

Jan. 6, 1931.

R. W. STROUT

1,788,071

POWER PRESS

Filed May 25, 1929

2 Sheets-Sheet 1

Fig. 1.

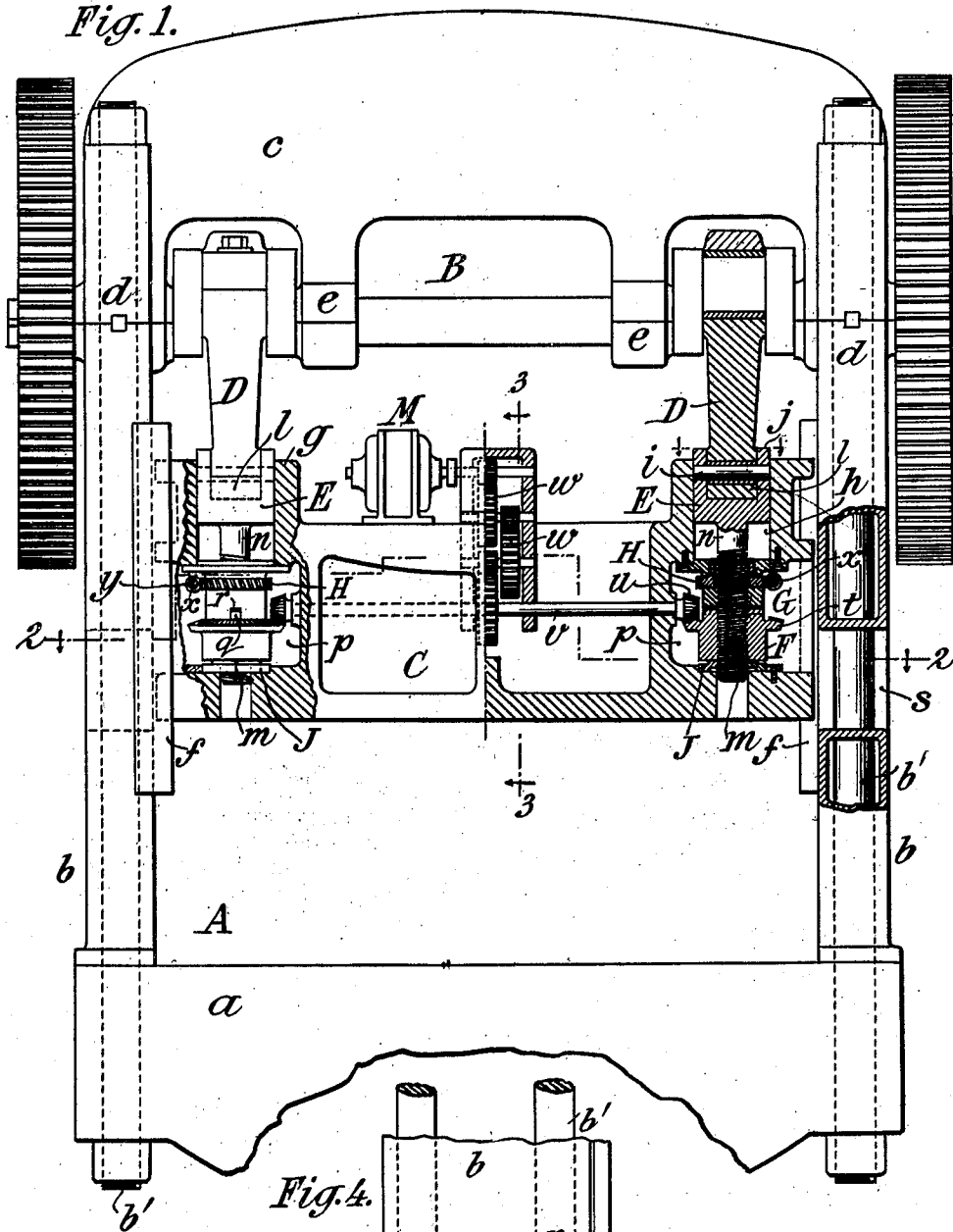
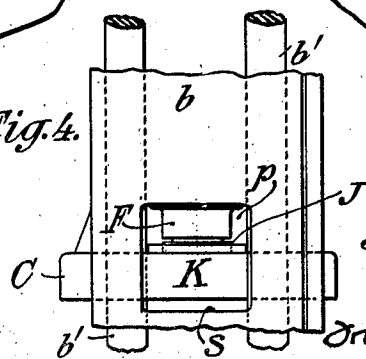


