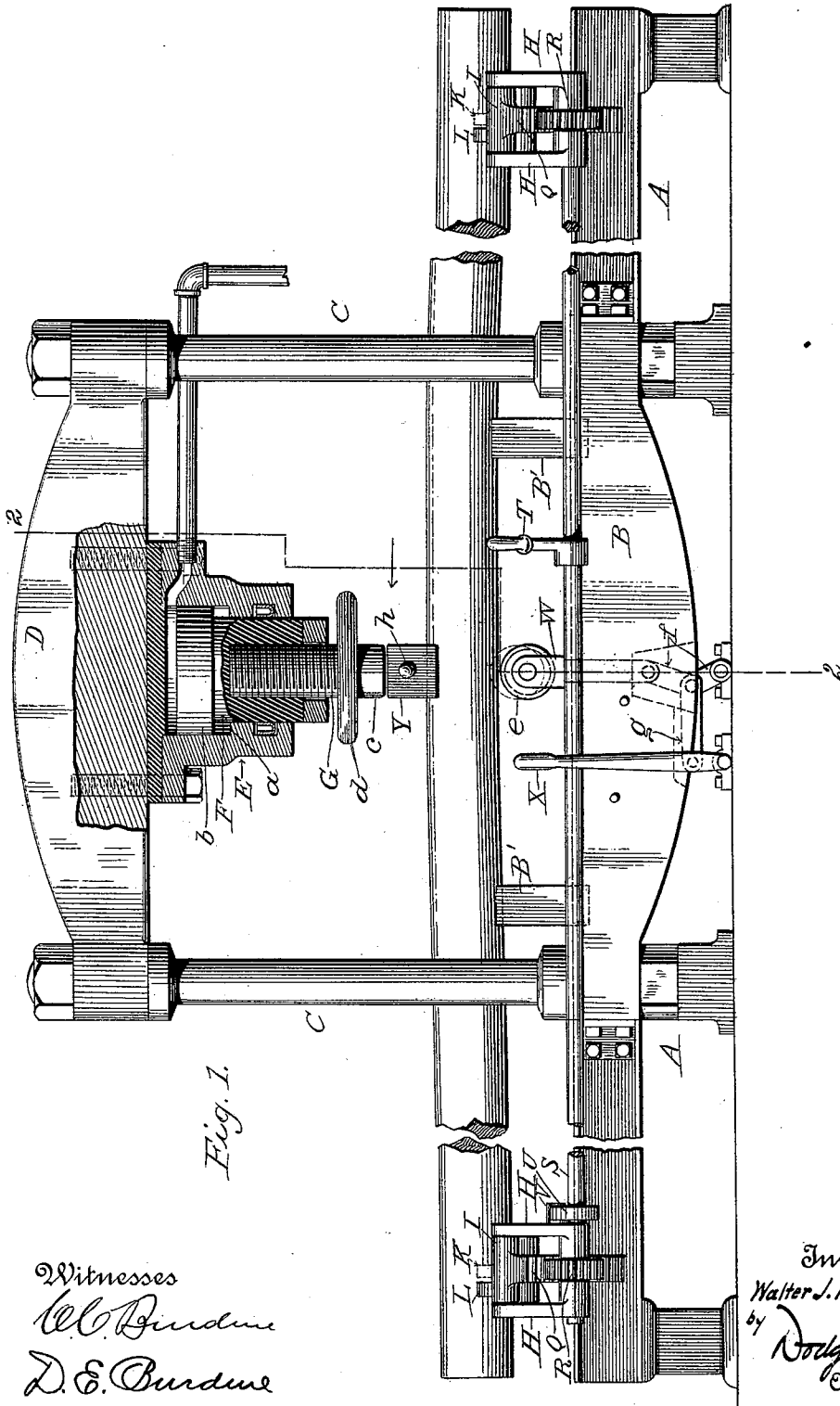


Fig. 1.

