

Sept. 22, 1953

A. O. RUSSELL ET AL

2,653,023

DEVICE FOR FEEDING A CONTINUOUS WEB

Filed June 16, 1949

7 Sheets-Sheet 1

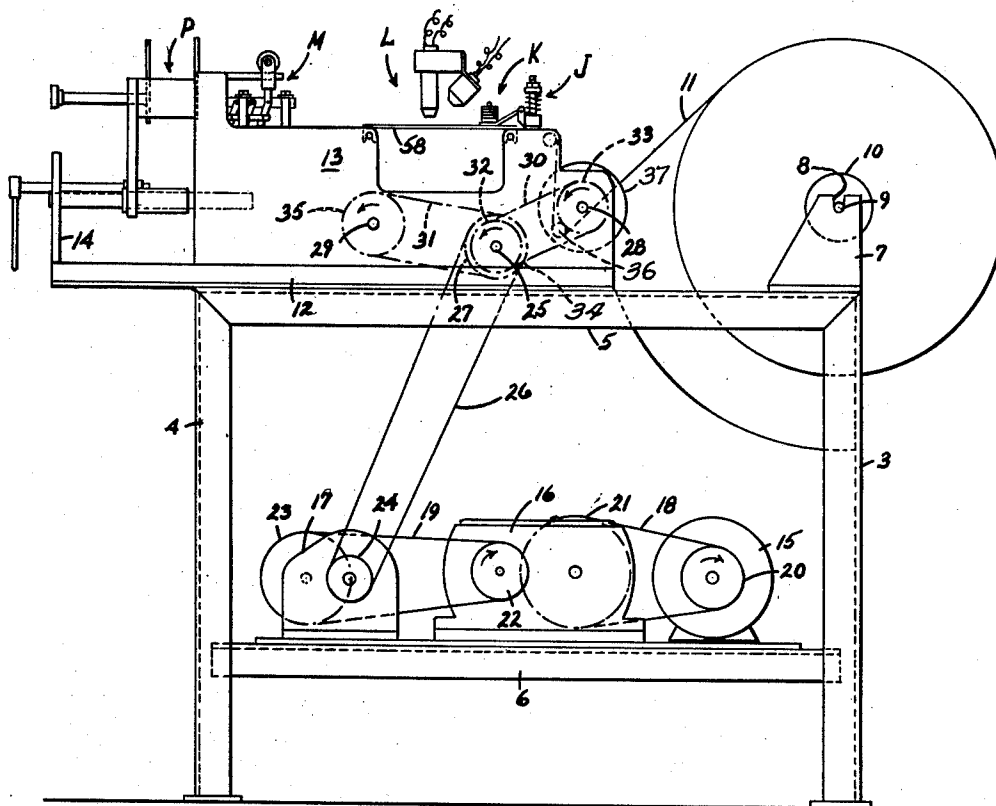


FIG. 1

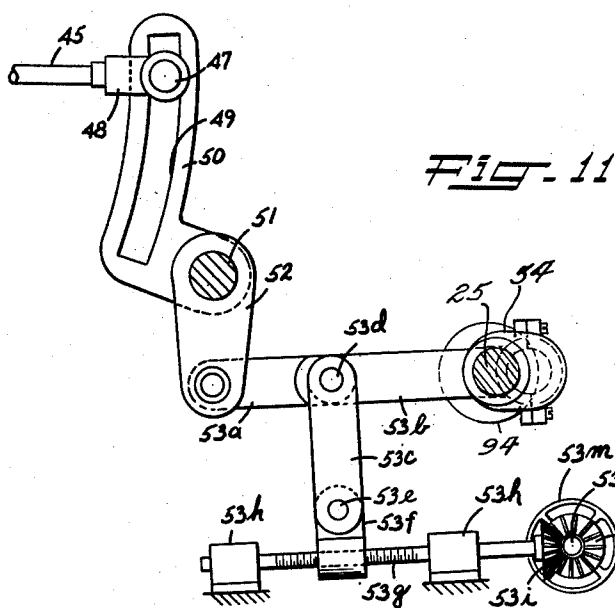


FIG. 11

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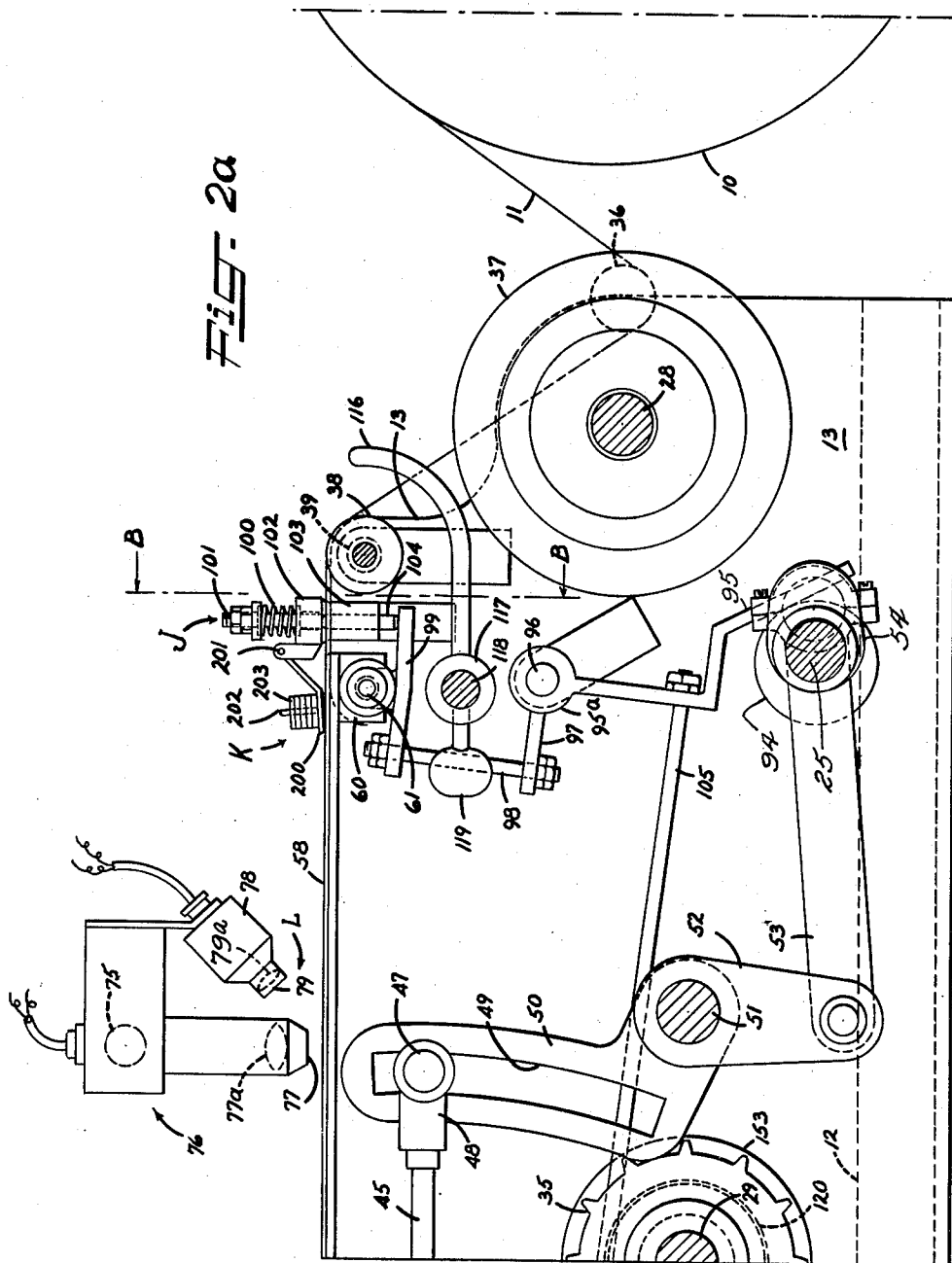
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DEVICE FOR FEEDING A CONTINUOUS WEB