Fig. 4.



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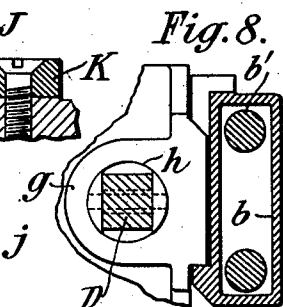
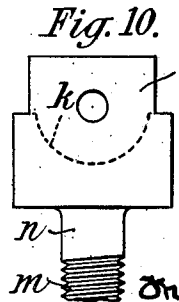
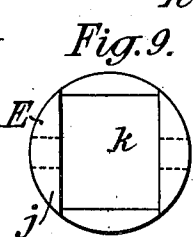
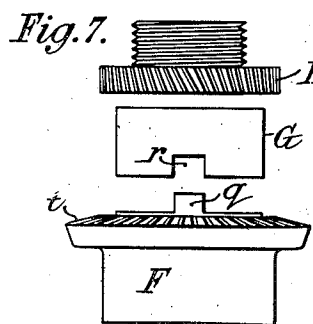
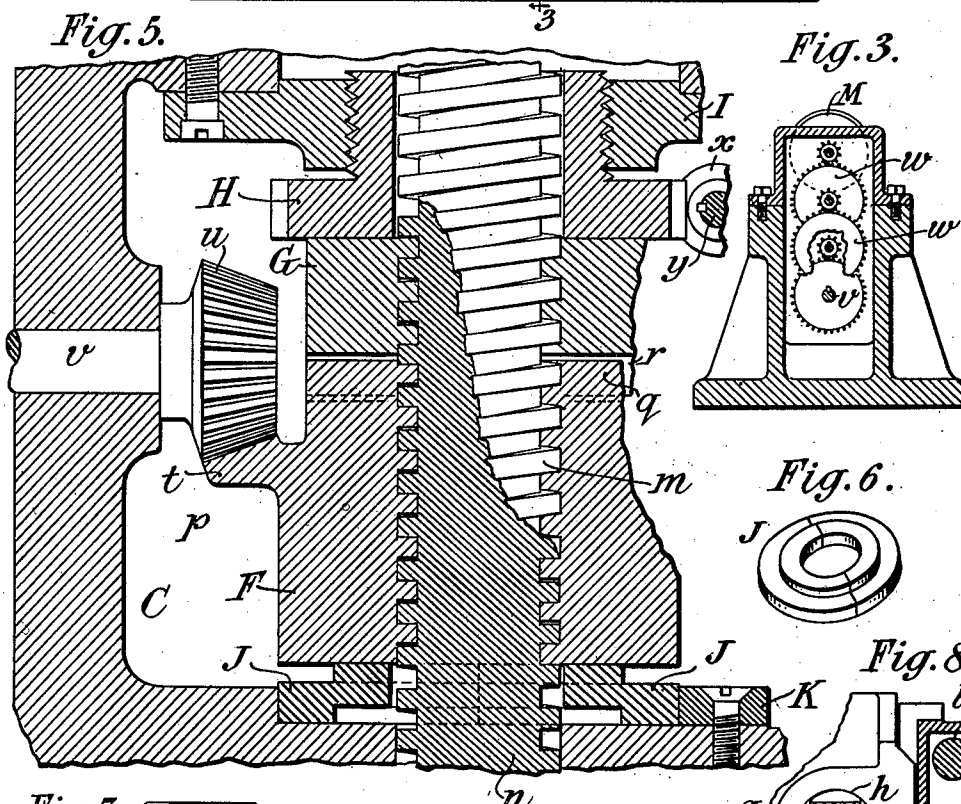
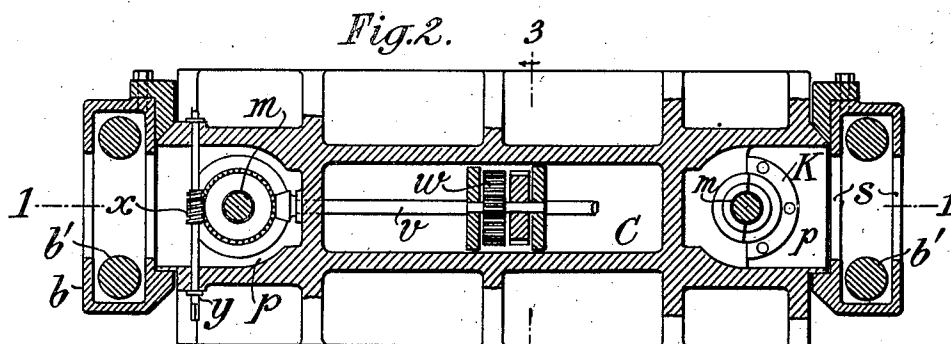
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POWER PRESS

