Feb. 24, 1942. W. HOPPE 2,273,961

PAPER FEED FOR WRAPPING MACHINES

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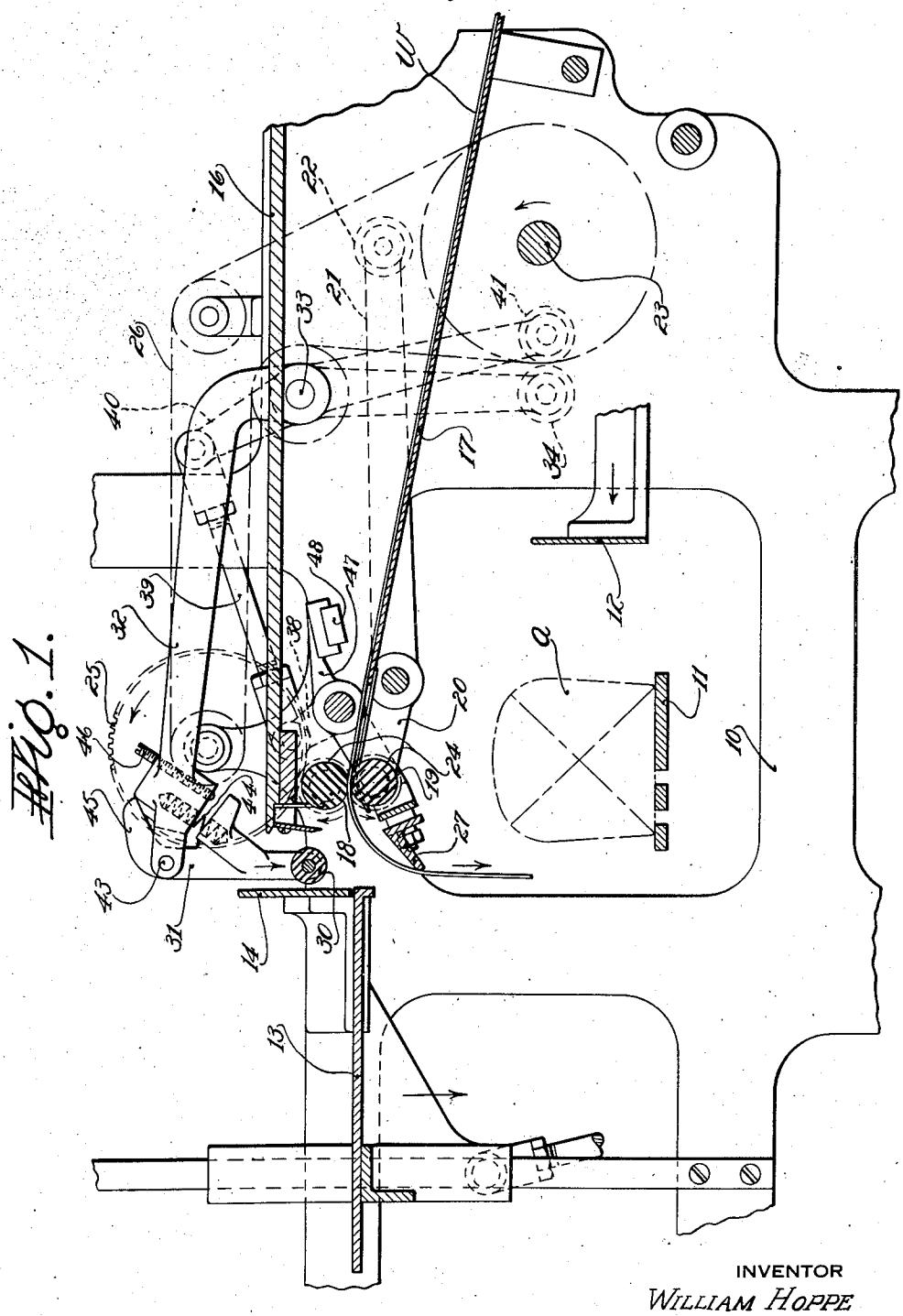


Fig. 1.

