Jan. 7, 1958 J. WITTEK 2,819,072

AUTOMATIC ROLL FEED FOR PUNCH PRESSES

Filed Sept. 23, 1955 6 Sheets-Sheet 1

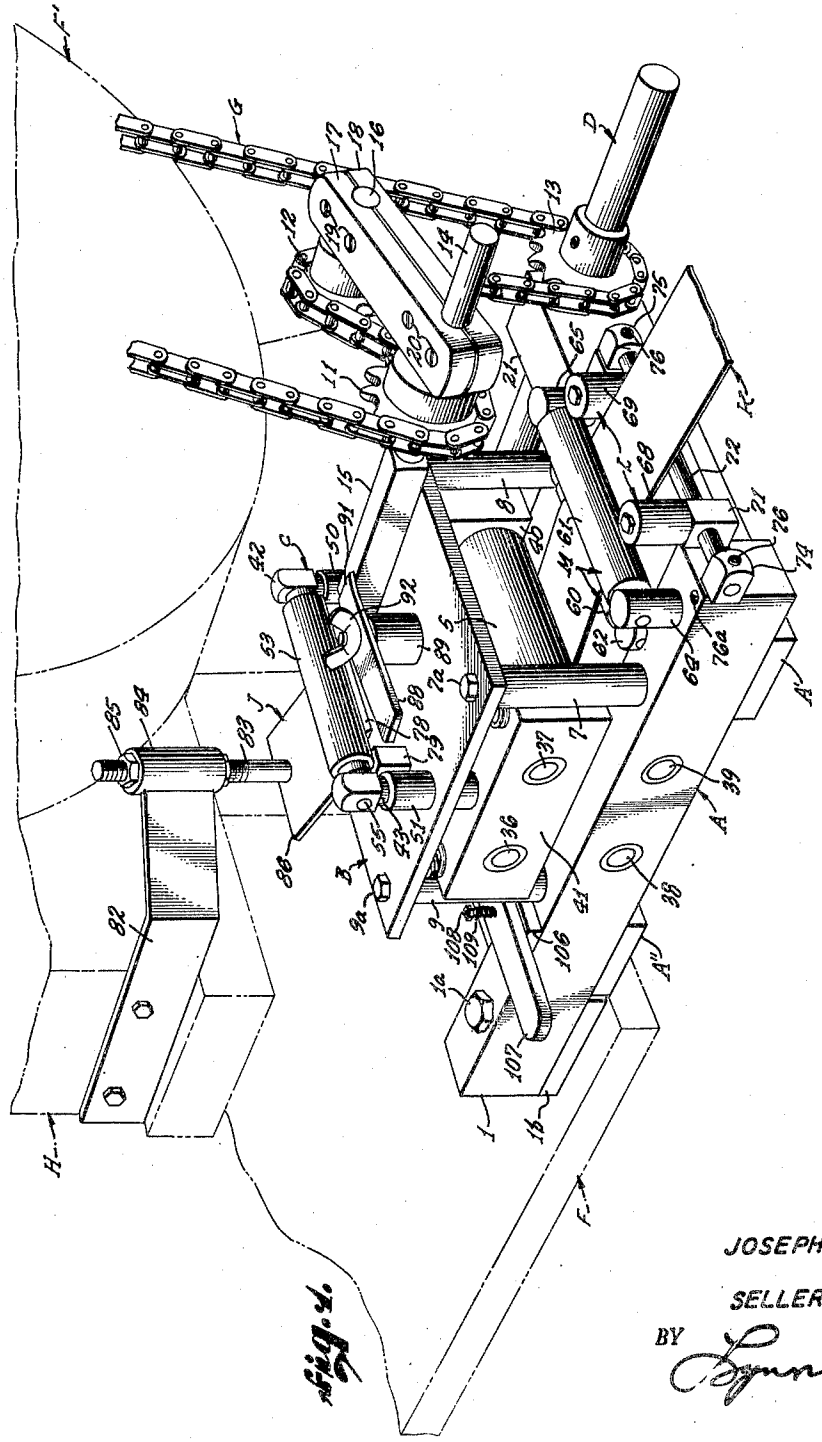


Fig. 1.

JOSEPH WITTEK,
INVENTOR.
SELLERS & LATTA,
ATTORNEYS.
BY

Jan. 7, 1958 J. WITTEK 2,819,072

AUTOMATIC ROLL FEED FOR PUNCH PRESSES

Filed Sept. 23, 1955 6 Sheets-Sheet 2

Fig. 2.

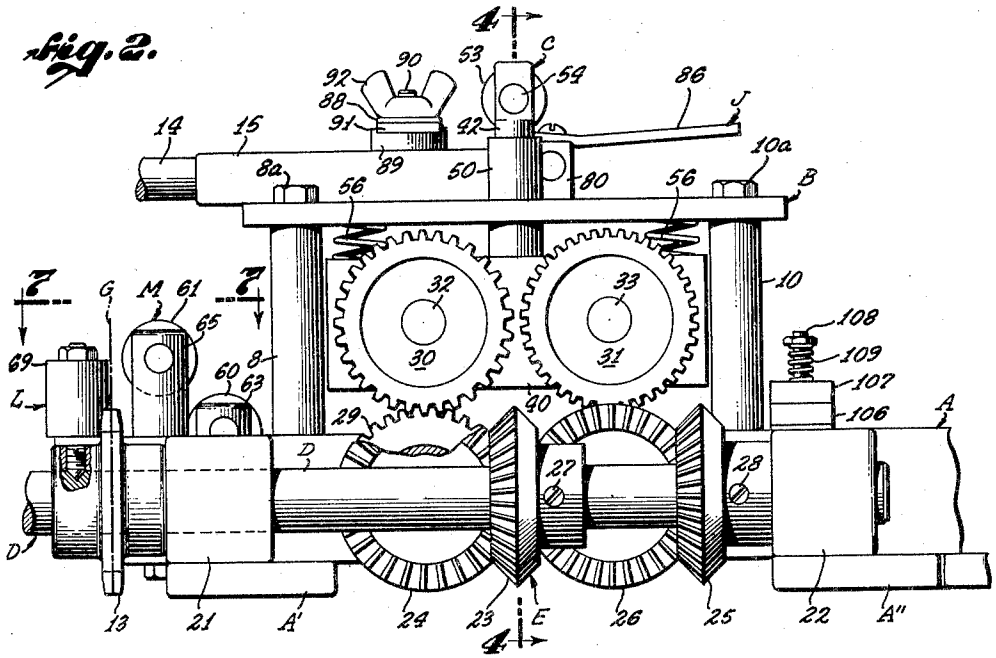
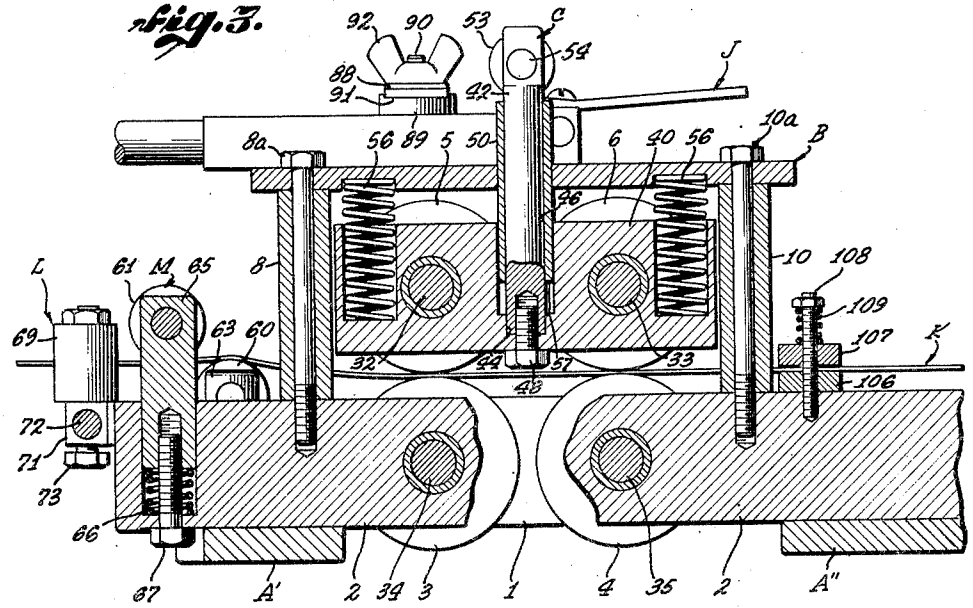


