United States Patent

[11] 3,576,283

[72] Inventor **William A. MacDonald, Jr.**
Rochester, N.Y.

[21] Appl. No. **817,886**
[22] Filed **Apr. 21, 1969**
[45] Patented **Apr. 27, 1971**
[73] Assignee **Eastman Kodak Company**
Rochester, N.Y.

[54] **STRIP FEEDING MECHANISM**
7 Claims, 4 Drawing Figs.

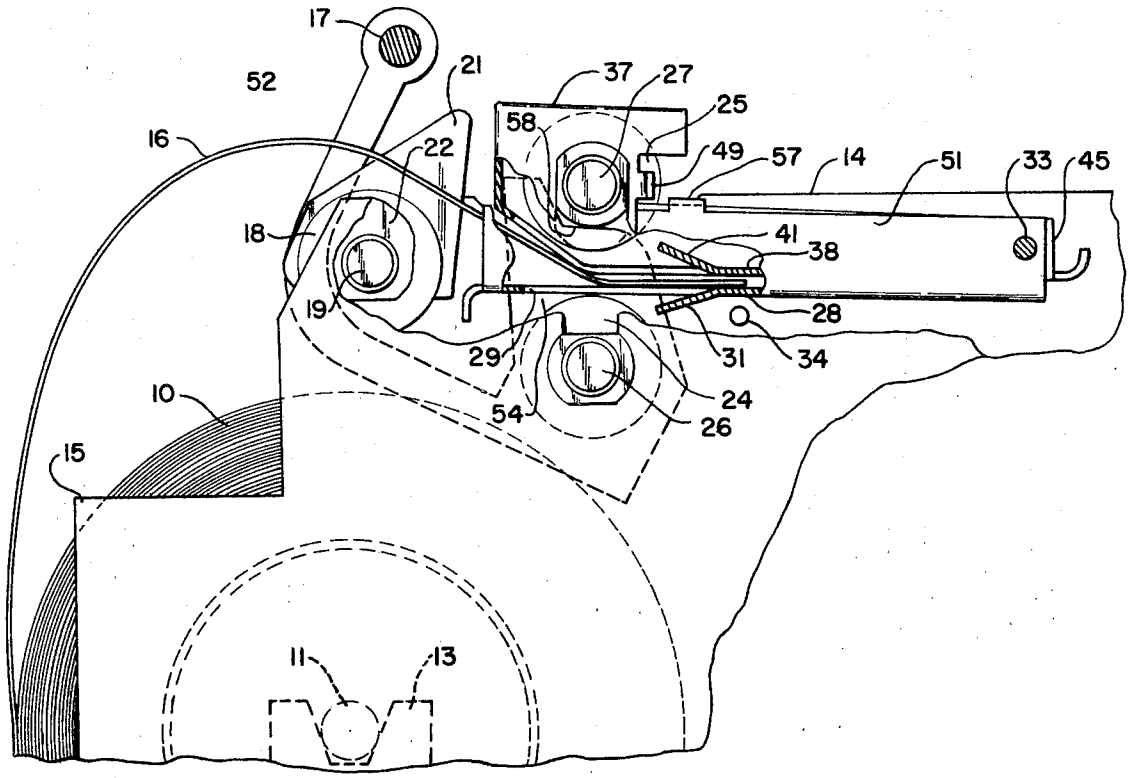
[52] **U.S. Cl.** **226/90,** 226/91, 226/176
[51] **Int. Cl.** **G03b 1/56**
[50] **Field of Search** 226/91, 90, 176, 177, 127

[56] **References Cited**
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Primary Examiner—Allen N. Knowles
Assistant Examiner—John J. Love
Attorneys—Robert W. Hampton and Gary D. Fields

ABSTRACT: A device for feeding a strip of material from a roll wherein means are provided to separate a metering roller from a pressure roller so that the rollers are moved out of a feed path defined by spaced plates to facilitate easy positioning of an end of the strip into the device. A lift bar is provided which moves the pressure roller away from the metering roller and through one of the plates and then moves the other plate away from the metering roller so that no rollers project into the feed path.



