

July 8, 1958

F. K. MAUST

2,841,997

FLYING ADJUSTMENT FOR PRESSES

Filed Aug. 23, 1954

2 Sheets-Sheet 1

FIG. 1.

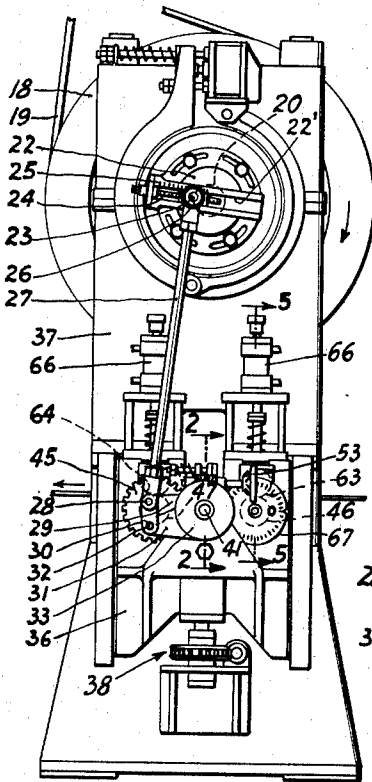


FIG. 2.

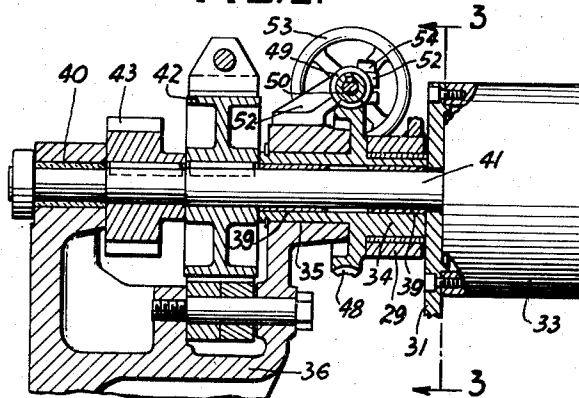


FIG. 3.

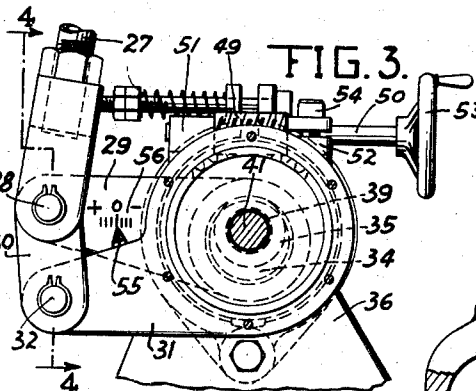


FIG. 4.

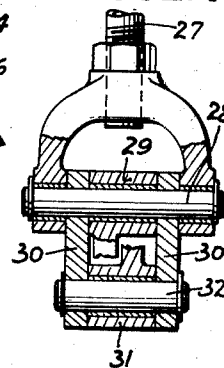


FIG. 5.

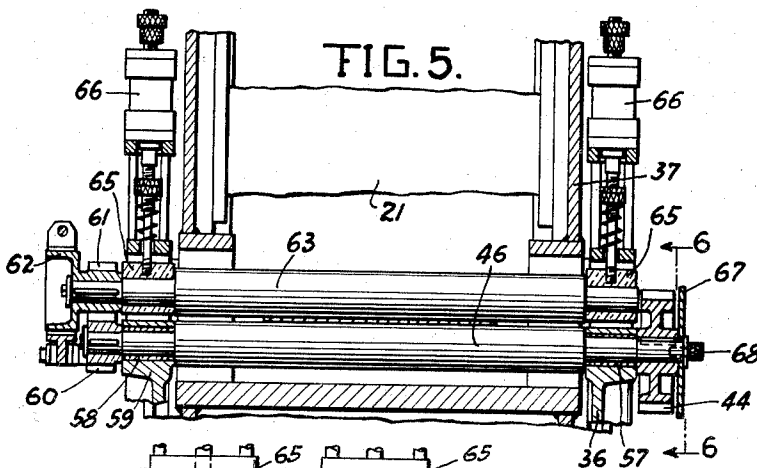
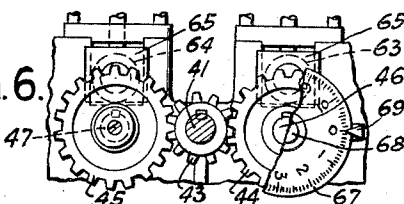


FIG. 6.