Witnesses
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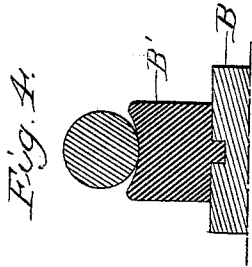
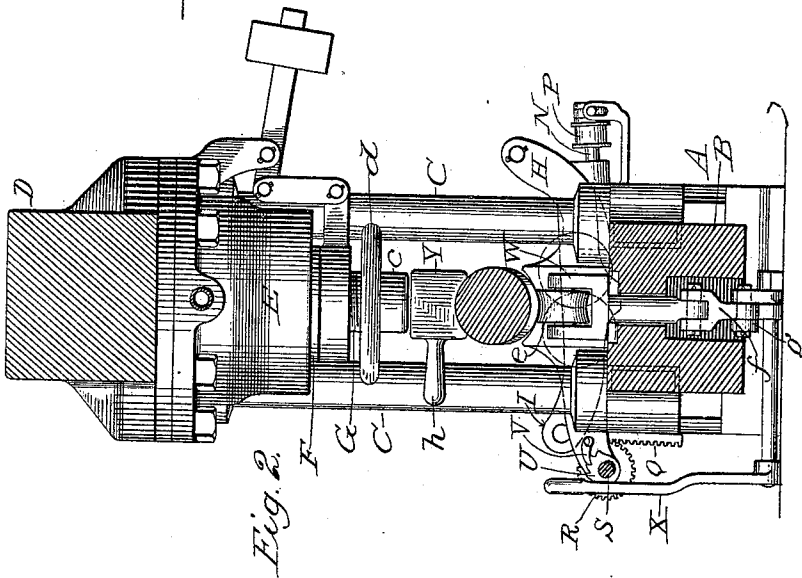
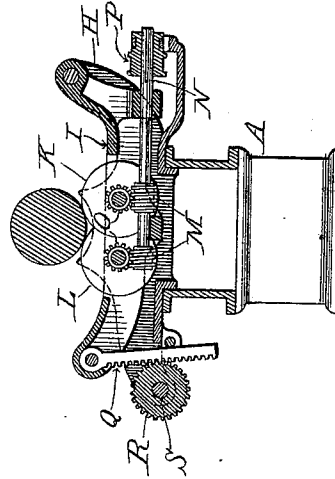


Fig. 3.



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Fig. 5.

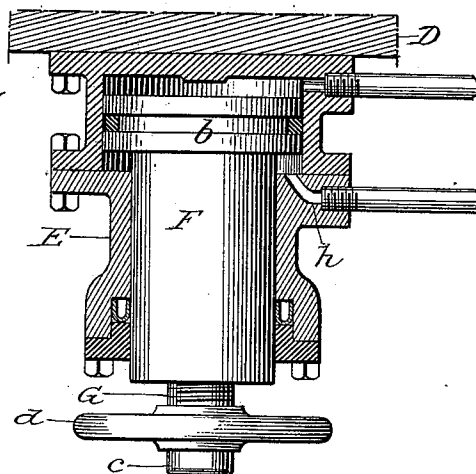
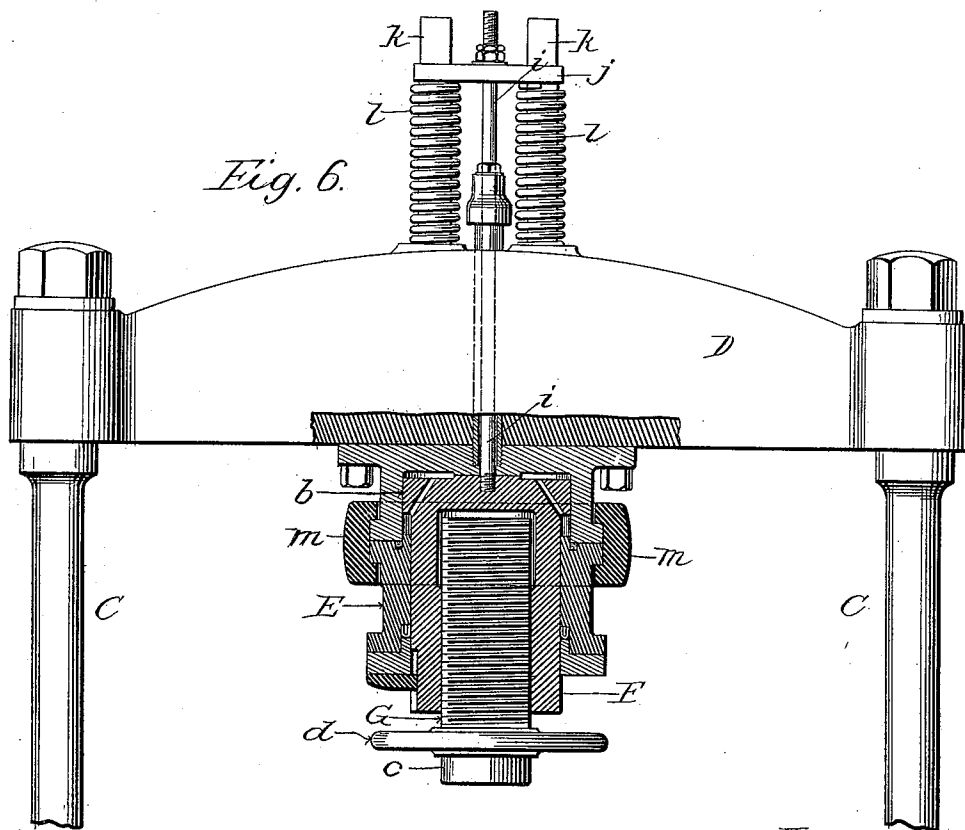


