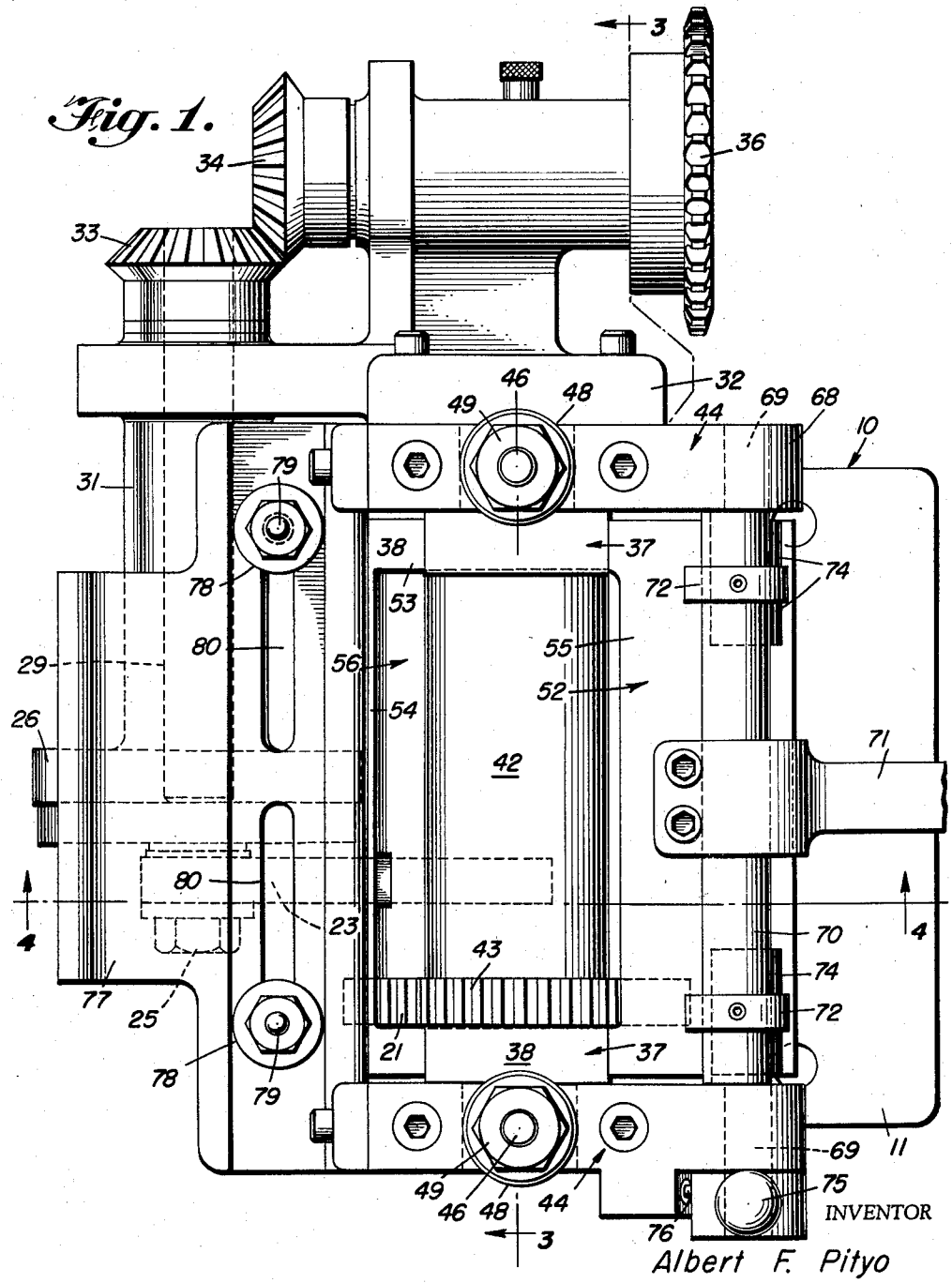
July 26, 1960 A. F. PITYO 2,946,588

WEB FEEDING MECHANISM

Filed Jan. 3, 1958 5 Sheets-Sheet 1

Fig. 1.