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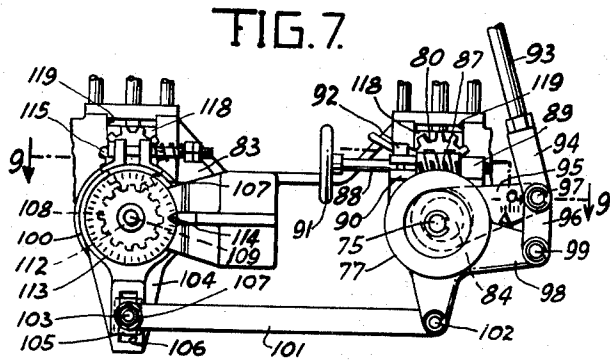
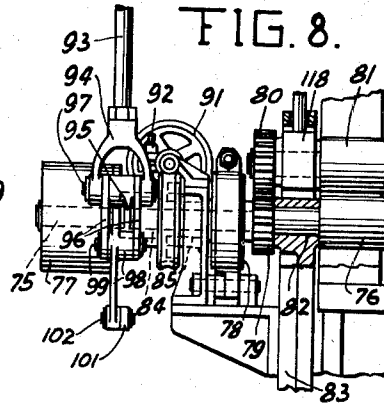
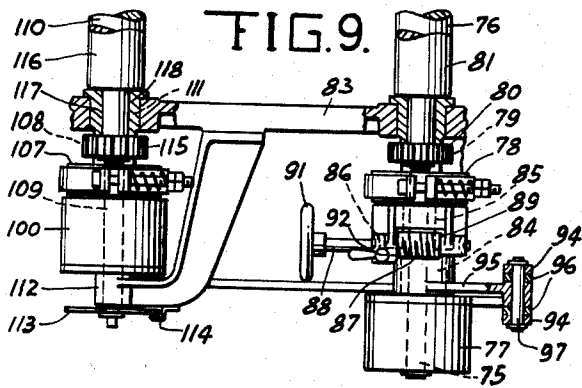
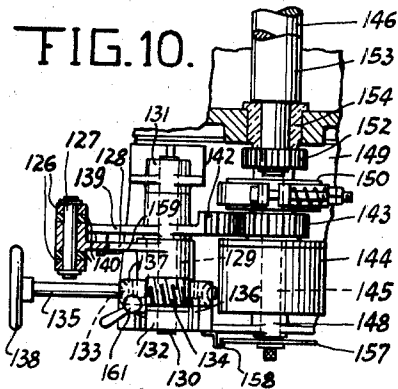
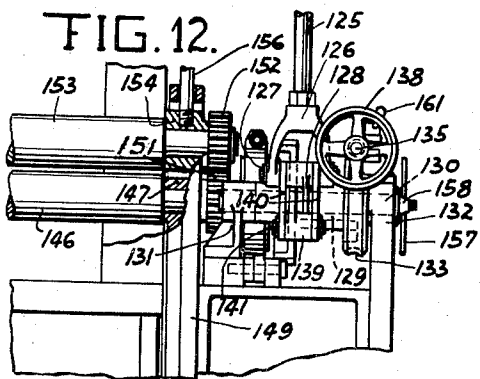
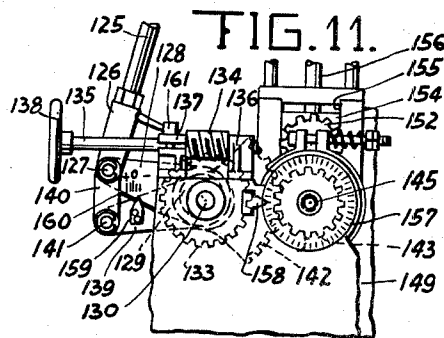
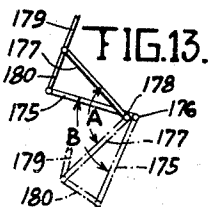
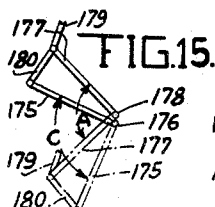
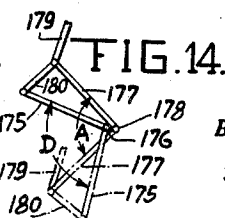
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FLYING ADJUSTMENT FOR PRESSES

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2 Sheets-Sheet 2



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FLYING ADJUSTMENT FOR PRESSES

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Application August 23, 1954, Serial No. 451,398

2 Claims. (Cl. 74-96)

This invention relates to presses used in performing blanking, piercing, perforating and drawing operations upon sheet or strip material fed through the press by a feed mechanism. More particularly, the invention deals with what I term a flying adjustment for the press, whereby accurate feed operation of the feed rolls can be controlled during operation of the machine to insure production of accurate work.