Fig. 6.



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UNITED STATES PATENT OFFICE.

WALTER J. MUNCASTER, OF CUMBERLAND, MARYLAND, ASSIGNOR OF ONE-HALF TO THE CUMBERLAND IRON AND STEEL SHAFTING COMPANY OF ALLEGANY COUNTY, MARYLAND, OF SAME PLACE.

PRESS FOR BENDING AND STRAIGHTENING METAL BARS, &c.

SPECIFICATION forming part of Letters Patent No. 634,245, dated October 3, 1899.

Application filed March 6, 1899. Serial No. 707,946. (No model.)

To all whom it may concern:

Be it known that I, WALTER J. MUNCASTER, a citizen of the United States, residing at Cumberland, in the county of Allegany and State of Maryland, have invented certain new and useful Improvements in Presses for Bending and Straightening Metal Shafting, Bars, &c., of which the following is a specification.

This invention has reference to presses or machines for straightening or bending shafting, rods, beams, and the like, though intended more particularly for straightening heavy shafting. The improvements are, however, applicable to presses and machines generally where great pressure and a positive stroke are required.

Briefly stated, the invention consists in the combination, with a suitable bed-frame and supports, of a hydraulic ram having a fixed limit of movement toward the shaft or object to be acted upon, but provided with an adjustable nose-piece or bunter, whereby though the range of movement of the ram remain unaltered the point to which the nose-piece or bunter moves may be varied as occasion requires.

The invention further consists in the employment, in connection with the above-mentioned apparatus, of a removable filling piece or block adapted to be introduced between the bunter or nose-piece and the shaft or object acted upon, whereby adequate clearance or adjusting space may be readily obtained with very slight movement of the ram.

These and other features of the invention will be more fully pointed out in connection with the accompanying drawings, in which—

Figure 1 is a side elevation of my apparatus, partly in section, the bed or frame and the shaft under treatment being broken to bring the figure within the prescribed limits of the drawing-sheet. Fig. 2 is a transverse vertical section on the line 2 2 of Fig. 1, looking in the direction indicated by the arrow therein. Fig. 3 is a transverse vertical section taken through the extension of the bed or base of the machine close to the shaft supporting and rotating mechanism. Fig. 4 is a view showing the work-supports; Fig. 5, a view showing the hydraulic cylinder provided with two fluid-inlets, one above and the other

below the head or enlarged portion of the ram, for the purpose of enabling the same to be lifted or returned as well as pressed outward by fluid-pressure; Fig. 6, a sectional view showing a preferred construction of the cylinder and a counterbalance or device in the form of a spring for returning the ram to its normal position.