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7 Sheets-Sheet 2



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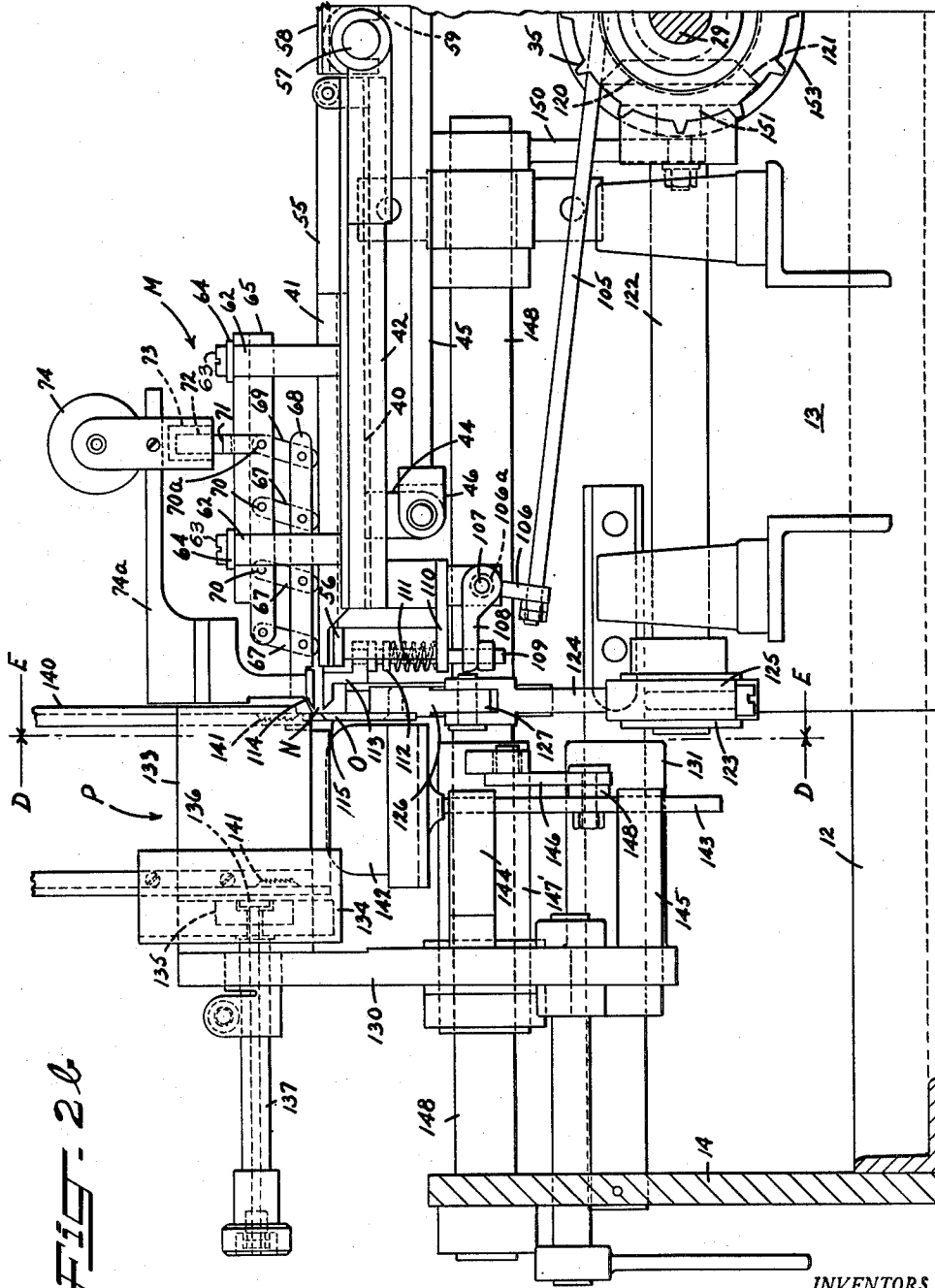
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DEVICE FOR FEEDING A CONTINUOUS WEB