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Fig. 2.

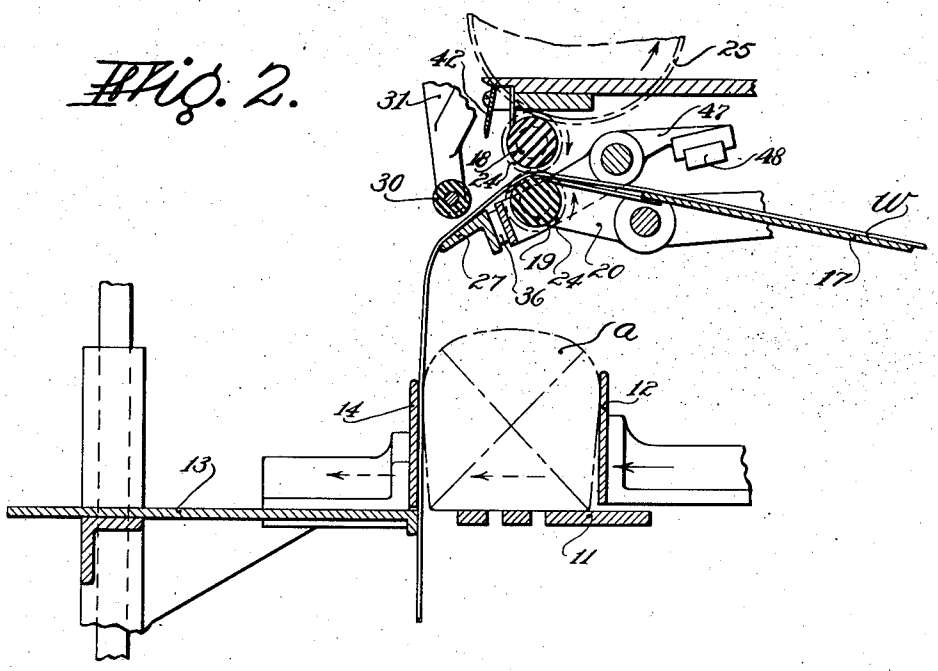
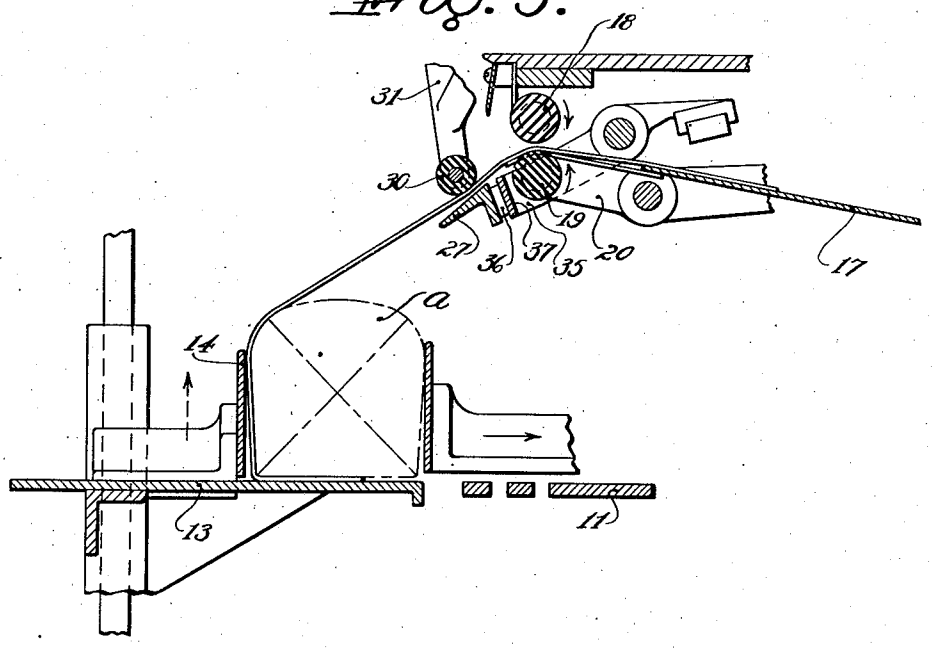


Fig. 3.



