

(No Model.)

2 Sheets—Sheet 1.

W. BURTON.

PRESS FOR DRAWING THROUGH AND FORMING UP SHEET METAL.

No. 486,065.

Patented Nov. 8, 1892.

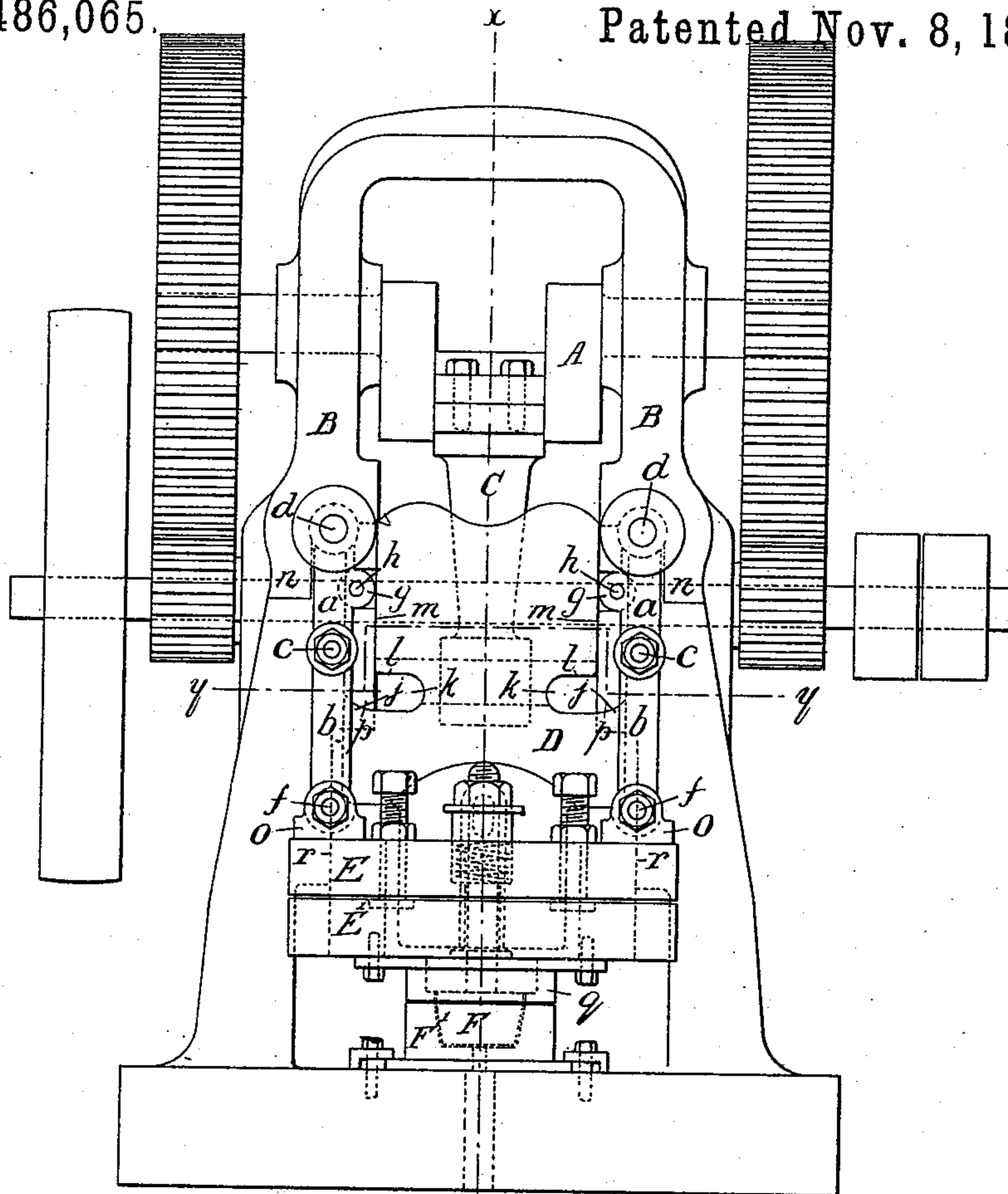
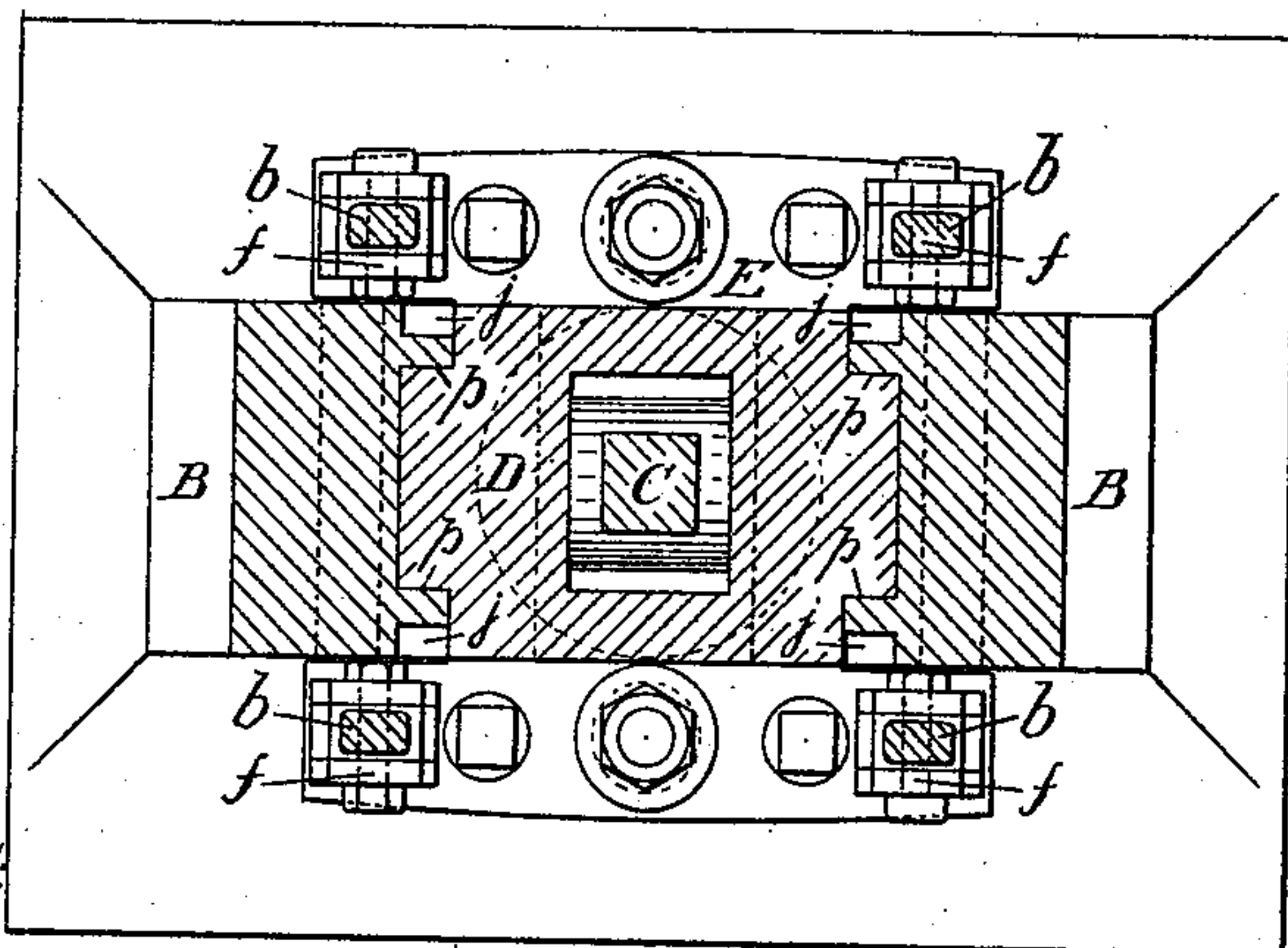