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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

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POWER PRESS

Application filed May 25, 1929. Serial No. 365,842.

This invention relates to power presses for punching, corrugating, and other work with sheet-metal or other materials. It applies to presses of the type having a frame which is usually upright or inclined, a bed for receiving the lower die member, a slide or press head (herein called the platen) for carrying the upper die member or punch, an operating shaft crossing the frame above this platen and having one or more cranks or eccentrics, and a connecting rod or rods for communicating movement from such cranks or eccentrics to the platen. In such presses the platen has been set or adjusted up or down with respect to the shaft (hereinafter called the crank-shaft) by adjusting means which most commonly have operated to lengthen or shorten the connecting rod or rods.

The present invention provides a press wherein the connecting rod (or each such rod) is of invariable length, the adjustment being provided between the rod and that part of the platen to which the effective thrust is communicated. The connecting rod at its lower end has pivotal connection with a member which has guiding engagement with the platen in such manner that it may be set up or down relatively to the platen, such member being screw-threaded, and an adjusting nut having a rotative seating engagement with the platen engages the threads of such member so as to transmit the downward thrust from such member to the platen. A second nut also engaging said threads is provided, which serves to carry the weight of the platen and to lift the latter during the up-stroke. In the preferred construction the two nuts are coupled to turn together, and a screw-threaded abutment reacting upwardly against the platen serves to force them together to lock them upon the threads of the adjusting member. In a wide press having a double crank the connecting rods and their connected parts are duplicated toward opposite ends of the platen, and communicating means are provided for simultaneously turning the respective adjusting nuts so as to adjust the platen bodily up or down with a parallel movement.

The preferred embodiment of the invention as applied to a double-crank press, is shown in the accompanying drawings, wherein:

Figure 1 is a front elevation of the press partly in vertical section, in a plane mainly on the line 1—1 in Fig. 2;

Fig. 2 is a horizontal section in the planes indicated by the line 2—2 in Fig. 1.

Fig. 3 is a vertical transverse section of the middle portion of the press on the lines 3—3 in Figs. 1 and 2.

Fig. 4 is a fragmentary side elevation.

Fig. 5 is a detail view on a much larger scale than the preceding figures, showing the screw and nuts shown at the right in Fig. 1, and their appurtenant parts, the plane of the section being the same as in that portion of Fig. 1.

Fig. 6 is a perspective view of a safety ring.

