Dec. 10, 1957 W. B. FAHRENBACH 2,815,626

BANDING MACHINE

Filed Oct. 26, 1953 5 Sheets-Sheet 1

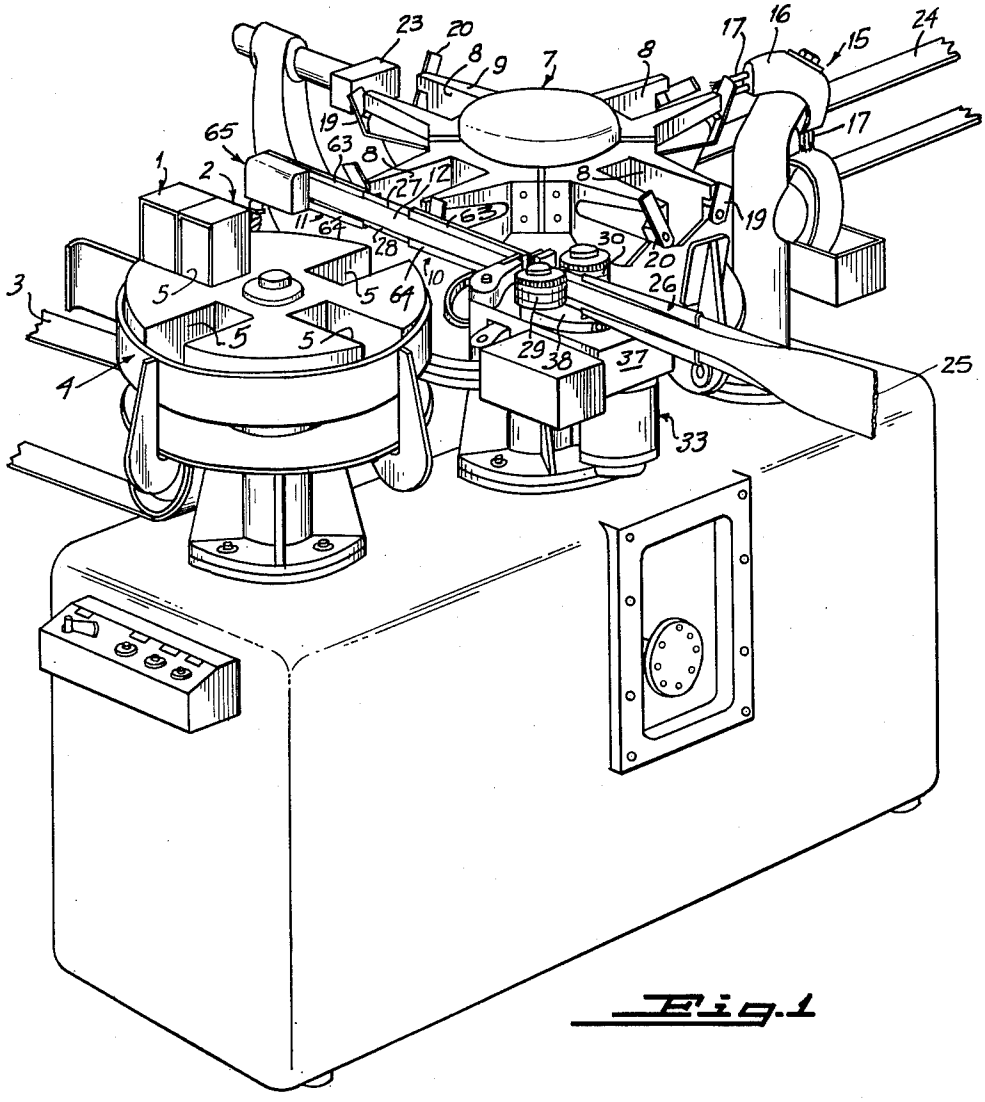


Fig. 1

INVENTOR.
WOLFGANG B. FAHRENBACH
BY
Bayley, Mohler & Beckley
ATTORNEY

Dec. 10, 1957 W. B. FAHRENBACH 2,815,626

BANDING MACHINE

Filed Oct. 26, 1953 5 Sheets-Sheet 2

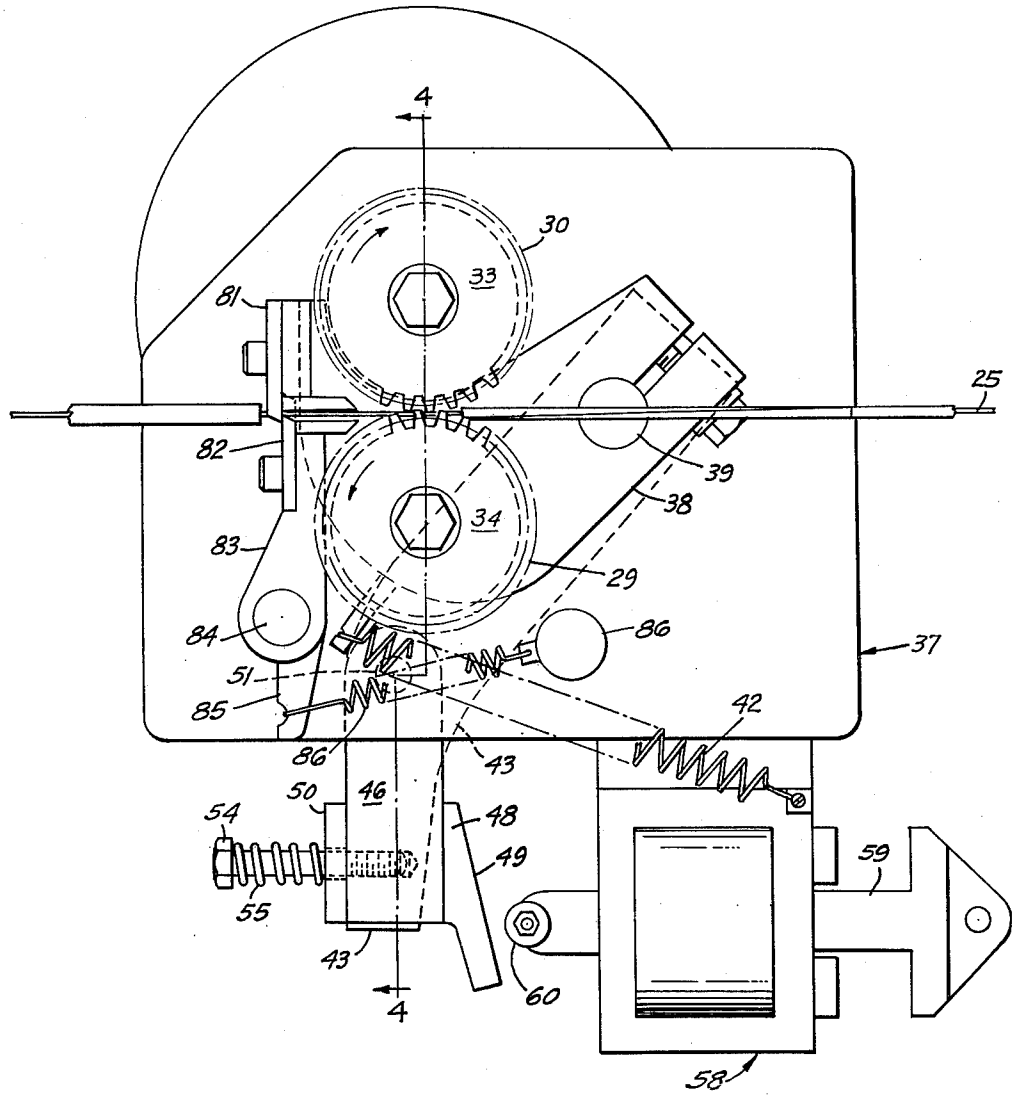


Fig. 2

INVENTOR.
WOLFGANG B. FAHRENBACH

BY
Bayley, Modler & Beckley