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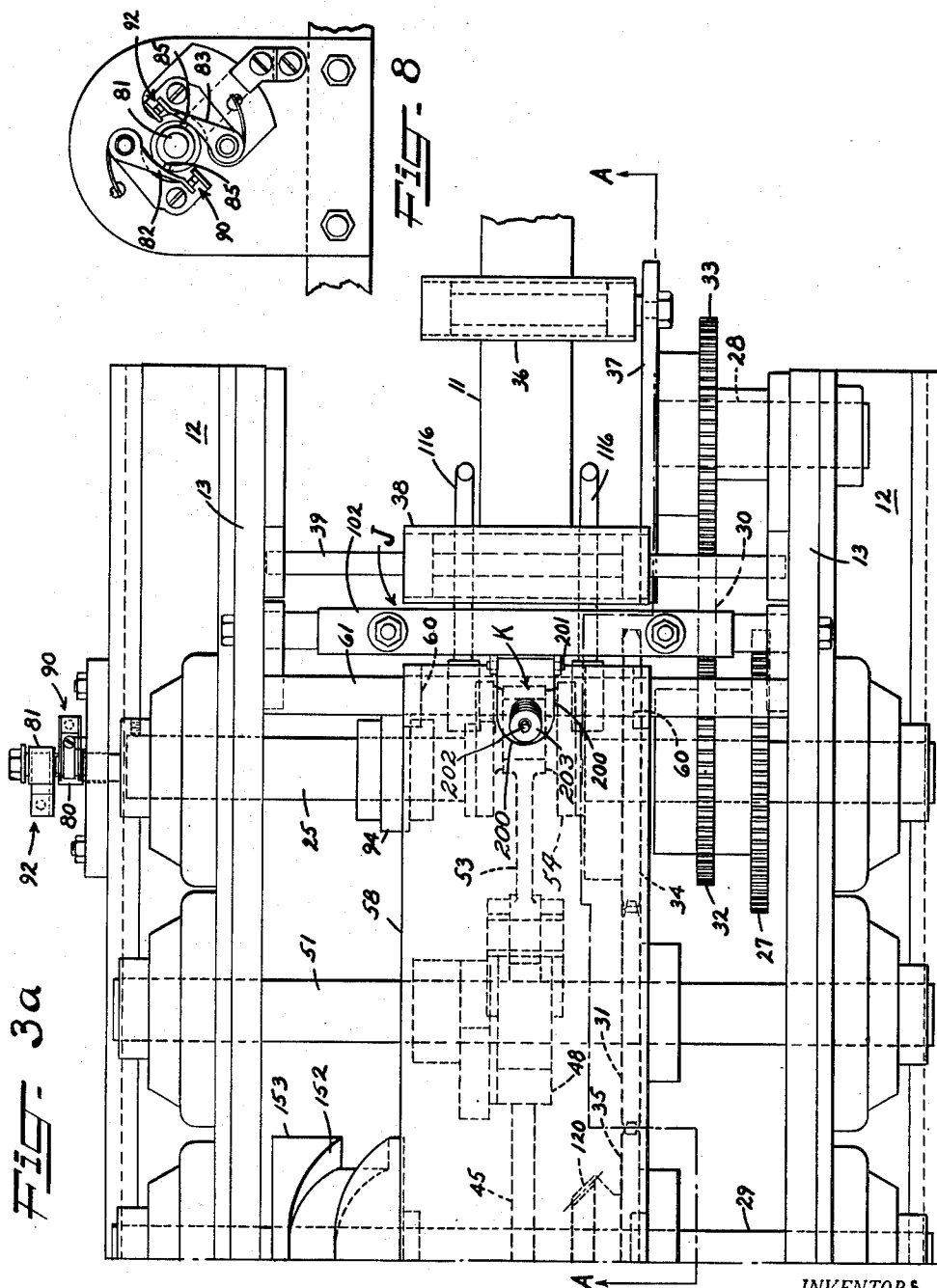
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DEVICE FOR FEEDING A CONTINUOUS WEB

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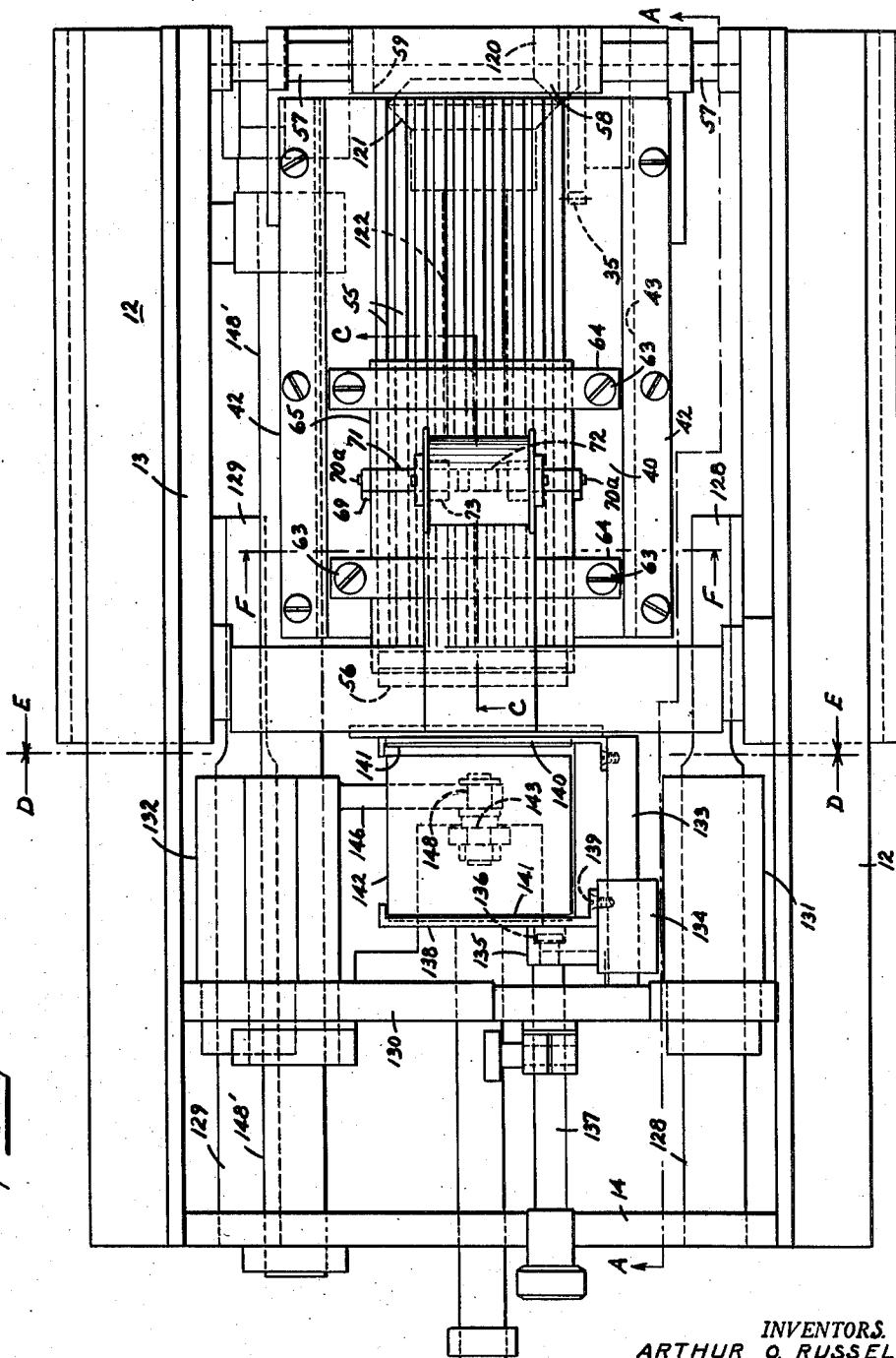
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DEVICE FOR FEEDING A CONTINUOUS WEB