Fig. 7 is an elevation of the two nuts and the screw abutment. Fig. 8 is a fragmentary section corresponding to the right hand of Fig. 2, in a plane above the platen.

Figs. 9 and 10 are respectively a plan and side elevation of the adjusting member E.

Referring to the drawings, the main frame A of the press is in general of the usual construction, such as is commonly employed in upright presses, and will be referred to herein as an upright or vertical frame, although for smaller presses it is often so mounted as to be tipped or inclined to varying angles. The frame comprises the usual bed *a*, upright side frame *b b*, and crown *c*. The operating shaft B, which will be referred to as the crankshaft (although it might be an eccentric shaft), and which for small presses has usually a single middle crank or eccentric, and for larger presses has two (or more) cranks or eccentrics, is shown as mounted in the frame in the usual manner in bearings *d d* formed at the junction of the side frames *b b* with the crown *c*, and in bearings *e e* hung beneath the crown. The manner of providing bearings for the shaft is immaterial to the present invention. The bed and crown are tied together by tie-rods *b' b'*, according to the usual construction, these rods

carrying the tensile strains for reacting the press thrusts.

The usual movable press head or platen C is mounted to slide in upright guides *f f* formed on the side frames *b b* in the usual manner. This platen is hung from the cranks through connecting rods D D and adjusting members E E. As these parts are duplicates, a description of one set will suffice. Each adjusting member E comprises a head or slide portion which has upright sliding engagement with the platen C. This engagement should be such as to guide the head of the member against the effect of oblique strains transmitted through the connecting rod D. In the specific construction shown, the platen is formed near its end with a rounded boss or projection *g* within which is an upright slideway *h* within which the head *j* of the adjusting member E is received, and the respective surfaces fit closely together as a vertical slideway. Preferably the recess *h* and head *j* are cylindrical, so that they can be finished by boring and turning. The head has within it a socket *k* which receives the rounded lower end or eye *l* of the rod D. In the preferred construction these surfaces are segments of cylinders and fit closely, so that the downward thrust is communicated from *l* to *j* without imposing downward strains upon the pivot pin *i*, the function of the latter being limited to carrying the lifting stresses. The lower part of the adjusting member E is screw-threaded at *m*, this screw-threaded portion being preferably reduced in diameter to form a neck or shank *n*. The screw-threads are engaged by two nuts, F and G; the nut F is the main adjusting and thrust nut; the nut G is the lock or set nut. The two nuts are housed in a suitable recess *p* in the platen. The nut F is seated rotatably with respect to the platen in such manner that the downward thrusts communicated through the member E to the nut are transmitted downwardly to the platen. The nut G has an upright bearing against an abutment H which has an adjustable engagement with the platen, so that it may be set up or down. This is best accomplished by forming it with a threaded portion which engages threads on a bearing piece I which is seated against the underside of the platen above the recess *p*. Incidentally, it closes the bottom of the recess *h*. The nuts F and G are coupled together in any convenient manner, so that normally they turn simultaneously in making the necessary up or down adjustments of the platen. A suitable construction is that best shown in Fig. 7, where the one has a diametrical tongue *q* which enters a groove *r* in the other. The engagement of this coupling is such as to permit to the respective nuts a slight vertical movement or play, as indicated best in Fig. 5.

In order to adjust the platen, the abutment

H being screwed back so as to release its bearing on the nut G and permit a certain vertical play between the two nuts, the latter are turned to screw them up or down on the threaded stem *n* until the desired adjustment is attained. Then the necessary slack which exists between the respective screw-threads is taken up by screwing down the abutment H. This has the effect of pressing down the lock-nut G so that the lower faces of its screw-threads bear downwardly upon the upper faces of the threads *m* of the threaded stem and thereby the lower faces of the threads *m* are pressed down into firm bearing contact with the upper faces of the threads in the nut F. Thus in the operation of the press the downward strains are transmitted from the connecting rod D through the adjusting member E and nut F to the platen. On the up-stroke the lift of the platen is communicated from the screw-threads through the lock-nut G, abutment H, and bearing piece I, to the platen.

