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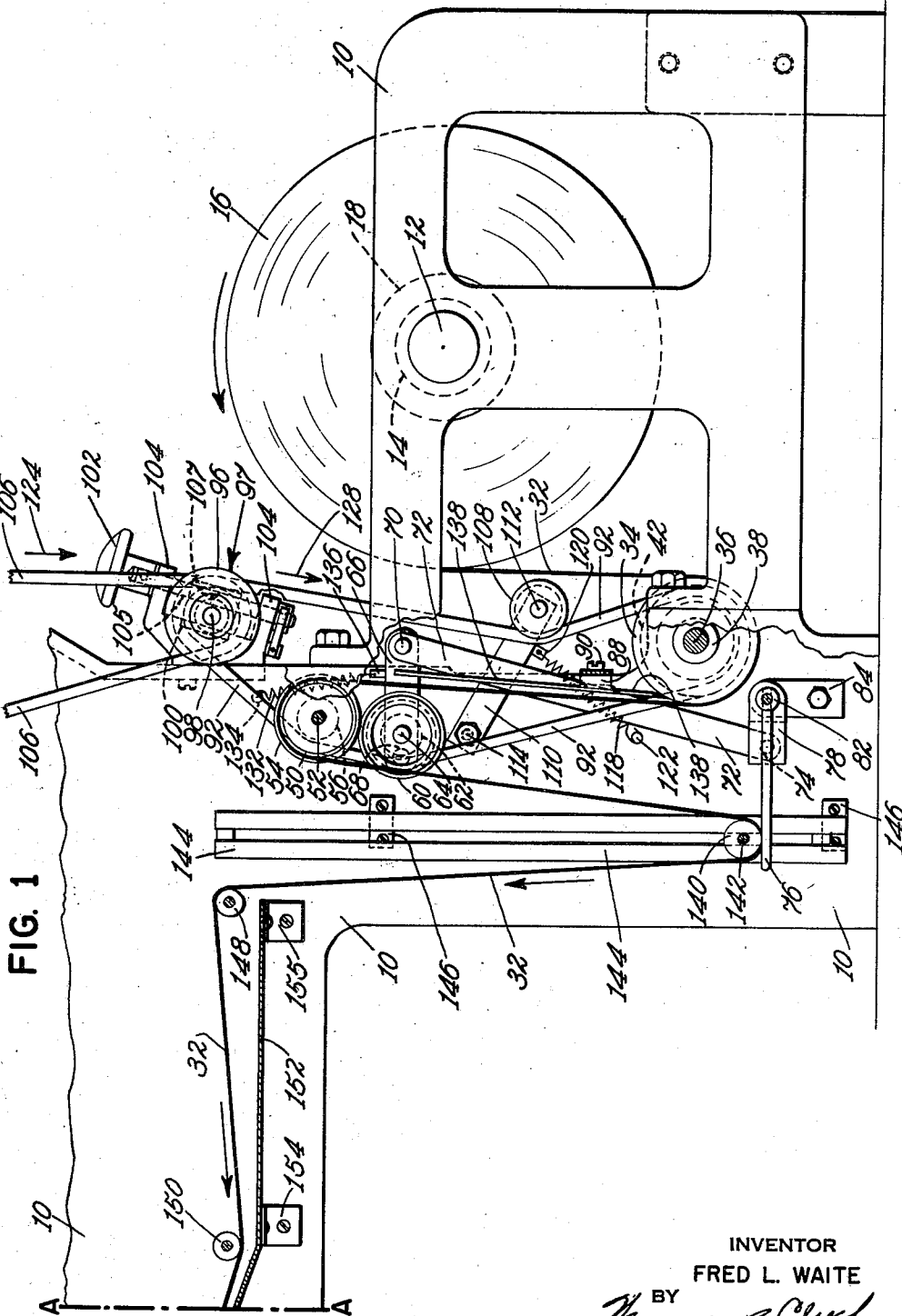
F. L. WAITE