ATTORNEY

Dec. 10, 1957 W. B. FAHRENBACH 2,815,626

BANDING MACHINE

Filed Oct. 26, 1953 5 Sheets-Sheet 3

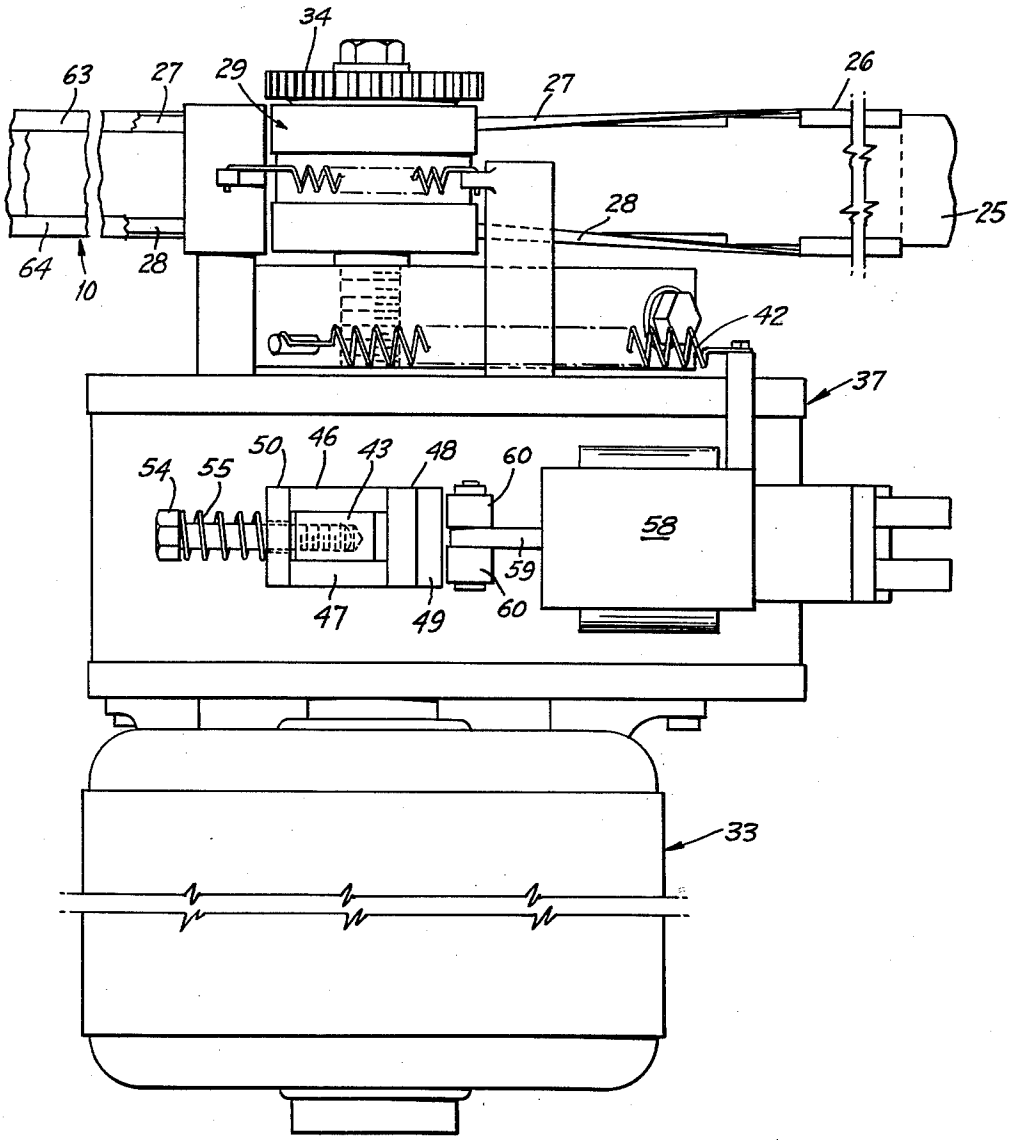


Fig. 3

INVENTOR.
WOLFGANG B. FAHRENBACH

BY
Boyken, Molden & Beckley

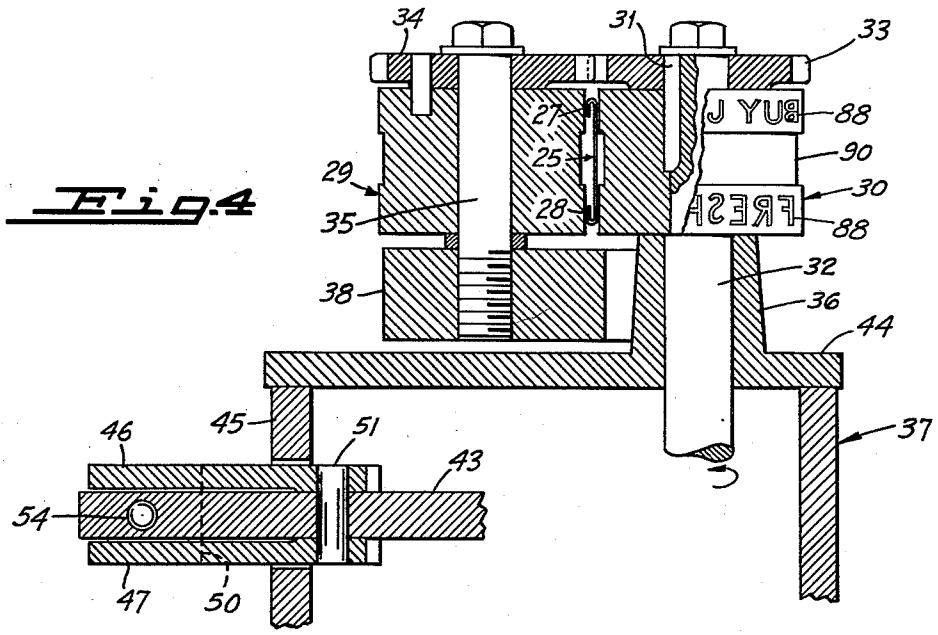
ATTORNEY

Dec. 10, 1957 W. B. FAHRENBACH 2,815,626

BANDING MACHINE

Filed Oct. 26, 1953 5 Sheets-Sheet 4

Fig. 4



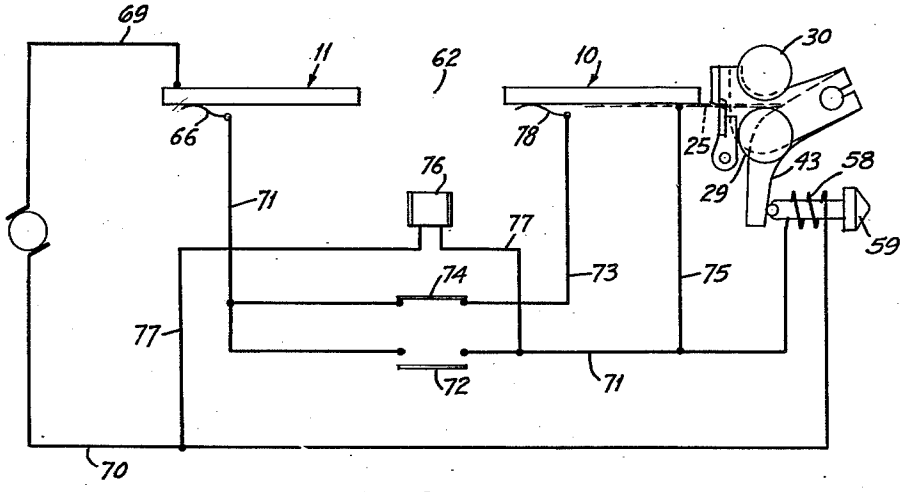


