April 7, 1959 C. M. GIBSON 2,880,560

WRAPPING PAPER FEEDING MACHINE

Filed March 20, 1957 5 Sheets-Sheet 1

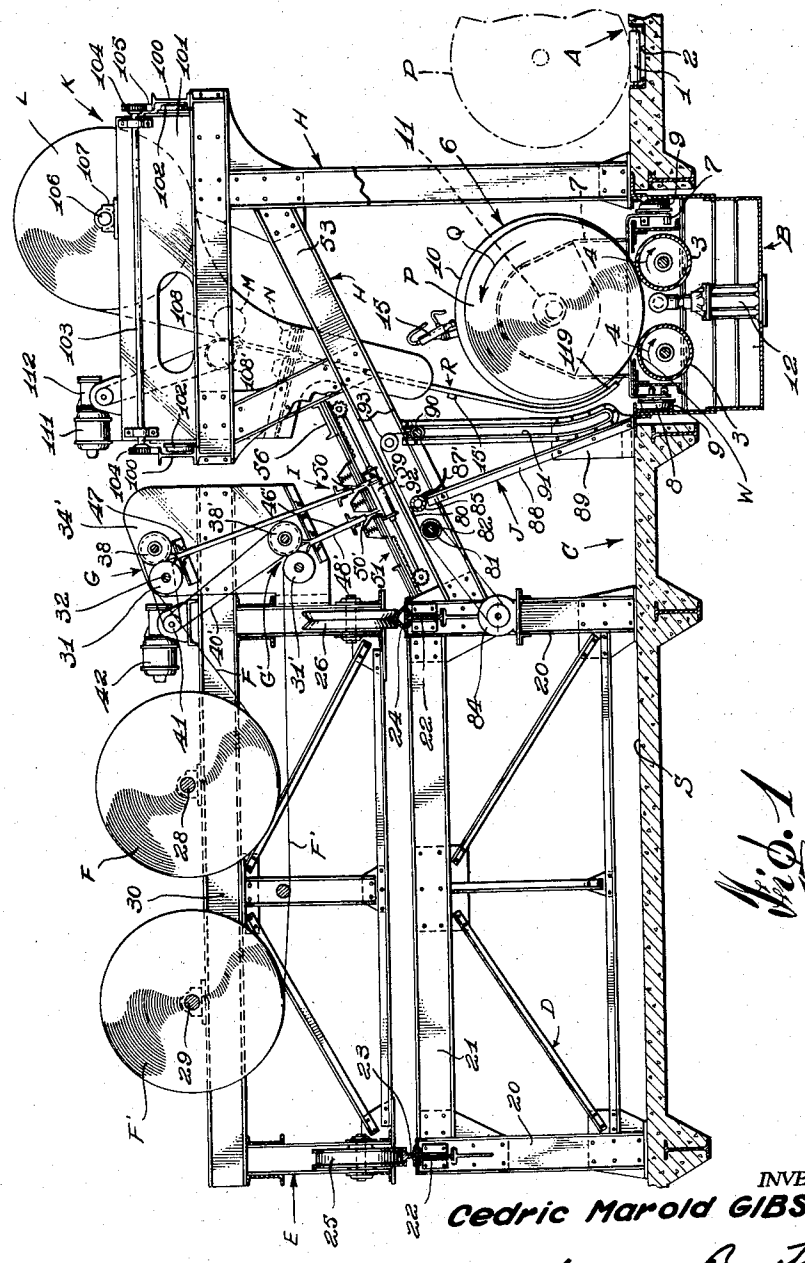


Fig. 1

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WRAPPING PAPER FEEDING MACHINE

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Fig. 2

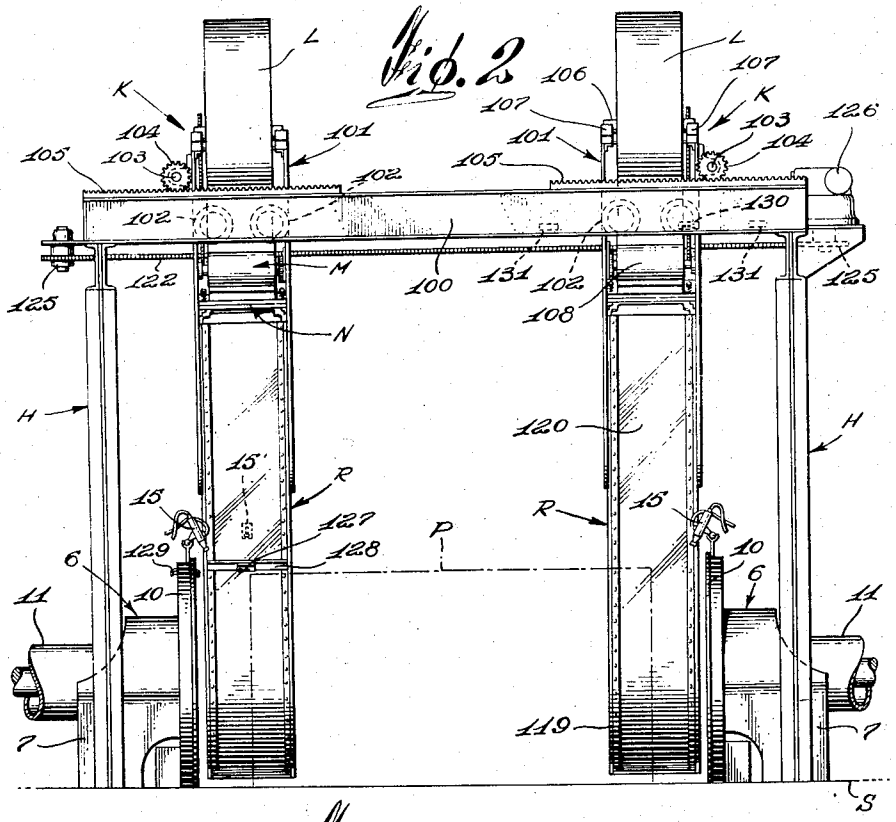


Fig. 3

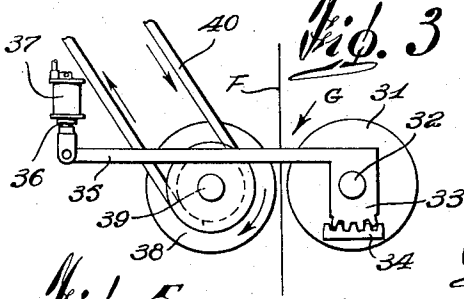


Fig. 4

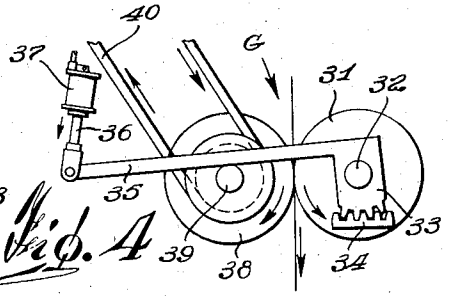
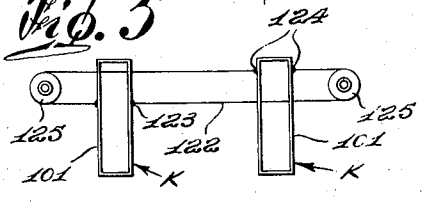


Fig. 5



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WRAPPING PAPER FEEDING MACHINE