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FIG- 3b



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DEVICE FOR FEEDING A CONTINUOUS WEB

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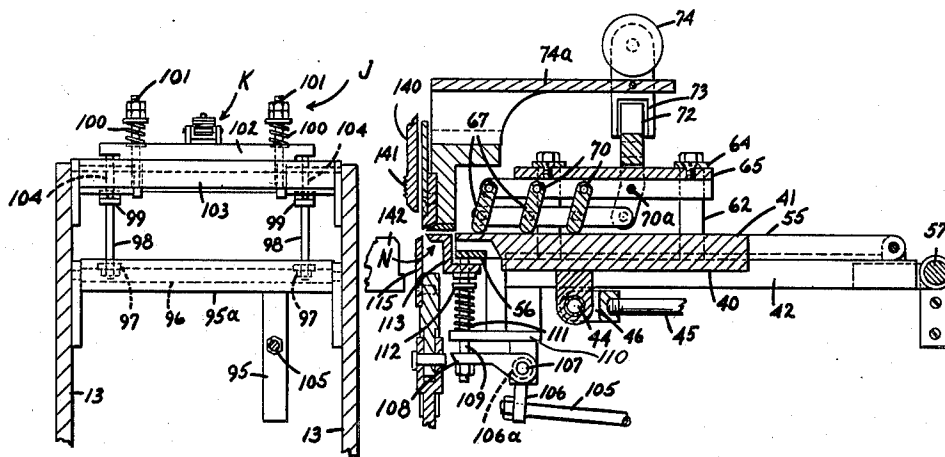


Fig. 4

Fig. 5

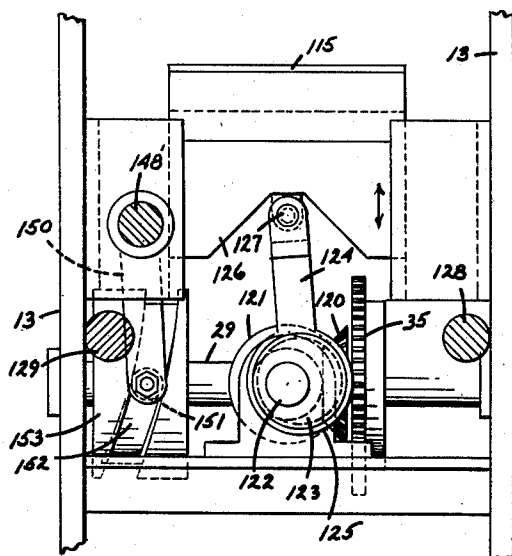


Fig. 6

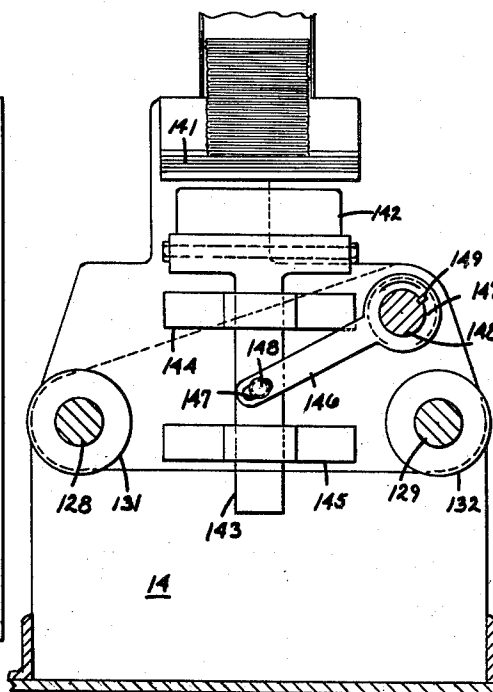


Fig. 7

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DEVICE FOR FEEDING A CONTINUOUS WEB

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Fig. 9

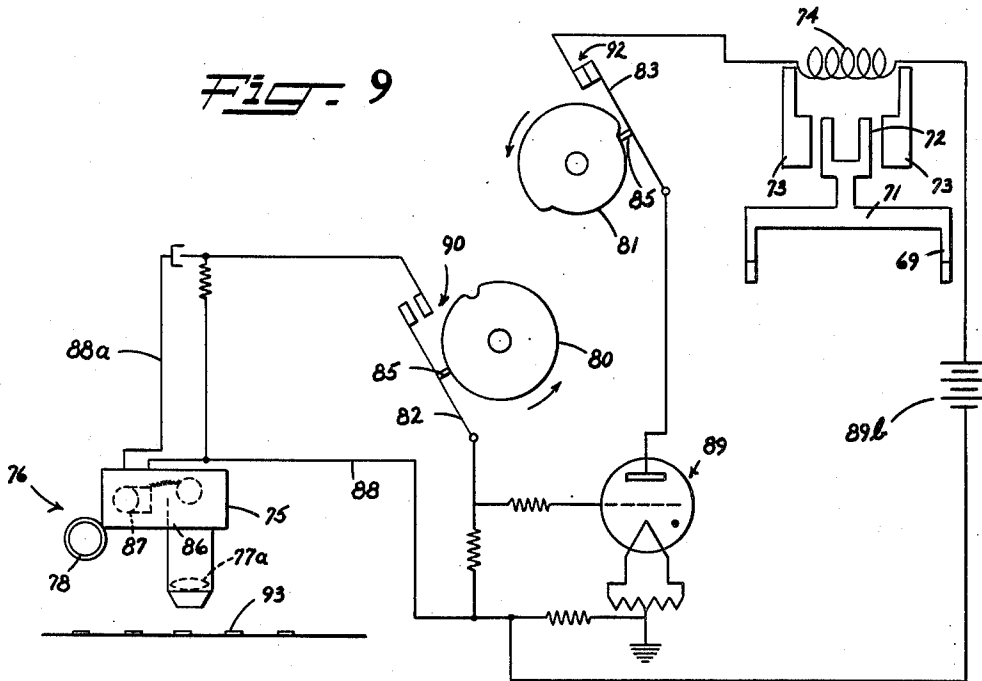
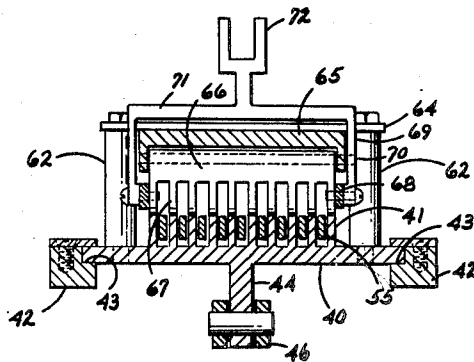