The described adjusting means has the advantage of providing a firmly locked adjustment which is free from liability to work loose; and the adjusting member E is so guided with respect to the platen that the two have a virtually solid connection whereby the oblique strains transmitted through the connecting rod are taken up without side thrust and the screw-threads are relieved from lateral strains. The adjusting parts are also so housed and protected that they are not liable to injury and are unlikely to be tampered with.

It is desirable in such presses to provide a safety device which will protect the adjusting means, and as far as possible the dies, from injury in the event of unusual strain, as, for example, when by accident some part comes between the dies, which prevents the full downward movement of the platen; this sometimes occurs in the case of an accidental double feed, and in other ways. At such times it is desirable to provide some unessential or inexpensive frangible member which is capable of transmitting the normal thrusts, but will break or shear when such destructive abnormal thrusts occur, and by its yielding will save the more valuable parts of the machine from destruction. In the present press this safety means is afforded by a bearing piece J which is interposed between the nut F and the platen, and is so shaped as to be sheared through in the case of a sufficiently abnormal stress. This bearing piece is conveniently made in the form of a ring having bearing faces at top and bottom which bear respectively against the underside of the nut and the top of the bearing face on the platen. These bearing portions are out of line, as best shown in section (Fig. 5) and afford between them a relatively weak neck which will yield to shearing strain in the event of a sufficiently

abnormal stress. It is desirable to provide for the ready replacement of such a safety member after it has been sheared; and for this purpose the bearing ring may be divided diametrically into halves, as best shown in Fig. 6, so that either half can be removed without the necessity of adjusting the screw neck *n* up into the nut F. In use, the safety ring J is housed in a bearing socket which engages its base peripherally, one side or half being formed solidly in the platen, and the other side or half being a segmental ring or flange K fastened down by screws which may be removed, so that by taking it off the halves of the safety ring may be taken away laterally. To facilitate this operation the recess *p* is open at the lateral side or end of the platen, and the side frame *b* is formed with an opening *s* through which access may be had to the open end of the recess. By dropping the platen until the openings are in approximate coincidence, as shown in Fig. 4, access may be readily had through the opening *s* and open side of the recess *p* to the safety bearing ring and its removable flange K. The ring J need not be divided if in using the press the nuts F are turned to lower the platen so far that the threaded shanks *n* do not project down beneath the bottoms of the nuts F; thus adjusted, the safety rings may be replaced through the end openings *s* by a bodily horizontal movement; and with this construction the removable flange or half ring K is not required.

In a double-crank press it is desirable that the adjusting nuts F, G, at right and left, be turned simultaneously so as to lift or lower the platen equally at opposite ends, that is, with a parallel motion. For this purpose a communicating train of mechanism is provided for simultaneously and equally rotating the respective nuts. This mechanism is clearly shown in Figs. 1 and 2. Each nut F is formed with a bevel gear *t* engaged by a pinion *u*. The two pinions *u* are mounted on opposite ends of a shaft *v* which is driven from an electromotor M (or other source of power or movement) through any suitable gear train *w*. A suitable train is that shown in Fig. 3, which also shows the preferred construction of the middle portion of the platen for receiving and housing such train of gears. For turning the abutment nuts H, they are formed with peripheral gear teeth engaged by worms *x* on transverse shafts *y*, this construction being best shown in Fig. 2. Each shaft *y* projects at its end and is squared in order that it may be turned by a key.

Obviously the details of the mechanism may be greatly varied within the skill of engineers and in accordance with the varying types of presses to which the invention may be adapted.

