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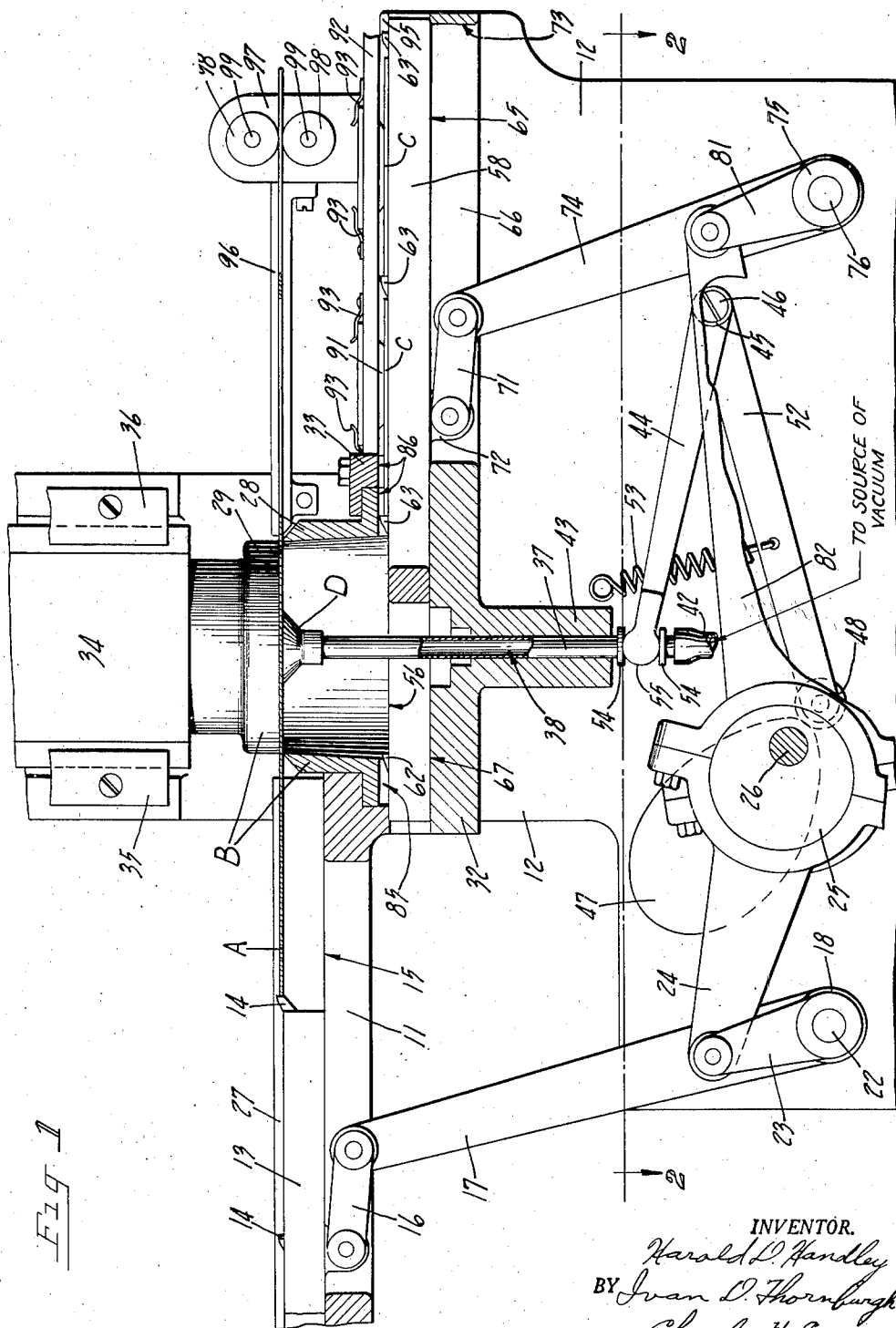
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FEEDING AND BLANKING DIE MECHANISM

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FEEDING AND BLANKING DIE MECHANISM

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This invention relates to die mechanism for blanking sheet material and has particular reference to a holding device located in the die for engaging the sheet material as a blank is cut therefrom and for holding the blank under control while shifting it through an opening in the die mechanism.

The present invention contemplates a feeding and blanking die mechanism in which blanks or flat discs are cut from sheet material advanced along one plane while the material is engaged and held during the cutting and in which the cut blank then is shifted under control to some other plane along which it may be moved to a suitable place of deposit such as to the working station of an adjacent machine.