Fig. 1.



Witnesses:

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Peter A. Ross

Inventor:

Wingfield Burton

by Henry Connell
Attorney

Fig. 2.

(No Model.)

2 Sheets—Sheet 2.

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Patented Nov. 8, 1892.

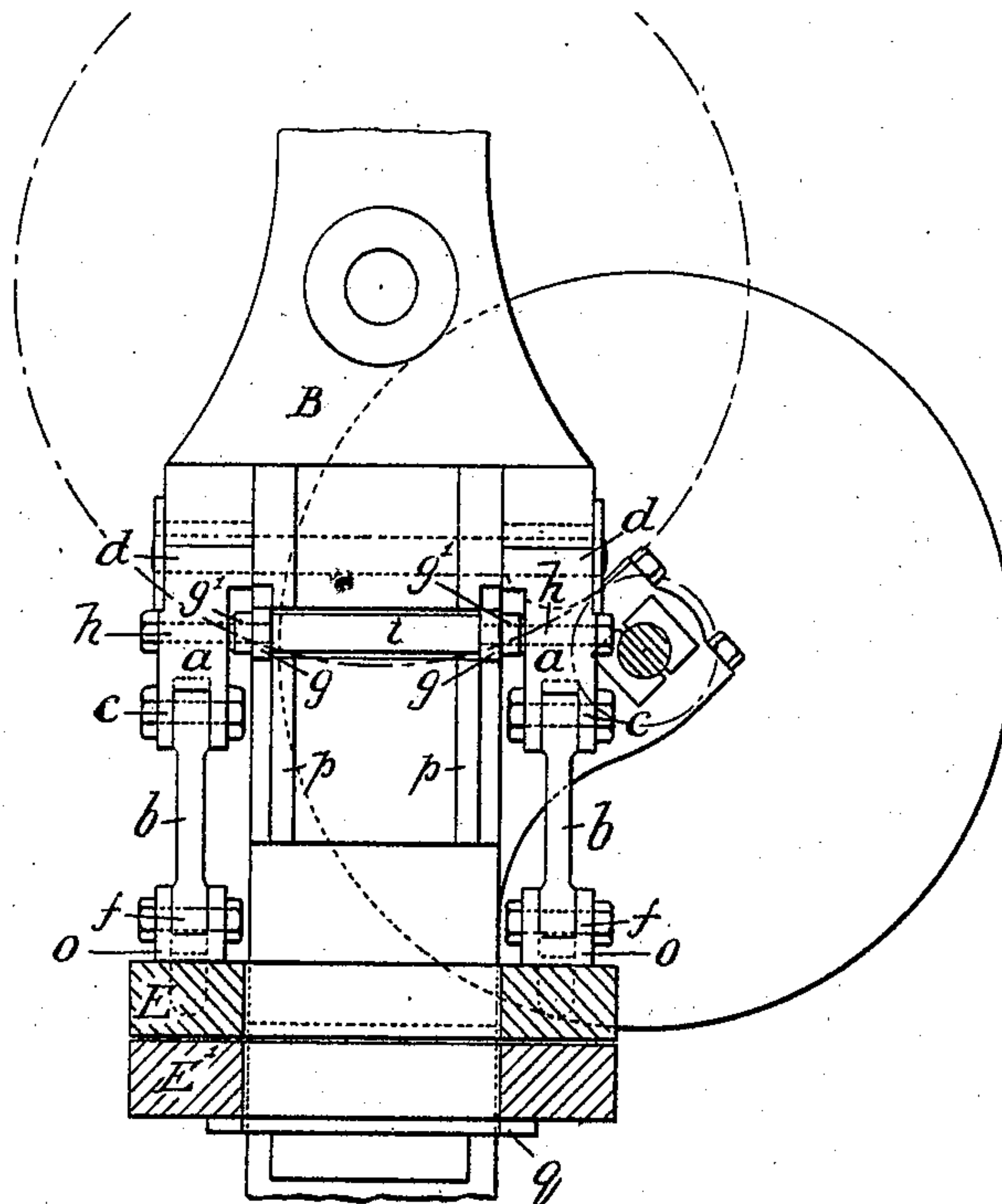


Fig. 3.