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Fig. 6

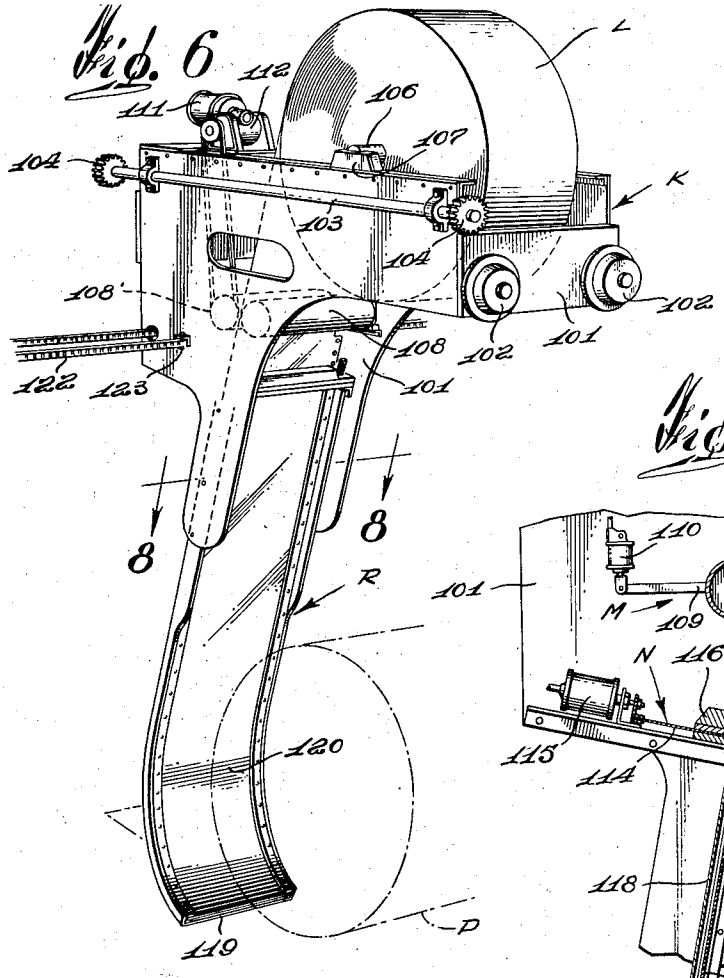
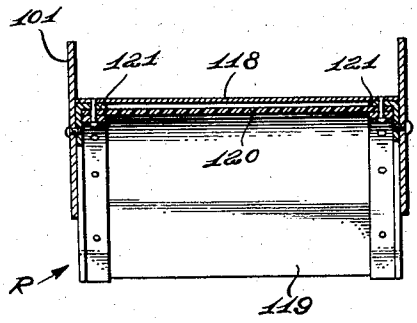


Fig. 7

Fig. 8



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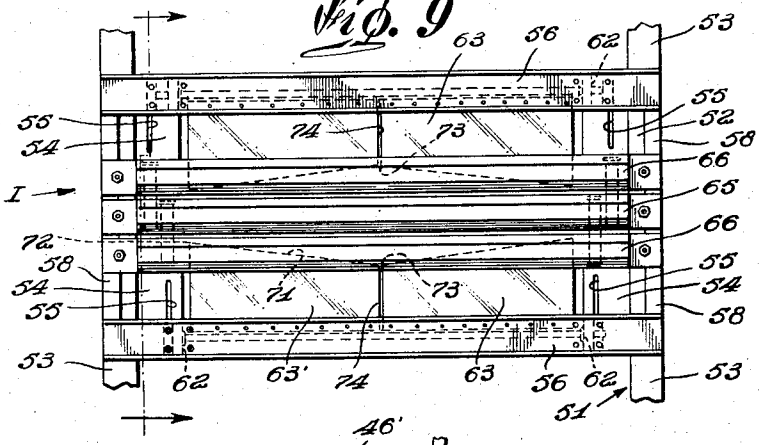
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WRAPPING PAPER FEEDING MACHINE

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Fig. 9



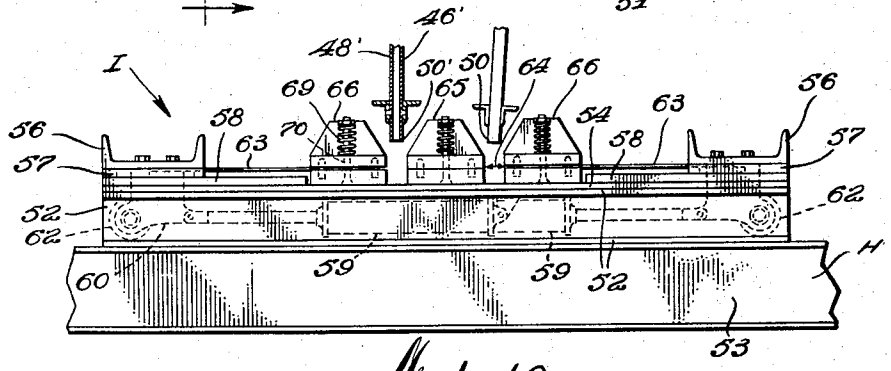


Fig. 10

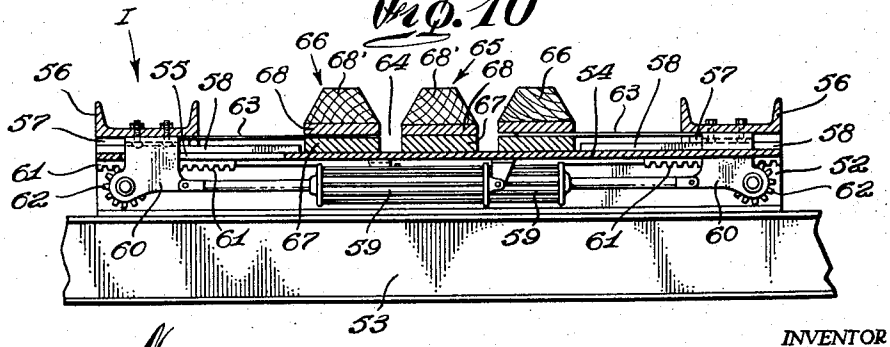


Fig. 11

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WRAPPING PAPER FEEDING MACHINE

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Fig. 12

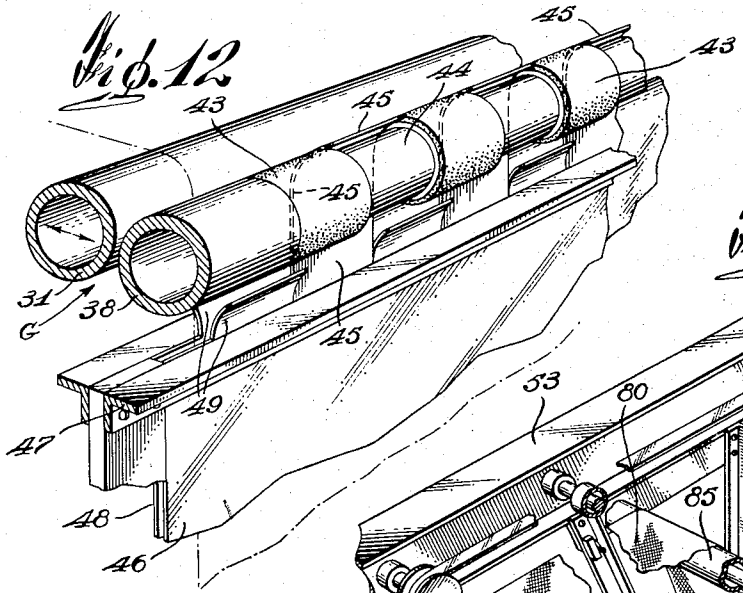
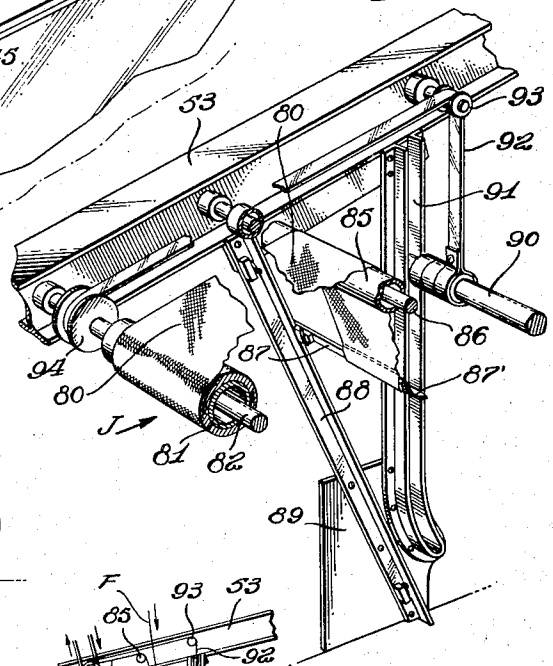