Fig. 3.



JOSEPH WITTEK,
INVENTOR.

SELLERS & LATTA,
ATTORNEYS.

BY

Jan. 7, 1958 J. WITTEK 2,819,072

AUTOMATIC ROLL FEED FOR PUNCH PRESSES

Filed Sept. 23, 1955 6 Sheets-Sheet 3

Fig. 4.

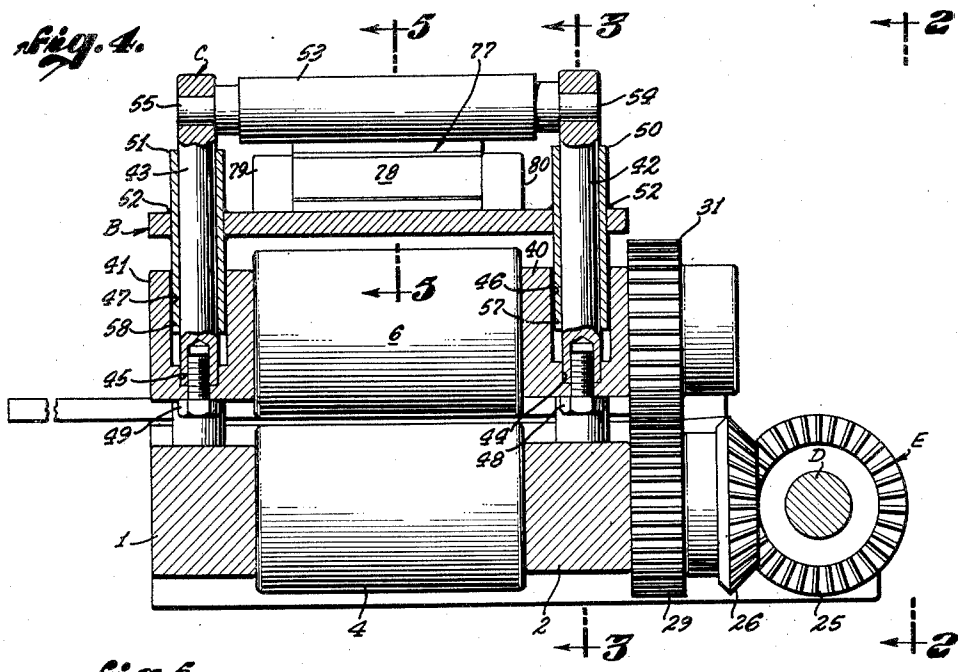


Fig. 5.

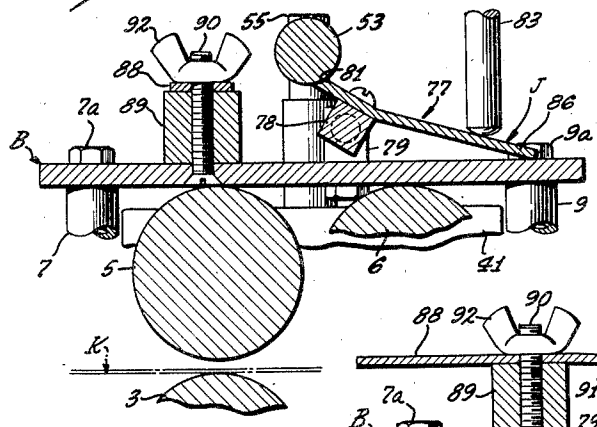


Fig. 8.

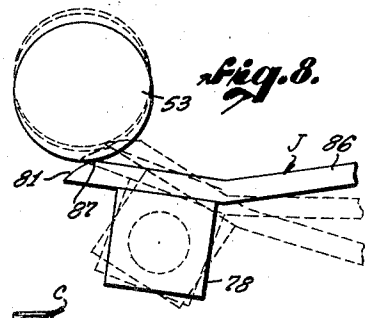


Fig. 6.

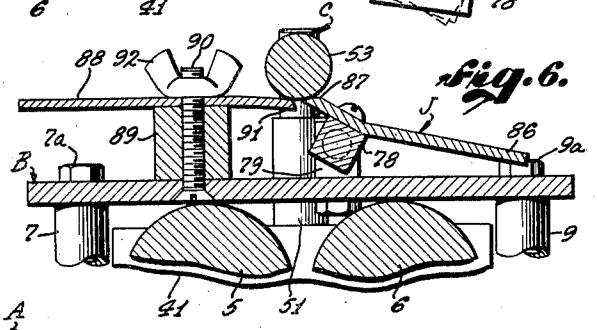
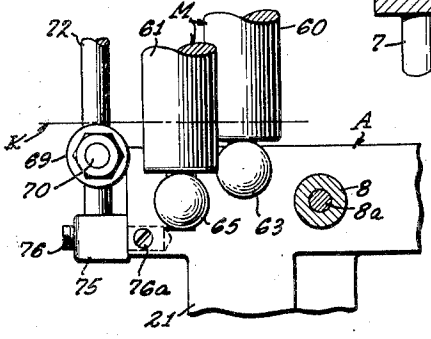


Fig. 7.



JOSEPH WITTEK,
INVENTOR.
SELLERS & LATTA,
ATTORNEYS.
BY Lynne E. Latta

Jan. 7, 1958 J. WITTEK 2,819,072

AUTOMATIC ROLL FEED FOR PUNCH PRESSES

Filed Sept. 23, 1955 6 Sheets-Sheet 4

Fig. 9.