2,945,337

WRAPPING MATERIAL WEB FEEDING MECHANISM

Filed Sept. 21, 1956

3 Sheets-Sheet 1



INVENTOR
FRED L. WAITE

BY
Hentworth & Claydon
ATTORNEY

July 19, 1960

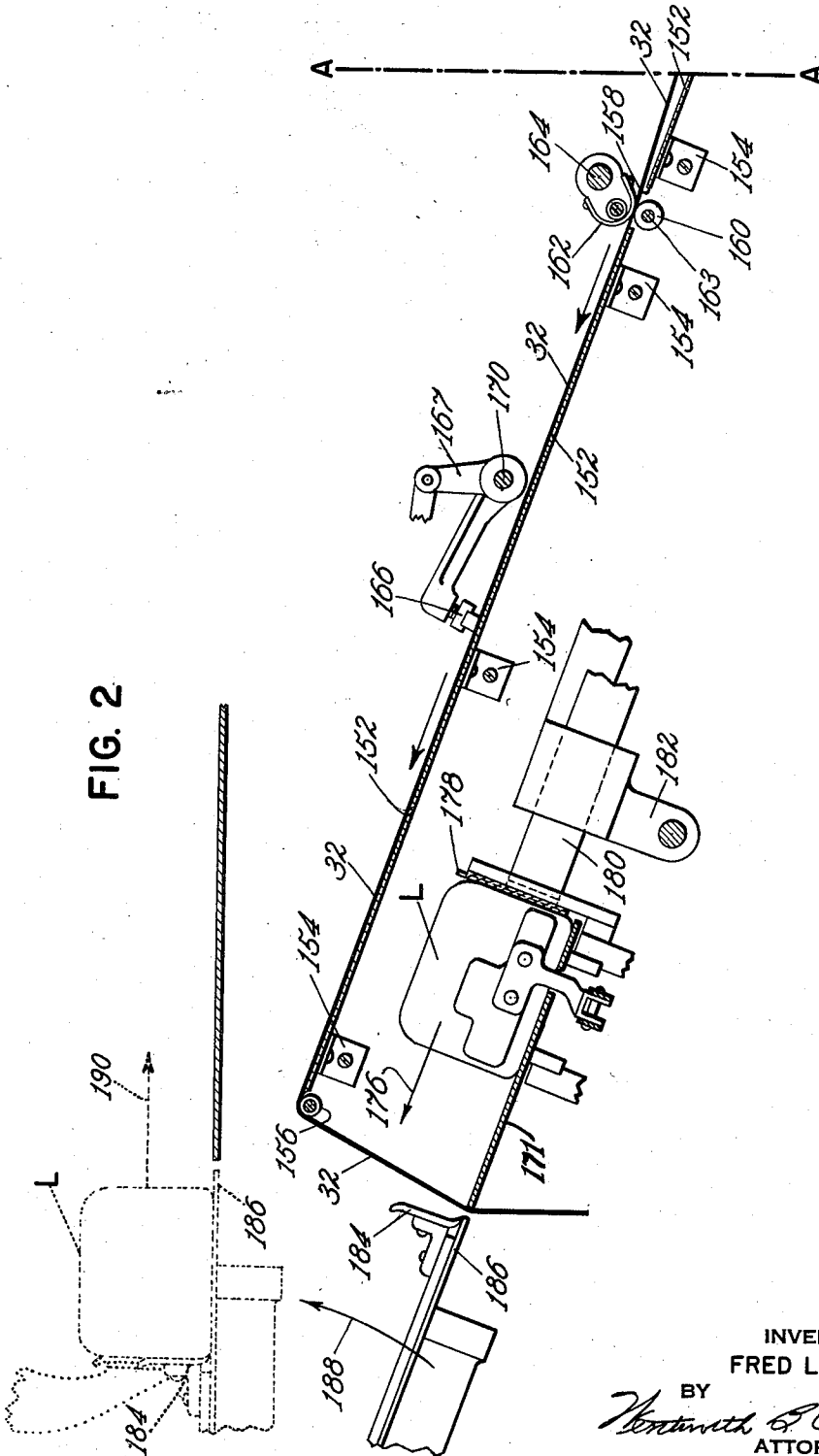
F. L. WAITE

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3 Sheets-Sheet 2



INVENTOR
FRED L. WAITE

BY
Hentrich & Chapman
ATTORNEY

July 19, 1960

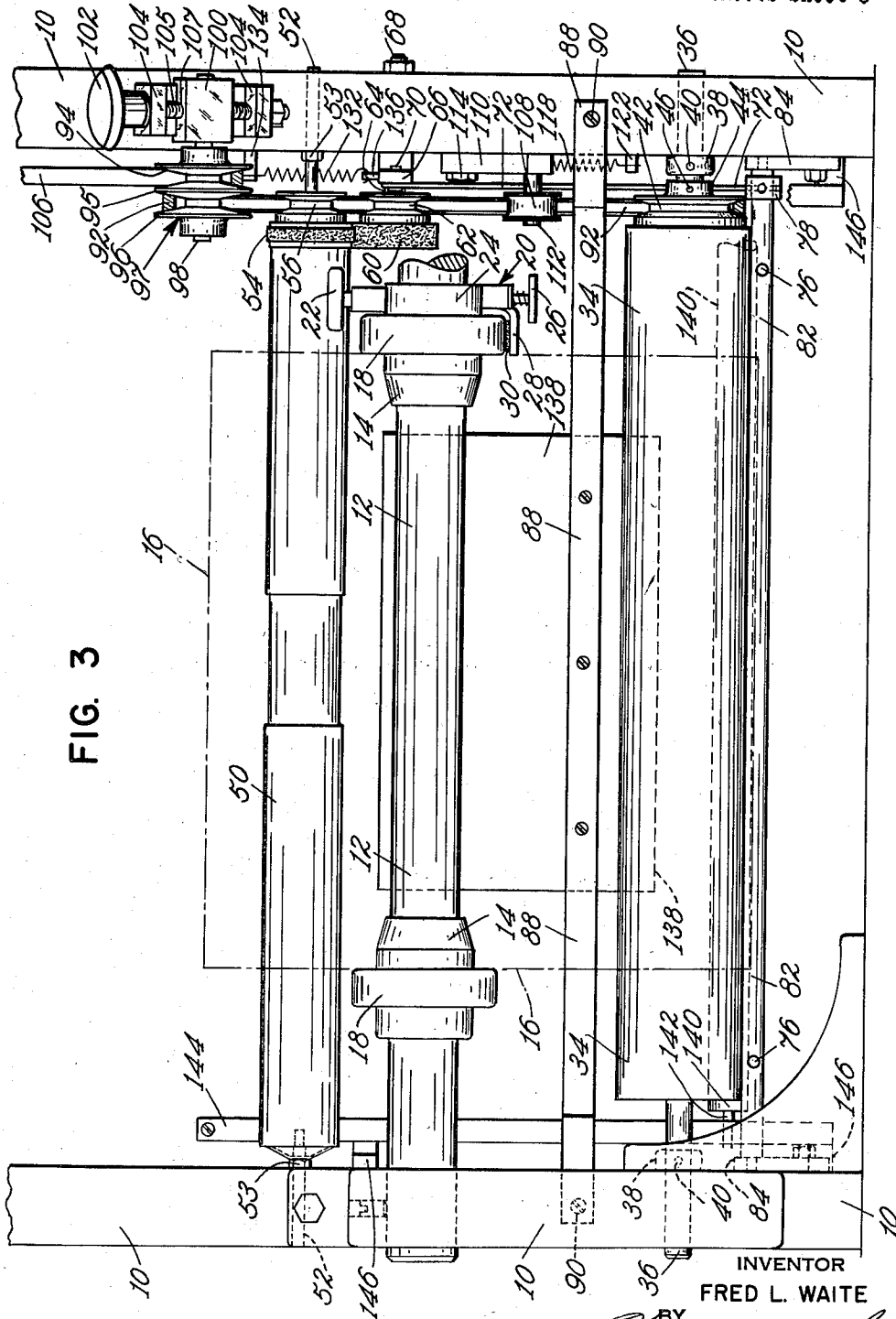
F. L. WAITE

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3 Sheets-Sheet 3



INVENTOR
FRED L. WAITE

BY
Ventumth & Chapman
ATTORNEY

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WRAPPING MATERIAL WEB FEEDING MECHANISM

Fred L. Waite, East Williston, N.Y., assignor to American Machine & Foundry Company, a corporation of New Jersey

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This invention relates to wrapping machines, and more particularly to improvements in wrapping material feeding devices for wrapping mechanisms, and to means for automatically controlling the feed of wrapping materials in accordance with requirements therefor.

In the wrapping of articles, such as loaves of bread which are easily deformed, the wrapping material is preferably fed to the wrapping mechanism in a manner calculated not to apply excessive pressures on the article being wrapped. One method of avoiding these excessive pressures is to control the material source to supply the wrapping material at a speed based upon the rate of material consumption by the wrapping mechanism.

It cannot be assumed, however, that the supply must be continuous since a continuous supply by the material source does not take into account discontinuities in the consumption of materials by the wrapping mechanism due to skips in the feeding of articles thereto or like interruptions. Consequently, it is necessary that wrapping material feeding devices be capable of supplying wrapping materials in a non-continuous manner.

One of the most common and convenient forms of wrapping material sources is the roll and a known method of controlling the roll for non-continuous supply has involved the application of external braking thereto. In a wrapping system, however, the web of wrapping material links the entire system together, and a brake, therefore, must absorb the inertia of the entire system. This deficiency leads to such harmful consequences as the tearing of the web and inaccurate feeding of wrapping material.

Accordingly, it is an object of the invention to provide an improved wrapping material feed control for use in association with wrapping mechanisms.