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WEB FEEDING MECHANISM

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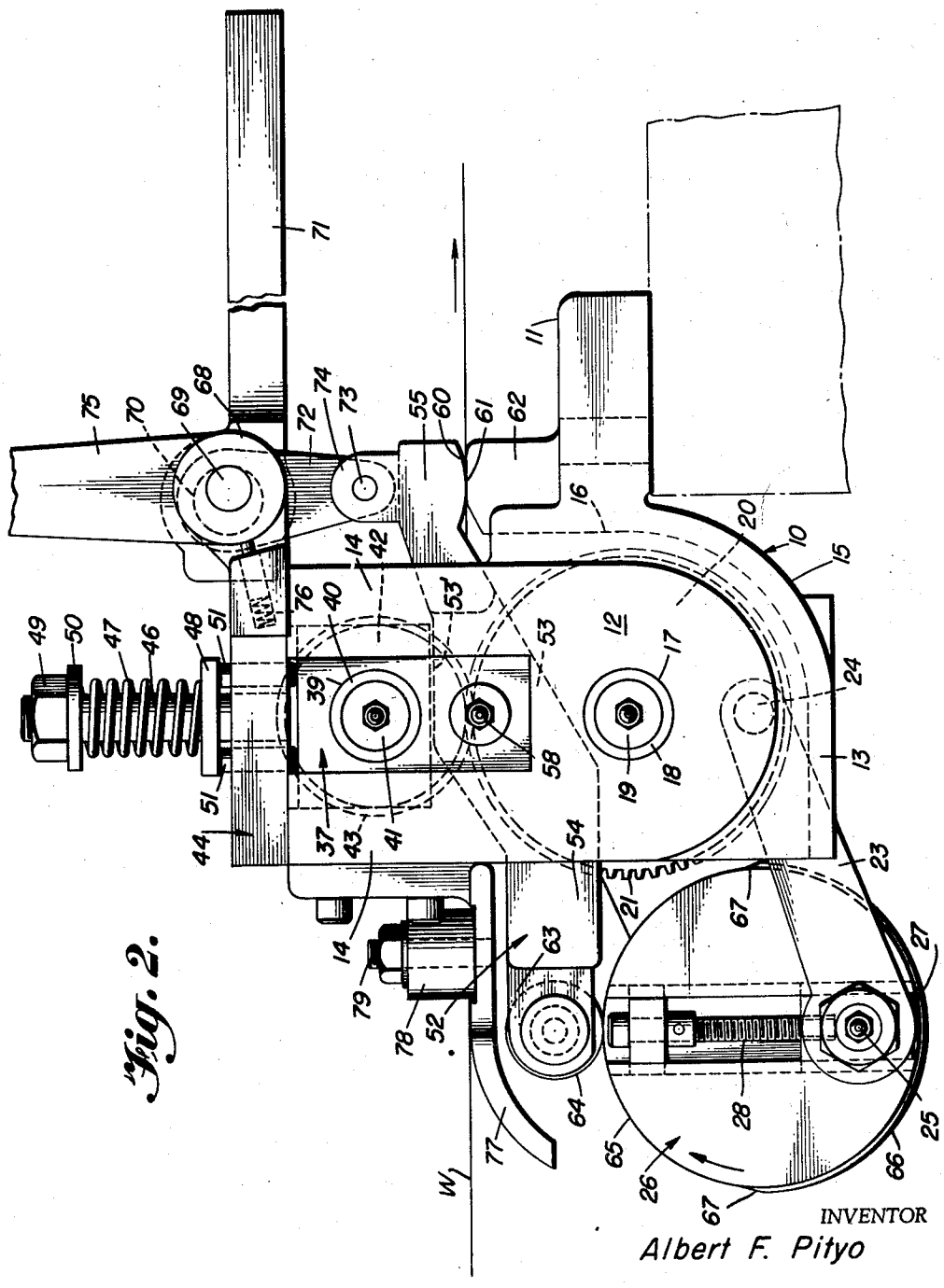


Fig. 2.

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WEB FEEDING MECHANISM

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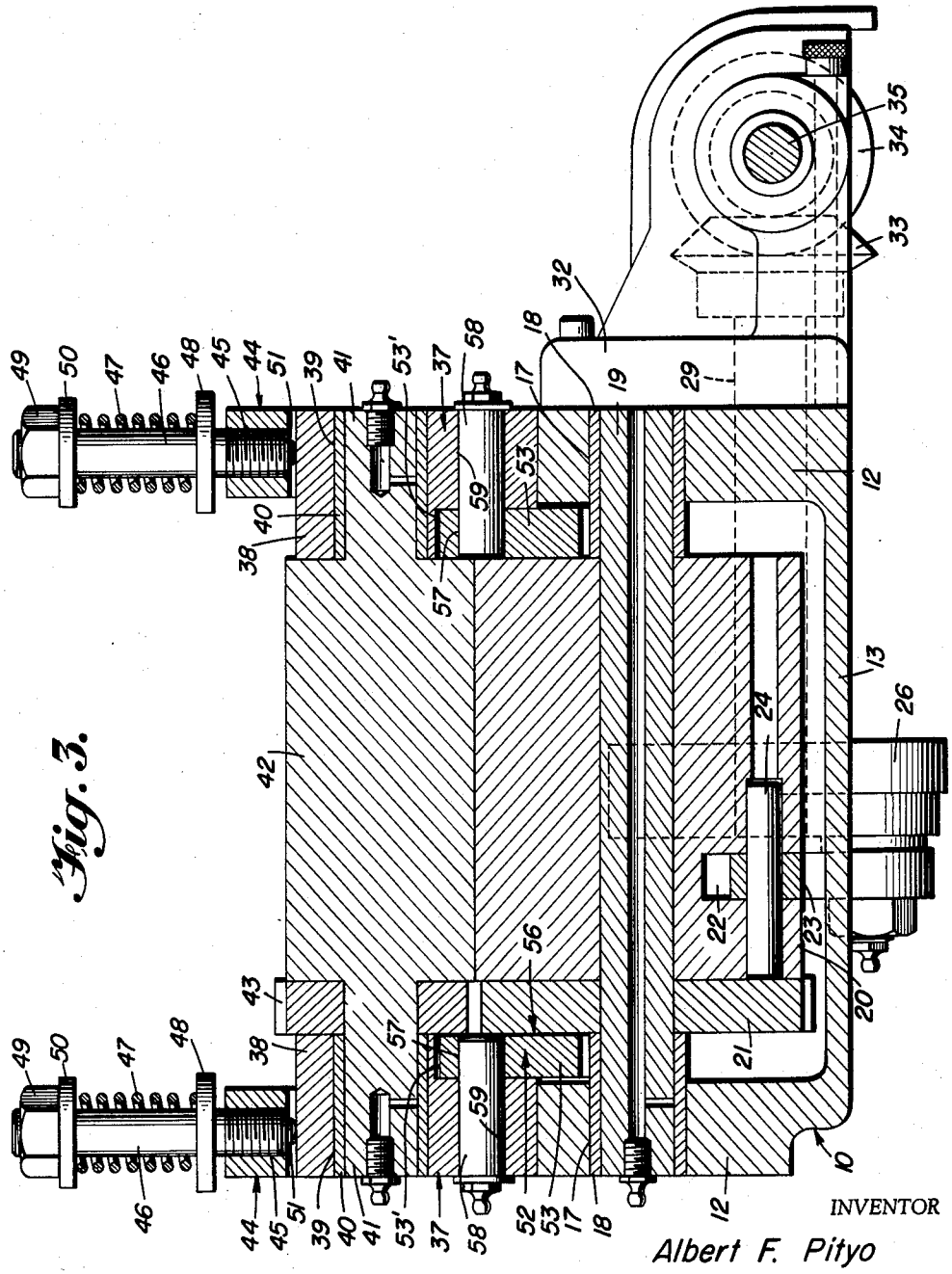