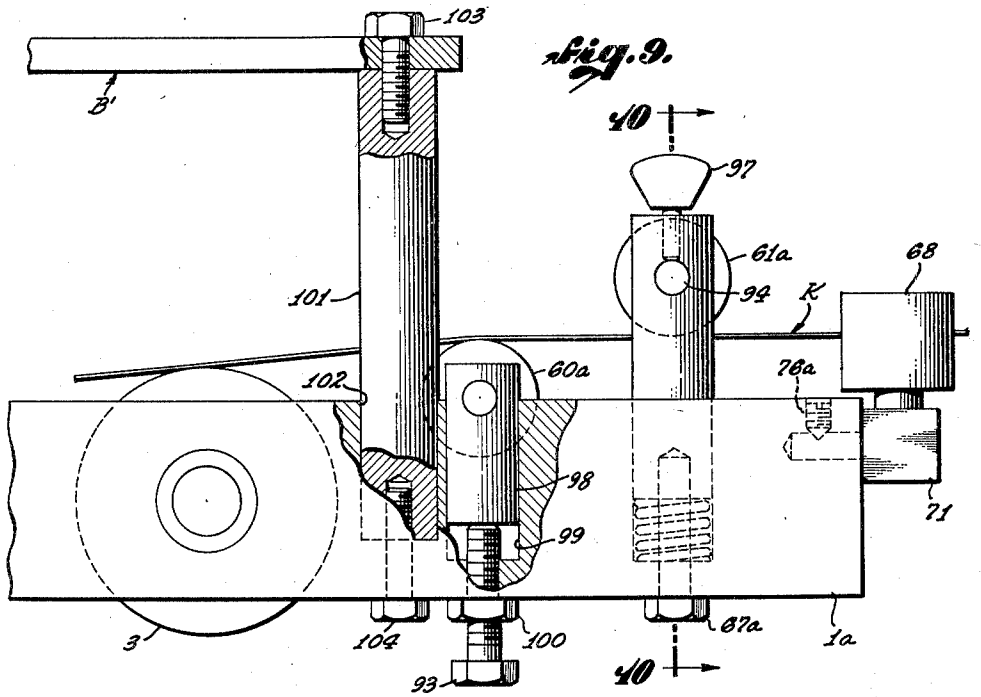
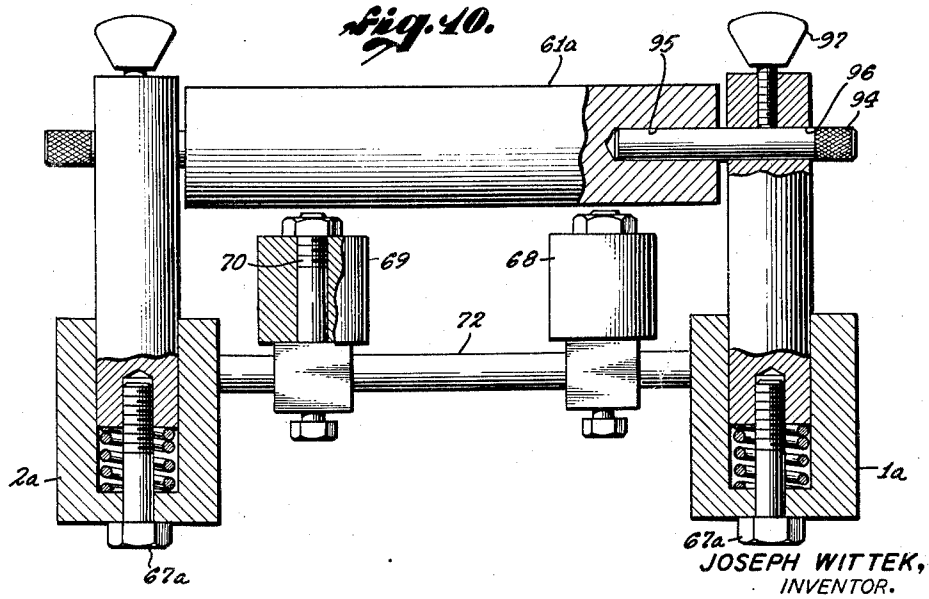


Fig. 10.