Fig. 10

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UNITED STATES PATENT OFFICE

2,653,023

DEVICE FOR FEEDING A CONTINUOUS WEB

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Application June 16, 1949, Serial No. 99,464

7 Claims. (Cl. 271—2.5)

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This invention relates to a device for intermit-
tently feeding a web or band to a cutting posi-
tion, setting the feed mechanism to overfeed
slightly, and occasionally overcorrecting the feed
by a light-responsive device such as a photocell
to incapacitate the feeding means a predeter-
mined distance ahead of the end of its forward
feeding stroke when a predetermined index on
the web or band passes under the photocell, re-
peatedly cutting the band and stacking the pieces
to facilitate packing.

In such intermittent feeding systems, there is
a permissible latitude or tolerance with respect
to the position of cutting and it is a primary ob-
ject of the present invention to speed up such
machines by making it unnecessary for the light-
responsive system to control every feeding stroke
of the feeding mechanism. A further object of
the invention is to provide for the automatic
stacking of the cut sections in superposition to
facilitate the packaging thereof. A further ob-
ject is to provide such feeding systems with a
stroke-adjusting means that can be adjusted
while the machine is in operation. A further
object is to provide an adjusting means of such
construction that the entire variation in length
is effected without changing the forward point
of the feeding stroke. Other objects of the in-
vention will be apparent from the drawing and
the description thereof hereinafter.

Figure 1 is a side elevation of the machine and
its driving connections,

Figure 2a is an elevation in cross-section of the
supply end of the mechanism with the driving
connections removed, taken on line A—A of Fig-
ure 3a,

Figure 2b is a similar view of the discharge end
of the mechanism taken on line A—A of Figure
3b,

Figure 3a is a plan view of the supply end of
the mechanism,

Figure 3b is a plan view of the discharge end
of the mechanism,

Figure 4 is a section on line B—B of Figure 2a,
Figure 5 is a section on line C—C of Figure 3b,
Figure 6 is a section on line D—D of Figure 2b,
Figure 7 is a section on line E—E of Figure 2b,
Figure 8 is an end view of the cam and switch
control,

Figure 9 is a diagrammatic view of the elec-
trical connections,

Figure 10 is a transverse section of the feed
mechanism taken on line F—F of Figure 3b, and

Figure 11 illustrates a stroke-adjusting mecha-
nism.

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As shown in Figure 1, a supporting framework
comprises corner posts 3 and 4, a horizontal top
frame 5 and a lower supporting frame 6. At one
end of the top frame 5 a pair of brackets 7 are
carried and have bearing grooves 8 adapted to
receive a shaft 9 upon which a reel or roll 10 of
a web or band material 11 is rotatably mounted.
The other end of the top frame 5 carries a bed
frame 12 to the opposite sides of which are
secured a pair of upright side plates 13. The
two side plates 13 support the operating con-
nections of the feeding and cutting mechanism
and cooperate with the upright end plate 14 to
support the stacking mechanism P.

A motor 15 drives a variable speed gearing 16
and a gear reduction box 17 through suitable
connections such as belts 18 and 19 respectively
which cooperate with pulleys 20, 21, 22 and 23.
Sprockets and chains may be substituted if de-
sired. The sprocket 24 driven by the gear box 17
drives a crank-shaft 25 through the chain 26
and a sprocket 27. The shaft 25 drives shafts
28 and 29 respectively through the chains 30 and
31 and sprockets 32, 33, 34 and 35 (see also
Figure 3a).

Referring more particularly to Figures 2a and
2b and 3a and 3b, the band or web 11 proceeds
from the reel 10 about a roll 36 rotatably mounted
eccentrically on a disc 37 secured to shaft 28 for
rotation therewith. The web or band then passes
upwardly between guides 116 and over the roll
38 fixedly mounted on a cross-shaft 39 rotatable
in bearings in the opposite upright frame mem-
bers 13. From the roll 38, the web or band passes
under a clamp generally indicated at J in Figures
2a, 3a and 4, under a tensioning rider indicated
at K, under a light-detecting system generally
indicated at L, then (see Figures 2b and 3b) into
the intermittent feeding mechanism generally
indicated at M, then between the jaws at N,
through the cutter at O, and into the stacker
generally indicated at P.

Intermittent feed

The intermittent feeding mechanism generally
indicated at M (see Figures 2b, 3b, 5 and 10) com-
prises a reciprocable bottom plate 40 having a
plurality of upwardly projecting parallel ribs 41
extending lengthwise of the direction of feed.
Spaced rails 42 having opposed grooves 43 serve
as guides for the edges of the plate 40 and a
depending lug 44 is connected to a link 45 by
means of a yoke 46. The other end of the link 45
is secured to a pin 47 (Figure 2a) by a fitting 48
rotatable on the pin. The other end of the pin

47 is adjustably secured in a slot 49 of the lever 50 which is fixedly secured to the shaft 51. The slot 49 is designed to provide a fixed forward position of the feeding mechanism regardless of stroke length. Shifting the connection of rod 45 in the slot 49 changes the stroke by changing the return position of the mechanism. This shaft is rotated by a lever 52 which is pivotally connected to the connecting rod 53 secured to a crank 54 eccentric with respect to the crank-shaft 25.