An object of the invention is the provision of a blanking die mechanism for cutting blanks from strip sheet material on one plane or level and having devices within the die for holding the cut blank under control and for shifting and releasing it at some other plane or level for discharge from the mechanism.

Another object of the invention is the provision of feeding and blanking die mechanism for feeding strips of sheet material intermittently on one level into a blanking die and for cutting blanks from the strip wherein suction devices located in the die hold the strip in a blanking area while cutting the blank and hold the blank after cutting and thereafter shift the cut blank through the die while holding the blank under control to release it at a different level for further advancement.

Numerous other objects and advantages 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 section of a feeding and blanking die mechanism embodying the instant invention, with parts broken away;

Fig. 2 is a sectional top plan view of the parts shown in Fig. 1 as taken substantially along the lines 2—2 in that figure with parts broken away;

Fig. 3 is a fragmentary sectional view of the die mechanism shown in Fig. 1 illustrating the moving parts in a different position; and

Fig. 4 is a detail showing the forked end of a feed bar.

As a preferred embodiment of the invention the drawings illustrate the principal parts of a feeding and blanking die mechanism, wherein flat sheet material preferably in web or strip form

is fed along on one level for cutting or punching blanks therefrom. In this mechanism the web or strips of sheet material, indicated by the letter A, are fed progressively in an intermittent or step by step manner along a predetermined path of travel to pass between movable and stationary die parts of a die mechanism B (Fig. 1) which is located at a blanking station of a conventional punch press or other machine.

As the strip A is brought to rest during the intervals between the stepped advancement, it is engaged and held temporarily preferably just prior to and during the cutting of a blank C (Fig. 3). This is accomplished by means of a movable suction cup D which moves within an opening in the die mechanism.

The suction cup D holds the strip at that portion which is to be cut out and which constitutes a blanking area. After such a cutting operation the suction cup continues to hold the resulting blank C and draws it downwardly through the die part to another plane or level while keeping it under control. At this different level, the blank is released for further advancement.

The drawings of this invention illustrate a mechanism in which the blanks C, are cut on one level and are delivered onto a lower level but the invention applies equally as well to blanks that are to be delivered into any desired plane different from the plane of cutting.

In the instant mechanism, Fig. 1 of the drawings illustrates a strip A being fed longitudinally along a feed table 11 toward the die mechanism B which is located adjacent the inner end of the table. This table is mounted on one side of a frame 12 which may be the main frame of a punch press or other machine of which the die mechanism forms a part as hereinbefore mentioned. The advancement of the strip is effected by a reciprocating feed bar 13 having spring held, depressible feed dogs or fingers 14 spaced along the bar. This feed bar slides in a slide way 15 which is formed in the table 11.

The feed bar 13 is reciprocated through a forward or feeding stroke and thence through a back or return stroke by a link 16 which connects the bar to one end of a rocker 17 of a lever 18. This lever is carried on a stud or pivot pin 22 mounted in the frame 12. The lever 18 has a short arm 23 which is connected to one end of an eccentric arm 24 which surrounds an eccentric 25 mounted on a horizontal drive shaft 26 journaled in bearings formed in the main frame.

The drive shaft 26 may be rotated in any suitable manner. The rotation of this shaft and the eccentric 25 thus effects movement of the arm 24 for operating the lever 18 in time with other moving parts of the mechanism.

As the feed bar 13 moves through a forward or feeding stroke, the strip A is advanced one step along the table 11 into the die mechanism B. Side guides 27 provided on each side of the table 11 guide the strip, whereby a portion of the strip is positioned between cooperating lower stationary and upper movable die parts 28, 29 of the die mechanism B. These die parts are in separated relation during each feeding stroke so that the sheet material may be placed over the lower die part 28 and in position for cutting.

The lower die part or stationary member 28 is mounted on a bolster plate 32 secured to the machine main frame 12. This stationary die member is fastened in position by clamps 33 which are bolted to the frame. The upper or cutting edge of the die part 28 is substantially on the same plane as the upper or initial feed level. It is over this cutting edge that the strip advances during a feeding stroke.

The upper die part or punch 29 is reciprocated vertically and is secured to the lower end of a slide 34. This slide moves in slideways 35, 36 mounted on the machine main frame 12. The slide is reciprocated through a down or working stroke and then through an up or return stroke in any suitable manner in time with the feed bar 13. This is a usual punch press construction.