Prior to my present invention machines of various kinds have been devised having for their object the bending or straightening of shafting, bars, beams, and the like. A very successful machine of this general character suited to the treatment of shafting of moderate weight is that described in Letters Patent No. 334,455, granted to me on the 19th day of January, 1886. Said machine, however, as is the case with most others with which I am familiar, depends upon the action of an eccentric or crank and lever to afford the pressure necessary to the bending or straightening operation. Other machines employ heavy screws for this purpose. While both of these plans answer quite well for shafting, bars, or beams of relatively light weight, they are not suited to the treatment of heavier shafts, bars, or beams, and even were they capable of performing the work when new they would in a short time cease to be satisfactorily operative owing to the wear and consequent looseness of the working parts. The only means known to me to be at once capable of affording the necessary pressure or power and of being readily and accurately controlled is a hydraulic or hydrostatic press. So far as I am aware presses of this description have always been constructed without any stop to limit the forward or pressing movement of the ram, the latter being capable of being freely withdrawn from its cylinder or chamber. In using such presses it is customary to continue the travel of the ram until the desired effect is produced, gaging and determining the range of movement, if at all, simply by the eye.

In truing shafting and in straightening or in bending to given pattern a beam, bar, or other body it is essential that the range of movement be nicely and certainly determined, as otherwise the necessary effect cannot be attained. If, for instance, a shaft be out of true and it be desired to bring it to its proper straight form, a slight overpressure

would result in a deflection in the reverse direction to that in which it was originally bent. If, on the other hand, the movement be inadequate in the first instance, it will be necessary to repeat the pressure, and in so doing with no guide other than the eye and no control other than the closing of the inlet-valve the second stroke or pressure is liable to deflect the shaft, bar, or beam beyond the proper point. To overcome this difficulty, I form the cylinder with an annular shoulder or ledge, and I construct the ram with a head or enlargement of a diameter to fit the interior of the cylinder and to overhang and to rest upon an annular ledge or shoulder of the cylinder when the ram is moved outward to its full limit. Instead of making the end of the ram to bear directly upon the body acted upon I bore the same to receive a large and heavy screw, the end of which forms the bunter, hammer, or pressing-head, and I provide said screw with a hand-wheel or equivalent means whereby it may be turned to run it farther into or out of the ram, and thereby to determine the point to which its bearing-face may be carried by the outward movement of the ram.

Referring now to the drawings, A indicates a bed frame or base which may be of essentially the ordinary form and construction common in hydrostatic presses for heavy work and including a heavy cross-bar B. Rising from opposite ends of said beam or section B and on opposite sides thereof are four posts or columns C, the upper ends of which are likewise connected by a cross-bar D, to which latter is secured the pressure-cylinder E. This cylinder is of two different diameters internally, as indicated in Fig. 1, the main body of the ram F or the greater portion of its length being of smaller diameter and the upper portion being of slightly-larger diameter. By this construction there is formed at the lower end of the cylinder an internally-projecting ledge or shoulder *a*, and there is formed at the upper end of the ram an overhanging projection *b*, which parts together form a stop to limit the descent or outward movement of the ram. The usual cup-leathers or packing-rings will be provided to insure a tight packing of the ram, as indicated in Fig. 1, and as shown in Fig. 2 said ram may be counterbalanced, so that when relieved of fluid-pressure it shall automatically rise to its highest point of movement. In Fig. 5 I have shown a second fluid-inlet *h*, opening into the cylinder beneath the enlarged head *b* of the ram, so that by introducing fluid through said opening the ram may be retracted and held in its retarded position. Any suitable form of valve may be employed to control the fluid-passages. In Fig. 6 a rod or stem *i* is shown passing through the base of the ram-cylinder and screwing into the upper end of the ram, said rod or stem passing vertically through the top cross-beam D of the pressing-frame and through a cross-head *j*, which is guided by

rods *k*, encircled by springs *l*, which, bearing beneath the cross-head *j*, serve to raise the same, and consequently to elevate the ram. The arrangement of the packing may be varied as desired. I find it convenient, however, to divide the cylinder in the manner shown in Figs. 5 and 6, uniting its parts either by bolts passing through the flanges of the sections, as in Fig. 5, or by clamping-rings *m*, as in Fig. 6. These details are not of the essence of the invention, though of some importance in the practical construction of the machine.

