

Jan. 19, 1937.

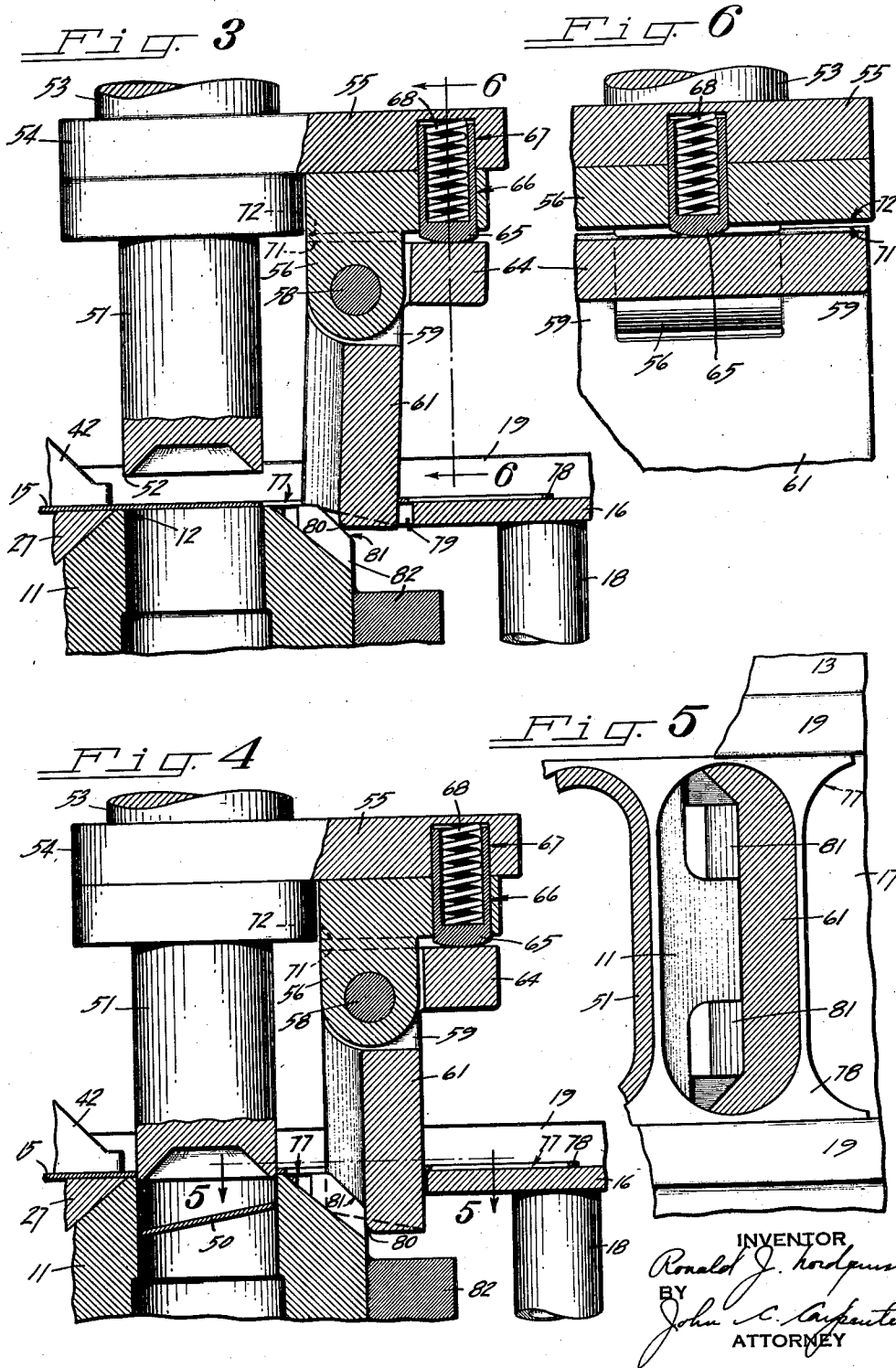
R. J. NORDQUIST

2,067,943

PRESS MECHANISM

Filed July 15, 1931

2 Sheets-Sheet 2



UNITED STATES PATENT OFFICE

2,067,943

PRESS MECHANISM

Ronald J. Nordquist, Maplewood, N. J., assignor
to American Can Company, New York, N. Y., a
corporation of New Jersey

Application July 15, 1931, Serial No. 550,929

9 Claims. (Cl. 164—21)

The present invention relates to a press mechanism and has particular reference to work feeding devices associated with a cutting operation by means of which sheet material is properly located in the cutting elements.

The principal object of the present invention is the provision of work locating devices closely associated with a cutting operation in a press and controlling the proper positioning of sheet material for the desired press operation.