Fig. 13



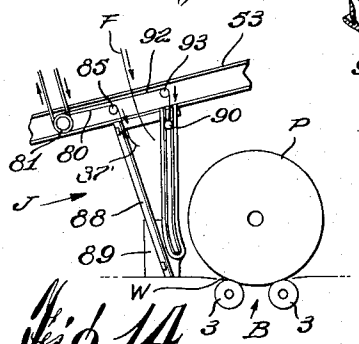


Fig. 14

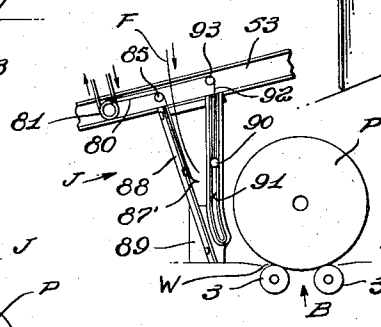


Fig. 15

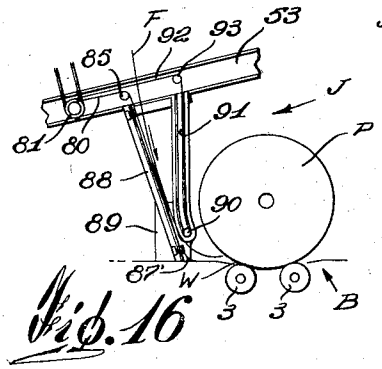


Fig. 16

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2,880,560

WRAPPING PAPER FEEDING MACHINE

Cedric Marold Gibson, Mount Royal, Quebec, Canada

Application March 20, 1957, Serial No. 647,365

18 Claims. (Cl. 53—389)

The present invention relates to a paper roll wrapping machine and more particularly to the wrapping paper feeding means for a roll wrapping machine such as described and claimed in my U.S. application Serial No. 598,889,filed July 19, 1956, now Patent No. 2,803,935,

In this U.S. patent application there is described a method and a machine for wrapping paper rolls, especially newsprint paper rolls, practically automatically and with a minimum of manual operation.

The general object of the present invention is the provision of means for feeding to the machine described in the above mentioned U.S. patent application, body wrapping paper and/or reinforcing paper bands of the required width and length in accordance with the fact that each successive paper roll to be wrapped may vary both in diameter and in width, as clearly described in the aforesaid patent application.

An important object, according to the present invention, is the provision of a wrapping paper feeding machine characterised by the fact that the body wrapping paper, together with the reinforcing bands are fed and brought into operative cooperation with the paper roll from above the wrapping station and are accessible to the operators at all times, thereby facilitating gluing of the body wrapping paper and of the reinforcing bands and whereby any hitch developing in the feeding of said wrapping paper and said bands may be quickly recognized by the operators and immediately rectified.

Another important object, according to the present invention, is the provision of means to allow the paper rolls to be wrapped to be moved successively in one direction from a loading station to the wrapping station and then to a discharge station, despite the fact that the wrapping paper and bands are fed from points above the wrapping station.

Still another important object of the persent invention is the provision of a machine for feeding wrapping paper and reinforcing bands of the required width and length to a paper roll wrapping station in a practically automatic manner, thus considerably improving the ease of operation and the rapidity of wrapping paper rolls.

Another important object of the present invention is the provision of novel means for cutting and wrapping paper and bands.

Yet another important object of the present invention is the provision in a machine of the character described of means for automatically centering the reinforcing bands with respect to the ends of the paper roll to be wrapped.

Another important object of the present invention is the provision of means for leading and guiding the wrapping paper towards the paper roll in such a manner so said wrapping paper is automatically gripped between the paper roll and the rotating rollers so as to automatically wind the wrapping paper around the paper roll.

Yet another important object of the present invention is the provision of the above mentioned leading and guiding means so arranged as to be retractable into an out of the way position to permit the wrapped paper roll to

be moved through the space previously occupied by said means.

A further object of the present invention is the provision of highly sensitive means for positively feeding predetermined lengths of reinforcing bands and body wrapping paper.

The foregoing and other important objects of the present invention will become more apparent during the following disclosure and by referring to the drawings in which:

Figure 1 is a longitudinal sectional elevation of the general arrangement of the machine according to the present invention;

Figure 2 is a front view of the same with some parts not shown for clarity;

Figures 3 and 4 are schematic end views of the means for positively advancing the paper, shown in inoperative and operative positions respectively;

Figure 5 is a schematic plan view of the means for synchronizing the inward and outward movements of the reinforcing band rolls;

Figure 6 is a perspective view of the arrangement for mounting the reinforcing band rolls and for feeding the same to the paper rolls to be wrapped thereby;

Figure 7 is a partial longitudinal section of some of the means shown in Figure 6;

Figure 8 is a cross-section along line 8—8 of Figure 6;

Figure 9 is a plan view of the wrapping paper cutting means;

Figure 10 is an end elevation of the same cutting means;

Figure 11 is a cross-section along line 11—11 of Figure 9;

Figure 12 is a partial perspective view showing the means for positively advancing the wrapping paper and the means for guiding the same past said advancing means;

Figure 13 is a partial perspective view, partially in cross-section, of the retractable means for guiding the wrapping paper towards the paper roll at the wrapping station; and

Figures 14 to 16 inclusive are diagrammatic elevations of the means of Figure 13, shown in different operative positions relative to a paper roll at the wrapping station.

Referring now more particularly to the drawings in which like reference characters indicate like elements throughout, the general arrangement of the machine, according to the present invention, is illustrated in Figure 1 and comprises a paper roll loading station A disposed at the level of the floor S, a paper wrapping station B, a discharge station C, a structure D mounted above the floor S, a carriage E mounted for movement on the structure D transversely of the machine, that is, transversely of the movement of the paper rolls from the loading to the wrapping and then to the discharge stations. The carriage E carries the wrapping paper rolls F, F′ and the means for positively advancing said wrapping papers, as shown at G and G′. The frame structure D is provided with a forward extension, generally indicated at H, and which is disposed over the wrapping station B. The extension structure H supports the means I for cutting the wrapping paper and the means J for guiding the wrapping paper towards the wrapping station B. The extension structure H also supports carriages K for the reinforcing paper rolls L for movement in paths substantially parallel to the path of the carriage E. Each carriage K also has means M for positively advancing the reinforcing band and cutting means N for said band, together with guiding means R for directing the reinforcing band to the wrapping station B.