JOSEPH WITTEK,
INVENTOR.
SELLERS & LATTA,
ATTORNEYS.
BY
Lynn Latta

Jan. 7, 1958 J. WITTEK 2,819,072

AUTOMATIC ROLL FEED FOR PUNCH PRESSES

Filed Sept. 23, 1955 6 Sheets-Sheet 5

Fig. 11

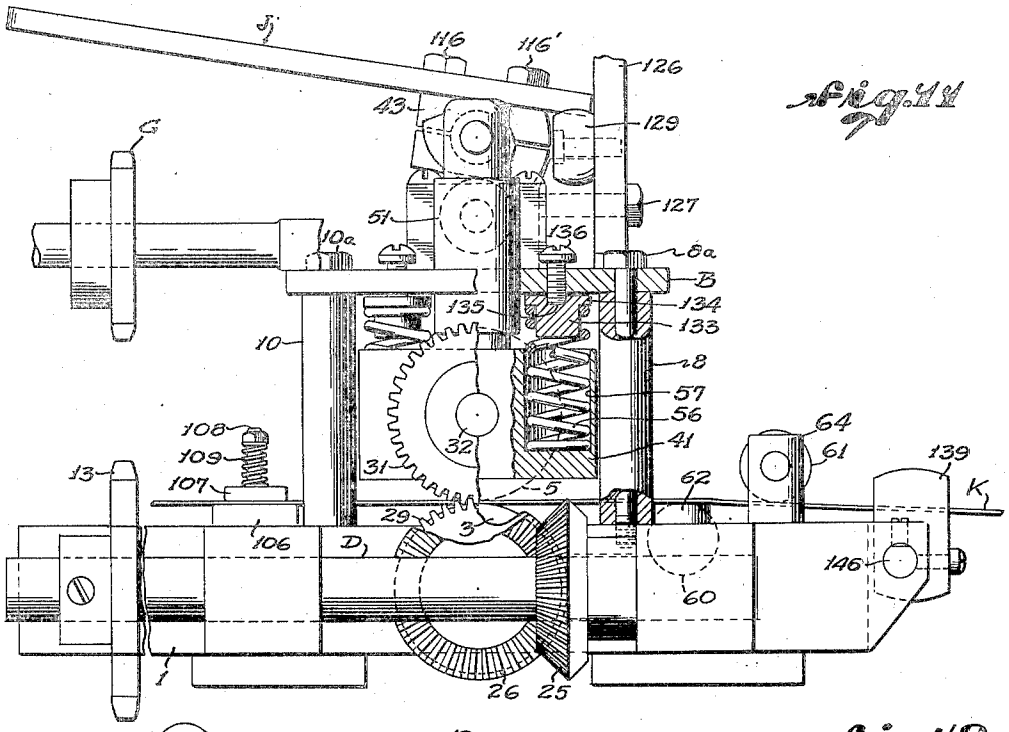
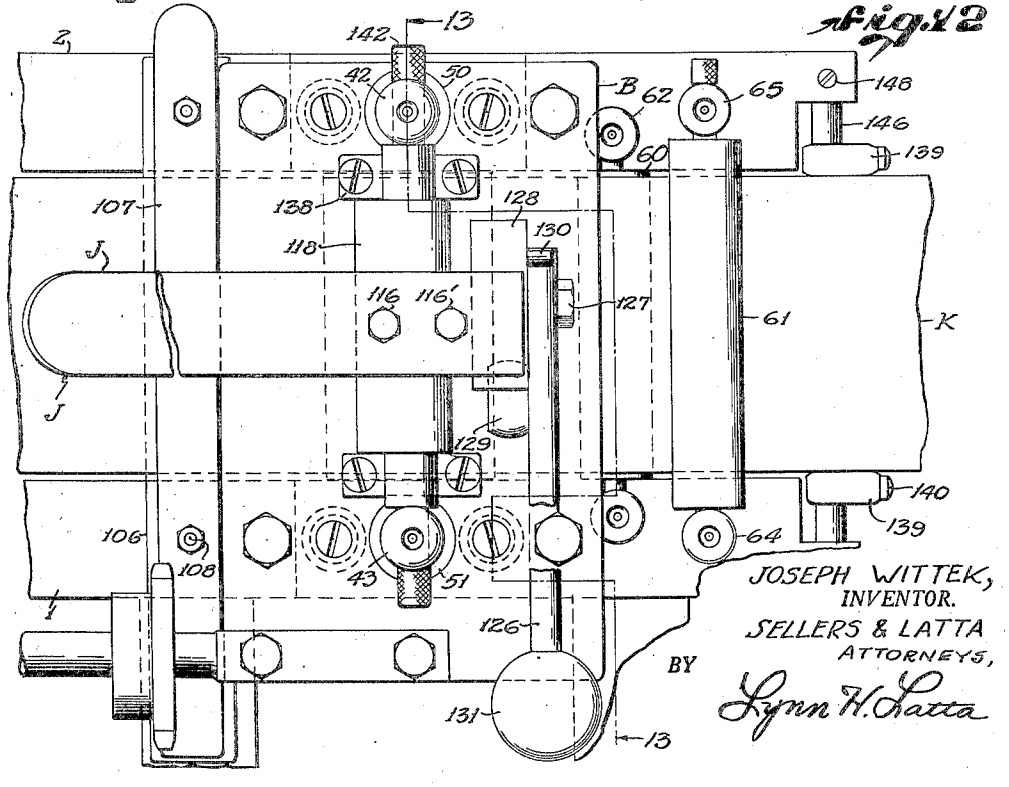


Fig. 12



JOSEPH WITTEK,
INVENTOR.
SELLERS & LATTA
ATTORNEYS,
BY
Lynn H. Latta

Jan. 7, 1958 J. WITTEK 2,819,072

AUTOMATIC ROLL FEED FOR PUNCH PRESSES

Filed Sept. 23, 1955 6 Sheets-Sheet 6

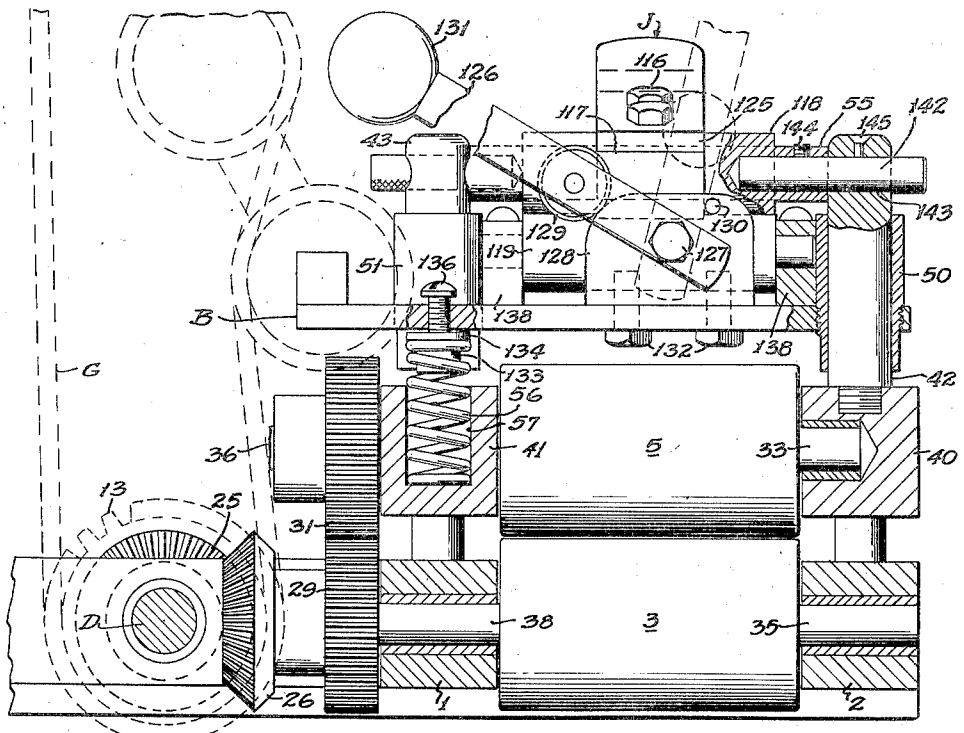


Fig. 13

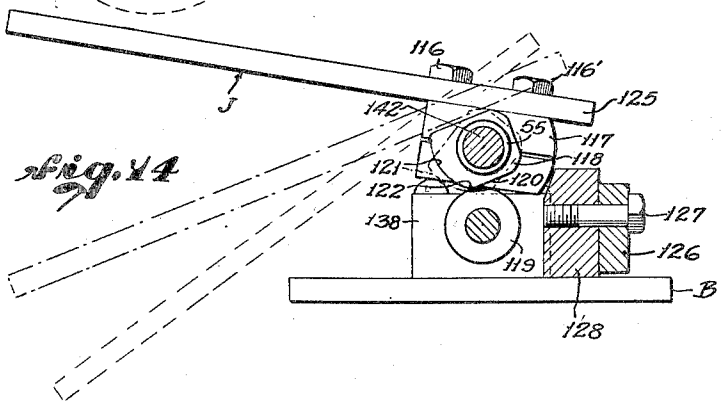
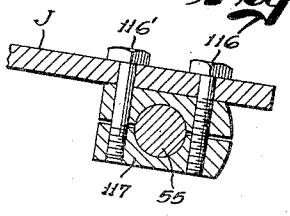


Fig. 14

Fig. 15



JOSEPH WITTEK,
INVENTOR.

BY SELLERS & LATTA
-ATTORNEYS-

Lynn N Latta

United States Patent Office 2,819,072 Patented Jan. 7, 1958

2,819,072

AUTOMATIC ROLL FEED FOR PUNCH PRESSES

Joseph Wittek, Sherman Oaks, Calif.; Rudolph Wittek, administrator of said Joseph Wittek, deceased

Application September 23, 1955, Serial No. 536,253

4 Claims. (Cl. 271—2.4)

This application is a continuation-in-part of my pending application Serial Number 425,693, filed April 26, 1954, now abandoned, for Automatic Roll Feed for Punch Presses.