Fig. 6

INVENTOR.
WOLFGANG B. FAHRENBACH

BY Bay Ken, Mohler & Beckel

ATTORNEY

Dec. 10, 1957 W. B. FAHRENBACH 2,815,626

BANDING MACHINE

Filed Oct. 26, 1953 5 Sheets-Sheet 5

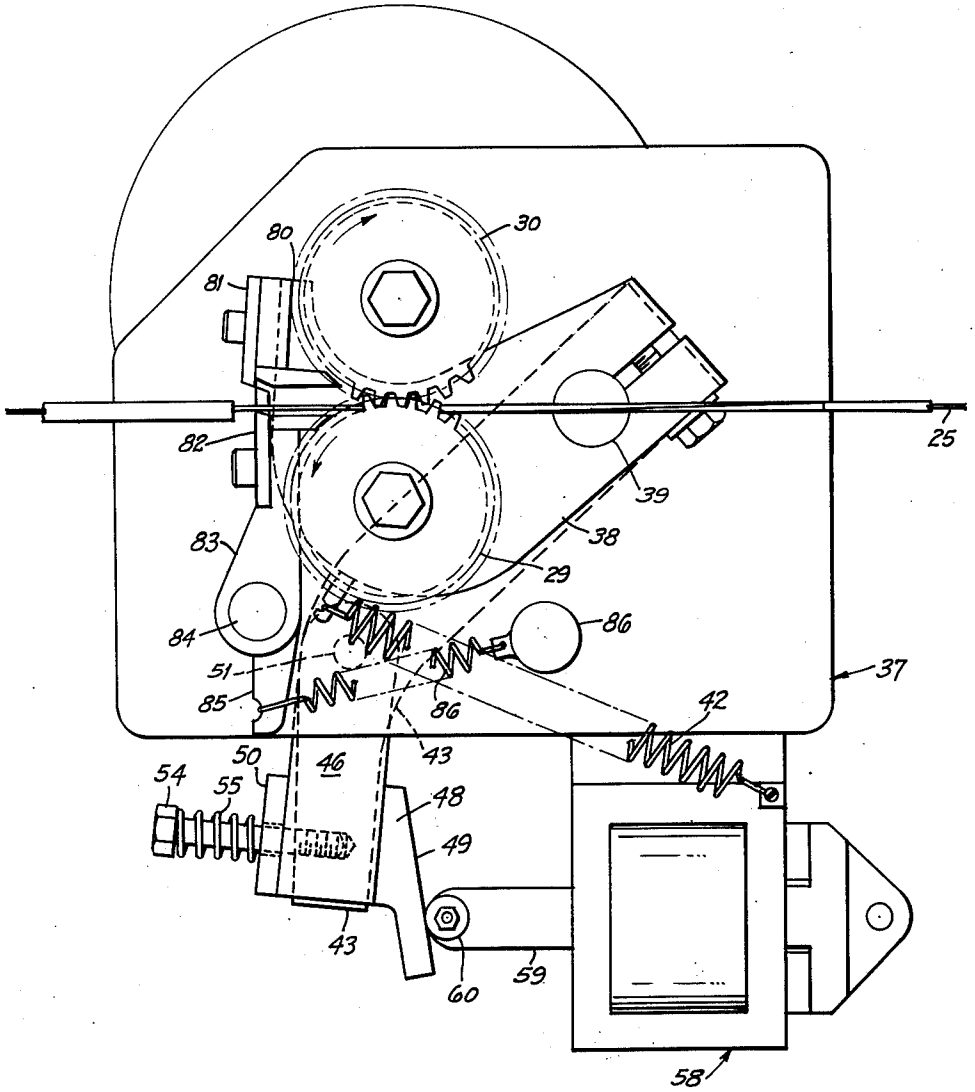


Fig. 5

INVENTOR.
WOLFGANG B. FAHRENBACH

BY
Boyken, Moeller & Beckley

ATTORNEY

United States Patent Office 2,815,626 Patented Dec. 10, 1957

2,815,626

BANDING MACHINE

Wolfgang B. Fahrenbach, Oakland, Calif., assignor to Edlo Inc., San Francisco, Calif., a corporation of California

Application October 26, 1953, Serial No. 388,330

5 Claims. (Cl. 53—198)

This invention relates to an apparatus for applying a band around an article or articles and more particularly to a device for feeding an elongated strip of banding material to a station for subsequent formation of a band to be applied around the article.