A further object of the invention is to provide an improved automatic wrapping material web feed control for operation with a wrapping mechanism, which is capable of controlling the feed of the wrapping material web in accordance with the requirements of the wrapping mechanism.

Another object of the invention is to provide an improved automatic feed control, for a wrapping material source, which avoids the deficiencies of braking devices which absorb all of the inertia of their associated systems, the improved control, in fact, operating substantially independently of the inertia forces in the associated system.

A further object of the invention is to provide an improved feed control device for wrapping machines which automatically senses the need for feeding wrapping material and responds by actuating the associated feed system whereas, if a discontinuity in the demand for wrapping material occurs, the control device automatically halts the feeding of wrapping material.

It is still another object of the invention to provide an improved control mechanism for operation within a wrapping material feeding system which functions to control the movement of the material without subjecting the

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material to strains due to braking operations or the like.

With these and other objects not specifically mentioned in view, the invention consists in certain constructions and combinations hereinafter fully described and then set forth in the claims hereunto appended.

In the accompanying drawings which illustrate an embodiment of the invention and form a part of this specification, and in which like reference characters designate the same or like parts:

Fig. 1 is a side elevation, partly in section, of a preferred form of wrapping material feed drive and control embodying the invention;

Fig. 2 is a partial side elevation of a wrapping device and a portion of the web feed mechanism which couples the wrapping mechanism to the apparatus of Fig. 1, and

Fig. 3 is an end elevation of the feed drive and control mechanism.

Apparatus provided in accordance with the invention is capable of being used with various types of wrapping materials such as waxed paper, cellophane and the like which, although being capable of withstanding some abuse, is preferably fed to a wrapping mechanism at rates controlled so as not to subject the material to undue strains. In connection with many wrapping mechanisms, however, the problem of controlling the feed is complex because the demand for wrapping material is of a non-continuous nature due to the method of wrapping or because the articles to be wrapped may not always be fed to the wrapping mechanism in a continuous manner.

In accordance with the invention, a continuous web of wrapping material, such as waxed paper, is supplied from a suitable source, such as a roll. The roll is provided with a drag mechanism so that the material cannot freely unwind therefrom. From the roll, the web is passed through a sequence of rollers and thence to the wrapping mechanism which is supplied with the wrapping material on a demand basis. One of the sequence of rollers is a drive roller which is controlled to perform its driving function in accordance with the demand of the wrapping mechanism and, more particularly, in accordance with the position of a slack stick which senses the slack in the web as the web passes through the sequence of rollers. Coupling the slack stick to the drive roller is a clutch consisting of frictionally engaged discs which also couple the drive roller to a suitable source of power. The slack stick and clutch are so arranged that when a predetermined degree of slack is detected in the web, the discs are caused to disengage, thereby halting the feeding of wrapping material web. This arrangement notably does not have to absorb the inertia of the feed system to function smoothly and efficiently.

With reference to the drawings, which show a preferred embodiment of the invention, the feed mechanism and control therefor consists of a frame 10 which constitutes the main frame of the feed mechanism. Frame 10 supports non-rotatable axle 12 on which rotates a pair of spool members 14 designed to engage with the core of the roll 16 of the wrapping material. Each spool member 14 is provided with a flange 18 which serves to center the roll 16 on axle 12.

To prevent the roll 16 from freely unwinding, a drag mechanism 20 is rigidly affixed to the axle 12 by means of locking screw 22 which prevents rotational displacement of drag housing 24. Adjustment screw 26 accommodated by the drag housing 24 controls the position of arm 28 which supports friction block 30 positioned so as to contact one of the flanges 18 and accordingly to resist the unwinding of roll 16. The degree of resistance to unwinding is varied by means of adjusting screw 26. Drag mechanism 20 can be axially displaced for roll replacement by loosening locking screw 22.

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From the roll 16, web 32 of wrapping material is drawn substantially vertically downward and is passed around a continuously driven roller 34 rigidly mounted on axle 36 supported by frame 10. Collars 38 are fastened to axle 36 to prevent axial displacement thereof, and for this purpose are held by set screws 40 in a position abutting frame 10. Also mounted on axle 36 is pulley 42 which provides the driving means for feed roller 34.