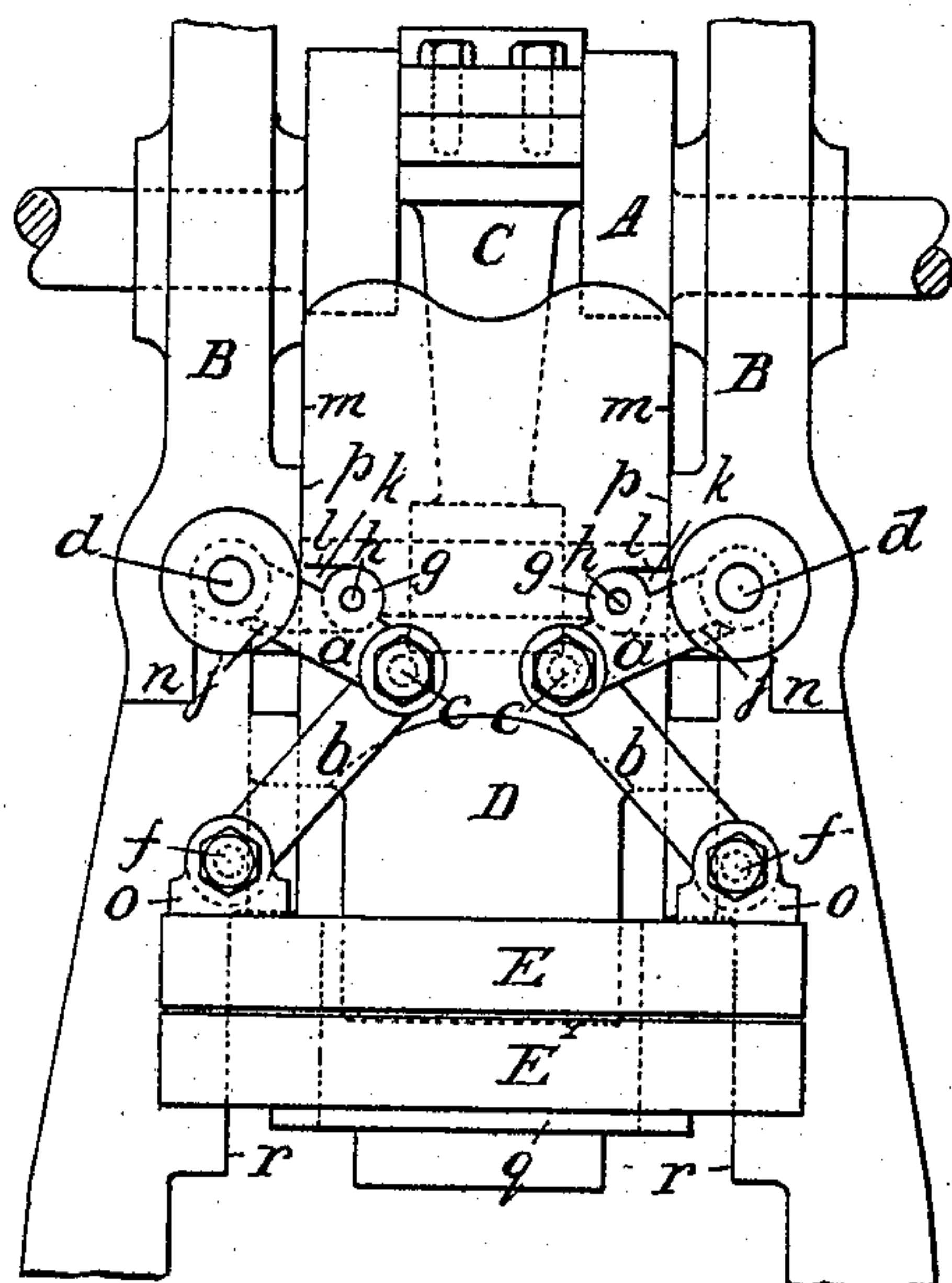


Fig. 4.

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UNITED STATES PATENT OFFICE.

WINGFIELD BURTON, OF BILSTON, ENGLAND, ASSIGNOR OF ONE-HALF TO
FREDERICK ERNEST SANKEY, OF SAME PLACE.

PRESS FOR DRAWING THROUGH AND FORMING UP SHEET METAL.

SPECIFICATION forming part of Letters Patent No. 486,065, dated November 8, 1892.

Application filed February 15, 1892. Serial No. 421,534. (No model.) Patented in England March 7, 1891, No. 4,109.

To all whom it may concern:

Be it known that I, WINGFIELD BURTON, a subject of the Queen of Great Britain, residing at Bilston, in the county of Stafford, England, have invented certain new and useful Improvements in Presses for Drawing Through and Forming Up Sheet Metal, (for which Letters Patent have been granted to me in Great Britain, No. 4,109, dated March 7, 1891,) of which the following is a specification.