The loading station A is disposed at floor level in front of the machine proper, and preferably comprises

a roller conveyor 1, which is disposed in a recess 2 made in the floor so that the rollers will be substantially level with the top face of the floor. Said roller conveyor 1 is arranged transversely of the machine and extends in front of the wrapping station B so that paper rolls P can be successively brought in front of the station B where they are pushed onto the rollers 3 at the wrapping station B. The mechanism at the wrapping station B has been described in detail in the aforesaid U.S. patent application Serial No. 598,889, now Patent No. 2,803,935. Said wrapping station comprises the aforesaid rollers 3, which are horizontally disposed and are driven by means (not shown) in the direction of rotation indicated by arrows 4, so as to rotate the paper roll P supported thereon in the direction of arrow Q. The wrapping station B further comprises two header assemblies 6 disposed at each end of the rollers 3 and adapted for movement towards each other in a path parallel to the longitudinal axes of the said rollers 3. Each header assembly 6 is mounted on a supporting frame 7 provided with wheels 8 which run on trackways 9, as shown in Figure 1. Furthermore, the two header assemblies 6 are mounted for synchronized movement towards or away from each other, so that they are always at equal distances from the mid-section of the rollers 3. Each header assembly 6 comprises a header plate 10 adapted to be pressed against the end of the paper roll P at the wrapping station by means of ram piston and cylinder units 11. The header assemblies are further provided with crimpers for folding and crimping the laterally projecting marginal portions of the body wrapping paper and bands against the end faces of the paper roll P.

Thus, at the wrapping station B, the following operations are performed. A roll of paper P is rolled onto the rollers 3 without attempting to center it. The headers 6 position the paper roll P centrally with respect to the mid section of the rollers 3 by bringing the headers 6 towards each other. Then the headers 6 are displaced outwardly and the wrapping paper F is then brought to the nip W, defined between the rear roller 3 and the paper roll P, by means to be described hereinafter. The paper roll P is then rotated by the rollers 3 in the direction of the arrow Q (see Figure 1) until the cylindrical surface of the paper roll P is completely covered by the wrapping paper F. One or more windings of the wrapping paper may be effected according to the requirements and then the rollers 3 are stopped and the wrapping paper is cut by the cutting means I. The trailing end of the cut length of wrapping paper is coated with a layer of glue while resting on the guiding means J, and rotation of the paper roll P is restarted whereby the rollers 3 press the glue coated trailing end of the length of wrapping paper against the underlying layers of the same to complete the wrapping. Simultaneously with the above mentioned rotation of the paper roll and the winding of the wrapping paper therearound, the outwardly projecting marginal portions of the wrapping paper are folded and crimped against the end faces of the paper roll by crimpers (not shown) which have been described in the above mentioned co-pending patent application. A paper disk (not shown) previously coated with glue along its marginal portion is then applied against each end face of the paper roll P, its glued portion being pressed against the crimped portion of the wrapping paper by the header plates 10. The headers are preferably provided with heating means (not shown) to speed drying of the adhesive, and a substantial pressure is provided. The headers are then pulled back and the completely wrapped roll is ejected by the lifting device 12 which consists of an upright cylinder and piston unit arranged between the two rollers 3 to contact the underface of the paper roll P slightly off center so as to lift the latter off the rollers 3 and push the same in a rearward direction, passing through the space previously occupied by the now retracted guiding means J, to reach the discharge station C.

In the wrapping operation just described, no mention has been made of providing reinforcing paper bands L. However, in most applications, reinforcing paper bands are required. Said paper bands are fed at the nip W between the paper roll P and the rearward roller 3 and between the wrapping paper and said paper roll, any time after engagement of the wrapping paper F between the roll P and the rearward roller 3. These bands are automatically aligned, in a manner which will be described later on, with the lateral edges of the wrapping paper and are wound on the paper roll first internally of the wrapping paper and then externally thereof after the trailing end of said wrapping paper has been passed. Preferably the bands L are wound around the paper roll a few extra layers. The reinforcing bands are crimped together with the wrapping paper F as the same are wound on the paper roll P. The bands L are cut to the desired length by the cutting means N which will be described hereinafter.

The cut length of reinforcing bands L are automatically glued onto the paper roll P by means of glue guns or ejectors 15 (Figures 1 and 2) which are mounted on top of the header plates 10, and are connected to a suitable source of glue under pressure. Said guns are directed towards the marginal end portions of the paper roll P being rotated by the rollers 3 with the header plates 10 in contact with said paper roll. The glue ejectors are preferably automatically operated in the following manner: operation of the cutting means I for cutting a length of body wrapping paper F closes a holding relay of an electric circuit which operates the glue guns 15. Said circuit is further controlled by the rollers 3 and by a feeler switch 15' mounted on one guiding means R to contact the paper band L and to open the circuit when the trailing end of the cut band passes beyond the feeler switch 15'. This circuit is so arranged that glue will be ejected only when the paper roll P is rotated by the rollers 3 and only after operation of the cutting means I that is when the trailing end portion of the body paper is wound on the paper roll P. Glue ejection provides gluing of the trailing ends of the bands L and is stopped in time to prevent the glue coatings from extending beyond the trailing ends of the bands. Thus, upon rotation of the paper roll, a continuous coating of glue is applied on the end marginal portions of the already wrapped body wrapping paper F, so that the incoming reinforcing bands L are applied against said glue coated paper F under the pressure of the paper roll P against the supporting rollers 3.

The structure D supporting the carriage E is constituted by I-beams forming columns 20 supporting and connected by transverse beams 21 and 22 to form a rigid structure. The beams 21 and 22 are at a level above the floor S sufficient to provide proper clearance for the wrapped paper rolls. The horizontal spacing between the columns 20, at the portion of the structure D rearwardly aligned with the wrapping station B, is sufficient to provide side clearance for the wrapped paper rolls unloaded from the wrapping station and so that said paper rolls can be rolled between the columns 20. A rail 23 of conventional I-shaped cross-section is disposed over and supported by a transverse beam 22 at the rear of the structure D, while a rail 24 of triangular cross-section is supported by a transverse beam 22 at the front of the structure D, the rails 23 and 24 extend transversely of the machine according to the present invention.

The carriage E is constituted by a structure made of I-beams and is provided at the four corners with supporting wheels consisting of rear wheels 25 and front wheels 26 adapted to roll over rails 23 and 24 respectively. The rear wheels 25 have a channel shaped rim of a width slightly greater than the width of the wheel engaging portion of the rail 23 so as to permit slight lateral displacement of the rear wheels 25 with respect to the rail 23. The front wheels 26 have a rim of tri-

angular cross-section adapted to fit the triangular rail **24**. Thus the carriage E is accurately positioned at its front portion, while the rear wheels **25** are always in frictionless contact with the rail **23** despite slight variations in the distance between the front and rear wheels under varying load conditions. The supply rolls of body wrapping paper F and F' are mounted on shafts **28** and **29** respectively, which are removably supported on the top transverse beams **30** of the carriage E.

The carriage E has a length to accommodate a plurality of supply rolls of body wrapping paper F in end alignment on the common shaft **28**, and similarly a plurality of supply rolls of body wrapping paper F' on the shaft **29**. Each supply roll will have a different width so that said rolls may be selected in accordance with the width of the paper roll P to be wrapped.

Obviously, if the paper rolls P to be wrapped are more or less of the same width, only one or two predetermined widths of body wrapping paper may be needed, in which case there will no longer be any need for the carriage E, and the supply rolls F and F' will be directly mounted on the framework D which would be upwardly extended for this purpose.

Each supply roll of body wrapping paper F and F' is associated with advancing means G or G', the latter being of similar construction.