Still more particularly, the invention deals with an adjustment, wherein a link connection is provided between a rocker arm and driven member in providing a simple, inexpensive control having a minimum amount of play and a structure which is light in weight so as to materially lower inertia forces which is desirable in machines of the kind under consideration operating at high speeds.

The novel features of the invention will be best understood from the following description, when taken together with the accompanying drawing, in which certain embodiments of the invention are disclosed and, in which, the separate parts are designated by suitable reference characters in each of the views and, in which:

Fig. 1 is an end elevation of a press incorporating the new flying adjustment in connection with a double roll feed which is centrally driven.

Fig. 2 is an enlarged sectional view, partly broken away, along line 2-2 of Fig. 1.

Fig. 3 is an enlarged sectional end elevation of the flying adjustment shown in Fig. 1, taken along line 3-3 of Fig. 2.

Fig. 4 is a sectional view along line 4-4 of Fig. 3.

Fig. 5 is a partial sectional side elevation taken along line 5-5 of Fig. 1.

Fig. 6 shows a detailed partially sectional end elevation of the gear drive and dial arrangement along line 6-6 of Fig. 5.

Fig. 7 is an end view of a modified flying adjustment applied to a double roll feed with cross-link drive from one roll feed to the other.

Fig. 8 is a partial side view of Fig. 7, partially in section.

Fig. 9 is a partial plan view of Fig. 7, partially in section along line 9-9 of Fig. 7.

Fig. 10 is a plan view, partially in section, showing the flying adjustment applied to a single roll feed with gear segment drive for obtaining long feed lengths.

Fig. 11 is an end view of Fig. 10.

Fig. 12 is a side view of Fig. 11, partially in section.

Fig. 13 shows diagrammatically the positions of the links and the eccentric for minimum feed length.

Fig. 14 shows diagrammatically the positions of the links and the eccentric for maximum feed length; and

Fig. 15 shows diagrammatically the intermediate positions of the links and the eccentric which results in corresponding intermediate feed length.

Referring to Figs. 1 to 6, which shows a press having the flying adjustment mechanism arranged between two pairs of feed rolls, 18 denotes a flywheel, driven by V-belts 19 from a motor or variable speed drive unit, not shown, and connected to a crankshaft 20 by a clutch,

not shown. The crankshaft imparts a reciprocating motion to a slide or ram 21 by suitable means, not shown. Normally, suitable tools are mounted on the slide and bed of the press to perform blanking, piercing, perforating or drawing operations as a sheet or strip of material is intermittently fed through the press by a feed mechanism.

Fastened to one end of the crankshaft 20 is a brake drum and feed crank disc 22 carrying in a radial T-slotted part 22' an adjustable crankpin 23, which is movable in the T-slot by means of a screw 24 engaging a threaded portion of the crankpin 23. A mark on the adjustable crankpin, cooperating with a linear scale 25 fastened to the feed crank disc 22 gives the press operator a guide for adjusting a desired throw of the crank pin and consequent length of feed of the roll feed. The crankpin 23 may be locked in its adjusted position in the T-slot by means of nuts 26.

A feed bar 27 is journaled at its upper end around crankpin 23 and at its lower end operatively connected by means of pivot pin 28 to a rocker-arm 29 and links 30, note Fig. 4. The lower ends of links 30 operatively connect the rocker-arm 29 to a driven member 31 by means of pivot pin 32. Driven member 31 is attached to a one-way clutch 33 of conventional design.

The rocker-arm 29 oscillates freely on an eccentric 34 which is rotatably supported by a bearing 35 forming part of a feed roll housing 36 fastened at the feed crank side of the press to the press housing or frame 37. The feed roll housing is adjustable in height by means of a worm gearing and screw 38 to enable alinement of the roll feed with dies having various heights, note Fig. 1.

Journalled at 39 within the eccentric 34 and at 40 in the feed roll housing 36 is a clutch shaft 41 having keyed to it the one-way clutch 33, a brake drum 42 and a drive gear 43, which transmits motion of the clutch shaft to meshing gears 44 and 45 which are fastened to the lower feed rolls 46 and 47.

The eccentric 34 has a worm or spiral gear 48 in mesh with a worm 49 fastened to a shaft 50. The shaft 50 is supported in a bearing 51 and a split bearing 52 and is provided with a handwheel 53. A clampscrew 54 on the split bearing 52 locks shaft 50 and the worm 49 in the desired adjusted position.