The suction cup D, located within the die 28 is carried on the upper end of a vertically reciprocable tube or hollow rod 37. This cup preferably is formed from resilient material such as rubber or the like. The cup has an opening which leads to the upper or sheet engaging surface and which communicates with a passage 38 in the tube 37. The lower end of this tube carries one end of a flexible connecting hose 42 which leads to a suitable source of vacuum. The tube 37 is vertically reciprocated through an up stroke and thence through a down stroke in a bearing 43 which may be formed integral on the bolster plate 32.

The tube 37 is actuated by a rocker arm 44 of a lever 45 carried on a stud or pivot pin 46 secured in the main frame. The lever 45 is operated by an edge cam 47 mounted on the shaft 26. This cam cooperates with a cam roller 48 carried on the outer end of an arm 52 of the lever 45 and thus effects movement of the lever in time with other moving parts of the machine. A spring 53 connected to the arm 52 has one end hooked to a stud secured to the frame 12 and this keeps the cam 47 and roller 48 in operating engagement.

The tube 37 and arm 44 are linked together in any desirable manner such as by a forked end of the arm located between a pair of spaced collars 54 (Figs. 1 and 2) formed near the lower end of the tube 37. The terminal ends of this fork are rounded as at 55 to effect a rocking action as they engage against the spaced walls of the collars.

Following the delivery of the strip A into cutting position at the blanking station, the suction cup D preferably moves up into engagement with the strip and holds it stationary against the cutting edge of the die 28 (Fig. 1). The punch 29 moves down and cuts through the strip and enters the die member 28 and thereby severs the portion of the strip held by the suction cup, which

severing operation results in a blank C. In some installations it may be desirable for the suction cup not to engage the strip but to come into holding position only after the blank C is severed.

When the punch returns on its up-stroke, the suction cup holds onto the cut-out blank and keeps it under control while the cup moves down through the die to the lower level, indicated by the numeral 56. At the bottom of its down stroke, the suction cup D brings the blank C into superimposed position onto a reciprocating auxiliary feed bar 58 which is located at the lower feed level 56.

The rear end of feed bar 58 adjacent the suction cup is formed with two spaced and parallel fork prongs 61 (Fig. 4) which straddle the suction cup tube 37. Each of these prongs carries one depressible feed finger 62, the two fingers being engageable simultaneously behind the rear edge of a drawn-down blank C to strip the blank off the suction cup D when the auxiliary feed bar moves through a forward stroke. The main portion of the auxiliary feed bar carries a plurality of feed fingers 63 which are spaced at intervals therealong.

The main portion of the auxiliary feed bar 58 slides in a horizontal groove 65 formed in an auxiliary feed table 66 which is integral with the main frame 12 of the machine. The forked end of the feed bar slides in a wider groove 67 which is located beneath the stationary die 28 and which is formed in the bolster plate 32.

The auxiliary feed bar 58 is reciprocated through a forward or feeding stroke and thence through a return stroke by a link 71. One end of the link is fastened to a lug 72 which depends from the feed bar and which operates in a slot 73 formed in the auxiliary feed table 66. The other end of the link is connected to a rocker arm 74 of a lever 75 mounted on a pivot pin 76 secured in the main frame 12.

The lever 75 is formed with a short actuating arm 81 which at its outer end connects with an eccentric arm 82. The eccentric arm surrounds an eccentric 83 mounted on the drive shaft 26. The rotation of this eccentric with the shaft 26 results in the movement of the actuating arm 81 and its lever 75 and thus reciprocates the feed bar 58 in time with the other moving parts of the machine.

When the feed bar 58 moves forward through a feeding stroke (toward the right as viewed in Fig. 1) the feed fingers 62 in the forked prongs 61 advance the blank C one step along the lower feed level 56 and into the path of travel of the feed fingers 63. Lateral openings such as notches 85, 86 in the bottom of the stationary die 28 and in the adjacent clamp 33 provide clearance for the feed bar fingers 62, 63 during these strokes.

On the return stroke of the feed bar 58 the advanced blank C is held stationary in its advanced position by hold-down blocks 91 which are disposed above the path of travel of the blanks on the auxiliary table 66 and which engage against the blanks. The blocks 91 are supported in longitudinal bars 92 which are secured to the table. Flat leaf springs 93 having one end secured to the support bar and the other end freely engaging the top of the blocks, press the blocks against the blanks C on the table to apply pressure thereto.