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Fig. 4.

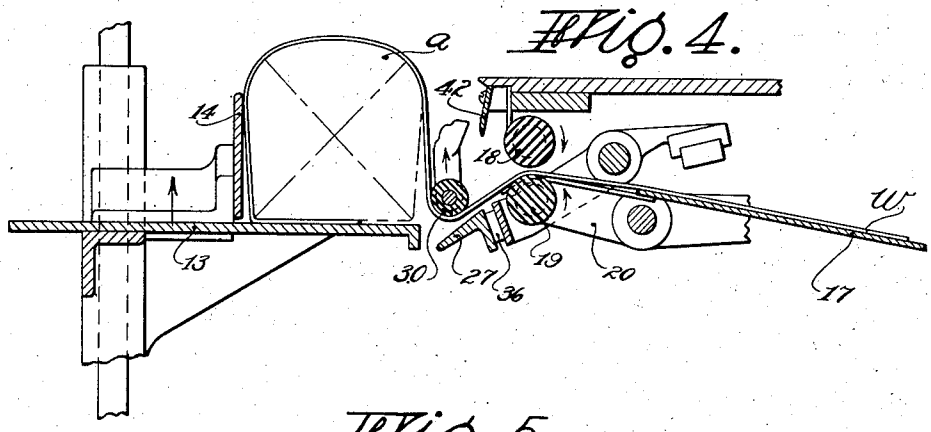


Fig. 5.

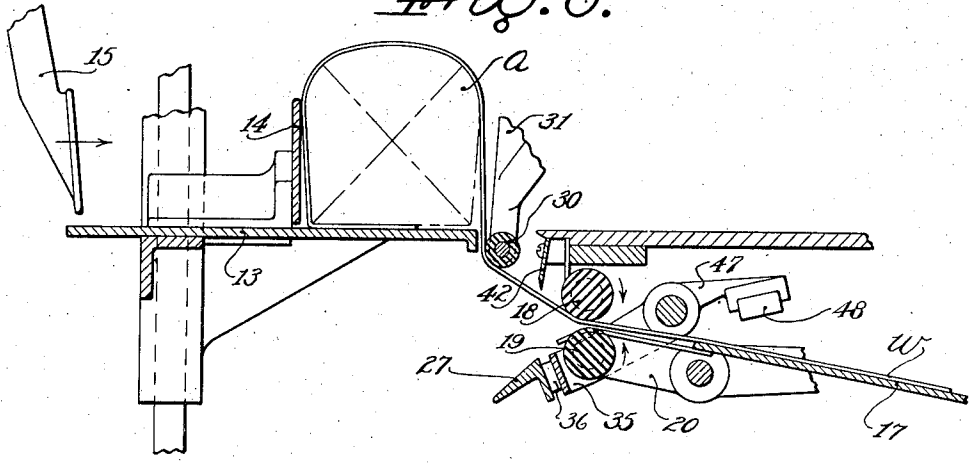
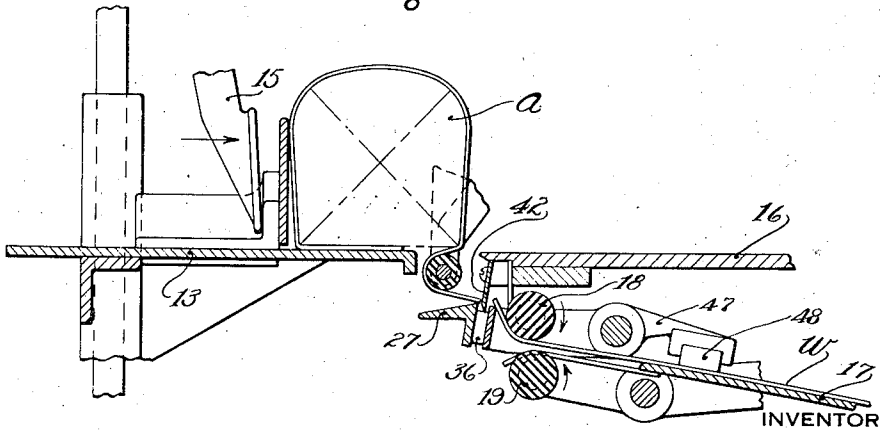