An important object of the invention is the provision of a press mechanism of the character described which embodies a primary work feeding element cooperating with the work locating device and assisting in properly presenting the sheet material or work for the desired press action.

Numerous other objects of the invention will be apparent as it is better understood from the following description, which, taken in connection with the accompanying drawings, discloses a preferred embodiment thereof.

Referring to the drawings:

Figure 1 is a longitudinal sectional view of a mechanism embodying the present invention, being taken substantially along the broken line 1—1 in Fig. 2;

Fig. 2 is a top plan view of the lower part of the same as taken substantially along the line 2—2 in Fig. 1, parts being broken away and parts being shown in section;

Fig. 3 is an enlarged fragmentary view of the principal parts of the mechanism shown in Fig. 1, this view showing these parts partially in side elevation and partially in section;

Fig. 4 is a view similar to Fig. 3 showing a different operating position of the parts;

Fig. 5 is a fragmentary sectional view taken substantially along the line 5—5 in Fig. 4; and

Fig. 6 is a fragmentary sectional view taken substantially along the line 6—6 in Fig. 3.

In the drawings there is illustrated a typical press mechanism for performing a cutting or blanking operation and such mechanism embodies a stationary die member and a cooperating movable punch member. Sheet material in the form of a strip and constituting the work, is fed through the press in a typical step by step movement by means of a reciprocating feed bar sliding in a work table. This feed bar presents the work to the first blanking operation and the resulting blank is discharged through the center of the die leaving a skeleton end on the strip.

For the next and for subsequent operations the strip, with its skeleton section, is advanced by the feed bar to an approximate blanking position over the die. A locating finger pivotally associated with the descending punch now comes into action entering the blank opening in the skeleton end of the strip. As punch and finger continue to descend the latter, projecting through the strip

opening, engages a cam surface on the die and is rocked on its pivot, this movement shifting the strip into exact location for the blanking operation that immediately follows.

Such strip movement takes place near the end of the downward stroke of the punch and just prior to the punch engaging the work. During cutting of the blank, the locating finger remains in its vertical position and holds the strip in its exact cutting location. Such accurate locating of the strip, since less allowance in metal is required for the cut, permits the use of smaller strips with a minimum of scrap material left in the resulting skeleton.

This press mechanism comprises a stationary die member 11 (Figs. 1 and 2) having a cutting edge 12 and this member is mounted upon a bolster plate 13 to which it is secured by screws 14. The bolster plate 13 and parts carried thereby may be suitably mounted in a press in the usual and desired manner.

A strip of sheet material 15 constitutes the work from which blanks may be cut and this is introduced into the machine and is advanced over the upper surface of a table 16 extending on both sides of the die member 11. The upper surface of the table, designated by the numeral 17, is flush with the top edge of the die member. This table may be secured to the bolster plate 13 through the medium of spacing blocks 18. Guide walls 19 formed integrally with the table, project upwardly from its surface 17 and extend along its longitudinal edges. These walls guide the strip 15 during its passage through the machine and over the die 11.

The feeding-in end of the table 16 is longitudinally grooved to present a stepped construction, a central groove 22 being formed beneath laterally disposed shelves 23. This central groove provides a slideway for a reciprocating feed bar 27. Plates 28 are mounted on the shelves 23 and are held in position by screws 29. These plates overhang the inner edges of the shelves, and extend into sliding engagement with grooved corners 30 of the feed bar 27 (Fig. 2). The upper surfaces of the plates and of the feed bar are flush with the surface 17 of the table 16 providing an unobstructed passageway for the strip 15 as it is advanced between the guide walls 19.

Reciprocation of the feed bar 27 is effected in any suitable manner, a lug 31 formed integrally with the bar being shown as exemplifying a proper connection for this purpose. This lug 31 moves within a slot 32 formed in the table 16 and extends below the table for pivotal connection with one end of a connecting rod 33.

The feed bar 27 carries pivotally mounted, spring held feed dogs 35 disposed in spaced recesses 36 cut in the upper part of the bar. Each dog is normally held in its raised position by a

spring 38 seated in a pocket 39 formed in the base of its associated recess 36. These dogs 35 successively engage the end of the strip 15 during reciprocation of the feed bar and advance it step by step into the different cutting positions in the usual and preferred manner.

A pair of spring held shoes 42 are mounted for engagement with the advancing strip and prevent return or backward movement of it when the feed bar moves on its return reciprocation. These shoes also prevent overthrow of the strip which might occur with high speed feeding movement. Each shoe 42 is pivoted at 43 and moves in a recess 44 formed in a frame part 45 of the press. A spring 47 is used with each shoe, being located in a bore 48 cut in the frame part 45. This spring bears upon its shoe 42 yieldingly holding it against the strip 15. A screw 49, threadedly disposed within the top part of each bore 48, provides the proper backing for its associated spring and makes possible some spring adjustment.