In presses for the purpose mentioned in the title the sheet metal to be operated upon is held between the top of the bottom die and a blank-holder, while the plunger or upper tool is brought down through an opening in the blank-holder and forces the sheet metal into the bottom die, the metal which is pressed between the blank-holder and top of the bottom die being drawn inward by the operation of the punch. The purpose of the blank-holder is, as is well known, to prevent the metal puckering. The means heretofore usually adopted for putting and maintaining for the required time the necessary pressure on the blank-holder have been unsatisfactory, as involving a considerable and sometimes an enormous amount of friction, (throwing when the blank-holder is operated by cams on a crank-shaft which works the plunger a heavy strain on such shaft,) besides not conveniently admitting of the raising of the blank-holder as high as is desirable for readily putting a blank in place and lifting it when formed up out of the bottom die, when requiring to be removed therefrom in such manner. According to the usual method, also, of operating the blank-holder the heavy strain causes great wear of the friction-rollers and interferes with the accurate bedding of the blank-holder.

Now this invention has for its object improved means of putting and maintaining the pressure on the blank-holder and of raising it on the return of the punch, whereby, while a greatly-increased pressure may be insured, friction is very considerably reduced in putting on the pressure and is practically avoided and the shaft (when such is used for operating the blank-holder) relieved, while the pressure is maintained of strain arising therefrom, thus reducing to a minimum the wear

of the parts by which the operation of the blank-holder is effected and insuring greater accuracy in the bedding of the holder upon a blank, and whereby the holder is conveniently raised to a greater height than heretofore, affording, consequently, increased facility in putting in the blanks and removing them upward from the bottom die when required to be so removed.

The above object is effected, according to this invention, by suspending the slide which carries the blank-holder from the framing of the press by means of knee levers or arms—that is to say, levers or arms formed each in two lengths pivoted together and their extremities pivoted the one to the framing and the other to the slide which carries the blank-holder; by providing each such lever or arm with a roller projection or corresponding part and providing the moving head which carries the punch with lifters, which as the head, rises lift the rollers and so draw the knee levers or arms out of line into an angular form and raise the blank-holder, and by forming vertical surfaces or slides on the moving head, terminating in shoulders at the bottom, which said shoulders put on the necessary pressure by forcing out the rollers to bring the knee levers or arms each into a straight position, and of which the vertical portions maintain such pressure by insuring against the rollers moving inward during the operation of the punch upon the sheet metal. As the rollers are being raised, they move inward below the shoulders aforesaid. Each roller is preferably placed for the purpose of giving increased lift of the blank-holder intermediately between the pivoted connection of the two lengths of lever, forming a knee-lever, and the point of suspension, and the nearer it is placed to the latter the greater of course will be the lift; but in fixing the exact position regard must be had to the fact that the upper side of the slide carrying the blank-holder must not in working foul the underside of the moving head which carries the punch.

A practical illustration of the application of this invention is given by the accompanying drawings, in which—

Figure 1 is a front elevation of a press with my invention applied thereto, both the blank-

holder and punch being shown at the bottom of their stroke. Fig. 2 is a transverse vertical section taken on line *yy* of Fig. 1. Fig. 3 is a vertical section taken on line *xx* of Fig. 1, the crank-shaft, connecting-rod, and moving head which carries the punch being removed and portions broken away or omitted at top and bottom for convenience of illustration. Fig. 4 is a view corresponding to Fig. 1, but with portions of the machine broken away or omitted for convenience of illustration, showing the parts in position when the blank-holder and punch are at the top of their stroke.

The press illustrated is, except for the application of my improvements thereto, of the common type in which an overhead crank-shaft A, carried in bearings in the framing B, imparts through the medium of a connecting-rod C a vertical reciprocating movement to a head D, guided in guides *p*, formed with or fixed to the framing, said head carrying the punch or force F. (Shown by broken lines, Fig. 1.) The block E, however, which works in vertical guides *r* and carries the adjustable block E', in combination with which it forms the slide to which the blank-holder *q* is bolted, is suspended by knee levers or arms *a b*, of which the portions *a b* are pivoted together at *c* and of which the upper extremities are pivoted to the framing at *d* and the lower extremities are pivoted to the block E at *f*. Rollers *g* are carried to turn on pins *h*, fixed to the levers or arms, preferably, as shown, in position intermediate between the pivot-centers *c* and *d*. The pins *h* at the front of the press are connected, respectively, so as the better to support the rollers, with the corresponding pins at the back by bars *i*, formed each in one length with the opposite pins on the same side of the press. The parts marked *g'*, Fig. 3, are merely reduced portions of the rollers *g* to give increased length of bearing and fill in the space between the rollers and arms *d*. Lifters *j* are formed on the moving head D, in position, as shown, to catch under and raise the rollers as the head is lifted, and thus draw inward the pivoted joints *c*, so as to move the arms *a* and *b* of each knee-lever into an angular position with one another, and so raise the block E. The knee-levers are shown at their greatest angularity by Fig. 4—that is, when the block E is in its highest position. The lifters *j* curve upward toward their outer ends, as shown, to give an easy action in commencing to lift the rollers. As the rollers are moved inward, they pass into the slotted openings *k* in the head, (see Fig. 4,) such openings being formed to allow of the inward movement of the bars *i* also. As the head D descends again, the weight of the block E and parts which it carries tends to draw the knee-levers back again into their straight position, and would draw them completely into such position but for the blank-holder *q* coming down upon the blank. When the block E and parts which it carries cease to