In order to enable the operator to judge the degree of fine adjustment in turning the handwheel 53, the driven member 31 carries a pointer 55 cooperating with marks on a scale 56 provided on the rocker-arm 29, note Fig. 3.

The lower feed rolls 46 and 47 are supported in bearings 57 and 58 of the respective feed roll housings 36 and 59. Each lower feed roll has keyed to it a gear 60 meshing with a gear 61 forming part of a brake drum 62 keyed or otherwise fastened to upper feed rolls 63 and 64, which are supported by bearing blocks 65 guided for vertical movement in the feed roll housings, note Figs. 5 and 6.

Air cylinders 66 provide equal pressures to the upper feed roll bearing blocks and cause the feed rolls to uniformly grip and feed a sheet or strip of material through the press without slipping.

One of the lower feed rolls carries on the feed-drive side of the press a dial 67 provided with marks. The dial is loosely mounted on the lower feed roll shaft 46 and can be locked to the shaft in any desired position by means of a knurled screw 68. Mounted stationary and cooperating with the marks of the dial is a pointer 69, which is adapted to indicate the sum of individual feeds made by the feed roll for a predetermined number of strokes.

Figs. 7, 8 and 9 show a modified arrangement of a roll feed drive and micro-feed adjustment mechanism. Movement of the feed crankpin is transmitted over the rocker-

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arm and link connection to one-way clutches, which in turn are fastened to each of the lower feed rolls. This arrangement may be used in applications in which a greater distance between the two roll feeds cannot be bridged in a practical manner by a simple gear train shown in Fig. 6.

The principal formation of the micro-feed adjusting mechanism is the same as shown in Figs. 1 to 6, inclusive, the difference in this modified form being that the eccentric is angularly displaced in an arc located above the bearing axis of the eccentric and the incidental axis of rotation of the driven member; whereas, in the arrangement shown in Figs. 1 to 6, inclusive, the eccentric swings in an arc below the bearing axis of the eccentric and the incidental axis of rotation of the driven member.

Describing the modification in detail, reference character 75 denotes the shaft extension of the lower right hand feed roll 76 which has attached to it a one-way clutch 77, a brake drum 78 and a drive gear 79 meshing with driven gear 80 fastened to upper right hand feed roll 81. The lower feed roll is supported in bearing 82, which may be part of a roll feed housing 83, and further supported within an eccentric 84, which in turn is rotatably supported by a bracket at 85 forming part of the roll feed housing.

Keyed to the eccentric 84, or forming part thereof, is a worm wheel 86 meshing with a worm 87 which is fastened to shaft 88 which is rotatably supported in bearings 89 and 90 and carries at one end a handwheel 91. Tightening of clamp screw 92 locks the worm gearing and eccentric in its adjusted position.

A feed bar 93 carries at its lower end a fork 94, which is connected to rocker-arm 95 and links 96 by a pin 97. The rocker-arm 95 oscillates freely on eccentric 84 and is operatively connected to a driven member 98 by means of links 96 and pivot pin 99. The driven member 98 of the micro-feed adjusting mechanism is attached to the oscillating part of the one-way clutch 77 and also transmits its motion to one-way clutch 100 through cross-link 101, which is pivotally connected to the member 98 at 102 and 103 to the driving member 104 which, in turn is attached to the oscillating part of the one-way clutch 100. In order to be able to compensate for stretch in the material as it passes through the dies, pivot 103 as part of a pillow block 105 is adjustably mounted in a slot 106 of driving member 104. The clutch 100, brake drum 107 and drive gear 108 are keyed to a shaft extension 109 of lower lefthand feed roll 110 which is supported in bearings 111 and 112. A dial 113 adjustably mounted on feed roll extension 109 in cooperation with a stationary pointer 114 indicates the sum of a predetermined number of feeds.

The drive gear 108 is in mesh with a gear 115 which is keyed to an upper feed roll 116 journaled at 117 in a pillow block 118. All pillow blocks for the upper feed rolls are vertically movable in guides 119 provided in feed roll housing 83 and are adapted to exert uniform pressures on the roll necks. Figs. 10, 11 and 12 show another modified arrangement of a roll feed drive including micro-feed adjustment adapted for large feeds.