Web 32 is brought substantially vertically upward from roller 34 and over another feed roller 50 rotatably supported at its ends by a pair of stud shafts which are fastened to frame 10 by nuts 53. Secured to one end of feed roller 50 is a friction collar or disc 54. Freely rotatably mounted on one of the stud shafts 52, and located adjacent disc 54, is an idler pulley 56. Located beneath friction collar 54 is a coacting friction disc 60 preferably formed integrally with pulley 62 freely rotatably mounted on stud shaft 64. Stud shaft 64 is suitably supported by an arm 66 pivotally secured at one end to a stud 68 on frame 10. The free end of arm 66 carries a stud 70 to which is pivotally connected the upper end of a link 72. The lower end of link 72 is pivotally connected by pin 74 to arm 78 mounted on transverse shaft 82, the ends of which are supported in suitable bearing brackets 84 fastened to frame 10.

Mounted and projecting outwardly from shaft 82 are slack or web feed control rods 76. As shown in Fig. 3, rods 76 are located preferably adjacent the ends of shaft 82 and are so spaced that they will at all times be clear of the edges of the wrapping material web and therefore will not tear or obstruct its movement. The function of rods 76 will be described more in detail hereinafter.

Pulleys 42, 56 and 62 constitute a pulley system cooperating through the medium of belt 92 driven by a pulley comprising axially movable flange 95 and fixed flange 96 through a pulley comprising fixed flange 94 and movable flange 95. It will be seen by reference to Fig. 3, that fixed pulley flanges 94, and 96, and movable flange 95 form a compound adjustable pulley 97 rotatable on axle 98 generally in block 100 adjustably mounted in bracket 104 suitably attached to frame 10 of the machine. Bracket 104 is generally U-shaped. Block 100 is mounted for adjustment to and from the legs of the U on a threaded adjusting screw 105 preferably supported in the legs of bracket 104 and engaging threads formed in a longitudinal bore 107 in block 100. When manually adjustable head 102 of screw 105 is turned in one direction or the other to raise or lower block 100, the axial position of movable flange 95 relative to fixed flanges 94 and 96, is changed, thereby moving belts 92 and 106 radially inwardly or outwardly with respect to the faces of the respective flanges 95, 96, and 94, 95 engaged thereby thus increasing or decreasing the speed of rotation of pulleys 42, 56 and 62.

Power is supplied to pulley 97 by belt 106 which runs on a pulley (not shown) mounted on a suitable source of supply, such as the drive shaft (not shown) of the machine.

In order to insure proper tension of belt 92 with the several pulleys with which it engages, there is provided a belt tightener pulley 108 mounted on pivot 112 supported in bracket 110. Bracket 110 is pivotally mounted on frame 10 by pin 114, and is resiliently urged in a clockwise direction as viewed in Fig. 1 by spring 118 connected at one end to tab 120 on bracket 110 and at its other end to pin 122 on frame 10.

Referring to Fig. 1, it will be seen that belt 106 is driven in the direction of arrow 124, thereby rotating pulley 97 in a clockwise direction so that belt 92 is driven in the direction of arrow 128, and accordingly rotate pulleys 42, 56 and 62, the latter driving friction disc 60 which is formed integrally therewith.

Friction disc 60 normally is urged into frictional engagement with friction collar 54 by means of spring 132

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having one end connected by pin 134 to frame 10, and its other end attached to tab 136 on arm 66. Therefore, unless the action of spring 132 is opposed by the action of the lever system consisting of arm 66 and link 72, friction disc 60 will operate through collar 54 to rotate roller 50 and accordingly will cause wrapping material web 32 to be fed by rollers 34 and 50 from roll 16. The rate of feed of the web of wrapping material 32 is controlled through the adjustment above described by the manual adjustment of head 102 of adjusting screw 105.

In order to prevent the possibility that the portion of the wrapping material web 32 extending between rollers 34 and 50 might double back and be drawn by belt 92 around roller 34, there is provided a guide plate 138 having its lower edge extending upwardly from a point substantially tangent to roller 34. Guide plate 138 is attached to a transversely positioned bar 88 having its ends attached to the side frames 10 of the machine by suitable screws 90. The width of guide plate 138 can be less than that of wrapping material web 32 without affecting its satisfactory operation.

Wrapping material web 32 is passed from roller 50 generally vertically downwardly and beneath a slack stick, such as a floating roller 140, whose axle 142 is loosely engaged for vertical displacement in guides 144 fixed to frame 10 by brackets 146. Wrapping material web 32 passes thence to roller 148.