Fig. 3.

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July 26, 1960 A. F. PITYO 2,946,588

WEB FEEDING MECHANISM

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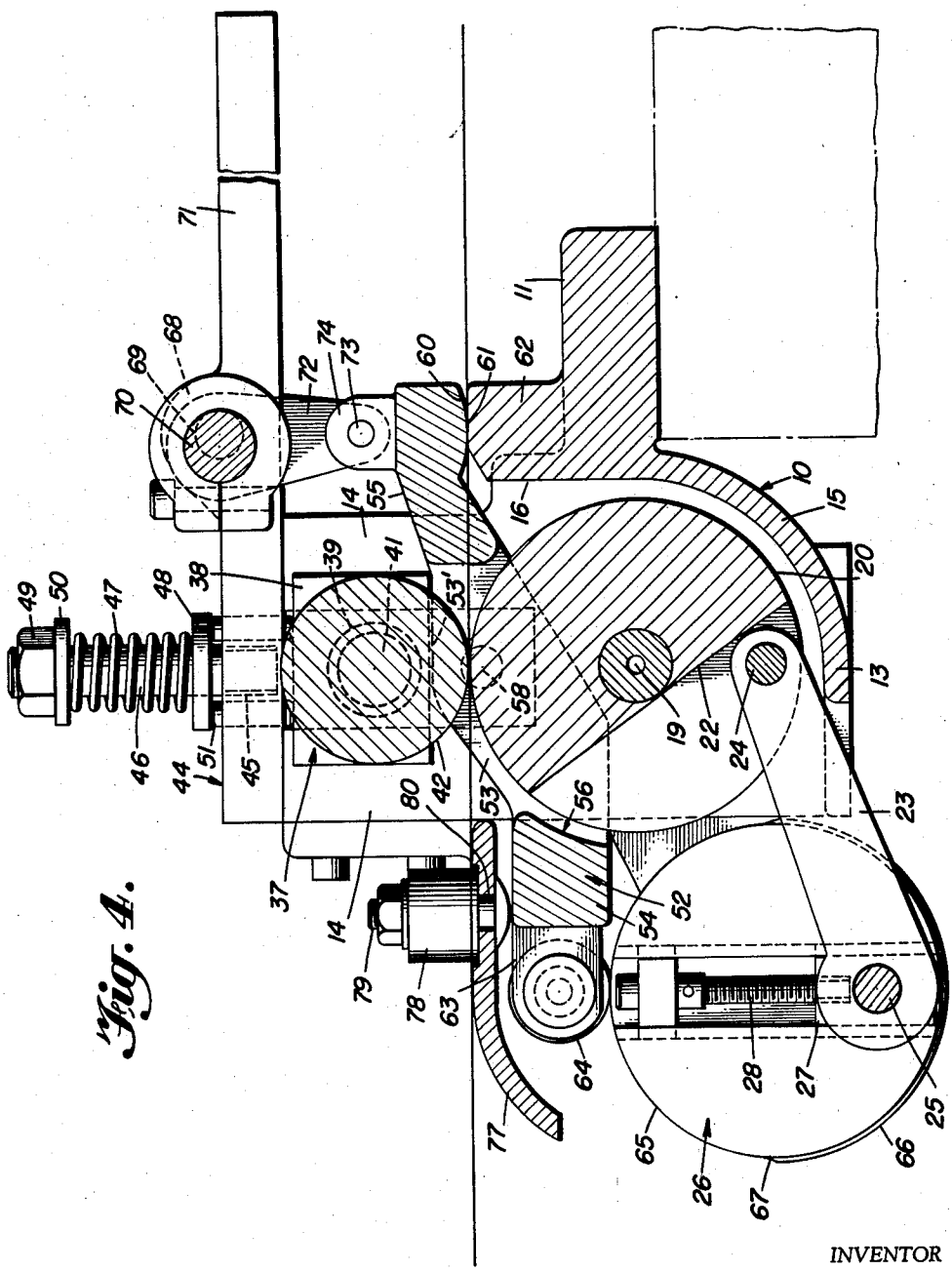


Fig. 4.