fall of their own weight, shoulders *l*, forming the upper side of the slots *k*, (or the outer corners of such shoulders and which are preferably slightly rounded,) press against the rollers *g* and force them outward until the knee-levers are each brought into line and the blank-holder thus pressed so tightly onto the blank as to flatten it down upon the bottom die F' and hold it with great force or pressure. As the head D continues to descend, vertical surfaces *m* of the head pass down between the rollers, and thus maintain the knee-levers in their vertical or straight position against any tendency to move inward. A small force suffices to maintain the levers in their straight position, and they are prevented from opening outward from such position by projections or stops *n* on the framing. An unyielding pressure is thus maintained on the blank-holder with practically no friction between the rollers and surfaces *m*. The arms *a* of the knee-levers bed at their upper ends in recesses in the framing, and the arms *b* at their lower ends bed in blocks *o*, carried by the block E, and at their middle joints the arms bed one within the other, and thus the joint-pins are relieved from strain as the levers are being forced into and retained in their straight positions.

Having thus described my invention, I claim—

1. In a press for forming up sheet metal, the combination, with a frame and a reciprocating punch-carrying head mounted in guides therein and provided with a lifter *j*, an operating-shoulder *l*, and a surface *m* above the lifter and substantially parallel with its line of motion, of a blank-holder, its slide mounted in guides in the frame, and a pair of knee-levers *a b*, pivoted at one end to the frame and at the other end to the slide which carries the blank-holder, said knee-levers having a projection arranged in the path of the upwardly-moving lifter on the head, whereby when the latter ascends the said lifter will take under said projection and raise the blank-holder through the medium of said knee-lever, substantially as set forth.

2. In a press for forming up sheet metal, the combination, with a frame and a reciprocating punch-carrying head mounted in guides therein and provided at each side with a lifter *j*, an operating-shoulder *l*, and a surface *m* above the lifter and substantially parallel with the line of its motion, of the blank-holder and its slide, the latter mounted in guides in the frame, and a pair of knee-levers, each consisting of arms *a* and *b*, arranged one pair at each side of the path in which the punch-carrying head moves and pivoted at their upper ends to the frame and at their lower ends to the slide which carries the blank-holder, said knee-levers being each provided with a projection at a point in the length of the upper arm *a* and in the path of the ascending lifter on the head, substantially as and for the purposes set forth.

3. As a means for operating the reciprocating blank-holder of a press for forming up sheet metal through the medium of the reciprocating punch-carrying head, the combination, with a projecting shoulder and lifter on the said head, of a knee-lever composed of two arms *a* and *b*, pivotally connected together and the arm *a* pivotally attached to a fixed part of the press and the arm *b* to the slide carrying the blank-holder, said arm *a* being provided with a roller which projects into the path of the said shoulder and lifter on the punch-carrying head, as and for the purposes set forth.

15 4. In a press for forming up sheet metal, the combination, with a frame and punch-carrying head mounted in guides therein and provided with an operating-shoulder *l* and a

surface *m* above the latter and substantially parallel with its line of motion, of a blank-holder, its slide mounted in guides in the frame, a pair of knee-levers *a b*, pivoted at one end to the frame and at the other end to the slide which carries the blank-holder, whereby the descent of the punch-carrying head permits the descent of, depresses, and holds down the blank-holder, and means for raising the blank-holder when the pressure is removed, substantially as set forth.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

WINGFIELD BURTON.

Witnesses:

STEPHEN WATKINS,
ROBERT M. LISTER.