Floating roller 140 functions under the influence of gravity to take up whatever slack exists in wrapping material web 32 between rollers 50 and 148. Accordingly, if the demand for wrapping material web by the wrapping machine decreases or halts while drive roller 50 is still feeding wrapping material web 32, there will be an increase of slack in wrapping material web 32 and floating roller 140 moves substantially vertically downwardly in guides 144. When this occurs, floating roller 140 bears downwardly against slack or web feed control rods 76 when a predetermined amount of slack in the wrapping material web 32 is exceeded. The weight of floating roller 140, and the mechanical advantage of the lever system consisting of rods 76, link 72 and arm 66, is sufficient to overcome the action of spring 132 which normally urges arm 66 upwardly and maintains friction disc 60 in driving engagement with friction collar 54. Therefore, as the result of this downward movement of floating roller 140, arm 66 is moved downwardly and friction disc 60 is disengaged from friction collar 54 and the rotation of drive roller 50 is interrupted so long as this slack condition exists.

After passing over roller 148, wrapping material web 32 passes beneath roller 150 rotatably supported in frame 10. A guide plate 152 is positioned beneath web 32 and fastened to frame 10 by brackets 154 and 155. Guide plate 152 is in part upwardly inclined, as seen in Fig. 3, in order to assume a position generally parallel to the direction of feed of articles to be wrapped into the wrapping machine. Web 32, which extends beyond guide plate 152 and around roller 156, is draped in a substantially vertical plane normal to the direction of article feed for engagement by an article being moved into the wrapping machine for wrapping. The construction and operation of the mechanism just described may be generally the same as that disclosed in Arelt Patent 2,356,644 and Kottmann Patent 2,747,349.

Guide plate 152 is provided with a transverse slot 158 on one side of which a roller 160 is freely rotatably mounted on axle 163. See Fig. 2. Positioned above roller 160 is a swinging brake shoe 162 loosely pivotally mounted on cross rod 164. Brake shoe 162 is supported in a forwardly inclined position with its lower end resting on top of roller 160. By means of this mechanism, wrapping material web 32 can move freely forwardly beneath brake shoe 162 and over roller 160. However when for any reason wrapping material web 32 tends to move in a reverse direction, it is clamped by brake

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shoe 162 against roller 160 and such reverse movement is prevented. The brake shoe mechanism described and disclosed herein is essentially the same in construction and operation as that disclosed in Kottmann Patent 2,747,349 and further detailed description and showing thereof are omitted in the interest of brevity.

Also provided along the length of guide plate 152 is a web brake 166 loosely pivotally mounted on axle 170 which is fixed with respect to frame 10. Brake 166 through a lever 167 is actuated by a cam (not shown) to hold wrapping material web 32 on plate 152 and prevent it from shifting thereon when a wrapper is cut from wrapping material web 32 in the course of wrapping an article. Brake 166 is similar in construction and operation to that shown in Arelt Patent 2,356,644.

When the advancing end of the wrapping material web 32 has been draped in a position substantially transverse to article infeed runway 171 and between the transverse edge of runway 171 and lifter table 186, the article to be wrapped, such as a loaf of bread "L," is pushed in the direction of arrow 176 by reciprocating pusher 178 mounted on rod 180 supported by bracket 182. The draped end of wrapping material web 32 is cut between loaf "L" and back tension plate 184 on lifter table 186, and back tension plate 184 moves rearwardly thereon with loaf "L" so as not to cause distortion thereof. Lifter table 186 then moves upwardly in the direction of arrow 188 thereby partially encircling loaf "L" with wrapping material web 32 which, after the wrapping web material has been cut to provide the necessary length of wrapper, is then moved in the direction of arrow 190 from lifter table 186, into the foldway designated generally 192 where the complete envelopment of each article is effected. The wrapping method and mechanism may vary widely, but in general is similar to that disclosed in Arelt Patent 2,356,644.

In operation, rollers 34 and 50 withdraw wrapping material web 32 from roll 16 at a rate substantially consistent with the demands of the wrapping machine. If this demand decreases for any reason, such as a discontinuity of the supply of articles to be wrapped, such as loaves of bread, the feed of wrapping material web 32 from roll 16 by rollers 34 and 50 will cause such increased slack in wrapping material web 32. The slack in the web causes floating roller 140 to move downwardly until it contacts control rods 76, which causes them to swing to rock shaft 82 in a counter clockwise direction, as viewed in Fig. 1, thereby pulling link 72 downwardly. This movement in turn results in a downward movement of arm 66 which disengages friction disc 60 from friction collar 54 despite the normal upward pull on arm 66 exerted by spring 132. As the result of the disengagement of friction disc 60 from friction collar 54, the rotation of roller 50 will stop. Friction disc 60 continues to rotate freely, but due to the interruption of rotation of roller 50, the further feed of wrapping material from roll 16 is discontinued.