The present invention will be described in detail in connection with apparatus for applying a wrapper band around a pair of milk cartons for holding said pair together for subsequent handling, transportation and sale as a unit. However, it will be understood that the invention is not necessarily restricted to such a limited use and may be utilized for handling bands of different material and for various purposes.

In the retail merchandizing of milk, it is extremely desirable to provide two separate cartons of milk secured together for sale as a unit. In this manner, the customer is provided with two separate quarts of milk which are more easily stored and handled during use and at the same time he is required to handle only one package when making his selection in the market.

Heretofore various types of bands have been provided for securing a pair of cartons together. For the most part, such bands have been relatively thick and heavy and therefore expensive to provide, thus appreciably raising the price of the product.

In addition, such bands have been relatively inconvenient to handle and the operation of applying the band around the cartons has not readily lent itself to automatic machinery. When performed manually, the operation is time consuming and therefore costly.

The main object of the present invention is the provision of a greatly improved device for applying wrapping bands around a pair of cartons and which device is adapted to handle relatively thin paper bands of, say, .004 inch in thickness, thus considerably reducing the material cost.

Another object of the invention is the provision of means for feeding bands automatically to a position for subsequent encirclement of a pair of cartons and which means is extremely fast and accurate.

Still another object of the invention is the provision of a feeding device for banding material which automatically folds a relatively thin band to provide optimum strength in the same.

Yet another object of the invention is the provision of a feeding device for banding material which incorporates a feed roller adapted to be provided with printing type for printing advertising or other indicia on the wrapping band so that the same is readily viewed by a customer.

Other objects and advantages will be apparent from the attached specification and drawings.

Fig. 1 is an isometric view of a band wrapping machine.

Fig. 2 is a top plan view of the strip feeding device with the rollers in inoperative position.

Fig. 3 is an enlarged side elevational view of the strip feeding means.

Fig. 4 is a vertical cross sectional view of the feed rollers and driving means.

Fig. 5 is a top plan view of the strip feeding device similar to Fig. 2 but with the rollers in operative position.

Fig. 6 is a schematic view showing the electrical wiring and the strip feeding means.

The general nature of the invention may best be understood from a consideration of Fig. 1 wherein the entire band applying apparatus is indicated.

The milk cartons are conveyed in pairs such as the pair 1, 2 by a belt 3 to a feeding turntable, generally designated 4. Turntable 4 rotates intermittently and is provided with a plurality of radially outwardly opening pockets 5 each of which is adapted to receive a pair of cartons.

Alongside, but spaced from turntable 4 is a main turntable generally designated 7 which is provided with radially outwardly opening pockets 8 for receiving pairs of cartons therein. Both turntables 4 and 7 are intermittently rotated in a counterclockwise direction.

When a pair of cartons in one of the pockets 5 moves to a position alongside a pocket 8 in turntable 7, said cartons are pushed by an arm (not shown) into said pocket 8 so that the same are supported by their upper peripherally extending outwardly directed lips on the upper face 9 of turntable 7.

Between the pockets 5 and 8 on the turntables 4, 7 respectively there are provided a pair of band supports generally designated 10, 11 respectively and between which the wrapper band 12 extends. The band 12 is releasably held at its opposite ends in said band supports in a manner which will be more fully described later on in greater detail. By this arrangement, when a pair of cartons are transferred from one of the pockets 5 to one of the pockets 8 their leading side engages the band 12 and carries said band along with the cartons.

Inasmuch as the pockets 8 are of such a size as to snugly receive a pair of cartons, the band 12 automatically bends at right angles to the leading side of the pair of cartons and is held between the opposite lateral sides of the cartons and the adjacent sides of the pockets 8.

The length of the band which encircles the cartons is such that the free ends thereof are not released from band holder 10 until the turntable 7 starts to rotate and forceably pulls said free ends away from said holder.

When the turntable 7 is indexed to swing the cartons counterclockwise through 90° a handle inserting device (not shown) inserts a vertically disposed handle between the pair of cartons.

Upon rotation through another 90°, the cartons are moved to a position alongside a glue applicator generally designated 15. This applicator is provided with an angularly disposed rotating head 16 having a pair of brushes 17 which alternately apply glue to the ends of the band 12. Said ends, it will be understood, extend outwardly from the pockets 8 so that the same are engaged by the brushes 17 as the turntable 7 moves past the latter.