G indicates a heavy screw or stem threaded to enter a socket formed in the ram F and extending from the lower end thereof upward to a point near the upper end of the ram. This stem or screw G has its lower end fashioned into a hammer or presser head *c* and is furnished with a hand-wheel *d*, by which it may be turned to vary the projection of the hammer or presser head *c* beyond the outer or lower end of the ram.

The base-frame or bed will be provided with work-supports B' and B' of suitable character to sustain the work while undergoing the pressing operation.

At each end of the press there is an extension A' of the bed, upon which extensions are mounted cross-frames, in which are hung or pivotally supported roll-carrying frames. These frames are adapted to be raised and lowered for the purpose of lifting the shaft or other body from the bending-supports and are provided with driving-gear, which may be thrown into and out of driving relation with a suitable prime motor for the purpose of rotating a shaft or like cylindrical body when required. The construction of the roll-supports and driving mechanism need not be minutely described, since they are fully set forth in my previous patent, No. 334,455, above mentioned; but for the purpose of making clear the construction and operation of this machine I will briefly outline this mechanism in connection with the drawings, and particularly Fig. 3.

II II indicate cross-frames or supports mounted upon the bed or base frame A and adjustable longitudinally thereon, so that they may be brought nearer together or moved farther apart, as occasion requires. Pivoted in brackets or arms of each cross-frame II is a roll-carrying frame I, provided with two work-supporting rolls K and L, to which motion is imparted in one and the same direction by means of worms or screws M, carried by a shaft N, journaled in the swinging frame I, said worms or screws meshing with worm-wheels O on the axles or shafts of the rolls K and L. Each shaft N is provided with a pulley P, through which motion may be imparted thereto, and in practice said pulleys are of like diameter and are driven by a belt common to both, so that the work-supporting rolls of both frames shall be rotated simultaneously and equally. The free end of each

roll-carrying frame I is provided with a pendulous rack-bar Q, which meshes with a pinion R, carried by a rock-shaft S. Said rock-shaft is provided with a hand-lever T, by which it may be turned to effect a raising or lowering of the roll-carrying frames, and it is furnished at a suitable point with a ratchet U, which is engaged by a pawl or dog V, by which the rock-shaft is held against backward rotation, and the roll-carrying frames and rolls are sustained at the desired elevation.

At a point directly beneath the ram or presser-head there is located a vertically-movable yoke W, carrying a grooved roller *e*. The yoke W is raised and lowered by a toggle *f*, which is connected by a link *g* with a hand-lever X, as shown in Fig. 1. Any other suitable mechanism may be employed to raise and lower the yoke W and its roller *e*. The purpose of the roller is to lift the shaft or bar off the bending-supports B' to facilitate its longitudinal movement or its adjustment in the press.

Y indicates a filling-block which when intended for use in connection with shafting or like cylindrical bodies will have its lower face curved to correspond to the circumference of the shaft or body, and it may conveniently be provided with a handle or handles *h*.

It is of course obvious that other means for supporting and rotating the work may be employed, but I have shown and described that mechanism which I prefer to use in practice and which experience has shown to be well suited to the requirements of the work.

The work-supporting rollers K L and their frames, as also the work-supports B', are freely adjustable lengthwise of the bed B and frames A, so that they may be made to support the work at suitable points.

Various modifications may be made in the details of the apparatus without departing from the spirit or scope of my invention.

The press being constructed as above set forth its operation is as follows: The shaft, bar, or beam to be straightened or bent is placed upon supports B, said supports and the frames or carriages H being first placed at proper distances apart or in proper relation to the ram F. The swinging frames I are then brought to the requisite elevation, so that the shaft will be raised clear of the supports B', and motion being imparted to the rollers K and L the shaft or other body, if of cylindrical form, is rotated, thus enabling the operator to discover any bends or crooks and to bring uppermost that side to which pressure is to be applied. The shaft is then quickly dropped on the supports B', the bunter or hammer face is run back into the ram, the block Y is placed upon the shaft or body, and the ram is lowered to the end of its travel. The bunter or hammer face is run out by means of the hand-wheel until it is stopped by coming into contact with the filling-piece Y. The ram is then relieved of pressure and is returned by a counterweight