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WEB FEEDING MECHANISM

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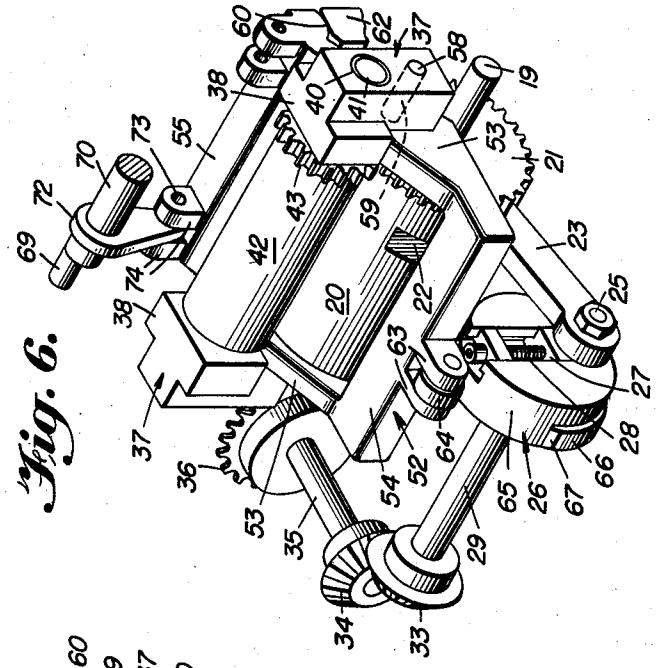


Fig. 6.

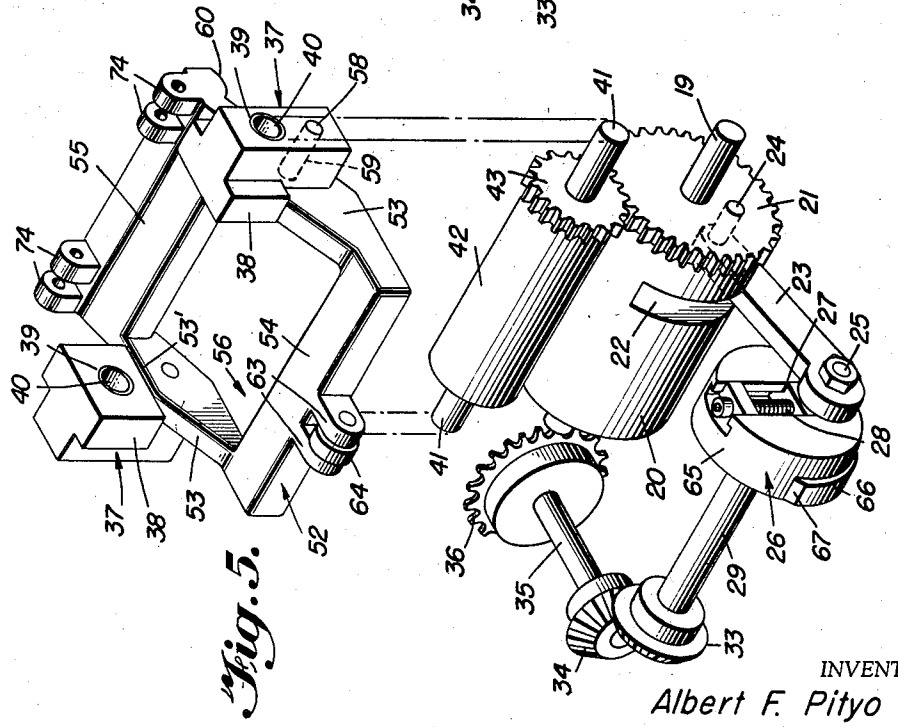


Fig. 5.

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2,946,588

WEB FEEDING MECHANISM

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Filed Jan. 3, 1958, Ser. No. 706,942

3 Claims. (Cl. 271—2.4)

The present invention relates to web feeding mechanism.

A primary object of the present invention is to provide mechanism for intermittently feeding a web in a highly accurate manner, and employing a novel arrangement of web feeding and clamping means which coact in a manner whereby it is impossible for the web to move or slip during the reverse movement of the feeding means or during the time interval when the clamping means is being rendered active and the feeding means inactive, or vice-versa.

A further object of the invention is to provide mechanism of the above-mentioned character which is adjustable to vary the length or distance of feeding of the web.

A further and more specific object of the invention is to provide in web feeding mechanism of the above-mentioned character means for clamping the web and holding it stationary a brief instant before the oscillatory feeding means is rendered inactive, said feeding means also re-engaging the web during the operation of the mechanism a brief instant before the clamping means releases the web, whereby it is impossible for the web to move or become displaced in the mechanism during the change-over from feeding to clamping and vice-versa.