A suitable punch member is provided for cooperation with the die mechanism. This member comprises a blanking or cutting punch 51 having a cut edge 52 (Figs. 1, 3 and 4) which is located for vertical movement in alignment with and directly above the stationary die member 11. The punch 51 may be carried on the lower end of a shank 53 adapted for mounting in a suitable press slide in the usual manner.

On its downward movement the punch 51, passing through the strip 15, enters the die 11, the cutting edges 12, 52 removing a punching 50 (Fig. 4) from the strip. Shank 53 is provided with a flange 54 which is extended laterally at 55 to provide support for a bracket 56. This bracket is a part of a locating device which supplements the strip positioning by the feed bar 27 and which accurately locates the work for the blanking operation. A pivot pin 58 is secured in the bracket 56 and its ends project outwardly to provide a bearing in spaced lugs 59 formed in a locating or adjusting finger 61. The finger 61 is extended at right angles in a web 64 which joins with the lugs 59. This web engages a spring barrel 65 which slides in a bore 66 cut in the bracket 56 and also in a bore 67 cut in the flange extension 55. A spring 68 is disposed within the barrel 65 and exerts an outward pressure from the barrel and through it upon the web of the locating finger tending to hold the latter in the position shown in Fig. 1. An upper corner 71 of each lug 59 (Figs. 3, 4 and 6) strikes against a surface 72 in the bracket 56 and this limits the pivotal movement of the finger 61 in its spring pressed direction. The finger is or may be substantially parallel with the path of the punch.

For the first blanking stroke of the punch 51 and for the removal of the first blank 50, the strip 15 is positioned for cutting by the feed bar, as previously described. During this first blanking operation, the locating finger 61 performs no function, it being in front of the strip. Each blank, as removed from the strip, leaves an opening 77 the surrounding part of the strip not removed constituting a skeleton strip section 78 (see Fig. 5). On succeeding blanking strokes of the press, that is following the first operating stroke, the strip with its skeleton section is initially and approximately positioned over the die by the feed bar 27 (Fig. 3). Following this and during the lowering of the punch unit and before cutting takes place the lowermost end of the fin-

ger 61 (carried with the moving punch) enters into the opening 77 of the strip.

The finger 61 is shaped to snugly fit into the opening 77, this finger engaging more than half of the peripheral edge of the opening. This is to insure a corresponding movement of the strip with the finger when so engaged, as will be fully explained. Table 16 is cut away at this place to provide a clearance opening 79 for the finger.

Upon further descent of the punch unit, lower corners 80 of the finger 61 strike cam surfaces 81 formed in a cam 82. This cam is mounted adjacent the die member 11 and is secured to the bolster plate 13. The cam surfaces 81 are formed in spaced projections of the cam 82 which project snugly engage the die member 11. The engaged corners 80 of the descending finger 61 slide along the cam faces 81, this action rocking the finger on its pivot 58.

At this time the lower end of the punch is approaching but has not yet reached the upper surface of the strip. The strip is, therefore, free to move forward with the rocking finger, being otherwise only frictionally held by the spring pressed shoes 42. The descending finger during this locating of the strip is sliding downwardly within the strip opening 77, the cross section of the finger being uniform throughout this part so as to maintain its closely sliding fit with the strip.

The strip 15 moves forward with the shifting finger until the corners 80 of the finger ride off of the incline cam surfaces. The strip is then in the proper accurate position for blanking. The remainder of the press stroke moves the locating finger downwardly through the strip and along the vertical face of the cam 82 (Fig. 4). This engagement with the vertical wall locks the finger against backward pivotal movement and guides or holds the finger and strip in a non-feeding position during the removal of the blank 50 by the cooperating die parts.

It will be evident from the preceding description that each opening 77, with the exception of the last in the strip, provides the reference or gauge point for the next blanking cut. This, by insuring accurate relationship at all times between the cuts produces connecting bridge parts left in the skeleton 78 which are of only a minimum width, making possible a great saving in material.

I am aware that it has been proposed heretofore to use a feeding finger carried by the punch head and having its lower end actuated by a fixed cam, as the sole feeding means for the strip to be punched, and I do not claim the same. But such feed is not satisfactory where an accurate and durable feed is required. I have improved upon the same by combining with it a reciprocating bar feed which feeds the strip almost far enough for the action of the punch, and constructing the finger so that it is not actuated until the strip has been delivered by the feed bar into the sphere of action of the finger, whereupon the latter engages the strip and advances it a small distance further and locates it accurately in the final punching position without any lifting action on the strip and by pressure substantially in the direction of the plane of the strip. It has also been proposed to set the strip backward by a spring-actuated finger on the punch head, and I do not claim such a construction.