A blank C advanced into the path of travel of the feed fingers 63 in the main portion of the feed bar 58 is engaged by these fingers as the

feed bar reciprocates through successive feed strokes and is advanced along the auxiliary table 66 in a step-by-step manner. Guide rails 95 secured to the table guide the blanks as they advance therealong. At the outer end of the auxiliary feed table the blanks C are discharged from the machine by the feed bar to any suitable place of deposit.

During this cutting of the blanks C from the strip A and the transfer and advancement of the blanks to and along the lower feed level 56, provision is made to take care of the scrap skeleton which is the remains of the strip after the blanks have been removed. This scrap skeleton is advanced by the higher level feed bar 13, along a pair of guide rails 96 which form a continuation of the feed table 11. These rails are secured at their ends to the main frame 12 and to a bracket 97 which is bolted to the outer end of the auxiliary feed table.

The scrap skeleton is discharged from the machine by a pair of discharge rollers 98 between which the skeleton passes as it is advanced by the feed bar 13. These rollers are mounted on short driving shafts 99 which are carried in bearings formed in the guide rail bracket 97. The rollers are periodically rotated, once for each strip A, in time with the other moving parts of the machine and in any suitable manner to discharge the skeleton, after all the blanks have been removed from the strip. This is a usual skeleton discharge device employed on numerous punch presses and other blanking die machines and it is therefore felt that further description of the device is unnecessary.

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. In a blanking die mechanism for cutting blanks from sheet material, the combination of blanking die members one movable into the other and engageable with a surface of said sheet material for cutting a blank from the sheet material therebetween, means located in one of said die members for engaging the opposite surface of the sheet material for holding the cut blank under control, and means for moving said blank holding means out of the plane of said sheet material independently of and relative to the movement of said die member.

2. In a blanking die mechanism for cutting blanks from sheet material, the combination of a stationary die member having an opening therein, a punch member movable into said die opening for cutting a blank from sheet material placed adjacent said opening, and holding devices located in said stationary die for engaging said sheet material to hold it under control while a blank is cut therefrom and for shifting the cut blank through said opening.

3. In a blanking die mechanism for cutting blanks from sheet material, the combination of a stationary die member having an opening therein, a feeding device adjacent said die member for advancing said sheet material in a plane across said die opening, a punch member movable into said die opening for cutting a blank from the sheet material, holding devices located in said stationary die for engaging the sheet material to hold it under control while a blank is being cut therefrom and for shifting the cut blank through said stationary die opening to a different plane, and an auxiliary feeding device located at the said different plane for receiving the shifted blank.

4. In a blanking die mechanism for cutting blanks from sheet material, the combination of a stationary die member having an opening therein, a punch member movable into said die opening for cutting a blank from sheet material interposed between said die and punch members at one level and a suction cup located in said stationary die and operable therein for engaging the blank to hold it under control and for shifting the cut blank to discharge it from said mechanism at a different level.

5. In a sheet material feeding and blanking die mechanism, the combination of a feed table for supporting a sheet of material in one plane, feeding devices for advancing the material along said table and in said plane, a stationary die member located adjacent said table and having an opening therein, a punch member movable into said die opening for cutting a blank from the sheet material on said table, an auxiliary table disposed adjacent said stationary die in a second plane, auxiliary feeding devices operable along said auxiliary table, and a suction cup located in said stationary die and operable in synchronism with said punch for engaging and holding the sheet material while a blank is being cut in the feed table plane and for shifting the cut blank through said die opening while holding it under control to discharge the blank in said second plane of said auxiliary table.

6. In a sheet material feeding and blanking die mechanism, the combination of a feed table for supporting a sheet of material fed along an upper level, feed bars movable in said table and having depressible fingers for advancing the material intermittently along the table, a stationary die member located adjacent said table and having an opening extending therethrough, a punch member movable into said die opening for cutting a blank from the sheet material fed over the said die opening by said feed bars, an auxiliary feed table disposed adjacent said stationary die and located at a lower level, an auxiliary feed bar operable in said auxiliary feed table and having strip-off fingers, and a suction cup located in said stationary die for engaging a blanking area of the sheet material while a blank is being cut and for drawing down the cut blank through said die opening while holding it under control to release it at the lower level and into the strip-off fingers of said feed bar in said auxiliary feed table.

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