It will be understood that while the present

invention is shown as embodied in a normally upright press, yet that the machine thus constructed may be applied with its frame laid horizontally or in any inclined position, and hence that the terms "upright", "vertical", "up or down", and the like, used in this specification and the accompanying claims, are to be understood in a relative sense and not as limiting the invention to use in a press which stands vertically or in any other given position.

What I claim is:

1. In a press having an upright frame, a reciprocating platen movable in guides therein, a crank-shaft, and a connecting rod of invariable length for transmitting motion from said shaft to said platen, means for providing an adjustable connection between the connecting rod and platen comprising a threaded member seated within the platen and having guiding engagement with the platen, to which member the connecting rod is pivoted, the platen having a vertical socket receiving and guiding said member, and an adjusting nut within the platen engaging the threads of said member and having a bearing on the platen adapted to transmit thereto the downward thrust from the connecting rod, and locking means for said nut.

2. In a press according to claim 1 said locking means being a lock-nut within the platen engaging said threads reacting upwardly against the platen and adapted to take up slack between the respective threads.

3. In a press according to claim 1, a lock-nut and means for exerting endwise pressure to take up slack between the threads of the threaded member and of said nuts.

4. In a press having an upright frame, a reciprocating platen movable in guides therein, a crank-shaft, and a connecting rod of invariable length for transmitting motion from said shaft to said platen, means for providing an adjustable connection between the connecting rod and platen comprising a threaded member having guiding engagement with the platen, to which member the connecting rod is pivoted, an adjusting nut engaging the threads of said member and having a bearing on the platen, a lock-nut connected to said adjusting nut to turn therewith, and an adjustable abutment above said lock-nut transmitting reaction therefrom to the platen.

5. In a press according to claim 4, the abutment having threaded engagement with the platen overlying the lock-nut and rotative to force the latter downward.

6. In a press comprising a platen a crank-shaft, a connecting rod, and an adjusting screw for adjusting the connection between the connecting rod and the platen, an adjusting nut and lock-nut engaging said screw, said nuts coupled to turn together and having relative end play, and means for moving

the lock-nut endwise of the screw to lock the adjusting nut on the screw.

7. In a press according to claim 6, said means for moving the lock nut endwise comprising a screw abutment reacting against the platen and rotatable to force the lock-nut downward.

8. In a press, a platen, a crank-shaft, a connecting rod, and an adjusting member for adjusting the relation of the connecting rod and platen, said adjusting-member seated in a recess in the platen and having a cylindrical head fitting said recess and a reduced threaded neck, and an adjusting nut engaging said neck, and the platen formed with a recess housing said head and nut.

9. A press frame comprising upright side frames, a platen movable in slideways therein, a crank-shaft, a connecting rod, and an adjusting member, said adjusting member having a threaded portion, a frangible member adapted to shear under abnormal pressure a nut engaging said threaded portion, the platen having a recess housing said nut and frangible member opening at its end, and the side frame having an opening through which the recess is accessible to replace said frangible member.

10. A press comprising a frame, crank-shaft, platen, connecting rod, and an adjusting member through which movements are communicated to the platen, and a frangible safety member interposed between said adjusting member and platen through which the downward stresses are communicated, and having a weakened portion adapted to shear under abnormal pressure.

11. In a press according to claim 10, the safety member formed as a ring having upper and lower bearing portions relatively displaced to shear between them.

12. In a press according to claim 10, the safety member formed as a divided ring.

13. In a press according to claim 4, the adjustable abutment formed as a worm gear, and a worm shaft carried by the platen for turning said abutment.

14. In a plural crank press, a crank-shaft, platen, connecting rods, and intervening adjusting members having threaded portions with adjusting nuts engaging them, lock-nuts and adjustable screw abutments, means for simultaneously adjusting both adjusting members comprising a shaft having gear connections with both said adjusting nuts, and separate adjusting shafts having worm gear engagement with said abutments for adjusting the latter to lock said lock-nuts.

In witness whereof, I have hereunto signed my name.

ROBERT W. STROUT.