The advancing means G are shown in Figures 1, 3, 4 and 12 and comprises an all metal idle roller **31**, freely rotatable on a shaft **32** which is secured at its two ends to gear sectors **33** in meshing engagement with two racks **34** which are stationarily mounted and secured to end plates **34'** forwardly extended from the frame of the machine carriage E. The gear sectors **33** are each provided with a lever arm **35**, the outer end of which is pivotally connected to the piston rod **36** of a pneumatic power unit **37**. It will be understood that operation of the two units **37** will cause downward movement of the lever arms **35** and rotating movement of the gear sectors **33** which, because they engage the racks **34**, will cause transverse displacement of the idle roller **31** towards a driving roller **38** which is mounted on a shaft **39** extending parallel and close to the shaft **32** of the idle roller **31**. The driving roller **38** is operatively connected by means of a belt **40** to a speed reducing unit **41** (see Figure 1) operated by an electric motor **42**. The body wrapping paper F passes between the two rollers **31** and **38** and is stationary when the roller **31** is out of contact with the driving roller, as shown in Figure 3. As soon as the roller **31** effects its closing movement, it presses the paper F against the continuously rotating driving roller **38** to cause practically instantaneous advancing movement of said paper F downwardly towards the cutting means I.

As shown in Figure 12, the driving roller **38** is provided with axially spaced rubber sleeves **43** alternating with peripheral recesses **44**. The sleeves **43** frictionally engage the paper F, while the recesses **44** permit the insertion of guiding strips **45** between the idle and driving rollers. These strips **45**, which partly surround the roller **38**, are upward projections of a guide plate **46** which is disposed and terminates underneath the rollers **31** and **38** and is secured to a frame **47** secured to the end plates **34'**. A second guide plate **48** is positioned parallel to and closely adjacent the guide plate **46**, so as to form a space therebetween for guiding the advancing body wrapping paper F towards the cutting means I. The guide plates **46** and **48** are further provided at their upper ends with short inlet strips **49** which are outwardly curved and extend to a point just underneath the rollers **31** and **38**. Thus the paper F is completely prevented from winding itself around the rollers **31** or **38** and is positively guided by the strips **45** and **49** between the plates **46** and **48** which terminate at their lower ends **50** at a point just above the cutting means I, as clearly shown in Figure 1.

The advancing means G' for the body paper F' have an idle roller **31'** and a driving roller **38'** driven by the speed reducer **41** through belt **40'**. The guiding plates **46'** and **48'** extend from the rollers to a point **50'** above the cutting means I and are parallel to the plates **46** and **48** of the advancing means G.

The cutting means I are illustrated in detail in Figures 9 to 11 inclusive. Said cutting means consist of two identical units symmetrically disposed on both sides of the longitudinal center line of the structure, generally indicated at **51**, each unit providing a cutting blade for cutting the respective body wrapping papers F and F'.

The structure **51** comprises supporting longitudinal beams **52** at both sides thereof, each disposed over and longitudinally of the main I beams **53** of the front extension H of the structure D. Each beam **52** consists of two opposed channel members. Plates **54** are rigidly secured inwardly of the beams **52** and are each provided with two slots **55** near the outer ends thereof. Transverse channel shaped members **56** are mounted on the beams **52** for sliding reciprocating movement in a direction parallel to the beams **52**. The channel members **56** have shoes **57** in sliding contact with wear plates **58** which are secured to the beams **52**. The members **56** are operated by double acting pneumatic cylinder and piston units **59** mounted underneath the plates **54** and extending between said plates **54** and brackets **60** which pass through the slots **55** and are rigidly secured to the channel members **56**. There is a unit **59** at each end of each channel member **56**. The latter are kept parallel to themselves during their reciprocating movements by providing rack members **61** underneath the plates **54** in meshing engagement with gear wheels **62** pivotally mounted on the brackets **60**. Each channel member **56** actuates a blade **63** for reciprocating movement through a gap **64** between a center assembly **65** and an outside assembly **66**. The blade **63** is slidable through both assemblies, said blade being inserted between a lower wear plate **67** and an upper wear plate **68** in each assembly. The upper wear plate **68** is provided with a bevelled wooden block **68'** covering the same. The ends of the wear plates **67** and **68** are mounted on the beams **52**, and the upper wear plate is resiliently urged towards the lower wear plate **67** by springs **69** surrounding bolts **70**. In its retracted position, the blade **63** clears the gap **64** so that the wrapping paper F can move freely therethrough. In its projecting position the entire cutting edge of the blade is positioned between the wear plates of the center assembly **65**.

The body wrapping paper F is cut by the shearing interaction of the blade **63** with the edges of the wear plates of the center assembly **65**.

In order to facilitate the cutting action of the blade, its cutting edge is bevelled, as clearly shown at **71**, so as to form a wide angled V having leading end corners **72** and a center recess **73**.

Each blade **63** is preferably made of two symmetrical parts **63'** and **63''** in end abutting relationship at the middle of the blade, as shown at **74**. In order to facilitate manufacture of such cutting blades they are made in two parts. The blades **63** are removably secured to their respective channel member **56** for easy replacement when worn out. Each blade **63** automatically returns to a retracted position after a cutting stroke. Thus the gap **64** is normally clear of the blade and the body wrapping paper F is free to move through said gap to be advanced by the advancing means G towards the guiding means J, which are more clearly shown in Figures 1 and 13 to 16 inclusive.

Referring to Figure 13, a flexible sheet or apron **80**, of fabric or the like, is wound on a cylinder **81** which is secured on a shaft **82** which is journalled at both ends on the beams **53**, which are part of the forward extension H of the structure D. The shaft **82** is hori-

zontally disposed transversely above the discharge station C, as shown in Figure 1, and is positively driven by an electric motor 84 mounted on a column 20. The sheet 80 is trained on idle roller 85 which mounted on a shaft 86, also transversely disposed and parallel to the shaft 82 and journalled at both ends on the beams 53. The free end of the sheet or apron 80 is provided with a weight bar 87 having a forward lip 87' and having its ends in sliding engagement with downwardly inclined side guide rails 88 disposed on each side of the discharge station C and each secured at its upper end to the beam 53 and at its lower end to a plate 89 mounted on the floor F; the distance separating the two guide rails 88 is sufficient to allow passage of the paper rolls P.

Upon actuation of the motor 84, the sheet or apron 80 is unrolled from the cylinder 81 and guides the descending wrapping paper F towards the nip W between the paper roll P to be wrapped and the rearward supporting roller 3 (Figures 14 to 16).

The body wrapping paper F has a tendency to curl upwardly towards the paper roll P due to the manner in which it was wound on the supply roll. In order to positively guide the wrapping paper F to the nip W despite curling tendency of its leading edge, there is arranged in front of the sheet or apron 80, a guiding rod 90 which is adapted to move downwardly simultaneously with and opposite to bar 87. The rod 90 is engaged at its two ends in channel shaped guiding members 91 which are secured at their upper ends to the beams 53 and at their lower ends to the plates 89. The rod 90 is connected to the shaft 82 for unwinding and winding the sheet or apron 80 by means of flexible metal straps 92 trained on rollers 93 and wound on pulleys 94 which are secured to the shaft 82.

Referring to Figures 14 to 16 inclusive, it will be seen that the simultaneous downward movements of the wrapping paper F and of the sheet or apron 80 and guiding rod 90 will positively lead the leading edge of said wrapping paper to the nip W between the paper roll to be wrapped and the rearward roller 3, thereby to be engaged by said roller 3 and wrapped around the paper roll P.