The general object of the invention is to provide an improved feeding device for the automatic feed of ribbon sheet material into a punch press.

A particular object is to provide in an automatic feeding device, a novel supporting deck mounted on four pillars, within the confines of which the upper pressure applying feed rolls are carried.

Another object is to provide an improved automatic trip mechanism for arresting the feed in response to downward movement of the ram of a punch press in which the feed mechanism is installed, and for reestablishing the feed as the ram ascends after having completed a punching or forming stroke.

The invention is particularly directed to the provision of an improved arrangement of release lever and release cam, such that there will be a quick-releasing action in the initial stages of depression of the lever by the ram, followed by fairly wide range of further downward movement of the lever which is accommodated without any substantial additional release movement, whereby various ram strokes of varying amplitudes may be accommodated by the same feed control mechanism.

A further object is to provide such an arrangement having relatively simple means for effecting an indexing adjustment of the release lever in relation to the release cam.

A further object is to provide improved straightening roll mechanism in connection with a roll feed apparatus.

Another object is to provide an improved locking mechanism for locking the feed rolls in their released positions.

Other objects will become apparent in the ensuing specifications and appended drawing in which:

Fig. 1 is a perspective view of the automatic feeding device mounted relative to a punch press, the punch press parts being shown schematically;

Fig. 2 is a side elevation of the feeding device from the rear side thereof;

Fig. 3 is a sectional view taken on the line 3—3 of Fig. 4;

Fig. 4 is a sectional view taken on the line 4—4 of Fig. 2;

Fig. 5 is a fragmentary sectional view taken on the line 5—5 of Fig. 4;

Fig. 6 is a fragmentary sectional view similar to Fig. 5 with the locking mechanism in locking position;

Fig. 7 is a fragmentary detail view taken on the line 7—7 of Fig. 2;

Fig. 8 is an enlarged schematic view showing several positions of the roll lifting mechanism in the roll lifting operation;

Fig. 9 is a fragmentary detail view of a modified construction of the straightening roll;

Fig. 10 is a sectional view taken on the line 10—10 of Fig. 9;

Fig. 11 is a side view, partially broken away and in section, of an improved modified form of the invention;

Fig. 12 is a plan view of the same;

Fig. 13 is a transverse sectional view taken on the line 13—13 of Fig. 12;

Fig. 14 is a detail sectional view showing the trip lever and release cam mechanism; and

Fig. 15 is a detail showing the attachment of the trip lever to the cam shaft.

The form of the invention shown in Figs. 1–10

Referring now to the drawings in detail, I have shown in Figs. 1–10, one form of the invention as embodied in an automatic feeding device including a base A comprising transversely extending the bars A′ and A″ which anchor the upwardly projecting and longitudinally extending rails 1 and 2 in spaced parallel fashion relative to each other. The rails carry the fixed rolls 3 and 4 (see Fig. 3), said lower rolls being rotatably journalled in the opposed rail members. An upper deck B carries the adjustable rolls 5 and 6 by means of the carriage assembly C. The platform member B is carried on four upright posts 7, 8, 9 and 10, which posts are carried on the rail members 1 and 2. The lower rolls are driven from shafts D through the gears E, such gearing also serving to drive the upper rolls. The base A is adapted to be mounted, for example, on the bolster plate F of the punch press F′, by means of bolts 1*a* projecting through the rails and through the filler plate 1*b* which extends between the rails and is of the same thickness as tie bars A′ and A″. In some cases the filler plate may not be needed and can be removed. The crank shaft of the punch press (not shown) has a sprocket mounted on one end thereof (said sprocket not being shown) for driving a chain G which drives the shaft D. The ram H of the punch press has an arm fastened thereto for actuating the roll-releasing mechanism J at a predetermined moment in the cycle of operation of the punch press. A ribbon of stock K is fed between the guide rolls L, then through the straightening rolls M and thence through the feed rolls preparatory to being operated upon by the upper die which is held in the ram of the punch press.

The crankshaft of the punch press transmits a positive drive to the gearing E by means of the chain G and the speed of rotation of the drive shaft D may be preselected by any one of various speeds by selectively varying the ratio of the sprocket 13 and/or the sprocket (not shown) on the punch press crankshaft. The idler sprocket 11 is rotatably journalled on the shaft 14 which is anchored to the bar 15, which in turn is anchored to the upper surface of the platform B. The shaft 14 may be integral with the bar 15 if desired. The second idler pulley 12 is rotatably journalled on the cylindrical stud 16 which is anchored between the clamp bars 17 and 18 by means of the screws 19. The opposite ends of the clamp bars are adjustably anchored to the shaft 14 by means of the screws 20. By loosening the screws 20 slightly, the clamp bars may be swung about the axis of the shaft 14 for taking up the slack in the drive chain.

The drive shaft D is rotatably journalled at one end in the extension 21 and the extension 22 of the base A. These extensions are preferably parallel to each other. The bevel gear 23 drives the bevel gear 24 and the bevel gear 25 drives the bevel gear 26. The gears 23 and 25 are adjustably fixed to the drive shaft D by means of the set screws 27 and 28. The gears 24 and 26 are compound gears having the bevel gear teeth at their outer ends and having the spur gears 29 formed on their inner ends. The spur gears 29 drive the spur gears 30 and 31 which are removably anchored to the trunnion portions 32 and 33 which are fixed to the upper rollers 5 and 6. The compound gears 24—29 and 26—29 are removably fixed

to the trunnion portions 34 and 35 which are anchored to the lower rollers 3 and 4. The rollers have trunnions 36, 37, 38 and 39 at the ends thereof opposite from the ends on which the gears are mounted. The trunnions 34 and 35 are rotatably journalled in sleeve bearings in the rail 2 and the trunnions 38 and 39 are rotatably journalled in appropriate sleeve bearings in the rail 1. The lower rollers 3 and 4 are thus rotatably carried by the opposing rails 1 and 2 in fixed positions of adjustment relative to the base A.

The trunnions 32 and 33 are rotatably journalled in the bearing block 40 and the trunnions 36 and 37 are rotatably journalled in the bearing block 41. Each of these trunnions may be journalled in appropriate sleeve bearings positioned in the bearing blocks, if desired. The bearing block 40 is carried on leader pin 42 and the bearing block 41 is carried on the leader pin 42. Each bearing block has a vertical bore 44 and 45 therein and a counterbore 46 and 47 respectively. The lower ends of the leader pin 42 and 43 are received in the bores 44 and 45 respectively and the bolts 48 and 49 are internally threaded into the leader pins 42 and 43 respectively to securely anchor the bearing blocks 40 and 41 respectively to the leader pins. Cylindrical bearings 50 and 51 project through the platform B into the counterbores 46 and 47 respectively of the bearing blocks and said sleeve bearings are anchored to the platform B as by means of spot welds 52. A roller 53 has trunnion portions 54 and 55 rotatably journalled in the upper ends of the leader pins 42 and 43 respectively.