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SHEET 1 OF 2

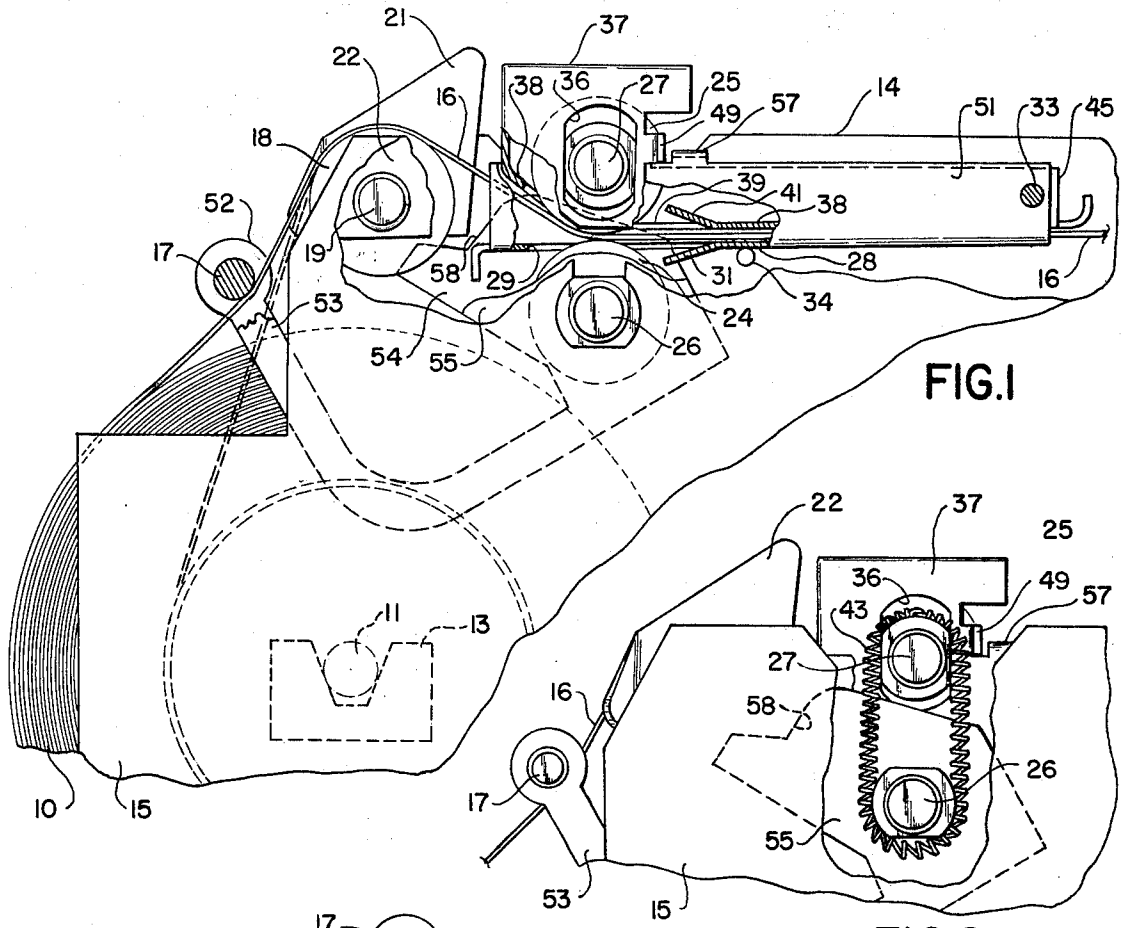