A plurality of parallel guide bars 55 are disposed between the ribs 41 and are secured to a horizontal cross piece 56 at one end and a cross rod 57 at the other. These guiding bars 55 form a bed for the web or band to pass over as it is drawn by the feeding mechanism. The guide bars 55 and the ribs 41 are shown with their upper surfaces disposed in a plane that is a continuation of the top surface of a plate 58 but their upper surfaces may be slightly above or below this level, and/or the upper surfaces of ribs 41 may be slightly higher than those of bars 55 in which event it may be desirable to provide longitudinal grooves in the upper surface of ribs 41 to reduce the friction on the return stroke. The plate 58 at each end has depending yokes 59 and 60 fitting over the cross-shafts 57 and 61 respectively. Four hollow posts 62 extend above the plate 40 and are secured in place by suitable screws 63 which engage threaded bores in the plate 40. Cross-straps 64 are carried by the posts 62 and held in place by the screws 63. An upper plate 65 is supported under and by the straps 64.

A plurality of depending members 66 (Fig. 10) are pivotally supported by cross-shafts 70 through their upper ends. As shown, there are three such gripping members 66. When the upper surfaces of ribs 41 and bars 55 are in the same plane, it is desirable, as shown, to notch the lower end of the gripping members to provide a number of fingers 67 disposed above and in alignment with the ribs 41 of the lower feed plate 40. At each side of the gripping members a side link 68 connects the members 66 to a lever 69 pivotally mounted at 70a on the upper plate 65. The levers 69 are secured to a cross rod 71 at their upper ends and this rod has an upwardly extending armature 72 of magnetic material. Normally, the fingers 67 of the comb-like members engage, by virtue of gravity, the upper surface of the web or band therebeneath and since the upper plate 65 is secured to the lower feeding plate 40 and must move with it, the web is gripped between the fingers 67 and the ribs 41 during the forward stroke of the feeding device.

The stroke of the feed plate 40 can be changed by adjustment of the position of the pin 47 in the slot 49 of link 50 and this stroke is set to give a slight overfeed, say up to .005 to .01 inch.

Stroke correction

Near the end of the forward feeding stroke, which is the position shown in the figures, the armature 72 passes between the depending poles 73 of an electromagnet comprising a coil 74. The magnet is carried on the fixed frame of the machine by a bracket 74a along which the magnet is adjustable so that its position relative to the foremost position of armature 72 can be varied to provide the amount of stroke correction desired. Energization of the magnet is effected when an index on the band or a change in the light-reflective properties of the band passes into

the field of the photocell 75. This photocell may be housed in a casing 76 having a restricted opening 77 just above the traveling web and optionally a lens system 77a. The casing 76 may support a light source 78, the casing of which has a light-directing opening 79 and optionally a condensing lens system 79a pointing toward the part of the web directly beneath the opening 77.

The crank-shaft 25 carries at one end two cams 80 and 81 (see Figures 3a, 8, and 9) against which spring contact arms 82 and 83 bear. The actual engagement between the arms 82 and 83 and the cams 80 and 81 may be made by followers 85. The photocell 75 is connected by suitable leads 86 to an amplifier 87 which may be housed in the casing 76 and may have any conventional construction. The amplifier is connected by the leads 88 and 88a to an electronic system comprising a thyratron tube 89. The switch 90 controlled by the cam 80 is in series with the grid circuit so that when the switch 90 is open, the photocell cannot affect the tube 89. The switch 92 is in series with the plate of tube 89 and the coil 74 and a source of current at 89b, such as 300 volts D. C. The cam rise surface of cam 80 constitutes a large portion of its circumference during which the light-responsive system is incapable of operating the magnet 74. For example, cam 80 may have a 330° dead zone and a 30° dwell which closes switch 90.

The cam 80 is connected on the crank-shaft 25 so that the dwell will close switch 90 before the armature 72 reaches the magnetic center of poles 73 during the forward stroke of the feeding device, so that the tube 89 does receive and is influenced by any impulses that may come from the photocell during the last portion of the forward feeding stroke. Cam 81 is also set to close the switch 92 at the same time as or before switch 90 is closed by cam 80, and the dwell of cam 81 may and preferably does overlap the dwell period of cam 80. The purpose of switch 92 is to break the plate circuit of the tube 89 in order to prepare or "reset" it for the next impulse. Thus, during operation, as the feeding device approaches the end of its stroke, switches 90 and 92 are closed so as to transmit from the photocell 75 to the electromagnet 74 the impulse made whenever the registering index or printed matter at 93 (Figure 9) affects the photocell. As will be explained, the photocell preferably does not correct on every stroke, but relatively infrequently, such as on one in five or more strokes. Energization of the poles 73 of the magnet magnetically seizes the armature 72 which is drawn back into the space between the poles, thus swinging levers 69 on their pivots 70 and pushing the gripping members 66 forward so as to lift them off the web 11 therebelow.

When this release of grip occurs, the tension drag at K restrains the web 11 and causes the lower reciprocating feeding member 40 to slip under the web without forwarding it. In this fashion, the photocell terminates the forward motion of the web precisely at the time when the index or other printed matter 93 influences the photocell. The correction made when the photocell energizes the magnet 74 is determined by the distance of the magnetic center of poles 73 from the most forward position of the magnetic center of armature 72. By making this distance or "correction" comparatively large with respect to the amount of overfeed of the stroke, such as $\frac{1}{16}$ inch correction for an overfeed of 0.01, the armature comes into action only infrequently,

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such as about once in three strokes in the specific instance cited. Since the cams 80 and 81 prevent any impulse from the photocell from affecting the electromagnet until near the end of the forward feeding stroke, any amount of intervening printed matter can be present on the web, provided it is not too close to the index or registering printed matter to which the photocell is set to respond and such intervening matter will not interrupt the feeding by releasing the gripping member. This system is extremely practical since it allows application of the feeding, cutting and stacking system to almost any printed web since the photocell can be set to use, as the registering index on the web, any part thereof that may be desired. The index can be near the middle or near the end of the labeled sections of the continuous web into which it is to be divided. It is always possible to find on a printed label some index mark which is preceded by a clear area or vice versa depending upon whether the photocell system is to be set to register upon increase of light-reflection or transmission or decrease thereof.

The opening of the switches 90 and 92 de-energizes the electromagnet and allows the gripping members 66 to rest upon the web but since the gripping members are inclined downwardly and forwardly, the return stroke merely causes them to slide freely over the web, whereas the forward stroke tends to increase the gripping action because of this inclination. Furthermore, clamping means is provided as described hereinbelow for holding the web in the forwardly fed position during cutting.