Each of the bearing blocks 40 and 41 have bores of substantial depth at the opposite ends thereof into which the compression springs 56 are received. The under surface of the platform B is preferably provided with four shallow bores for receiving the upper ends of the compression springs 56. The compression springs continuously urge the upper rolls 5 and 6 toward the lower rolls 3 and 4 and consequently apply considerable pressure to the surface of the ribbon of stock K which passes between the four rolls and is positively fed through such rolls by the frictional engagement of the rolls on the opposite surfaces of the stock. The lower ends 57 and 58 of the bearing sleeves 50 and 51 are spaced sufficiently far from the annular shoulders which are formed at the bottoms of the counterbore 46 and 47 to permit the up and down movement of the bearing blocks 40 and 41 relative to sleeves 50 and 51 in the operation of the pressure roll releasing mechanism J as will be more fully explained hereinafter.

The platform B and its supporting pillars 7, 8, 9 and 10, together with the bearing guides 50 and 51 provide the necessary supporting structure for the pressure applying rolls, the bolts 7*a*, 8*a*, 9*a*, and 10*a* being threaded into the rails 1 and 2 to anchor the platform B relative to the base A.

A pair of straightening rolls 60 and 61 are mounted on the rails 1 and 2 and serve to substantially eliminate any kinks in the ribbon stock K as it is fed through the feeding rolls. The lower straightening roll 60 serves to correct any downwardly directed kinks in the stock and the upper straightening roll 61 serves to correct any upwardly directed kinks in the stock so that all kinks in the stock are substantially ironed out before the stock reaches the die of the punch press. The lower straightening roll 60 has trunnions at either end rotatably journalled in the bearing blocks 62 and 63 which are journalled in and rest by gravity in appropriate bores in the rails 1 and 2 respectively. The upper straightening roll 61 has trunnions at either end journalled in the bearing blocks 64 and 65. Each of the bearing blocks 64 and 65 are mounted in the rails 1 and 2 respectively in the manner as shown in detail in Fig. 3, wherein the bearing block 65 may have a cylindrical external surface which is journalled for reciprocable movement in a vertical bore 66 in the rail 2, a compression spring abutting the annular shoulder formed at the base of the bore and continuously urging the bearing block upwardly to maintain the straightening roll 61 in the elevated position above the stock K. A bolt 67 extends loosely through a bore in the annular shoulder at the base of bore 66 and is threaded into the end of the bearing block 65, the bolt head engaging the under face of the annular shoulder to maintain the roll 61 in a fixed position of elevation when upward pressure is exerted on such roll, as when same encounters an upwardly directed kink in the stock. It will be understood that the bearing block 64 is mounted in rail 1 in a manner similar to the mounting of bearing block 65 in rail 2.

A pair of guide rollers 68 and 69 are rotatably journalled about the vertical axes of the trunnions 70 (see Fig. 7), said trunnions being formed on the upper ends of the slide blocks 71 which may be moved axially along the supporting rod 72 by loosening the bolts 73. The guide rollers may thus be adjusted along the length of the rod 72 and then spaced apart from each other a sufficient distance to accommodate the width of the stock K, thereby to guide the stock in the proper longitudinal alignment through the feed rolls and prevent same from shifting laterally relative to the feeding device. The stock at the opposite end of the feeding device is guided against lateral shifting by the appropriate guiding devices on the punch press die. Each end of the rod 72 is received in bores in the bearing blocks 74 and 75 respectively and the rod is removably anchored within the bearing blocks by means of the set screws 76. The bearing blocks have trunnion portions which are mounted in the ends of the rails 1 and 2 and anchored with set screws 76*a*. The guide rollers 68 and 69 may be moved outwardly on rod 72 beyond the inside corners at the ends of the rails 1 and 2 to accommodate stock of maximum width.

The stock which is fed through the feed rolls at a predetermined speed throughout a portion of the cycle of operation of the punch press, is momentarily arrested while the ram H of the press performs the punching operation. The movement of the stock through the feed rolls must be quickly arrested just prior to the punching operation and to accomplish this it is necessary to quickly release the tension which is exerted by the upper rolls 5 and 6 against the stock through the medium of springs 56. The operation of the mechanism for lifting the pressure rolls 5 and 6 is synchronized with the stroke of the punch press and this roll lifting mechanism is carried on top of the platform B.

A lever 77 of considerable width is anchored to a fulcrum bar 78 which has trunnion portions at either end thereof rotatably journalled in the bearing posts 79 and 80. The inner end of the lever has a cam surface 81 formed thereon which engages the cylindrical external surface of the roller 53. An arm 82 is removably fixed to the ram of the punch press and has an adjustable striking rod 83 extending through the boss 84 at the end of the arm. The rod may be adjusted axially of the boss by loosening and then retightening the nut 85, to accurately predetermine the moment during the stroke of the ram when the lower end of the rod 83 engages the handle end 86 of the lever 77. The fulcrum of the lever being the axis of the fulcrum bar 78, the greater portion of the weight of the lever is located on the side of the fulcrum of the handle portion 86 and when the punch press ram is in its uppermost position, the weight of the handle portion 86 of the lever, by gravity, causes the opposite end of the lever to always remain in contact with the undersurface of the roller 53 preparatory to the pressure roll lifting operation. When the lever is in its position of rest as shown in Figs. 1 and as shown in solid lines in the schematic view in Fig. 8, the corner 87 of the lever is in engagement with the lift roller 53, said corner 87 being the point of commencement of the cam surface 81 at the free end of the lever. When the

striking rod 83 engages the outer end of the lever, the corner 87 causes the lift roller 53 to be quickly lifted a pre-determined distance in proportion to the distance of travel of the lever about its fulcrum, then continued oscillation of the lever about the axis of the fulcrum bar 78 brings the cam surface 81 into engagement with the undersurface of the roller 53 and the rate of lifting of said roller is only nominal compared to the initial lifting rate accomplished by the corner 87, since some additional lifting of the roller 53 is necessary to permit the lifting lever to operate about its fulcrum throughout the remaining length of the stroke of the punch press ram after initial contact has been made by the striking rod 83 with the lever, however, the total amount of lift must be controlled so that the gears 29 remain in mesh at all times with gears 30 and 31. It will be noted in viewing Fig. 8 that a line drawn through the axes of the roller 53 and the fulcrum bar 78 establishes a center line and the cam surface 81 at its point of contact with roller 53 remains on the left side of this center line, viewing Fig. 8, and never goes beyond dead center. In Fig. 8 I have shown schematically how the roller 53 is lifted a substantial distance during the initial oscillatory movement of the lever and the subsequent amount of lifting of the roller 53 by the cam surface 81 is very slight.