On the radially outwardly directed faces of turntable 7 and adjacent each pocket 8 are a pair of levers 19, 20 which are actuated to fold the outwardly projecting ends of the band across the outer side of the outer carton. Levers 19, 20 are swung successively so that the glued end of the band is between the carton and the other end of the band.

After rotation of the turntable 7 through another 90°, the levers 19, 20 are released and a heated iron 23 is applied to the ends of the band, pressing them against the cartons, and setting the glue. The wrapped cartons are then removed and conveyed away on a conveyer belt 24. The heated iron 23 may be omitted when fast drying hot glue is employed.

The present invention is particularly directed to the band supports **10**, **11** and the means for feeding the banding strip thereto. This structure will now be described.

The band **12** is formed from a continuous strip **25** (Fig. 1) of relatively thin paper or the like which may be provided in the form of a roll (not shown) and made available by any desired paying out device so that there is no appreciable tension on the end portion of the strip which is to form the band.

The strip **25** is fed through a hemming device or guide **26** which folds the opposite longitudinally extending margins of the strip **25** to provide upper and lower hems **27**, **28** respectively (Fig. 4). These hems strengthen the strip and prevent tearing of the same.

Adjacent the discharge end of guide **26** are a pair of vertically disposed rollers **29**, **30** adapted to engage the strip **25** therebetween. Roller **30** is fixedly secured by means of a key **31** (Fig. 4) to a vertically disposed shaft **32** driven through any suitable drive from an electric motor **33** (Fig. 3).

Also secured to shaft **32** and above roller **30** is a spur gear **33** which is in mesh with a similar spur gear **34** on a vertically extending shaft **35** (Fig. 4).

The driven shaft **32** is rotatably supported in a bearing **36** carried by the upper side of a housing **37**, and shaft **35** is fixedly secured at its lower end in a relatively heavy curved arm **38**. Arm **38** is supported at one of its ends on a pin **39** (Figs. 2, 5) rotatably secured to housing **37**. By swinging arm **38** on pin **39** it will be apparent that the roller **29** may swing towards or away from roller **30** as desired. Furthermore, it should be noted that roller **29** may be swung from the engaged position shown in Fig. 5 to the disengaged position of Fig. 2 without completely separating the teeth of gears **29**, **30**. By this structure, the rollers **29**, **30** rotate in opposite directions at all times and may be run at an extremely high speed since there are no inertia effects to be overcome in starting and stopping the rollers.

Moveable roller **29** is urged toward a disengaged position at all times by a helical extension spring **42** which is secured at one end to the housing **37** and at the opposite end to the arm **38** (Figs. 2, 5).

Also secured to rotatable pin **39** is one end of a second arm **43** which is positioned below the top **44** of housing **37** and which extends outwardly through one side **45** of housing **37**. Intermediate the ends of arm **43** are a pair of links **46**, **47** which are respectively positioned above and below the outer end of arm **43**. Adjacent the outer end of arm **43** the links **46**, **47** are connected together at one side by means of a plate **48** which is formed to provide a biased surface **49** for a purpose to be described. Opposite plate **49** is another plate **50** which is also rigidly secured to the links **47**. By this structure the outer ends of links **46**, **47** are boxed so that the outer end of arm **43** is loosely received in the boxed end. The inner ends of links **46**, **47** are pivotally mounted on a vertically extending pin **51** secured to arm **43** (Fig. 4).

As best seen in Figs. 2, 3, 5 a bolt **54** is threadedly secured in the outer end of arm **43** with its shank projecting through a suitable aperture in plate **50**. A helical compression spring **55** surrounding the shank of bolt **54** operates between the head of said bolt and the plate so as to urge the outer end of arm **43** toward the plate **50**.

Carried by the housing **37** is a conventional solenoid generally designated **58** and provided with a plunger **59** which is urged to the left as seen in Fig. 2 when the solenoid is energized. One end of plunger **59** is provided with rollers **60** (Figs. 2, 3, 5) for engaging the biased surface **49** of plate **48** when the solenoid is energized to move the plunger **59** to the position of Fig. 5. In so moving, the links **46**, **47** are swung clockwise as seen in Figs. 2, 5 and yieldably urge the arm **43** in the same direction against the resiliency of spring **55**. In this manner the sharp impact imparted by solenoid plunger **59** on plate **48** is converted to a smooth pressure on arm **43** causing the same to swing through an arc in a clockwise direction until roller **29** is pressed against stationary roller **30** or against the paper strip **25** that is between said rollers. Inasmuch as the rollers **29**, **30** are both rotating at a high speed at all times in the direction indicated by arrows the strip **25** is quickly fed to the left as seen in Figs. 2, 5. When the solenoid **58** is deenergized, the spring **42** instantly swings arm **43** to the position of Fig. 2, thus separating the rollers and discontinuing feeding of strip **25**.