Fig. 6.



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FIG. 7.

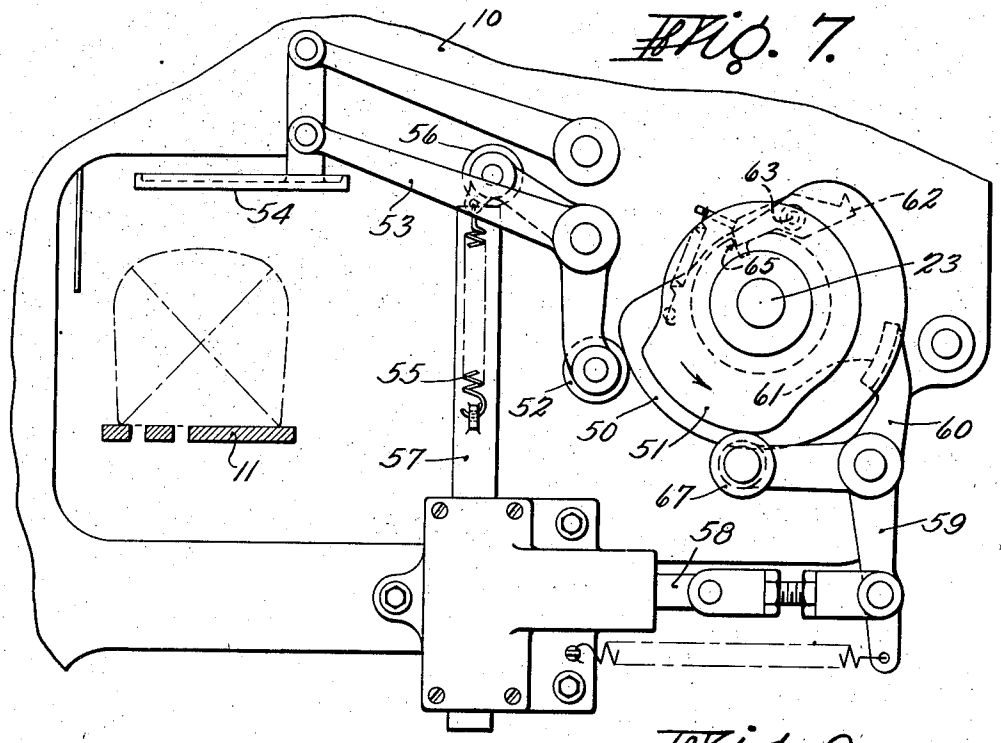


FIG. 8.

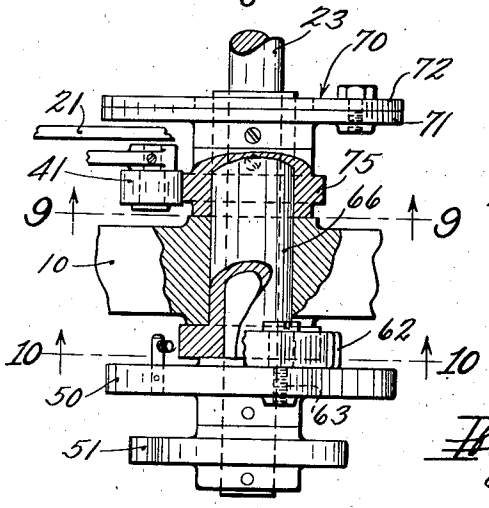


FIG. 9.