In some instances it may be desirable to lock the pressure rolls 5 and 6 in lifted or released positions and this may be done by means of the lock arm 88 which is mounted on top of the bearing block 89 and which is free to swing about the axis of the screw 90 which is threaded into the platform B. The lock arm 88 may be swung about until the end 91 thereof extends beneath the lift roller 53. The wing nut 92 may then be tightened and the subsequent releasing of the lever 77 causes the lock arm to hold the lift roller 53 in a position where the pressure rolls 5 and 6 are lifted away from the stock K against the tension of the springs 56.

In the modified form of construction disclosed in Figs. 9 and 10 the straightening roll 61*a* is mounted for quick removal from the bearing posts 64 and 65 without affecting the pre-determined adjustment of bolts 67*a*. Removable pins 94 are received in the bores 95 in the opposite ends of the roller 61*a*, said roller being rotatably journalled on said pins. The pins 94 extend through the diametrical bores 96 in each of the aforementioned bearing posts and the thumb type set screws 97 anchor said pins relative to the bearing posts. In order to remove roller 61*a* it is only necessary to loosen the thumb screws 97 and then withdraw the pins 94 until the ends of said pins are completely removed from within the bores 95 in the roller. The pins do not need to be completely removed from the bearing posts and it is desirable to leave them in the bearing posts to prevent their becoming lost.

The lower straightening roll 60*a* is preferably mounted so as to be adjustable in a vertical direction relative to the rails 1*a* and 2*a*, consequently, it is rotatably journalled at its opposite ends in the bearing posts 98 which are slidably received in the vertical bores 99 in the rails 1*a* and 2*a*. The bolt 93 is threaded through the undersurface of the rails 1*a* and 2*a* and the inner ends of said bolts abut the lower ends of the bearing posts 98, thereby supporting same. The roller 60*a* may be adjusted to any desired height relative to the rails by tightening or loosening the bolts 93 and then tightening the locknuts 100 against the undersurface of the rails in order to lock the bolts 93 in the selected positions of adjustment. The entire roller assembly including roller 60*a* and bearing posts 98 are positioned in bores 99 by gravity and may be removed by simply withdrawing same—the adjustment of screw 93 remains unaffected.

The deck B' is anchored at each of its four corners to the pillars 101, each of which are slidably received in the vertical bores 102 in the rails 1*a* and 2*a* (only one pillar and one rail bore being shown in Fig. 9). The pillars 101 are preferably solid cylindrical pillars with internally threaded bores at each end into which the bolts 103 and 104 are threaded. It will be understood that there are four sets of these bolts for use with each of the four pillars.

Referring to Figs. 1, 2 and 3 I have provided a friction brake mechanism comprising a lower bar 106 and an upper bar 107. The bolts 108 are threaded through the lower bar and on into the rails 1 and 2. Compression springs 109 urge the upper bar toward the lower bar, the upper bar being reciprocable on the bolt shanks. The stock K is guided between the upper and lower bar and the upper bar has tensioned frictional contact with the stock which is not sufficient to interfere with the movement of the stock through the feed rolls but which is sufficient to hold the stock in its arrested position during the punching operation and while the pressure rolls are in released or lifted position out of contact with the stock.

The feeding device may be operated in either direction by reversing the direction of rotation of the pressure and idler rolls, this being accomplished by removing shaft D and reversing the gears 23 and 25 on the shaft in a known manner.

The preferred form of the invention, Figs. 11–15

Referring now to Figs. 11–15 inclusive, I have shown therein an improvement upon the mechanism described above. In Fig. 11, the apparatus is viewed substantially from the viewpoint of the punch press operator, and is disposed to the right of the ram-die axis, the strip K feeding from right to left, through a single pair of feed rolls 3, 5 (instead of the dual pair of rolls previously described) and the release lever J projecting leftward to intersect the path of vertical reciprocation of the ram-carried actuator finger 83.

Upper feed roll 5 has its trunnions 33, 36 journalled in bushings in pillow blocks 40 and 41 which are suspended on the leader pins 50, 51, the latter having reduced, threaded lower ends threaded into pillow blocks 40, 41 as shown. Lower feed roll has its trunnions 35, 38 similarly journalled in sill rails 1 and 2. Forward trunnions 36, 38 project forwardly of block 41 and rail 1 respectively and there provided with meshing gears 31, 29. Bevel gears 25, 26 transmit drive from sprocket chain driven drive mechanism G, 13, D as in the arrangement described above.

The release lever J is secured by bolts 116, 116' to a hub 117 which is in the form of a split yoke clamp adjustably secured to the cam shaft 55 by means of which the roll carriage 41 is elevated, for releasing the drive. An indexing adjustment of lever J relative to cam shaft 55 may be effected by loosening clamp screws 116' of clamp hub 117, shifting relationship between lever and cams, and re-tightening screws 116'. Formed integrally on shaft 55, at opposite ends of hub 117 (Fig. 14) are a pair of cams 118 which bear against a fulcrum roller 119 in a manner such that, as finger 83 commences to depress the trip lever J, there will be an initial stage of operation wherein shaft 55 is lifted relatively rapidly for a relatively small increment of ram movement, thus to quickly release the grip of feed rollers 5, 3, from the work strip K; whereas, when the feed is thus completely released, the cams 118 will continue to rotate against fulcrum roller 119 with only a very slight additional lift of shaft 55 and roller 5. This is effected by providing on each cam 118 a flat face 120 which rests against fulcrum roller 119 in tangential relation as shown in full lines in Fig. 14, in the normal, raised position of release lever J, and providing, beyond flat 120, an arcuate bearing face 121 that is almost concentric with the axis of shaft 55. Where flat 120 intersects arcuate face 121, there is an apex 122. Between a radius of shaft 55 normal to flat 120 and up to apex 122, the flat 120 provides a rapid rise in the cam. The rising movement transmitted to shaft 55 accelerates to a maximum rate as

apex 122 approaches the common radius between shaft 55 and fulcrum roller 119, and it is in this stage that the rapid release of the drive is effected. As apex 122 intersects this common radius, the rapid rise sharply abates and substantially a dwell action ensues as arcuate face 121 rides against fulcrum roller 119.

An important feature of the invention is the wide amplitude of downward movement of release lever J beyond the release point, provided by the extended circumference of arcuate cam face 121 with nearly zero rise. Sufficient allowance for additional upward movement of feed roller 5 and leader pins 51 against the yielding resistance of coil springs 56, is provided so as to allow the lever J to stop at any point along its extended stage of further movement beyond the release point. Thus the mechanism adapts itself to a wide range of amplitudes of ram stroke beyond the point where finger 83 initially engages lever J without affecting the operation of the feed apparatus.