FIG.1

FIG.2

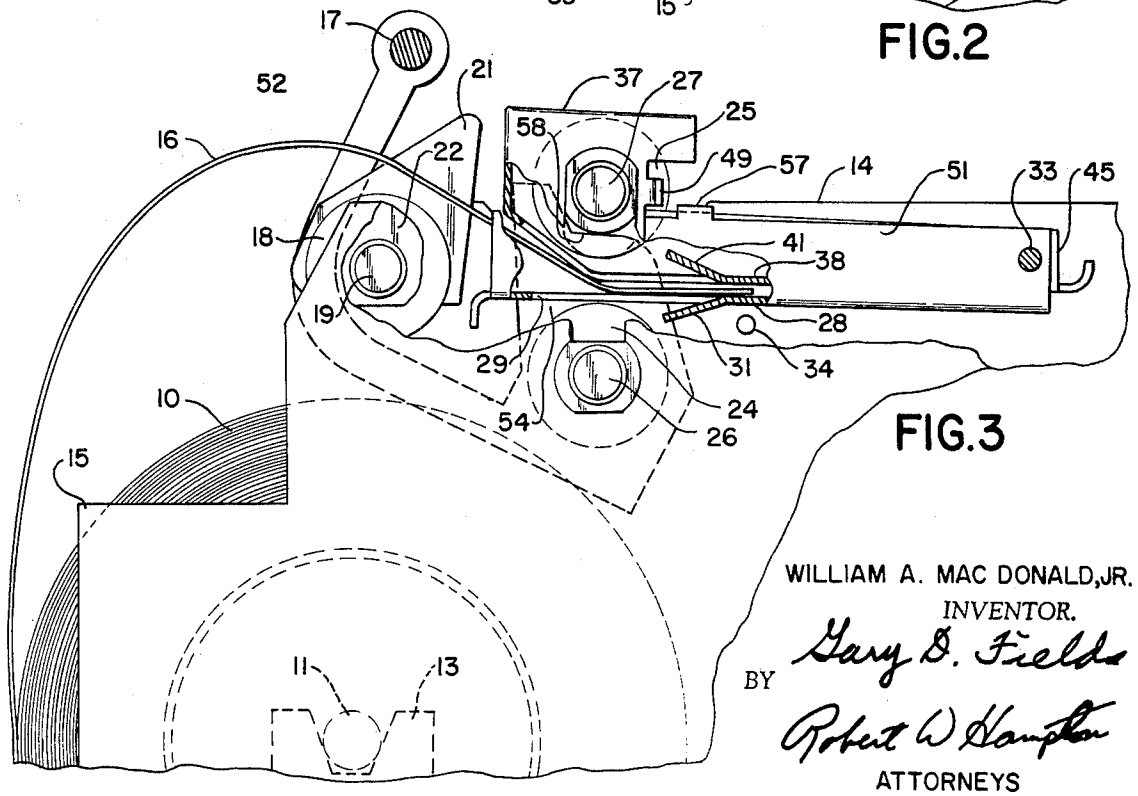


FIG.3

WILLIAM A. MAC DONALD, JR.
INVENTOR.