Stroke adjustment

Besides the ability of adjusting the stroke by resetting the position of pin 47 in slot 49 (Figures 2a and 11) which can only be done when the machine is not in motion, there may be provided, as shown in Figure 11, an additional adjustment which can be made during operation of the machine. In this modification, the lever 52 is set in the downwardly extending position shown in Figure 11 when the feed plate 40 is at its foremost position, and lever 52 is connected by a link 53a to the crank rod 53b. Link 53a and rod 53b are pivotally connected with a link 53c at 53d. Link 53c is pivotally connected at 53e to a follower 53f which has a threaded bore engaging the screw shaft 53g supported in bearings at 53h and provided at one end with a bevel gear 53i which meshes with bevel gear 53j fixedly mounted on shaft 53k which extends through the side of the machine and carries a handwheel 53m accessible to the operator. In the position shown with the feed plate 40 in its foremost position, the follower 53f is in intermediate position and the link 53c makes approximately a right angle to the screw 53g. Also, in this position, the center of pivot 53d is slightly above the straight line through the center of shaft 25 and the center of the pivotal connection of link 53a with lever 52. With this construction and disposition of the parts, it requires a considerable movement of follower 53f along the screw shaft 53g before an appreciable shift occurs in the forward point of the feed plate 40 although even very small movements of the follower 53f from the position shown cause definite movement of the rearmost point of the feed plate stroke.

Tensioning means

The tensioning device K comprises a smooth-

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bottomed pan 200, the handle of which is pivotally mounted at 201. A post 202 is adapted to receive annular weights 203, the number of which can be varied in accordance with the material fed and its particular tension requirements.

Clamping means

This means is best shown in Figures 2a, 2b, 3a, 3b, 4 and 5 and comprises the mechanism shown in J and in N. Their operation is derived from an eccentric 94 on the crank-shaft 25. This eccentric works against the arm 95 of a bell-crank lever having a sleeve 95a rotatably mounted on a cross-shaft 96 and two other arms 97 which are connected by the tie-rods 98 to levers 99 pivotally mounted on the cross-rod 61. Springs 100 around the threaded posts 101 urge a transverse clamp bar 102 downwardly against the web and the upper surface of a cross-bar 103. Pins 104 extend through bores in the cross-piece 103 from their upper ends which are engaged under the outer ends of the clamp bar 102 to their lower ends engaged upon the ends of the levers 99. It will be seen that when the eccentric 94, as viewed in Figure 2a, swings the arm of the bell-crank lever 95 in a counter-clockwise direction, the pins 104 raise the clamp bar 102 and allow free passage of the web but when the eccentric 94 allows the arm 95 to swing in a clockwise direction, the clamp bar is urged by the springs 100 against the web.

A tie-rod 105 extends through a bore in the arm 95 and at its other end through another bore in an arm 106 of the bell-crank lever having a long sleeve 106a (similar to 95a of the other bell-crank lever) rotatably mounted on a cross-rod 107 and having a pair of arms 108 through bores in the ends of which threaded tie-rods 109 extend. The threaded tie-rods 109 extend upwardly through bores in a transverse fixed plate 110 and springs 111 thereabove urge the tie-rods upwardly by means of collars 112. The tie-rods are fixed in a transverse member 113 which has an offset upper surface adapted to form a lower clamping jaw. It cooperates with the lower surface of an upper fixed member 114, the forward edge of which is adapted to cooperate with the reciprocable knife 115.

It will be seen that when the eccentric 94 swings the arm 95 of the bell-crank lever in a counterclockwise direction and thereby releases the clamp bar 102 of the clamping means J, at the same time the tie-rod 105 swings the arm 106 of the other bell-crank lever in a counterclockwise direction, and this causes the threaded tie-rod 109 to pull the clamp bar 113 downwardly against the spring 111 to release the clamping action in the clamp N. Vice versa when the eccentric 94 swings the arm 95 in a clockwise direction, both clamps resume clamping position under the action of the springs 100 and 111, respectively. Nuts may be provided upon the posts 101 and on the threaded tie-rods 109 to adjust the spring tension.

A pair of curved rods 116 extend from sleeves 117 which are adapted to be secured on a cross-rod 118 by means of set screws 119. These rods 116 may be set further apart to accommodate a wider web, or may be shifted endwise of the rod 118 to control the path of travel of the web through the mechanism. In general, however, it is preferred to set them so as to guide the web along a path which is centered with respect to the feeding mechanism of the machine.

Cutting mechanism

The shaft 29 carries a bevel gear 120 which meshes with a bevel gear 121 on a shaft 122, the other end of which is provided with an eccentric 123 (see Figure 6). A connecting rod 124 secured to the eccentric by a strap 125 is pivotally connected with a reciprocable plate 126 by means of a wrist pin 127. The member 126 carries at its upper end the knife 115.

Stacking mechanism

This mechanism is shown in Figures 2b, 3b, 6 and 7. It is supported by two rods 128 and 129 which extend into bearings in the end plate 14 and are secured at their other ends by bolting to the upright frame plates 13. It has a carriage comprising an upright plate 130 having sleeves 131 and 132 which fit slidably on the rods 128 and 129. The upright member 130 has secured at one side of its top a vertical plate 133 which extends from the plate 130 toward the feeding and cutting devices (see especially Fig. 3b). A yoke member 134 fits slidably on the vertical plate 133 and has a lateral extension or lug 135 adapted to receive the enlarged end 136 of the adjusting screw 137 which engages a threaded bore in the vertical plate 130 but is free to rotate in the lug 135. A vertical channel-shaped member 138 is secured by screws 139 to the yoke 134, and an opposite channel-shaped member 140 is secured to the end of the plate 133 along the lower portion of one side thereof. As shown best in Figures 2b, 5 and 7, a member having one or more projecting serrations 141 is provided at the bottom edge of both channels.

A lifting block 142 mounted in the upper end of a slide member 143 which in turn is mounted slidably in suitable guide members 144 and 145, is adapted to move upwardly to lift a cut section past the serrated edges 141 of the bottom of a stack of such sections supported between the vertical channels 138 and 140. The serrations protrude so as to narrow the width between the channels because the arching of the sections as they are lifted upwardly therebetween tends to grip the ends of the bottom cut pieces and hold the entire stack within the space between the channels even after the block is lowered.