Another object of the invention is to provide web feeding mechanism embodying an oscillatory web feeding element which reaches a point of substantial dwell during the time that the clamping means is rendered active and the feeding means inactive and vice-versa.

Another object is to provide web feeding mechanism which will intermittently feed the web in an accurate manner, regardless of variations in speed of or lost motion in the driving means.

Other objects and advantages of the invention will become apparent during the course of the following description.

In the accompanying drawings, forming a part of this application and in which like numerals are employed to designate like parts throughout the same,

Figure 1 is a plan view of web feeding mechanism embodying the present invention.

Figure 2 is a side elevation of the mechanism.

Figure 3 is a vertical section taken on line 3—3 of Figure 1.

Figure 4 is a vertical section at right angles to Figure 3, taken on line 4—4 of Figure 1.

Figure 5 is an exploded perspective view of elements of the mechanism with the support and other parts omitted.

Figure 6 is a perspective view showing the elements of Figure 5 in assembled relation.

In the drawings, wherein for the purpose of illustration is shown a preferred embodiment of the invention, the numeral 10 designates generally a relatively stationary housing or support for the web feeding mechanism, including a horizontal flange 11 adapted to be rigidly secured to the bed of a conventional punch press, not

shown. The housing 10 includes spaced opposed sides 12 and a bottom wall 13 integral therewith, and the sides 12 are bifurcated at their upper ends to form pairs of upstanding extensions 14. The housing 10 further includes a circularly curved forward wall 15, leading to an upstanding vertical wall 16, having its upper end terminating near the bottoms of the extensions 14. The rear side of the housing 10, remote from the wall 16, is entirely open between the sides or ends 12. The ends 12 of the housing 10 have openings 17 formed therethrough in axial alignment and concentric with the curved wall 15.

Freely journaled in suitable bearings 18, held within the openings 17, is a feed roll shaft 19, having the oscillatory or reciprocatory feed roll 20 rigidly mounted thereon, between and inwardly of the ends 12 of the housing 10. A gear 21 is rigidly secured to one end of the feed roll 20 to positively drive the same, and the feed roll 20 is provided intermediate its length with a transverse slot 22 for receiving a link 23, pivoted thereto eccentrically at 24.

The link 23 has its other end pivoted at 25 upon a rotary cam 26, through the medium of a slide or element 27, which is adjustable radially of the cam by screw-threaded means 28. By this means, the pivot 25 of the link 23 is adjustable radially of the cam 26, so that the throw or travel of the link 23 may be varied as desired for regulating the extent of feeding of the web by the oscillatory feed roll 20.

The cam 26 is rigidly mounted upon a drive shaft 29, having its axis arranged parallel to the axis of the shaft 19 and spaced laterally therefrom and somewhat below the same, as shown in Figure 2. The shaft 29 is journaled within suitable bearings mounted within a bearing support member 31, the latter being of right-angled construction and including a mounting flange 32, suitably rigidly secured to one end 12 of the housing 10.

The shaft 29 carries a first beveled gear 33 near one corner of the mechanism, engaging and driven by a second beveled gear 34, secured to a shaft 35, suitably journaled within the adjacent portion of the bearing support 31. The other end of the shaft 35 has secured thereto a sprocket wheel 36, or the like, for continuously driving the shaft 35 and associated elements. The driving of the shaft 35 causes the cam 26 to turn continuously with the shaft 29, and through the medium of the link 23 to impart oscillatory movement to the feed roll 20.

A pair of slide blocks 37 engage slidably between the upstanding extensions 14 of the housing 10, and include enlarged heads 38, engaging inwardly of the extensions 14, as shown. The slide blocks 37 have axially aligned openings 39 formed therethrough, for the reception of bearings 40, within which shaft extensions 41 of a presser roll 42 are freely journaled for rotation. The presser roll 42 lies directly above the oscillatory feed roll 20 and is coextensive in length with the feed roll and adapted to contact the latter at the top of the feed roll. A gear 43 is rigidly secured to one end of the presser roll 42, and is arranged in constant mesh with the gear 21 of the feed roll. It is thus seen that the feed and presser rolls 20 and 42 are positively connected in driving engagement, so that there cannot be any slippage between the two rolls during the operation of the mechanism. The presser roll 42 is bodily carried by the slide blocks 37, and vertically shiftable therewith a small extent relative to the feed roll 20. The vertical shifting of the presser roll 42 and associated elements is of such extent during the operation of the mechanism that the gears 43 and 21 never move entirely out of mesh.

Stationary head plates 44 are fixedly secured to the tops of the extensions 14 of housing 10. These head plates 44 have screw-threaded openings 45, above the tops of the

slide blocks 37, for the reception of upstanding screw-threaded studs 46, carrying strong compressible coil springs 47. Collars 48 are slidably mounted upon the studs 46, in engagement with the lower ends of the springs 47. The upper ends of the studs 46 carry adjusting nuts 49 and flat washers 50, to facilitate adjusting the tension of the springs 47. The collars 48 have their lower sides engaging slidable pins 51, which engage through openings in the head plates 44 and have their lower ends contacting the tops of the slide blocks 37. With this arrangement, the springs 47 yieldably urge the presser roll 42 against the oscillatory feed roll 20 at all times, but permit of the elevation of the presser roll 42 periodically, by means to be described.