Once the wrapping paper F is so engaged, the advancing means G or G' become inoperative, whereby the wrapping paper is directly pulled from its supply roll. During the wrapping operation with the body wrapping paper, the apron 80 and the guiding rod 90 remain in their downward position. After a sufficient length of wrapping paper has been fed to the paper roll P, rotation of the latter is stopped and a coating of glue is applied to the inside face of the wrapping paper F, transversely thereof, preferably just underneath the cutting means I. Thereafter the cutting means I are operated to cut off the desired length of wrapping paper and the paper roll P is again rotated until the trailing end of the wrapping paper, now coated with glue, engages between the paper roll and the rollers 3 to be pressed against the layers of wrapping paper.

The means for feeding the reinforcing bands L are shown in Figures 1, 2 and 5 to 8 inclusive. The frame extension H provides two spaced horizontally disposed transverse I-beam rails 100 extending above the wrapping station B, for supporting two carriages K for movement transversely of the machine towards and away from each other and such that in any given position thereof, said carriage K will be equally spaced on each side of a center plane passing through the mid-section of the rollers 3 at the wrapping station B. One of the carriages K is shown in Figure 6; it comprises a substantially rectangular framework 101 having flanged wheels 102 adapted to roll on the lower flange inside of the I-beams 100. A shaft 103 extends along the opposite side of the framework 101 and is provided at its two ends with gear wheels 104 adapted to engage rack members 105 disposed on the upper flanges of the I-beams 100. The arrangement of the rack members 105 and gear wheels 104, secured to the common shaft 103, maintains the carriage K parallel to itself in its movement transversely of the machine.

Each supply roll of reinforcing band L is mounted on a shaft 106 which is removably supported on brackets 107 across the frame 101. The band L is adapted to be unwound from its supply roll by passing through the structure 101 downwardly between the rollers 108, 108' of the advancing means M for the reinforcing bands.

Said advancing means M are similar in construction to the advancing means G and G' for the body wrapping paper F, except that rollers 108 and 108' have a much shorter length than the rollers 31 and 38 of the previously described advancing means G and that the idle roller 108 is provided with a lever gear sector 109 at only one end thereof, said lever sector 109 being actuated by the pneumatic unit 110 for displacement towards the driving roller 108'. The latter is entirely covered with a frictional material, such as rubber, and is driven by the electric motor 111 through the gear reducing unit 112.

The reinforcing band L, fed by the rollers 108 and 108', engage between the guide plates 113 which direct the band L to the cutting means N which comprise a cutting blade 114 which is reciprocated by the pneumatic unit 115 between the wear plates of two spaced blade engaging assemblies 116, defining a gap 117 through which the band L passes to engage the guiding means R.

The guiding means R consist of a strip 118 of a width slightly greater than the width of the band L and which is rigidly secured to the frame 101 and extends downwardly therefrom and is forwardly curved at its outer lower end as shown at 119. A strip 120 of transparent, rigid material, preferably plastic, is disposed in front of the metal strip 118 and is spaced therefrom by means of spacers 121 as shown in Figure 8. Progress of the reinforcing band L may be seen through the transparent strip 120. The lower forwardly curved end portions 119 of the strips 118 and 120 conform to the average peripheral surface of the paper rolls P to be wrapped, as clearly shown in Figure 1, and are adapted to extend in close proximity thereto so as to guide the band L to the nip W and feed the reinforcing band L between the paper roll P and the body wrapping paper F.

During the wrapping operation, the reinforcing bands L are fed to the paper roll P before the trailing end of the body wrapping paper F is reached so that said reinforcing bands L are engaged between the paper roll and the body wrapping paper to be pulled thereby, whereupon the advancing means M become inoperative.

When suitable lengths of reinforcing bands L have been fed to the paper roll, the rotation of said paper roll is stopped and the cutting means N are operated. The reinforcing bands L are glued onto the paper roll in the manner previously described by means of the glue ejectors 15 mounted on the header plates 10.

The bands are preferably disposed around the ends of the paper roll such that half of the bands will project outwardly from the end face of the paper roll to be crimped against said end face simultaneously with the body wrapping paper. For this purpose, the carriages K are movable across the machine to align the center planes of the supply rolls of bands L with the end faces of the roll P centered at the wrapping station B. The two carriages K are interconnected by means of a driving sprocket chain 122, one run of which is secured to one carriage, as shown at 123, and the other run of which is secured to the other carriage, as shown at 124 (see Figure 5). The chain 122 is trained on end sprocket wheels 125, at least one of which is positively driven by an electric motor and speed reducer 126 (see Figure 2). Movement of the sprocket chain 122 will move the two carriages K equal distances towards or away from each other so that said carriages will always be at an equal distance at each side

of a center vertical plane passing through the mid-section of rollers 3 of the wrapping station B.

Control means responsive to the position of the header plates 10 serve to operate the motor 126 to position the carriages K according to the position of the header plates 10 when the same abut the paper roll P. Said control means include a limit switch 127 positioned on a transverse bar 128 attached to the guide assembly 118, 120 of one carriage K (Figure 2) and adapted to engage a shoe 129 on the corresponding header plate 10. As soon as the limit switch 127 engages the shoe 129 it stops the operation of the motor 126, whereby inward movement of the carriages K is stopped to position the assemblies 118, 120 with their center lines aligned with the end faces of the paper roll P.

After the wrapping operation is completed, the carriages K are moved outwardly towards the ends of their supporting rails 100 with the guide assemblies 118, 120 clearing the wrapped paper roll P. The movements of the carriage K are limited by the interaction of shoes 131 and a limit switch 130. After completion of the wrapping operation, the apron 80 and guiding rod 90 are moved upwardly in an out-of-the-way position, whereby the space between the wrapping station B and discharge station C is completely cleared so as to allow rolling movement of the wrapped paper roll P under the action of the ejector device 12. The wrapped paper roll is then rolled through the structure D out of the wrapping machine.

The operation of the machine just described is preferably semi-automatic, although a completely automatic operation of the machine could be devised. One preferred method of operating the machine, is by means of a plurality of push buttons controlling the different electric motors and pneumatic means for actuating the various elements of machine in the sequence preferred by the operator.

A preferred procedure for operating the machine according to the present invention will now be described.

A roll of paper P to be wrapped is rolled by hand onto the rollers 3 without attempting to center it. The headers 6 are then operated to move towards each other to position the paper roll P centrally with respect to the mid-section of the rollers 3. Then the supply roll of wrapping paper F or F' is selected in accordance with the width of the paper roll P to be wrapped. If this supply roll is already opposite the cutting means I, the advancing means G or G' associated with said supply roll F or F' are actuated right away, or if the desired supply roll of wrapping paper is not opposite the wrapping station B, the carriage E is actuated in the desired direction so as to move the carriage E transversely of the wrapping station in order to bring the desired supply roll of wrapping paper opposite the cutting means I. Then the advancing means G or G' associated with the selected wrapping paper are actuated, whereby the selected wrapping paper moves downwardly past the cutting means I and onto the sheet or apron 80 which is actuated simultaneously to bring the same down into operative position along with the guiding rod 90. The leading edge of the wrapping paper is thus brought to the nip W between an unwound end portion of the paper roll P and the paper roll P itself so as to grip said wrapping paper F upon rotation of the rollers 3 to rotate the paper roll P in the direction of the arrow Q. In an alternative procedure, the leading edge of the wrapping paper F is coated with glue while still on the apron 80 and then brought to the nip W and stuck to the paper roll P by the rollers 3. One or more windings of the wrapping paper F may be effected.

The wrapping paper F has been selected so as to have marginal portions projecting from the end faces of the paper roll; said marginal portions are engaged by the crimping means (not shown) disposed within the header plates 10 so as to be turned radially inwardly and crimped and pressed by the header plates against the end faces of the paper roll.