The block 142 is reciprocated by means of an arm 146 having a slot 147 at the end thereof for receiving a pin 148 secured to the slide member 143. The arm 146 extends from a sleeve 147' which is slidable relative to a shaft 148' but secured for rotation thereby by means of a key 149. An arm 150 is secured to the inner end of shaft 148' (Figures 2b and 6) and carries at its lower end a follower 151 which engages in the cam groove 152 of a rotatable cam 153 secured to the shaft 29.

As will be seen, rotation of cam 153 oscillates the lever 150 which rocks the shaft 148 and oscillates lever 146 which in turn imparts reciprocating motion to the block 142. This is timed to lift a cut section immediately after cutting by the knife 115 into the magazine constituted by the channels 138 and 140.

General operation

While the operation of each individual functioning mechanism has been described hereinabove, the general sequence of operation is now given in broad outline in order to facilitate a general understanding of the machine.

The web of material carrying the repeated indicia or pattern 93 (Fig. 9) is drawn from the

rotatable reel 10 by the action of the withdrawing roll 36 which makes a planetary motion around the axis of shaft 28. This drawing motion from the reel takes place while the clamp 102 holds the web to prevent withdrawing the web back out of the machine. After the drawing action of roll 36 is completed for a given cycle, the clamps J and N release the web and it is apparent that there will be slack material between the roll 38 and the reel 10 so that the feeding mechanism M which now enters its forward feeding stroke does not act to rotate the reel 10. The feeding mechanism takes up only part of the slack between 33 and 10 during the forward stroke. The light-responsive system is present in readiness for operation near the end of the forward feeding stroke of M so that it may then receive an impulse from the change in light-reflecting or transmitting characteristics of the web caused by the passage of the predetermined index mark or pattern element 93 into the field of view of the photocell 75, which passage indicates the need for correction. Such impulse causes energization of the electromagnet 74 which maintains the grip of the feeding mechanism until the magnetic center of the armature 72 has been moved by the forward feeding stroke of the mechanism M to the magnetic center of poles 73, after which the web is released. As stated hereinbefore, the cams 80 and 81 are set so as to incapacitate the electrical system connected with the photocell except near the end of the stroke when the proper index is about to come into the field of the photocell.

At the completion of the forward feeding stroke, clamps 102 and 113 are actuated to hold the web in position and the knife 115 is moved upwardly to cut the protruding section of the web. Immediately following this, the block 142 lifts the cut sections past the serrated members 141 in the bottom of the magazine between the channels 138 and 140. This operation is repeated indefinitely and the operator may remove the stacked sections from the magazine at any time desired.

The machine may be employed for cutting any indexed or printed web. For example, it may be employed to cut substantially uniform lengths repeatedly from a ribbon of cellophane, paper, felt, a fabric, or from a flattened tube of such material, such as regenerated cellulose sausage casings, or tubes used for forming bottle bands and the like. The webs or flattened tubes may be made of any desired material, such as cellulose derivatives, of which cellulose acetate and cellulose ethers such as ethyl cellulose and hydroxy ethyl cellulose are representative, resinous bands such as those of vinyl resins, nylon, polyethylene, proteins, such as casein, and the like. The web may contain any indicia, labels, printed designs or the like desired and any portion of each of such marks that is preceded by or followed by a relatively contrasting portion of the web may be employed. While the light-responsive system actually shown depends upon light reflected from the web, it may be employed when the web has some transparent or even translucent portions in cooperation with the light source positioned to transmit light through the web.

It is to be understood that changes and variations may be made without departing from the spirit and scope of the invention as defined in the appended claims.

We claim:

1. Feed mechanism for intermittently advancing a web of material comprising a frame, a

reciprocable member mounted on the frame for carrying the material to be fed, means for pressing the material against the reciprocable member during its forward feeding stroke, means for reciprocating the member comprising a crank shaft, a lever oscillatable about an axis and connected to the reciprocable member for converting the oscillations of said lever into reciprocating motion of a member, a link connecting said lever with a crank rod carried by the crank shaft, an adjustable link pivotally connected to the crank rod at its pivotal connection with the first-mentioned link, and means comprising a handle accessible to the operator for adjusting the adjustable link during operation of the machine.

2. Feed mechanism as defined in claim 1 in which the first-mentioned link and crank rod are disposed approximately in a straight line and the adjustable link is disposed approximately at right angles to said straight line when the member is at the forward end of the feeding stroke.

3. Feed mechanism for intermittently advancing a web of material comprising a frame, a reciprocable member mounted on the frame, a plurality of parallel bars fixedly carried on the member and over the top of which the web is to be passed longitudinally of the bars, a supporting element fixedly secured to the member and extending above the path of the web over the bars, means for gripping the web comprising a transverse member pivotally mounted on the element on an axis transverse of the bars and of the direction of travel of the web and gravitationally urged downwardly into a position inclined somewhat from a perpendicular to the web with the lower end thereof engaging the web forwardly of the perpendicular through the pivotal axis and pressing the web against the bars, and means for reciprocating the reciprocable member, electromagnetic means mounted in fixed position on the frame, a magnetic element linked to the transverse gripping member for movement therewith and arranged to be carried thereby into the influence of the electromagnetic means at least during the last portion of the forward feeding stroke of said transverse gripping member, and a photocell disposed along the path of the web to receive light impulses therefrom, said photocell being connected to the electromagnetic means to energize said means in response to a change of light impulse.

4. Mechanism as defined in claim 3 in which the means for reciprocating the reciprocable

member comprises a crank shaft, a lever oscillatable about an axis and connected to the reciprocable member for converting the oscillations of said lever into reciprocating motion of the member, a link connecting said lever with a crank rod carried by the crank shaft, an adjustable link pivotally connected to the crank rod at its pivotal connection with the first-mentioned link, and means comprising a handle accessible to the operator for adjusting the adjustable link during operation of the machine.

5. Mechanism as defined in claim 3 comprising means for adjusting the stroke of said reciprocable member.

6. Mechanism as defined in claim 3 in which the electromagnetic means is an electromagnet adjustably mounted in fixed position above the transverse gripping member and the magnetic element is an armature extending upwardly from the transverse member.

7. Mechanism as defined in claim 6 in which the magnetic element is fixedly connected to the transverse gripping member and means is provided for adjusting the electromagnet along the direction of reciprocation of the transverse gripping member to set the magnetic center of the poles of the electromagnet a predetermined distance back of the most forward position of the magnetic center of the armature during reciprocation thereof.

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