A web clamping and presser roll elevating member or yoke 52 is provided, including sides 53 and ends 54 and 55 formed integral therewith. The yoke 52 has a large central rectangular opening 56 to receive the upper portion of the feed roll 20. The yoke 52 engages between the ends 12 of the housing 10 and is provided in its sides 53 with axially aligned openings 57, adapted to receive pivot elements 58, in turn rigidly mounted within openings 59 provided in the lower portions of the slide blocks 37, below the shaft extensions 41, Figure 2. The yoke sides 53 have horizontal portions 53' underlying the enlarged heads 38 and spaced somewhat therefrom to permit the yoke 52 to turn or move somewhat relative to the slide blocks 37. By this arrangement, the yoke 52 is bodily carried by the vertically shiftable slide blocks 37 and is adapted to be elevated and lowered bodily with the presser roll 42 and associated elements. The pivots 58 for the yoke 52 are located in vertical alignment with the axes of the rolls 20 and 42, as shown in Figure 2, and the pivots 58 are arranged near the longitudinal center of the yoke 52.

The end of the yoke nearest the flange 11 has a rounded clamping face 60 extending for its full width, on its lower side, adapted to clamp the web against the flat upper surface 61 of a transverse upstanding lug 62, formed integral with the housing 10 at the rear side of the latter. The other end 54 of the yoke carries a pair of spaced apertured lugs 63, between which is journaled a freely rotatable cam follower 64, held in constant engagement with the periphery of the cam 26.

The cam 26, as shown, has a low part 65 extending for about one-half of its circumference, and a high part 66 extending for one-half of its circumference, the high and low parts of the cam being connected by gradually inclined shoulders 67. These shoulders 67 are at diametrically opposite points of the cam 26, and the shoulders are generated from a diameter of the cam intersecting the axis of the shaft 29. The shoulders 67, as shown in Figure 2, are arranged on opposite sides of the center of rotation of the shaft 29, when the pivot 25 is directly below the axis of the shaft 29. The pivot 25 is spaced ninety degrees from each of the shoulders 67, as shown. By virtue of this arrangement, the cam follower 64 of the yoke 52 will engage the shoulders 67 when the pivot 25 of the link 23 is at dead center with respect to the axis of the shaft 29 and the pivot 24 of the feed roll 20. When this condition exists during the operation of the mechanism, the oscillatory feed roll 20 will dwell and will have no perceptible movement while the cam follower 64 is moving from the low part of the cam to the high part thereof and vice-versa. Accordingly, the feed roll 20 will dwell during the transition period while the pivoted yoke 52 is moving into or out of clamping engagement with the web and while it is rendering the presser roll 42 active or inactive with respect to the feed roll 20.

The head plates 44 are each provided at their rear ends with apertured extensions 68, within which are journaled end extensions 69 of a horizontal rock shaft having an eccentric body portion 70. The eccentric shaft 70 is spaced above the clamping part 60 of the yoke 52 and parallel therewith, as shown. A horizontal lever 71 is suitably rigidly secured to the eccentric shaft 70 and extends at right angles thereto beyond the rear end of the mechanism for automatic actuation by a rocker arm of the punch press, during piloting operations, in a well-known manner.

A pair of vertical connecting links 72 have their lower ends pivoted at 73 to upstanding lugs 74 formed upon the top of the yoke end 55. The upper ends of the links 72 have openings slidably receiving the eccentric body portion 70 of the shaft-carrying lever 71. Accordingly, when the lever 71 is depressed by the rocker arm of the punch press, not shown, the eccentric portion 70 of the shaft, through the medium of the links 72 will elevate the clamping end 60 of the yoke 52 and turn the yoke upon its pivots 58. This arrangement automatically releases the web from clamping engagement by the yoke 52 during the piloting operation in the punch press. A separate handle 75 may also be rigidly secured to the shaft 70 in upstanding relation therewith, as shown, to facilitate manually turning the eccentric shaft 70 to elevate the adjacent end of the yoke 52 when desired. The handle 75 may be omitted if preferred.

Spring means 76 is carried by the head plate 44 adjacent to the handle 75, and engaging the bottom of the handle to return the handle automatically to the upstanding position after the same has been actuated for elevating the clamping part 60 of the yoke 52. The spring means 76 also functions to return the lever 71 automatically to its horizontal position and to return the part 60 of the yoke into clamping engagement with the web, when the rocker arm of the punch press has depressed the lever 71 and subsequently released it.

A curved apron 77, coextensive in length with the rolls 20 and 42 is provided, for guiding the web W into feeding engagement between the feed roll 20 and clamp roll 42. Means are provided to center the web upon the apron 77 and to guide the same between the feed and presser rolls 20 and 42. This means comprises a pair of guide rollers 78, carried by vertical bolts 79, adjustably mounted in a pair of transverse slots 80 formed through the apron 77, as shown in the drawings. The guide rollers 78 are thus adjustable toward and from each other so that they may have guiding contact with the opposite longitudinal edges of webs of varying widths which are being fed by the mechanism.