BY Gary D. Fields
Robert W Hampton

ATTORNEYS

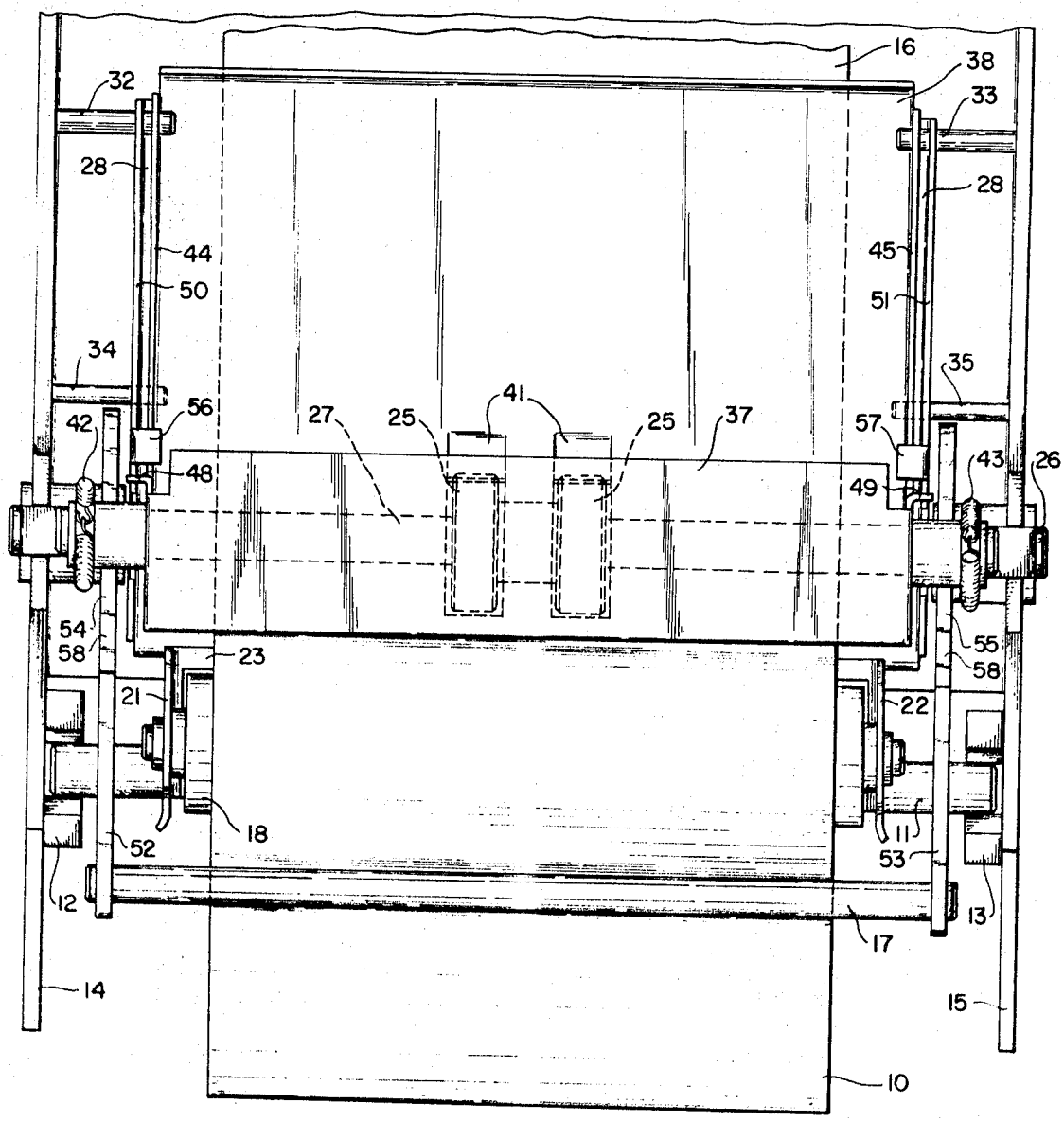


FIG. 4

WILLIAM A. MAC DONALD, JR.
INVENTOR.
BY Gary D. Fields
Robert W. Hampton
ATTORNEYS

STRIP FEEDING MECHANISM

CROSS-REFERENCE TO RELATION APPLICATION

This application may find utility in my commonly assigned copending U.S. application Ser. No. 665,915, entitled, "-Device and Method for Handling a Flexible Photoconductor."

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to a device for feeding strip material and more particularly to a device to facilitate positioning an end of the strip material between separated metering and pressure rollers.

2. Description of the Prior Art

In any device where it is desirable to supply a strip from a roll to a work station, it generally is necessary to initially feed the leading end of the strip from the roll into a drive means for advancing the strip along a predetermined path. In some such devices the supply roll is rotatably driven and stripper means is provided for separating the end of the strip from the roll for feeding. However, for may many applications this type of mechanism is too costly. Alternatively, the strip initially may be fed by hand. In this case, it is necessary to provide a means of separating a metering or feed roller from a pressure roller so that the end of the strip can be fed therebetween after which the rollers are brought back into pressure contact for advancing the strip. However, some difficulty is encountered with some such devices because the rollers protrude into the guide path. Since the rollers generally have surfaces that have a high coefficient of friction with respect to the strip, the strip tends to stick to the rollers and not feed properly. Also, if the end is curled or bent, it may tend to follow around one of the rollers. Thus, it requires additional operator time to carefully feed it between the rollers without contacting them so that it can be properly positioned prior to bringing the rollers into pressure contact.