The inward movement of the header plates 10 to center the paper roll P has also caused automatic centering of the rolls of reinforcing bands L, in the manner previously described, with the end faces of the paper roll P. Thus after one or more windings of the wrapping paper F, the advancing means M for the reinforcing paper bands L are started, to thereby feed said bands downwardly past the cutting means N and along the guiding means R to the nip W, whereas said bands are caught by the wrapping paper F being fed to the paper roll P.

After the desired number of windings of paper F, the rollers 3 are stopped and a layer of glue is applied on the body wrapping paper F across the width thereof underneath the cutting blades of the cutting means I, as by means of a brush or a spray gun. Thereafter, the cutting means I are actuated to cut off the desired length of body wrapping paper and the rollers 3 are again started, whereby the trailing edge of the cut body wrapping paper F is stuck into position onto the underlying layers of said paper on the paper roll P. From this point on, the bands L become external and may be wound a few extra turns on the paper roll P. Then the rollers 3 are again stopped and the bands L are cut by operating the cutting means N. The rollers 3 are again started to wind the trailing end portion of the cut bands.

As soon as the bands L become external relative to the trailing end of the body wrapping paper F, a coating of glue is continuously applied by the glue ejectors 15 on the marginal portion of the wrapped roll P so as to adhere the bands L as they are wound. The portions of the bands projecting outwardly from the end faces of the paper roll P are crimped against the end faces of the paper roll P together with the projecting portions of the wrapping paper.

In all the previously mentioned operations the advancing means G, G' and M are made inoperative as soon as the body wrapping paper F and the bands L become engaged between the paper roll P and the rotating rollers 3 so that from then on, the rollers 3 effect the actual pulling of the wrapping paper and bands directly from the supply rolls thereof.

After the winding of the bands L on the paper roll is terminated, the headers 6 are moved outwardly and paper disks, previously coated with glue along their marginal portion, are then applied against the end faces of the paper roll and the headers are again moved inwardly to press and stick said disks into position against the crimped portion of the wrapping paper and reinforcing bands.

The headers 6 are then pulled back, the carriages K are moved outwardly to position the guiding means R outwardly at the sides of the wrapping station B and the guiding means J are moved upwardly to clear the wrapped paper roll P which may then be ejected by the ejecting device 12 to be discharged at the station C where it is rolled by hand between the posts 20 of the structure D. The procedure just described can be modified to suit particular requirements of the mill in which the machine is installed.

While a preferred embodiment according to the present invention has been illustrated and described, it is understood that various modifications may be resorted to without departing from the spirit and scope of the appended claims.

I claim:

1. In a paper roll wrapping machine comprising a loading station, a wrapping station and a discharge station, said stations being disposed in succession and at substantially the same level whereby a paper roll will be moved rearwardly from said loading station to said wrapping station, and from said wrapping station to said discharge station, the combination of means to feed wrapping paper to said wrapping station, said means comprising means to provide a supply of wrapping paper, means

to advance said wrapping paper, means to cut lengths of said wrapping paper and means for guiding said wrapping paper to said wrapping station, said supply means, advancing means and cutting means being disposed at a level well above a paper roll disposed at said wrapping station, said advancing means comprising a supporting structure, a driving roller journalled at its ends in said structure and an idle roller disposed with its axis substantially parallel to the axis of said driving roller and mounted for movement between a position spaced from said driving roller and a position adapted to contact the same, and means for moving said idle roller between said two positions, said means comprising at least one rack member mounted on said structure, a toothed sector pivoted at one end of said idle roller about the axis thereof and in meshing engagement with said rack, and power means to rotate said toothed sector which causes said movement of said idle roller, said wrapping paper being fed between said two rollers, said guiding means being movable between an operative position in which said guiding means extend downwardly from said cutting means with their lower end at a point adjacent the lower portion of a paper roll at said wrapping station, and rearwardly of said wrapping station, and an inoperative position in which said guiding means are retracted to a position at which they clear the space between said wrapping and discharge stations so that the wrapped paper roll at said wrapping station may have a clear passage when moved from said wrapping station to said discharge station.

2. In a paper roll wrapping machine comprising a loading station, a wrapping station and a discharge station, said stations being disposed in succession and at substantially the same level whereby a paper roll will be moved rearwardly from said loading station to said wrapping station and from said wrapping station to said discharge station, the combination of means to feed body wrapping paper to said wrapping station, said means comprising means to provide a supply of body wrapping paper, means to advance said body wrapping paper, means to cut lengths of said body wrapping paper, and means for guiding said body wrapping paper to said wrapping station, said supply means, advancing means and cutting means being disposed at a level well above a paper roll disposed at said wrapping station, said guiding means comprising a horizontally disposed rotatably mounted roll located above and rearwardly of said wrapping station, an apron of flexible sheet material wound on said roll, a first pair of downwardly inclined guide rails extending from said roll to the level of the wrapping station and disposed on each side of and rearwardly of said wrapping station, and means to rotate said roll in two directions of rotation whereby in one direction of rotation said apron is unwound from said roll and guided downwardly to an extended position by said guide rails, and in the other direction of rotation, said apron is wound on said roll into a retracted positon, whereby said apron, in its extended position, extends downwardly from said cutting means with its lower end at a point adjacent the lower portion of a paper roll at said wrapping station and in the space between said wrapping and discharge stations, and in its retracted position, the lower end of said apron is well above the paper roll at said wrapping station so that the wrapped paper roll at said wrapping station may have a clear passage when moved from said wrapping station to said discharge station.

3. In a machine as claimed in claim 2, wherein said guiding means further include flexible straps wound on the ends of said roll, guiding pulleys on which said straps are trained, a transversely extending guiding rod secured to the free ends of said straps, guiding channels in which the ends of said guiding rod are engaged, said guiding channels extending forwardly of said guide rails on each side and rearwardly of said wrapping station from points well above a paper roll at said wrapping station to points just above the level of said wrapping station, whereby rotation of said roll will cause movement of said guiding rod simultaneously with the movement of said apron and in front of said apron.

4. In a machine as claimed in claim 1, further including means for leading said wrapping paper past said rollers, said means comprising two spaced plates disposed underneath said rollers and defining a space in communication with the gap between said rollers, said plates extending downwardly from said rollers, at least one of said rollers having recessed portions along the length thereof, at least one of said plates having integral strips upwardly extending between said rollers and engaging said recessed portions of said one roller and curved outwardly at their upper ends around the upper portion of said recessed roller.

5. In a paper roll wrapping machine comprising a loading station, a wrapping station and a discharge station, said stations being disposed in succession and at substantially the same level whereby a paper roll will be moved rearwardly from said loading station to said wrapping station, and from said wrapping station to said discharge station, the combination of means to feed wrapping paper to said wrapping station, said means comprising means to provide a supply of wrapping paper, means to advance said wrapping paper, means to cut lengths of said wrapping paper and means for guiding said wrapping paper to said wrapping station, said supply means, advancing means and cutting means being disposed at a level well above a paper roll disposed at said wrapping station, said cutting means comprising at least two sets of oppositely disposed wear plates, the wear plates in each set being resiliently urged toward each other in contacting relationship, the wear plates of one set being spaced from the wear plates of the other set to define a gap therebetween, a cutting blade extending between the wear plates of one set and power means to move said cutting blade between a retracted position in which its cutting edge lies between said wear plates of said one set and a projecting position in which said cutting blade extends across the gap between the two sets of wear plates, and its cutting edge engages between the wear plates of the other set of wear plates to thereby cut wrapping paper extending in said gap by a shearing action between the cutting edge of said blade and the wear plates of the other set, said guiding means being movable between an operative position in which said guiding means extend downwardly from said cutting means with their lower end at a point adjacent the lower portion of a paper roll at said wrapping station, and rearwardly of said wrapping station, and an inoperative position in which said guiding means are retracted to a position at which they clear the space between said wrapping and discharge stations so that the wrapped paper roll at said wrapping station may have a clear passage when moved from said wrapping station to said discharge station.