As best seen in Fig. 1 the band supports **10**, **11** are spaced apart a distance slightly greater than the width of a carton and it is necessary that the strip **25** traverse this space **62** (Fig. 6) during feeding thereof. Inasmuch as the paper speed may be made as high as 100 inches per second the paper supports **10**, **11** must be set up quite accurately. Said supports preferably comprise a section of sheet metal or the like bent along its margins to provide a pair of oppositely inwardly opening channels **64**, **64** (Fig. 1) within which hems **27**, **28** of the paper strip **25** are retained.

As seen in Fig. 4 the pressing together of rollers **29**, **30** during feeding of the strip **25** helps to bend the hems **27**, **28** of said strip flat so that the strip is relatively rigid when it traverses the space **62** between the supports **10**, **11**.

Paper support **11** is provided with a switch, generally designated **65** (Fig. 1) having a contact **66** (Fig. 6) which normally engages the band support **11** to complete a circuit. When the strip **25** moves between said contact **66** and the support **11** the circuit is broken thereby deenergizing the solenoid to stop feeding of the strip. This operation will be more fully described now with reference to the wiring diagram (Fig. 6).

The solenoid **58** receives its power from a pair of power leads **69**, **70** (Fig. 6). Lead **69** is connected with the solenoid through a wire **71** in which is a normally open switch **72**. Wire **71** is connected with contact **66** of switch **65** and a circuit is established through band support **11**. Thus, when switch **72** is closed and there is no band between contact **66** and band support **11**, the solenoid **58** will be energized and the paper band will be fed by rollers **29**, **30** across space **62**.

On band support **10** and adjacent space **62** is a second contact **78** similar to contact **66**. Contact **78** is connected by a wire **73** with wire **71** and is provided with a normally closed switch **74**. When switch **74** is closed a circuit is established through wire **73**, contact **78** and band support **10** by means of a wire **75** which connects said support and wire **71**.

Operatively connected with switches **72**, **74** is a relay **76** which is connected by means of wire **77** with lead **70** and wire **71** so that said relay is energized when switch **72** and contact **66** are both closed or when contact **78**, switch **74** and contact **66** are all closed. When relay **76** is deenergized, switch **72** is open and switch **74** closed. It will therefore be apparent when contacts **66**, **78** are both closed a circuit is established through the solenoid **58** causing the paper strip to be fed along support **10**, across space **62** and into support **11**.

When the strip is interposed between contact **78** and support **10** said contact is opened but a circuit is still established through switch **72** which, of course, is closed while relay **76** is energized. When the strip **25** has been fed sufficiently so that the same opens contact **66**, the solenoid **58** is immediately deenergized, and feeding stops. At the same time, relay **76** is deenergized causing switch **74** to close and switch **72** to open. When feeding ceases, the strip **25** is cut at a point adjacent rollers **29**, **30**, in a manner which will subsequently be described, thus forming the band **12**.

When a pair of cartons are moved from a pocket **5** in turntable **4** to a pocket **8** in turntable **7** the band is auto-

matically pulled from the band supports 10, 11. In this connection, it will be noted that the spacing between the strip cutter (Figs. 2, 6) and the contact 78 is such that the band 12 is completely released from support 11 before it is disengaged from contact 78.

Thus when the carton starts to pull the band 12 from the supports 10, 11 contact 66 closes first but a circuit through the solenoid 58 is not completed because switch 72 is still open. Switch 74 is, of course, closed; but until contact 78 closes, no circuit is established through said switch.

When the turntable 7 has rotated sufficiently so that the band 12 is pulled from between contact 78 and support 10 the circuit through the latter is established and both the relay 76 and the solenoid 58 are energized to feed the strip past contact 78 and across space 62 to support 11. When the desired amount of strip has been fed the contact 66 closes thus immediately stopping feeding. At the same time relay 76 is deenergized so that feeding will not again commence until contact 78 is opened.

The cutting means will now be described. As best seen in Figs. 2, 5 the arm 38 which supports the moveable roller 29 is formed with a return bend to provide a portion 80 which extends alongside and below the roler 30. Secured to this portion 80 is an upstanding cutting blade 81 which cooperates with another similar blade 82 on the opposite side of the paper strip 25 from blade 81.

Blade 82 is secured to one end of a lever 83 which is pivotally supported for horizontal swinging on a vertical pin 84 mounted on housing 37. On the opposite side of lever 83 from the cutting blade 82 is an extension 85 to which is secured one end of a helical extension spring 86. The other end of spring 86 is fixedly secured to a post 86 carried by housing 37. It is thus seen that the cutting blade 82 is yieldably urged at all times against blade 81. The cutting edges of blades 81, 82 diverge upwardly so as to permit said strip to pass therebetween when the blades are in the open position of Fig. 5. However, when the solenoid 58 is deenergized to stop feeding of strip 25 the blade 81 swings toward blade 82 with arm 38, automatically cutting the paper in a scissor-like fashion.

The present invention is readily adapted for advertising the user's products. To this end, the roller 30, which engages the outer side of the wrapping band may be provided with printing type 88 (Fig. 4) to print any desired advertising material on the outside of the wrapping band during the feeding process. By providing interchangeable rollers with different written material thereon the advertising may be changed from day to day or as desired. It will be understood that any conventional inking means (not shown) may be employed to ink type 88.