SUMMARY OF THE INVENTION

In the present invention, movable guide plates are provided which define a path through which the strip is advanced. A metering roller and a pressure roller project, respectively, through the pair of plates and are normally in pressure contact for feeding the strip from a supply roll. The rollers can be separated, however, and the guide plates can be moved so that the rollers do not project therethrough during feeding of a strip, such as paper. This prevents the end of the strip from adhering to the rollers as it is initially positioned therebetween. After initial positioning of the leading end of the strip, the guide plates are moved back to their initial positions wherein the pressure rollers project through the plates into pressure contact for feeding the strip from the supply roll.

More particularly, the invention contemplates a lift bar which will move from a first position to a second paper-threading position causing a cam to raise a pressure roller away from a metering or drive roller and through a first guide plate. The pressure roller has means which then engages and moves the first guide plate away from a second guide plate until means thereon in turn engages and moves the second guide plate away from the metering roller so that the metering roller no longer projects through the second guide plate. Thus, a channel or passageway is provided between the first and second guide plates for initially positioning the end of h the strip between the pressure roller and drive roller. After the paper has been properly positioned, the lift bar is moved back to its first position which permits the second guide plate to move back to its initial position with the metering roller projecting therethrough and permits the first plate and pressure roller to move back to their respective first positions, wherein the pressure roller projects through the first plate and is in pressure contact with the strip for feeding it from the supply roll.

Conveniently, a resilient means or spring is provided to urge the pressure roller into pressure contact with the metering roller for feeding the paper. Advantageously, it serves the dual purpose of a detent force for holding the pressure roller against the cam when the lift bar is in the paper-threading position.

The invention finds particular application in electrophotographic devices in which a receiver material is fed from a roll through a metering roll to a platen where an electrostatic charge pattern is placed thereon.

Additional objects and novel features of this invention will become apparent from the description which follows, taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a fragmentary side elevation of a strip-feeding mechanism of this invention in strip-feeding position, the mechanism having parts omitted and broken away for clarity of illustration;

FIG. 2 is a fragmentary side elevation, similar to FIG. 1, but showing an endless spring for providing gripping pressure between a metering roller and a pressure roller; and

FIG. 3 is a fragmentary side elevation, similar to FIG. 1, but showing the mechanism in a strip-threading position; and

FIG. 4 is a fragmentary top-plan view of the strip-feeding mechanism of FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In accordance with this invention, a supply roll **10** of paper or other strip material is supported by a shaft **11** which is journaled in bearing blocks **12** and **13**, as best seen in FIG. 4. Bearing l block **12** is supported by a sidewall or plate **14** while bearing block **13** is supported on a sidewall or plate **15** of a larger mechanism, such as an electrophotographic apparatus.

A leading end **16** of the strip may be fed from roll **10** under a lift bar **17** and over a wobble roller **18**, such as that disclosed in commonly assigned U.S. Pat. No. 3,161,283 to Knab et al., which issued Dec. 15, 1964. The wobble roller causes tension to be evenly distributed across strip **16** so that it feeds evenly as it is pulled from the supply roll **10** as by a metering roller to be described. Conveniently, wobble roller **18** is journaled on a shaft **19** supported in a pair of upstanding paper guides **21** and **22** which guides may be integrally formed with a transverse support plate **23**. Strip **16** then passes between drive or metering rollers **24** and pressure rollers **25** mounted for rotation about shafts **26** and **27**, respectively. Metering rollers **24** are driven by a suitable drive means (not shown) to advance the strip material along a predetermined path.