or spring or by fluid-pressure, as the case may be. The bunter or hammer is then moved forward by the hand-wheel as much as in the opinion of the operator will be necessary to produce the desired bend or deflection of the shaft or other body, after which fluid-pressure is again applied to the ram and the latter is forced down until it finds a bearing upon the seat or shoulder *a* of the cylinder, which, as before explained, limits and determines the travel of the ram. The bunter or hammer having been previously set, as explained, the shaft or other body will be pressed, bent, or deflected to the precise extent desired, and hence will be speedily and accurately brought to the required condition. This operation will be repeated at such places and as many times as the condition of the shaft or other body may require, the shaft being turned about its axis or moved lengthwise of the machine, as the condition of the work dictates.

By the use of the block Y, I am enabled to lift or adjust the shaft or other body at will upon a very slight movement of the ram, the block being temporarily removed from between the parts to permit such adjustment and replaced when the adjustment is effected without altering the previous adjustment of the bunter or hammer face.

I am aware that presses of many forms and for a variety of purposes have made use of the hydraulic or hydrostatic ram, and I make no broad claim thereto; but so far as I am advised and so far as careful inquiry among manufacturers has developed no one has heretofore made or proposed a hydraulic or hydrostatic press the ram of which was limited in its movement in any manner except by contact of its outer or pressing end with the object to be pressed or with the frame of the press, nor has any one, so far as I am aware, constructed a hydraulic or hydrostatic press with a ram which in addition to a stop to limit its outward movement was provided also with means for varying the adjustment or projection of the working face or end of the ram.

I am aware that it is not broadly new to provide the ram or piston of a hydraulic press with a stop or shoulder which might, if occasion required, limit its outward movement. My invention is, however, to be distinguished from prior patented devices in that the work-support is of such character as to permit the object under treatment to be deflected or pressed beyond the line of the work-supports, which supports consequently do not constitute a stop to limit the deflection of the work or the movement of the ram or piston. Obviously where the work-support and the work themselves prevent the movement of the ram beyond a certain predetermined point the shoulder or stop on the ram itself performs no function in the ordinary operation of the machine. In the class of work under consideration it is essential that the body to be

straightened or bent shall be capable of deflection slightly beyond the point or line which it is finally to assume, since there is a greater or less degree of resilience and a partial return of the material to or toward its original lines. It is because of this requirement and of this action that the stop for the ram or piston and the adjustable nose-piece or bunter are provided. While, therefore, not meaning to claim separately and broadly a hydraulic press having a stop to limit the movements of the ram or piston, nor, broadly, the provision in connection therewith of an adjustable bunter or nose-piece, I do mean to claim these matters in the combination and relation herein set forth.

Having thus described my invention, what I claim is—

1. In a press for bending and straightening, the combination of a work-support adapted to sustain the work at two separated points but to permit its deflection beyond the line of said supports at a point between them; a cylinder; a ram movable within said cylinder; and a stop or shoulder serving to limit the outward movement of said ram relatively to the cylinder, whereby the ram is prevented from deflecting the work beyond a predetermined point.
2. In a press for bending and straightening, the combination of a work-support adapted

to sustain the work at two separated points but to permit its deflection beyond the line of said supports at a point between them; a cylinder; a ram movable within said cylinder; a stop or shoulder serving to limit the outward movement of said ram relatively to the cylinder; and an adjustable nose-piece or bunter applied to the ram; whereby the range of movement of the bunter or nose-piece may be varied and accurately determined and the work may be deflected to varying but accurately-determinable points without liability of being carried beyond the desired point.

3. The herein-described press consisting of a bed or base A, A'; cross-beam B; columns C; cross-beam D; hydraulic cylinder E carried by the cross-beam D and provided with a ledge or shoulder *a*; a ram or piston F provided with a head or enlargement *b*; a screw-stem G screwing into the ram F, and provided with a bunter or hammer-head *c*; and two work-supports B' B' on opposite sides of and out of line with the vertical plane of the ram or piston, substantially as and for the purpose set forth.

In witness whereof I hereunto set my hand in the presence of two witnesses.

WALTER J. MUNCASTER.

Witnesses:

ALBERT CHARLES,
FRANK STARK.