Movement of the feeder is transmitted over a feed bar 125 and fork 126, pivotally mounted at 127 to a rocker-arm 128 which freely oscillates on eccentric 129. Eccentric 129 is rotatably mounted on a shaft 130 which, in turn, is supported in brackets 131 and 132 mounted to feed roll housing 149. Fastened to the eccentric 129 or forming part thereof is a wormwheel 133 in mesh with a worm 134 which is fastened to a shaft 135 supported in bearings 136 and 137 and provided at its end with handwheel 138. Motion of rocker-arm 128 is transmitted to a member 139 by means of links 140 which operatively connect fork 126 and rocker-arm 128 through pivot pin 127 with member 139 by means of pin 141.

The member 139 is provided with a segment 142 in mesh with a gear 143 fastened to the oscillating part of

a one-way clutch 144. The member 139 is freely rotatable on the shaft 130.

The one-way clutch is fastened to an extension 145 of the lower feed roll 146 which is rotatably supported in bearings 147 and 148 provided on the roll feed housing 149.

Fastened to the extension 145 is a brake drum 150 and a gear 151 in mesh with a gear 152 fastened to an upper feed roll 153 which, in turn, is rotatably supported in a pillow block 154 slidably mounted in an aperture 155 of the roll feed housing 149. Extending downwardly from air cylinders are piston rods 156 threaded into the pillow blocks 154 at both ends of the feed roll 153.

A dial 157, adjustably mounted on the feed roll extension 145 in cooperation with a stationary pointer 158, indicates the sum of a predetermined number of feeds. A pointer 159 fastened to the member 139 cooperates with marks 160 provided on rocker-arm 128 and gives the press operator a guide while making a feed adjustment.

The bearing 137 for the worm-shaft 135 is split and provided with a clamp screw 161 to lock the worm gearing and eccentric in its adjusted position.

Figs. 13, 14 and 15 show diagrammatically the changing angles B, C and D of a driven member 175 around its fulcrum 176 while a rocker-arm 177 is swinging through a constant angle A around an eccentric 178 by means of a feed bar 179. The rocker-arm 177 and member 175 are operatively connected by means of a link 180. The eccentricity is the distance between the center of the eccentric 178 and the fulcrum point 176.

Fig. 13 shows the eccentric 178 in its extreme left position causing the driven member 175 to swing through a smaller angle B than the rocker-arm angle A.

Fig. 14 shows the eccentric in its extreme right position, causing the driven member 175 to swing through a larger angle D than the constant angle A of the rocker-arm.

Fig. 15 shows the eccentric in intermediate position, causing the driven member 175 to swing through an angle C, which is intermediate between angles B and D.

Procedure for obtaining an exact desired feed without having a sheet or strip of material in the roll feed in referring to Figs. 1 to 6:

Desired feed=3.75" per stroke
Feed roll diameter=3.000"
Number of predetermined strokes=20
Desired feed for 20 strokes=20×.375=7.500"

The operator sets the desired feed as accurately as he can on the feed crank disc. Next, he sees to it that the eccentric 34 is about in its midway position, as indicated by the pointer 55 and marks 56, as shown in Fig. 3.

The operator sets the dial 67 on the lower feed roll to zero with respect to the pointer 69, starts up the press and at twenty strokes stops the press.

While the press is running, the pointer 69 indicates the accumulated amount of feeds on the dial and the reading reflects the accuracy of the crankpin setting. It may be in this example 7.250". This is .250" short of the desired feed length 7.500".

Turning of the handwheel clockwise causes the eccentric 34 to be displaced counterclockwise, thus bringing the rocker-arm 29 to the right, shortening the effective length of the rocker-arm 29 and consequently increasing the angle of oscillation of the driven member 31 and, hence, the feed length.

Turning of the handwheel counterclockwise causes the angles of oscillation of the driven member and, hence, the feed length to be decreased.

The eccentricity of the eccentric may be so chosen that the total range of adjustment is about 10 to 15% of a range of feeds most used.

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Having fully described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In mechanisms for the fine adjustment of the feed movement of a feed roll on a machine having a drive shaft, a drive adjustment for said feed roll, comprising the combination of an oscillatable driving arm actuated from said drive shaft through suitable means, said arm adapted to be freely oscillated through a constant angle, an angularly displaceable eccentric pivot for said arm, an oscillatable driven arm having its axis of oscillation coincident with the axis of displacement of said eccentric pivot, a link connecting the free ends of said arms, and means for angularly displacing said eccentric to thereby vary the effective length of said driving arm and through said link vary the angle of oscillation of said driven arm.

2. A drive adjustment of the type set forth in claim 1, wherein the displacement of said eccentric is effected by a worm and worm gear set.

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