6. In a machine as claimed in claim 5, further including means to maintain said blade parallel to itself in its cutting movement, said means comprising stationary rack members and gear wheels mounted at the ends of said blade and in meshing engagement with said rack members.

7. In a machine as claimed in claim 5, wherein the cutting edge of said blade forms a reentrant wide angled V, the apex of said V being at substantially the centre of said blade.

8. In a machine as claimed in claim 7, wherein said blade is made of two symmetrical parts adjoining each other at said apex.

9. In a paper roll wrapping machine comprising a loading station, a wrapping station and a discharge station, said stations being disposed in succession and at substantially the same level whereby a paper roll will be moved rearwardly from said loading station to said

wrapping station, and from said wrapping station to said discharge station, the combination of means to feed wrapping paper to said wrapping station, said means comprising means to provide a supply of wrapping paper, means to advance said wrapping paper, means to cut lengths of said wrapping paper and means for guiding said wrapping paper to said wrapping station, said supply means, advancing means and cutting means being disposed at a level well above a paper roll disposed at said wrapping station, said guiding means being movable between an operative position in which said guiding means extend downwardly from said cutting means with their lower end at a point adjacent the lower portion of a paper roll at said wrapping station, and rearwardly of said wrapping station, and an inoperative position in which said guiding means are retracted to a position at which they clear the space between said wrapping and discharge stations so that the wrapped paper roll at said wrapping station may have a clear passage when moved from said wrapping station to said discharge station, said means for providing a supply of wrapping paper comprising a framework for removably and rotatably supporting a supply roll of wrapping paper, said framework mounting said advancing means opposite said supply roll of wrapping paper and consisting of a carriage mounted for transverse movement relative to said wrapping station, said carriage supporting several supply rolls of wrapping paper of different widths, said carriage further mounting advancing means for each of said supply rolls disposed opposite their respective supply rolls, whereby any one of said supply rolls together with its associated advancing means may be disposed opposite said cutting means and said wrapping station.

10. In a wrapping machine as claimed in claim 9, wherein said framework supports at least two supply rolls of wrapping paper one behind the other and at least two advancing means disposed vertically one above the other and each associated with one supply roll.

11. In a paper roll wrapping machine comprising a loading station, a wrapping station and a discharge station, said stations being disposed in succession and at substantially the same level whereby a paper roll will be moved rearwardly from said loading station to said wrapping station and from said wrapping station to said discharge station, the combination of means to feed reinforcing paper bands to said wrapping station, said means comprising means to provide a supply of reinforcing paper bands, means to advance said reinforcing paper bands, means to cut lengths of said bands and means for guiding said bands to said wrapping station, said supply means, advancing means and cutting means being disposed at a level well above a paper roll disposed at said wrapping station, said guiding means comprising rigid members movable between an operative position in which said members extend downwardly from said cutting means with their lower ends at points adjacent the lower portion of a paper roll at said wrapping station and rearwardly of said wrapping station, and an inoperative position in which said members extend at the sides of said wrapping station to clear the space between said wrapping station and said discharge station so that a wrapped paper roll at said wrapping station may have a clear passage when moved from said wrapping station to said discharge station.

12. In a paper roll wrapping machine as claimed in claim 11, further including a framework disposed over said wrapping station, two carriages mounted for movement on said framework transversely of said wrapping station, each carriage removably and rotatably mounting a supply roll of reinforcing band, each carriage being provided with said advancing means, cutting means and guiding means.

13. In a machine as claimed in claim 12, further including means to displace said carriages towards and away from each other in synchronism.

14. In a machine as claimed in claim 13, wherein said last named means are operative to maintain said carriages at an equal distance on each side of a center plane passing through the center of said wrapping station.

15. In a machine as claimed in claim 14, wherein said means comprise an endless sprocket chain providing two runs and trained at both ends on sprocket wheels, at least one of said sprocket wheels being positively driven, one run being secured to one carriage and the other run being secured to the other carriage.

16. In a machine as claimed in claim 14, wherein said guiding means comprise two closely spaced substantially parallel strips extending downwardly from said cutting means and defining a guiding space therebetween for a reinforcing paper band, the lower ends of said rigid strips being forwardly curved to conform with the cylindrical surface of a paper roll at said wrapping station and to discharge said paper band at a point adjacent the lower portion of said paper roll at said wrapping station.

17. In a paper roll wrapping machine having two closely and horizontally disposed rotatable supporting rollers for supporting and rotating a paper roll of any width to be wrapped at a wrapping station, a first set of means for feeding to said paper roll a length of body wrapping paper of a width selected in accordance with the width of said paper roll, and a second set of means for feeding two reinforcing bands to said paper roll in alignment with the ends of said paper roll, each set of means comprising means for providing a supply of body wrapping paper and of reinforcing bands respectively, means for advancing said body wrapping paper and reinforcing bands and means for guiding said body wrapping paper and reinforcing bands as they are advanced towards the portion of the paper roll adjacent one of said supporting rollers, and means for cutting a length of said body wrapping paper and of said reinforcing bands, said supporting rollers being located at substantially floor level so that a paper roll may be rolled onto said rollers from a loading station forwardly thereof, said means for providing a supply of body wrapping paper and reinforcing bands, said advancing means and said cutting means all being disposed at a level substantially above a paper roll supported on said supporting rollers, said guiding means for said body wrapping paper and reinforcing bands being movable between an operative position in which said guiding means extend downwardly from their respective cutting means with their ends at points adjacent the lower portion of a paper roll supported on said supporting rollers and rearwardly of said supporting rollers, and an inoperative position in which said guiding means clear the space rearwardly of said supporting rollers so that the wrapped paper roll on said supporting rollers may have a clear passage when moved from said supporting rollers rearwardly of the same, said means for feeding two reinforcing bands further including a framework, two carriages mounted on said framework for movement transversely of said wrapping station, each carriage rotatably mounting a supply roll of reinforcing bands, each carriage provided with said advancing means, guiding means and cutting means for said bands, and means for moving said carriages to align said bands with the ends of a paper roll at said wrapping station.

18. In a paper roll wrapping machine having closely and horizontally disposed rotatable rollers for supporting and rotating a paper roll of any width to be wrapped at a wrapping station, means for feeding to said paper roll a length of body wrapping paper of a width selected in accordance with the width of said paper roll, said means comprising a stationary frame structure extending above a paper roll at said wrapping station, cutting means for cutting said body wrapping paper mounted on said structure at a level above and in alignment with said paper roll at said wrapping station, a carriage mounted on said structure for movement transversely of said wrapping station and supporting supply rolls of body

wrapping paper of different widths mounted side by side on said carriage, body wrapping paper advancing means mounted on said carriage associated with and disposed opposite each one of said supply rolls, said advancing means including means for leading the paper of the supply rolls associated therewith to a point just above said cutting means on said stationary structure, said carriage being movable to position any one of said supply rolls of different widths in alignment with said cutting means, and said associated advancing means leading the

wrapping paper of its associated supply roll to said cutting means, and said feeding means further including retractable guiding means between said cutting means and said supporting rollers to guide said wrapping paper from said cutting means to said supporting rollers.

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