When articles are again moved into the wrapping machine by pusher 178, and there is a demand for wrapping material web, the forward movement of wrapping material web 32 upwardly over table 152 causes floating roller 140 to be lifted vertically upwardly in guides 144, and roller 140 thereupon is moved away from control rod 76. When this occurs, spring 132 again urges arm 66 into its normal operative position, such as shown in Fig. 1, whereupon friction collar 54 and friction disc 60 are again engaged, and the normal feed of wrapping material web 32 resumes.

It is to be noted that the device described is a feed control which achieves the various aforementioned objects of the invention. There will now be obvious to those skilled in the art many variations and modifications of the apparatus described but which do not depart essentially

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from the spirit of the invention which is defined by the following claims.

What I claim is:

1. In combination with a wrapping machine provided with a source of material for the wrapping of articles, drive means for the feeding of wrapping material from said source, support means for said wrapping material fed by said drive means, a power source coupled to and actuating said drive means and said support means to feed said material to said wrapping machine, and sensing means responsive to the feeding of wrapping material to said wrapping machine in excess of the demand therefor for decoupling said support means from said power source, whereby the feeding of said wrapping material by said drive means and said support means is interrupted.

2. In a wrapping machine, a wrapping mechanism, a source of wrapping material, a drive roller for feeding the material from said source, a support roller for feeding material fed by said drive roller, a power source coupled to said drive roller and said support roller for the actuation thereof at a determinable rate to feed said material to said wrapping mechanism, and means for detecting when said rate exceeds the demand of said wrapping mechanism, said means being responsive thereto for decoupling said power source from said support roller to interrupt the feeding of said material by said drive and support rollers.

3. In a wrapping machine, a wrapping mechanism, a material source supplying a web of wrapping material, a roller for driving said web from said source, a power source, means for coupling said drive roller to said power source, a roller for tensioning said material about said drive roller, first and second friction means normally interengaged for coupling said tension roller to said power source, means for measuring the slack in said web intermediate said tension roller and said wrapping mechanism, and coupling means coupling said measuring means to said friction means for disengaging said first and second friction means when said slack exceeds a predetermined limit whereby the feed of wrapping material to said wrapping mechanism is controlled.

4. The mechanism defined in claim 3 including means for varying the speed of rotation of said drive roller to vary the rate at which said web of wrapping material web is fed.

5. In a wrapping machine, a material source for supplying a web of wrapping material, a roller for driving said web, a friction collar on said roller, a rotatably mounted friction disc normally engaging said friction collar, a pulley for rotation with said friction disc, a power driven pulley, a belt coupling said pulleys, a lever movably supporting said friction disc, resilient means normally urging said friction disc into engagement with said friction collar for driving said web, a wrapping mechanism, a second roller intermediate said wrapping mechanism and the first said roller for the guiding of said web, a floating roller intermediate the two said rollers and supported on said web, control means positioned to be contacted by said floating roller and to be displaced thereby when the slack in the web intermediate the two said rollers exceeds a determinable limit, and means coupling said control means to said lever so that said friction disc is disengaged from said friction collar in accordance with the displacement of said control means whereby the feed of the web is discontinued when the demand of the wrapping mechanism is exceeded.

6. In a wrapping machine, a material source for supplying a web of wrapping material, a first roller for guiding said web from said source, a drive roller for withdrawing said web from said source, a wrapping mechanism, a second roller for guiding said web to said wrapping mechanism, a floating roller absorbing the slack in the web between said drive and second rollers, a friction collar rotatable with said drive roller, a friction disc adapted to engage said friction collar, a spring urging

said friction disc into engagement with said friction collar, a pulley rotatable with said friction disc, a power driven pulley system, a bell engaging said pulley with said pulley system for actuating said drive roller, a movably mounted bracket supporting said pulley and said friction disc for the displacement thereof, resilient means for maintaining said belt in engagement with said pulley in all positions of said pulley, a rod positioned to be contacted by said floating roller when a determinable limit of slack in said web is exceeded, pivot means supporting said rod for the displacement thereof, and a link coupling said rod to said bracket whereby the displacement of said rod causes the displacement of said bracket and thereby said friction disc which is thus disengaged from said friction collar to render said drive roller inactive.

7. In a wrapping machine, a roll of wrapping material rotatably supported for supplying a web of wrapping material, a drag mechanism for resisting unwinding of said roll, a first guide roller for guiding the web of wrapping material, a drive roller for driving said web, a second guide roller for guiding said web, a wrapping mechanism utilizing said web, said second guide roller being positioned intermediate said wrapping mechanism and said drive roller, said drive roller being positioned intermediate said first and second guide rollers, a floating roller resting on said web, guide means freely supporting said floating roller for displacement in accordance with the slack in said web, first and second pulleys, a drive pulley aligned with said first and second pulleys, a driven pulley aligned with said drive pulley, a belt supported on said pulleys, means for urging said belt into tight engagement with said pulleys, a friction collar on said driving roller, a friction disc coaxial with and rotatable with said driven pulley, support means displaceably supporting said friction disc in engagement with said friction collar for actuating said drive roller, slack control rods supported beneath said floating roller, said floating roller displacing said slack control rods when the slack in said web exceeds a predetermined limit, and an arm coupling said slack control rods to said support means, the displacement of said slack control rods operating through said arm and support means to disengage said friction disc and collar for inactivating said drive roller.