It is thought that the invention and many of its attendant advantages will be understood from the foregoing description, and it will be apparent that various changes may be made in the

form, construction and arrangement of the parts without departing from the spirit and scope of the invention or sacrificing all of its material advantages, the form hereinbefore described being merely a preferred embodiment thereof.

I claim:

1. A press mechanism comprising in combination, a pair of opposed cooperating instrumentalities for cutting blanks from sheet material, feeding devices reciprocating in the plane of the sheet material for primarily advancing the said material between said instrumentalities to a point rearwardly of its desired position, and means carried on the moving instrumentality and moving substantially parallel therewith and engaging within the opening made in said sheet material by removal of a said blank for further advancing said material to definitely locate the same for the next blank cutting operation, and means for moving said advancing means only in the direction of the feeding of the material.

2. A press mechanism comprising in combination, a pair of opposed interengageable instrumentalities for cutting a blank from a strip of sheet material, feeding devices reciprocable in the plane of the strip for initially moving said strip to an approximate longitudinal cutting position rearwardly of and between the instrumentalities, a finger pivotally mounted on one of said instrumentalities and engaging within the opening made in said strip by removal of a previously cut blank, and means operating prior to the blank cutting operation for moving said finger on its pivot to further advance said strip in a forward direction only to accurately locate the strip with respect to said cutting instrumentalities.

3. A press mechanism comprising in combination, a pair of opposed interengageable instrumentalities for cutting blanks from a strip of sheet material, a table associated with one of said instrumentalities for supporting said strip, a feed bar reciprocating in the plane of the strip for initially advancing said strip in a step by step movement to an approximate position between the instrumentalities for each cutting operation, a movable finger mounted on one of said instrumentalities and engaging within the opening made in said strip by removal of said blank for further advancing and accurately locating said strip relative to said instrumentalities for the next cutting operation, and means operating on said finger for locking it in located position and through it holding said strip in said instrumentalities during the following blank cutting operation.

4. A press mechanism comprising in combination, a pair of opposed interengageable instrumentalities for cutting blanks from a strip of sheet material, means for moving said sheet into approximate location with respect to said cutting instrumentalities, a movable finger mounted on one of said instrumentalities and engaging within the opening made in said strip by removal of said blank for further advancing and accurately locating said strip relative to said instrumentalities for the next cutting operation, a cam for moving said finger forward, and spring pressed means for frictionally engaging and holding said strip while permitting its location by said finger.

5. A press mechanism having in combination a reciprocable punch and a die, means reciprocating in a horizontal plane for initially feeding

and positioning sheet material between and rearwardly of said punch and die, a finger movably connected with the punch whereby it is inserted in a punched-out opening in the material for engagement with the same, the engaging portion of said finger having a configuration conforming to a substantial portion of said punched-out opening, and a cam fixedly connected with the die, against which cam the inserted finger is engaged by the punching movement to advance the finger and the material further in the direction of feeding only to accurately position the material for the punching operation.

6. A press mechanism having in combination a reciprocable cutter and a fixed cutter, means reciprocable in a horizontal plane for initially feeding and positioning sheets rearwardly of and between said cutters, and a finger connected and reciprocable with the movable cutter for engaging a punched edge portion of the sheet to give forward longitudinal movement only to the sheet in addition to the movement given by said feeding means, whereby said sheets are accurately positioned between said cutters to be operated on thereby without reverse movement of the sheet, and a spring pressed shoe engaging said sheet and yielding to the action of said finger to permit the sheet to be advanced by said finger.

7. A press mechanism for operating on sheet material, having in combination: opposed punch and die devices one of which is movable, means for moving said sheet into approximate location with respect to and rearwardly of said punch and die devices, a sheet-positioning finger movably connected with the movable device, and means located at the lower side of the path of the sheet for engaging and moving forwardly a part of said finger which has passed through the sheet to engage said finger with and thereby further advancing and accurately positioning the sheet.

8. A press mechanism for operating on sheet material, having in combination: opposed punch and die devices one of which is movable, means for moving said sheet into approximate location with respect to said punch and die devices, a sheet-positioning finger movably connected with the movable device, and means located at the lower side of the path of the sheet for engaging and adjusting a part of said finger which has passed through the sheet and thereby further moving and accurately positioning the blank, and guiding means for holding the finger in the position to which it has been adjusted, during further movement of said movable device.

9. A press mechanism for operating on strip material, having in combination: opposed punch and die devices one of which is movable, means for moving said strip material into approximate location with respect to said punch and die devices, a strip-positioning finger movably connected with the movable device, and means located at the lower side of the path of the strip for engaging and adjusting a part of said finger which has passed through the strip and thereby further moving and accurately positioning the strip for the punching operation, said engaging and adjusting means having a part parallel with the axis of the punch, on which part the finger may slide when the proper adjustment of the strip has been made.

RONALD J. NORDQUIST.