If desired, the same roller may be employed at all times and the type 88 may be provided on a removable sleeve.

Although the rollers 29, 30 are indicated on the drawings as being relieved centrally between their ends to provide an annular groove 90, this structure is not required and the advertising may be placed anywhere on the roller. However the shape of the roller shown in Fig. 4 is preferred since it insures optimum pressure on the hems 27, 28 of the paper strip 25.

I claim:

1. In a banding machine for applying an elongated band around an article, a pair of longitudinally spaced band supports for supporting said band at its opposite ends with its central portion free whereby said band partially encircles said article when the latter is moved across the space between said supports in a direction transversely of said band, means for feeding a free end portion of a continuous strip of banding material from one support to the other across said space, a feed controlling mechanism for stopping operation of said feeding means including actuating means interposed in the path of movement of said strip and carried by said other support and actuated by engagement with the leading edge of said portion for stopping said feeding means.

2. In a banding machine for applying an elongated band around an article, a pair of longitudinally spaced band supports for supporting said band at its opposite ends with its central portion free whereby said band partially encircles said article when the latter is moved across the space between said supports in a direction transversely of said band, means for feeding one end of a continuous strip of banding material from one support to the other across said space, and means adjacent said one support for cutting said strip to provide a band, solenoid actuated means for stopping and starting said feeding, an electrical circuit for energizing said solenoid and a switch on said other support adapted to be opened by said end of said strip for opening said circuit to stop feeding of said strip when the latter engages said switch.

3. In a banding machine for applying an elongated band around an article, a pair of longitudinally spaced band supports for supporting said band at its opposite ends with its central portion free whereby said band partially encircles said article when the latter is moved across the space between said supports in a direction transversely of said band, means for feeding one end of a continuous strip of banding material from one support to the other across said space, and means adjacent said one support for cutting said strip to provide a band, solenoid actuated means for stopping and starting said feeding, first and second circuits each separately adapted to energize said solenoid for feeding said strip, first and second switches on said one support and said other support respectively for opening and closing said circuits, each of said switches being adapted to be opened when said strip is fed past the same, and means closing one of said circuits to energize said solenoid only when both of said switches are closed.

4. In a banding machine for applying an elongated band around an article, a pair of longitudinally spaced band supports for supporting said band at its opposite ends with its central portion free whereby said band partially encircles said article when the latter is moved across the space between said supports in a direction transversely of said band, means for feeding one end of a continuous strip of banding material from one support to the other across said space, and means adjacent said one support for cutting said strip to provide a band, said feeding means comprising a pair of opposed feed rollers, one of said rollers being mounted for rotation on a swingably mounted arm, a solenoid engageable with said arm for swinging the same toward said other roller when said solenoid is energized whereby said strip is engaged by said rollers and fed therebetween, power means for rotating said other roller and gears carried by said rollers for rotating said one roller at the same speed as said other roller at all times, means for swinging said arm away from said other roller when said solenoid is deenergized, first and second electrical circuits each adapted to energize said solenoid when closed, first and second switches adjacent said one support and said other support respectively and adapted to open said first and second circuits respectively when said strip is fed past the same thereby stopping said feeding, and means closing one of said circuits to energize said solenoid only when both of said switches are closed.

5. In a banding machine for applying an elongated band around an article, a pair of longitudinally spaced band supports for supporting said band at its opposite ends with its central portion free whereby said band partially encircles said article when the latter is moved across the space between said supports in a direction transversely of said band, means for feeding one end of a continuous strip of banding material from one support to the other across said space, and means adjacent said one support for cutting said strip to provide a band, said

feeding means comprising a pair of opposed feed rollers, one of said rollers being mounted for rotation on a swingably mounted arm, a solenoid engageable with said arm for swinging the same toward said other roller when said solenoid is energized whereby said strip is engaged by said rollers and fed therebetween, power means for rotating said other roller and gears carried by said rollers for rotating said one roller at the same speed as said other roller at all times, means for swinging said arm away from said other roller when said solenoid is deenergized, first and second electrical circuits each adapted to energize said solenoid when closed, first and second switches adjacent said one support and said other support respectively and adapted to open said first and second circuits respectively when said strip is fed past the same thereby stopping said feeding, and means closing one of said circuits

to energize said solenoid only when both of said switches are closed, said last mentioned means comprising a relay and a pair of switches in said circuits actuated by said relay, one of said pair being normally closed and the other normally open.

References Cited in the file of this patent

UNITED STATES PATENTS

467,040	Mellen	Jan. 12, 1892
561,567	Crowell	June 9, 1896
836,241	Camp	Nov. 20, 1906
1,135,077	Tomlinson	Apr. 13, 1915
1,648,769	Hugo	Nov. 8, 1927
2,109,527	Fenton	Mar. 1, 1938