8. In a wrapping machine, a frame, a roll of wrapping material rotatably supported on said frame for supplying a web of wrapping material, a web feeding roller for guiding the web of wrapping material, a drive roller for feeding said web, a guide roller for guiding said web, a wrapping mechanism utilizing said web, said guide roller being positioned intermediate said wrapping mechanism and said drive roller, said drive roller being positioned intermediate said web feeding and said guide rollers, a floating roller resting on said web intermediate said drive and guide rollers, guide means freely supporting said floating roller for displacement in accordance with the slack in said web intermediate said drive and guide rollers, first and second pulleys, a drive pulley aligned with said first and second pulleys, a driven pulley aligned with said drive pulley, a belt supported on said pulleys, a friction collar on said drive roller, a friction disc rotatable with said driven pulley, support means displaceably supporting said friction disc for engagement with said friction collar, a spring urging said friction disc into engagement with said friction collar for actuating said drive roller, a feeler device supported beneath said floating roller, said floating roller displacing said feeler device when the slack in said web intermediate said drive and guide rollers exceeds a predetermined limit, an arm coupling said feeler device to said support means, and a bar fixed to said frame for limiting the motion of said arm to the control of said feeler device, the displacement of said feeler device operating through said arm and support means to overcome the action of said spring to disengage said friction disc and collar for inactivating said drive roller.

9. In a wrapping machine, a frame, a roll of wrapping material rotatably supported on said frame for supplying a web of wrapping material, a first web feeding roller parallel to said roll for guiding the web of wrapping material, a second web feeding roller parallel to said roll for feeding said web, a guide roller parallel to said roll for guiding said web, a wrapping mechanism utilizing said web, said guide roller being positioned intermediate said wrapping mechanism and said second web feeding roller, said drive roller being positioned intermediate said first web feeding roller and said guide roller, a floating roller resting on said web intermediate said second web feeding roller and said guide roller, guide means freely supporting said floating roller for vertical displacement in accordance with slack in said web intermediate said second web feeding roller and said guide roller, first and second pulleys respectively coaxial with said first web feeding and said second web feeding rollers and rotatable independently thereof, a drive pulley aligned with said first and second pulleys, a driven pulley aligned with said drive pulley, a belt supported on said pulleys, means for urging said belt into tight engagement with said pulleys, means for actuating said drive pulley, a friction collar on said drive roller, a friction disc coaxial with and rotatable with said driven pulley, support means displaceably supporting said friction disc for engagement with said friction collar, a spring urging said friction disc into engagement with said friction collar for actuating said second web feeding roller, a plurality of slack feeler rods, a shaft mounting said rods supported beneath said floating roller, said floating roller displacing said slack rods when the slack in said web intermediate said drive and second guide rollers exceeds a predetermined limit, an arm coupling said shaft to said support means, the displacement of said feeler rods operating through said arm and support means to overcome the action of said spring to disengage said friction disc and collar for inactivating said second web feed roller, and a guide plate adjacent to said web intermediate said first guide and drive rollers for restricting the path of said web.

10. The invention as defined in claim 9 wherein said spring is attached to said support means and partially supports the weight of said floating roller whereby, as the next successive article to be wrapped by said wrapping mechanism is delivered thereto after the interruption of feeding of said web, said floating roller is moved upwardly by said web and said spring out of engagement with said slack feeler rods to prevent crushing of said article by tension on said web.

11. The invention as defined in claim 1 wherein said sensing means includes a floating roller to maintain said wrapping material in engagement with said support means, means supporting said floating roller when an excess of wrapping material has been fed by said drive means, and resilient means connected to said floating roller support means and partially supporting the weight of said roller, said resilient means being operative to assist said wrapping material in moving said roller out of engagement with said roller support means to prevent crushing of an article being wrapped by said machine.

12. The invention as defined in claim 5 wherein said resilient means includes a spring connected to said lever and partially supporting the weight of said floating roller, said spring being operative to assist said web in moving said roller out of engagement with said control means to prevent crushing of an article being wrapped by said machine.

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