A further important feature of the invention is the provision for automatic return of the lever J back to its normal, raised position, following the return upward movement of the ram and operator finger 83. This is provided for by a slight, constant rate rise in arcuate faces 121 from apexes 122 up to the limit of lever depression, which is more than 60 degrees beyond the point of starting operation of the cams. This rise is established at a minimum to provide the substantially dwell action referred to above, and yet is sufficient so that, as the pressure of springs 56 is exerted to move the shaft 55 downwardly as permitted by the upward withdrawal of operator finger 83, the camming action of arcuate face 121 against fulcrum roller 119 will be effective to lift the lever J back to its starting position and allow the shaft 55 to thus return to its lowered position wherein feed roller 5 engages the work K against feed roller 3. The angle of face 121 may be within the range of 2 degrees to 5 degrees and is substantially uniform throughout its circumferential extent so that adequate camming action combined with minimum rise in this range, is attained.

Because of the automatic return action derived from the rise in cam faces 121 and the pressure of springs 56, the cams 118 will not lock against fulcrum roller 119 at any point in the full range of the pressure of lever J. The invention does however provide for locking the feed roller 5 in its elevated, released position. Such locking mechanism comprises a lip 125 projecting beyond the rear end of hub member 117 (Fig. 14) together with a locking lever 126, pivoted on a screw 127 which is anchored in a bracket block 128, and a roller 129, carried by lever 126 in a position to engage beneath lip 125 with a camming action, as lever 126 is swung upwardly and over in the direction indicated by the arrow in Fig. 13. The arc of movement of roller 129 in this operation is such that the roller will engage the lip 125 at one side and will pass transversely beneath the lip to a point adjacent the other side, beyond "dead center" with reference to pivot 127, at which point lever 126 will engage a stop pin 130 in bracket block 128, thus locking the lever 126 under the back pressure exerted by lip 125 as drawn downwardly by springs 56. In this locking position, lip 125 will be elevated to the position indicated in dotted lines in Fig. 13, and trip lever J will be shifted downwardly well beyond the work release point, thus releasing roller 5 from the work.

Lever 126 may be provided on its outer end with a knob 131 for actuation of the lever.

Bracket block 128 is mounted solidly upon deck B, being secured thereto by screws 132. Being arranged at the opposite end of trip lever J from the end that is engaged by the actuator finger 83, it does not interfere in any way with the normal operation of lever J by the punch press ram. At the same time, its operating range is disposed above the deck B and above the roll feed mechanism therebelow, where it can be easily and efficiently manipulated to effect the locking of the rolls in released position whenever desired.

This modified form of the invention embodies an improved mechanism for spring loading the upper feed roll 5 downwardly against work. Such mechanism comprises the coil springs 56, caged in bores 57 in pillow blocks 41, their lower ends seated against the bottoms of bores 57 and their upper end projecting above pillow blocks 41 and piloted around abutment plugs 133. Each plug 133 has a flange 134 at its upper end, providing a shoulder against which the upper end of a respective spring 56 is compressively engaged, and with a central socket 135 in which is received the lower end of an adjustment screw 136 that is threaded through the deck B as indicated in Fig. 11. Coil springs 56, two for each pillow block 41, are disposed symmetrically on opposite sides of the axis of shaft 32 of upper roll 5. A single set of rolls 5, 3, symmetrically arranged between the transverse planes of posts 8 and 10, is employed in this form of the invention.

The invention may utilize the upper roll 5 as one of the series M of straightening rolls including rolls 60 and 61. Rolls 60 and 61 are arranged at respective heights such that the work strip K, in passing over roll 60, is bent downwardly. A very slight upward bend is given to the work strip K as it passes between feed rolls 3, 5, by the operation of the brake 106, 107 between which the strip K passes after leaving the feed rolls 3, 5. The brake leaf 106 may have its upper face on a level with the top of roll 3, but the top of roll 60 is somewhat higher than the top of roll 3 and consequently the strip assumes a slight downward inclination between roll 60 and roll 5 and is straightened to a level condition between roll 5 and leaf 106 bearing upwardly against its lower face. Thus, the strip passes through two stages of bending, first downwardly and then upwardly as it passes from straightening roll 61 to brake 106, 107. Also, the first stage, the downward bend that is given to the strip as it passes over roll 60 is a bend of greater degree than the upward bend given to the strip as it passes beneath roll 5. Thus the strip, as delivered to the punching dies, is absolutely flat and straight.

An improved mounting for cam shaft 55 is provided, the details of one of such mountings being shown in Fig. 13. A trunnion 142, having a knurled outer end, is journalled in a cylindrical bore 143 in the upper end of leader pin 51 and its inner end is mounted in a socket in the shaft 55, and is secured by a set screw 144. An oil hole 145 is drilled through the upper end of post 51 down to bore 143 and provides for lubricating the bearing wall thereof.

The drive mechanism for this form of the invention is substantially the same as that shown in Fig. 1 and the same reference numerals indicate the various parts thereof. It is however, located on the leftward side of the apparatus as viewed looking in the direction of the feeding movement of strip K, instead of on the rightward side as in Fig. 1, and is therefore symmetrically reversed as indicated in Fig. 13.

Fulcrum roller 119 has end trunnions journalled in bearing blocks 138 which are mounted on deck B just inwardly of bushings 51.

Instead of lateral guide rolls 69, the invention utilizes pads 139 which are mounted on a shaft 146 and secured thereto by set screws 140. Shaft 146 is secured in the ends of rails 1, 2 by means of set screws 148.

I claim:

1. In a roll-feed mechanism for feeding strip stock into a punch press having a vertically reciprocating ram carrying an actuator finger: upper and lower feed rolls; a fixed frame in which the lower roll is journalled; a deck fixedly supported by said frame above the upper roll; a pair of leader pins vertically slidable in said deck; journals carried by the lower ends of said pins, in which said upper roll is journalled; means spring-loading said journals down-

wardly; a cam shaft bridging between the upper ends of said pins and journalled thereto; a fulcrum roller carried by said deck below said cam shaft; cam means on said shaft and bearing against said fulcrum roller; and a release lever attached to said cam shaft and including an actuator arm projecting generally radially therefrom and horizontally beneath said actuator arm for engagement thereby; said cam means including a rapidly rising cam face terminating in an apex, and a substantially dwell face following said apex, said apex, in approaching an on-center position on said fulcrum roller, effecting an elevation of said upper roll to a release position within a relatively small portion of the stroke of said lever, and said dwell face allowing a wide range of further downward movement of the release lever with only a moderate further elevation of the upper roll.

2. Roll-feed mechanism as defined in claim 1, wherein said dwell face has a low-angle rise, so as to automatically return the lever to an elevated starting position in response to said spring-loading means, as permitted by the upward return of the ram to its starting position.

3. Roll-feed mechanism as defined in claim 2, including a clamp yoke to which said release lever is secured, said clamp yoke embracing said cam shaft and having means for clamping it to the cam shaft in a selected position of angular adjustment thereon, whereby to adjust the angular relation between said lever and said cam means.

4. A feed mechanism as defined in claim 1, wherein said cam has on its periphery a flat face, a slowly rising spiral face, and a hump defined between said flat face and spiral face, said hump being positioned to engage said fulcrum roller in an early stage of depression of said trip lever and to effect a rapid rise of said cam shaft in said early stage, followed by a slow rise throughout a relatively wide angle of depression of the lever.

No references cited.