Conveniently, a bottom guide plate **28** extends over metering rollers **24** and is provided with slots, such as slots **29** through which the rollers **24** project. Advantageously, the forward end of each slot **29** is provided with a downturned lip **31** which serves to catch the end of strip **16** and guide it along plate **28** so it does not follow roller **24**. Guide plate **28** is pivotally supported about pins **32** and **33** at one end, as best seen in FIG. 4, and rests on stationary pins **34** and **35** spaced from pins **32** and **33** to limit the downward movement of plate **28** at a position where rollers **24** project through slots **29** a suitable distance for engaging and feeding sheet **16**. Shaft **27** supporting pressure rollers **25** is mounted for sliding movement in vertical slots such as slot **36** of a roller housing **37**. Housing **37** includes a lower wall which forms an upper guide plate **38** extending generally parallel to lower guide plate **28**, plate **38** having slots such as slot **39** through which pressure rollers **25** normally extend for engagement with drive rollers **24**, as best seen in FIG. 1. Lips **41** opposite lips **31** also act as guides to assure that the end of strip **16** is fed along a predetermined path between guide plates **28** and **38** rather than following pressure rollers **25**. Pressure rollers **25** are normally held in pressure contact with drive rollers **24** by resilient means, such as a pair of endless springs **42** and **43** as shown in FIG. 4 and better illustrated in FIG. 2 extending around shafts **26** and **27**. The resilient material, if desired. Endless spring **43** has been omitted from FIGS. 1 and 3 for clarity of illustration; it will be

understood that this spring 42 tends to urge shaft 27 downwardly in slots 36. Upper guide plate 38 includes upstanding sidewalls 44 and 45. Guide plate 38 and roller housing 37 also are pivotally mounted about pivot pins 32 and 33. The opposite end of guide plate 38 is supported by ears 48 and 49 thereon extending outwardly from each sidewall of the housing and engageable with paper guides 50 and 51, respectively, the paper guides being formed as sidewalls extending upwardly from lower guide plate 28.

Lift bar 17 is pivoted by a pair of sidearms 52 and 53 about shaft 26, the sidearms being integrally formed with a pair of cam plates 54 and 55, respectively. The cam plates separate the roller upon rotation of left bar 17 in a clockwise direction from the position of FIG. 1 to the position of FIG. 3, as described below. Thus, lift bar 17 serves as a control means for the cam plates.

From FIG. 1, the path strip 16 takes can be seen, a full roll being shown in solid lines and a substantially used roll shown in dotted lines. When a roll is exhausted and a new roll of strip material is to be put in place, lift bar 17 is raised from the position in FIG. 1 to that shown in FIG. 3. This movement causes cam plates 54 and 55 to rotate in a clockwise direction raising shaft 27 and hence rollers 25 so that rollers 25 are withdrawn through slots 29. As this movement continues, shaft 27 engages the upper end of slots 36 pivoting upper guide plate 38 about pins 32 and 33. As lift bar 17 continues to be raised and cam plates 54 and 55 continue to rotate about shaft 26, inwardly extending tabs 56 and 57 on sidewalls 50 and 51, respectively, of lower guide plate 28 will be engaged by sidewalls 44 and 45 of upper guide plate 38, causing guide plate 28 also to be pivoted about pins 32 and 33 so that it is raised above rollers 24 to the position shown in FIG. 3.

When in the raised position, endless springs 42 and 43 exert a force which holds pressure roller shaft 27 in detent on the cam plates, such as detent 58 on cam plate 55, so that the operators hands are free for positioning the end of the strip material. When in the raised position, neither drive roller 24 nor pressure roller 25 is in the guide path between guide plates 28 and 38. Thus, the end of the strip may be positioned without adhering to the surface of the rollers. When the paper is in proper position with the end extending beyond the rollers, as shown in FIG. 3, lift bar 17 may be pivoted in a counterclockwise direction to move it from the position shown in FIG. 3 to the position shown in FIG. 1 so that the strip can be driven by the rollers.

From the foregoing, the advantages of this invention are readily apparent. A strip-feeding mechanism is provided wherein the end of the strip material is easily positioned between a feed roller and a pressure roller without adhering to either roller. This is accomplished by a cam mechanism which sequentially raises the pressure roller away from the feed roller and then raises an upper guide plate which in turn raises a lower guide plate above the driver roller so that the pressure and drive roller are spaced on opposite sides of the guide plates providing a clear open path through which the end of the strip material may be fed to be positioned either by hand or by automatic means (not shown). A spring means provides a driving pressure between the pressure roller and the drive roller and also provides tension for holding the pressure roller shaft against detents on the cam means to maintain the guide plates in raised position while the end of the strip material is positioned between the guide plates.