The remaining details of construction are of no particular consequence in connection with the invention, and need not be described herein.

Operation

Power is applied to the sprocket wheel 36, and through the medium of the gearing shown, the cam 26 is caused to turn continuously clockwise or in the direction of the arrow in Figure 2, at the desired speed. When the parts are arranged as shown in Figure 2, the web W is at the mid-point of its feed. The cam follower 64 is engaging the low part 65 of the cam and the springs 47 are holding the presser roller 42 in active engagement with the web W, and the clamping part 60 of the yoke 52 is releasing the web so that it may be fed to the right or in the direction of the arrow by the feed roll 20. The cam 26, through the medium of the link 23, causes the feed roll 20 to turn clockwise or in the direction of the arrow for feeding the web. The web is thus fed for the entire time that the cam follower 64 is riding on the low part 65 of the cam, between the shoulders 67, and the cam 26 turns one-half a revolution in the clockwise direction for a complete feeding of the web. As previously stated, with the parts arranged as in Figure 2, the web is actually at the mid-point of its feeding.

When the shoulder 67 at the left-hand side of Figure 2 reaches the cam follower 64, the latter will ride onto the shoulder 67 and become elevated as it passes onto the high part 66 of the cam. Upon engaging the shoulder 67, the follower 46 will cause the yoke 52 to turn a slight

amount clockwise upon its pivots 58, and when this occurs, the clamping part 60 of the yoke will first clamp the web W tightly against the stationary lug 62 so that the web cannot move further. Immediately subsequent to this, and substantially simultaneously with it, the passing of the cam follower 64 onto the high part 66 of the cam will cause a slight elevating of the pivots 58 of the yoke, together with the slide blocks 37 and the presser roll 42. The springs 47 will yield to permit the elevating of the slide blocks 37 and associated parts, and the yoke 52 will rock upon the curved clamping part 60 as a fulcrum. The arrangement of the yoke 52 and its movement are such that the operation of the presser roll 42 and web clamping parts 60 and 61 are perfectly synchronized, and there can be no movement of the web during the transition period when the cam follower 64 is engaging either cam shoulder 67. The total movement of the yoke 52 is a function of the slope and radial height of the cam shoulder 67. The yoke 52 moves in two manners when the cam follower 64 rides over the shoulder 67 while passing from the low cam face 65 to the high cam face 66, and the cam shoulder displaces the follower 64 radially. That is to say, when the cam follower 64 begins to engage the slope of shoulder 67, the yoke 52 is initially rocked clockwise upon its pivots 58, Figure 2, in the manner of a first-class lever, and the clamping part 60 of the yoke clamps the web against the stationary clamp part 61. Further and continued radial displacement of the cam follower 64 as it passes over the shoulder 67 and onto the high cam face 66 causes the yoke 52 to pivot upon the curved clamping part 60, which now serves as the lever fulcrum, and the yoke 52 now functions as a second-class lever for separating the presser roll 42 from the feed roll 20. That is to say, the yoke 52 pivots on its clamping part 60 and the pivots 58 of the yoke are elevated with the blocks 37 and the presser roll 42 carried thereby. The presser roll 42 is thus lifted or separated from the feed roll 20 and rendered inactive relative thereto while the parts 60 and 61 continue to clamp the web.

As soon as the presser roll 42 is elevated, the driving engagement between the feed roll 20 and the web W ceases. The cam follower 64 is now completely onto the high part 66 of the cam 26, and the cam continues to rotate for one-half turn while the high part 66 of the cam engages the cam follower 64. During this time, the cam, through the medium of the link 23, causes the feed roll 20 to turn in the reverse direction or counter-clockwise in Figure 2, and in so doing, the feed roll slides freely below the lower side of the web W and cannot cause any reverse feeding of the web, due to the clamping engagement of the yoke part 60 with the web.

When the feed roll 20 reaches the back end of its travel, the cam follower 64 will have traveled the full 180 degrees upon the cam 26 encompassed by the high part 66. The cam follower will now travel down the oncoming inclined shoulder 67 of the cam and pass back onto the low part 65 of the cam. As this occurs, the pivots 58 of the yoke 52 and the slide blocks 37 and presser roll 42 will first be lowered, so that the presser roll 42 re-engages the web W and engages the same to the feed roll 20. The clamping part 60 at this time again serves as the fulcrum for the yoke 52 which is operating as a second-class lever. Immediately following this, and substantially simultaneously therewith, the yoke 52 will turn counter-clockwise upon its pivots 58, Figure 2, as a firstclass lever, and the clamping part 60 of the yoke 52 will move out of clamping engagement with the web W, and the web is free to be fed once again by the feed roll 20 during the next cycle of operation of the mechanism. The cam 26 now continues to turn for 180 degrees, while the follower 64 is engaging the low part 65 of the cam, and the feed roll will again be turned in the clockwise direction for feeding the web W while the clamping part 60 of the yoke 52 is free of clamping engagement with the web. The cycle of operation may be continuous in the above-described manner for intermittently feeding the web W a desired number of times. The extent of feeding of the web at each cycle of operation or rotation of the cam 26 is regulated by adjusting the pivot 25 radially inwardly or outwardly upon the cam 26. Through the medium of the link 23, the feed roll 20 is caused to oscillate a desired amount upon each complete revolution of the cam, in accordance with the adjustment of the pivot 25.