The invention has been described in detail with particular reference to a preferred embodiment thereof, but it will be understood that variations and modifications can be effected within the spirit and scope of the invention.

I claim:

1. A strip-feeding mechanism for feeding a leading end of a strip along a guide path, said mechanism comprising:

a first movable guide plate;

a second movable guide plate generally parallel to said first guide plate defining said guide path;

a rotatable drive roller normally extending through one of said guide plates into said guide path;

a rotatable pressure roller normally extending through the other of said guide plates into said guide path;

means movable from a first position to a second position and cooperant with at least one of said rollers and with said guide path defining means for moving one of said rollers away from said other of said rollers and for moving each of said guide plates to enlarge said guide path upon movement of said movable means from said first position to said second position; and

control means cooperant with said movable means to move said movable means from first position to said second position.

2. In a strip-feeding mechanism, as claimed in claim 1, wherein

movement of said movable means from said first position to said second position effects sequential movement of one of said rollers out of said guide path, said first movable guide plate away from said second guide plate and said second movable guide plate away from the other of said rollers.

3. In a strip-feeding mechanism, as claimed in claim 2, further including:

means on one of said guide plates engageable with the other of said guide plates after predetermined movement of said one of said guide plates for moving the other of said guide plates.

4. A strip-feeding mechanism comprising:

means for supporting a supply of strip material to be fed along a predetermined path;

a drive roller rotatably mounted about a shaft extending across said path, said drive roller being positioned for driving engagement with said strip material to advance said strip material along said path;

a pressure roller rotatably mounted about a shaft in juxtaposition with said drive roller for holding said strip material against said drive roller;

spring means for biasing said pressure roller toward said drive roller to feed said strip material therebetween;

a first guide plate forming one side of said path and having means defining an opening therein through which said pressure roller normally extends into said path, said first guide plate being mounted for pivotal movement about an axis spaced from said pressure roller shaft along said path;

a second guide plate extending generally parallel to said first guide plate and forming a second side of said path and having means defining an opening therein through which said drive roller normally extends into said path, said second guide plate being pivotally mounted about said axis;

cam means, having a detent, pivotally mounted on said drive roller shaft and movable from a first position wherein said pressure roller is in driving engagement with said drive roller to a second position wherein said pressure roller shaft is engageable by said detent to move said pressure roller shaft away from said drive roller shaft to separate said pressure roller from said drive roller;

means on said first guide plate engageable with said pressure roller shaft after a predetermined movement of said pressure roller shaft to pivot said first guide plate about said axis and away from said second guide plate; and

means on said second guide plate engageable with said first guide plate after a predetermined movement of said first guide plate to pivot said second guide plate about said axis and away from said drive roller to provide an unobstructed and enlarged path between said first and second guide plates for positioning an end of said strip material between said rollers.

5. A strip-feeding mechanism, as claimed in claim 4 wherein said spring means includes:

an endless spring extending around said drive roller shaft and said pressure roller shaft for urging said pressure roller shaft against said cam and said pressure roller toward said drive roller, said spring being yieldable upon

rotation of said cam to said second position to permit separation of said pressure roller from said drive roller, said spring holding said pressure roller shaft against said detent when said cam is in said second position.

6. A strip-feeding mechanism for feeding a leading end of a strip along a guide path, said mechanism comprising:

means defining a guide path;

a rotatable drive roller mounted on a first shaft;

a rotatable pressure roller mounted on a second shaft;

a rotatable cam having a detent, said cam being pivotal from a first position, wherein said rollers extend into said path and are in pressure contact with each other, and a second

position wherein said detent is in engagement with one of said roller shafts to hold said rollers apart and is cooperant with said guide path defining means for enlarging said guide path when in said second position.

7. In a strip-feeding mechanism, as claimed in claim 6 further including:

an endless spring extending around each of said shafts for urging said pressure roller and said drive roller toward each other when said cam is in said first position and for holding said rollers apart when said cam is in said second position.