It may now be seen that due to the arrangement of the pivots 58 of the yoke 52 upon the vertically movable slide blocks 37, whenever the cam follower 64 passes from the low part 65 of the cam to the high part 66 thereof, the yoke 52 will first turn upon its pivots 58 to bring the clamping part 60 of the yoke into clamping engagement with the web and against the lug 62, prior to elevating the presser roll 42 and freeing the same from engagement with the web. Likewise, whenever the cam follower passes from the high part of the cam to the low part thereof, the yoke 52 will first pivot upon its rounded clamping part 60 as a fulcrum, and lower the presser roll 42 into positive engagement with the web, prior to releasing the clamping part 60 from clamping engagement with the web. By virtue of this arrangement, there is never a chance of the web W to slip or move during the transition period when the cam follower 64 is passing from the low part of the cam to the high part or vice-versa, and the movements of the presser roll 42 and clamping part 60 are perfectly synchronized. In one case, the clamping part 60 will engage the web and hold it before the presser roll 42 is elevated, and in the other instance, the presser roll 42 is lowered into engagement with the web before the clamping part 60 releases it. The above improved mode of operation is further enhanced by arranging the pivots 58 of the yoke 52 near the longitudinal center of the yoke, so that the lengths of the yoke arms or levers upon opposite sides of its pivots are substantially equal.

As a further safeguard against movement of the web W during the transition period when the cam follower 64 is moving from the low part of the cam to the high part or vice-versa, the pivot 25 of the link 23 will always be, at these times, on dead center with respect to the axis of the shaft 29 and the pivot 24 of the feed roll 20. Consequently, whenever the cam follower 64 is passing onto or from one of the shoulders 67, the feed roll 20 will be at a point of dwell and will not move perceptibly. This feature is not critical, however, since, as previously stated, the clamping part 60 of the yoke 52 will always be holding the web W against movement before the presser roll 42 is elevated away from the web and feed roll 20, and conversely, the presser roll 42 will re-engage the web W into driving engagement with the feed roll 20 prior to the moment when the clamping part 60 of the yoke releases the web.

In connection with the lever 71 which is actuated automatically by the punch press to facilitate piloting operations, whenever the rocker arm of the punch press depresses the lever 71 and causes the eccentric shaft 70 to turn clockwise in Figure 2, the connecting link 72 will elevate the clamping part 60 of the yoke 52 and also elevate the presser roll 42 from engagement with the web. When this action takes place, the yoke 52 pivots upon the cam follower 64 as a fulcrum, and the web W is released for piloting within the punch press. The same operation may be accomplished at any desired time manually by means of the handle 75, as should now be obvious.

This application is a continuation-in-part of my co-pending application Serial Number 380,685, filed Sept. 17, 1953 for Web Feeding Mechanism.

It is to be understood that the form of my invention herewith shown and described is to be taken as a pre-

ferred example of the same and that various changes in the shape, size and arrangement of parts may be resorted to, without departing from the spirit of the invention or the scope of the subjoined claims.

Having thus described my invention, I claim:

1. Web feeding mechanism comprising a support having a stationary web clamping part, a feed roll journaled upon the support on one side of the stationary web clamping part, a presser roll arranged opposite the feed roll to engage the web with the feed roll as the web passes between the feed and presser rolls and across the stationary web clamping part, reciprocatory means slidable upon the support and carrying the presser roll and shiftable therewith toward and away from the feed roll, resilient means connected with the reciprocatory means to urge the same toward the feed roll, a rockable member pivoted intermediate its ends to the reciprocatory means and extending on opposite sides of the feed and presser rolls and provided near one end with a movable web clamping part disposed opposite the stationary web clamping part, said rockable member provided near its other end with a cam follower, a rotary cam journaled upon the support near the feed roll and having circumferentially extending opposed radially offset high and low cam faces and inclined shoulders connecting the high and low cam faces near opposite sides of the cam, and driving connecting means between the rotary cam and feed roll to oscillate the feed roll during rotation of the cam, whereby initial engagement of one of said inclined shoulders with the cam follower turns the rockable member upon its pivot to first shift the movable clamp part into clamping engagement with the web and stationary clamp part, complete passage of the cam follower over

said one shoulder and onto said high cam face causing the rockable member to pivot upon said movable clamp part for separating the presser roll from the feed roll, passage of the cam follower from the high cam face over the other shoulder and onto the low cam face causing the rockable member to pivot in the reverse direction upon said movable clamp part to return the presser roll into active engagement with the feed roll and to then turn the rockable member upon its pivot in the reverse direction for separating the movable clamp part from the stationary clamp part and web.

2. Web feeding mechanism according to claim 1, and wherein the rotational axes of said feed and presser rolls and said rotary cam are parallel to each other and parallel to the pivot axis of the rockable member, and said driving connecting means is a link having its opposite ends pivoted eccentrically to the feed roll and rotary cam.

3. Web feeding mechanism according to claim 2, and wherein the eccentric pivot of said link upon said cam is adjustable radially of the cam to vary the stroke of the feed roll.

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