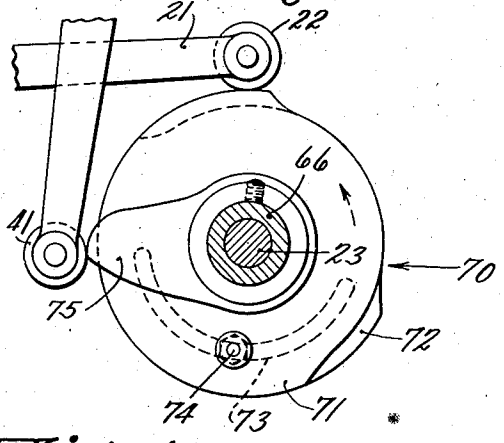
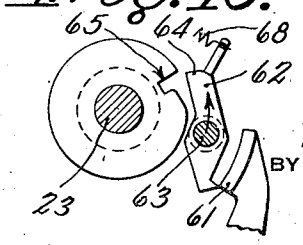


FIG. 10.



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Patented Feb. 24, 1942

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UNITED STATES PATENT OFFICE

2,273,961

PAPER FEED FOR WRAPPING MACHINES

William Hoppe, Longmeadow, Mass., assignor to National Bread Wrapping Machine Co., Springfield, Mass., a corporation of Massachusetts

Application July 10, 1940, Serial No. 344,679

16 Claims. (Cl. 93—2)

This invention relates to paper feeds for wrapping machines, and has particular utility in that type of machine in which the article is wrapped circumferentially in the leading end of a web before the latter is severed to form individual wrappers. In this form of device the rapidity with which the wrapper is drawn around the article by the wrapping operation is not uniform, but varies in accordance with the shape of the article and with the speed with which the article moves. This results in variations in the tension of the wrapper; certain portions being loose while others are under a degree of tension higher than desired.

It is one object of this invention to provide an improved wrapper feed for machines of this class, in which excessive local tension on the wrapper may be avoided at all times and the wrapper fed out at exactly the rate required by the conformation and speed of movement of the article. A further object is to avoid all lateral misplacement of the wrapper, both when the machine is in operation and when it is temporarily rendered inactive by the absence of an article to be wrapped. The manner in which this object is accomplished will now be described in connection with the accompanying drawings, in which—

Fig. 1 is a longitudinal central section through a wrapping machine embodying the present invention;

Figs. 2 to 6 are diagrammatic views illustrating the operation of the mechanism during the circumferential wrapping of an article;

Fig. 7 is a detail of the wrapper feed control;

Fig. 8 is a plan view thereof, partly broken away;

Fig. 9 is a section on line 9—9 of Fig. 8; and

Fig. 10 is a section on line 10—10 of Fig. 8.

The wrapping machine is built upon a frame 10 and in general outline may be similar to that shown in the patent to Smith and Hoppe 1,953,195, April 3, 1934. The machine has a conveyor or platform 11 from which the article *a* is pushed laterally by a plunger 12 onto a vertically movable elevator 13. This elevator is provided with a backing plunger 14, preferably frictionally controlled to exert the desired resistance on the article, and adapted when the elevator rises into position to be contacted with by a horizontally movable ejector 15 which is preferably mounted on a horizontal conveyor as in the patent to Lyon 2,088,269, July 27, 1937. The article, which is at this time circumferentially wrapped as in Fig. 6, will be moved off the elevator onto the final wrapping channel 16.

The web *w* is led from any suitable source of supply, such as a roll, over a supporting plate 17 and between two rolls 18 and 19. The former of these rolls may conveniently be mounted on a fixed axis, while the latter is carried by opposed arms 20 one of which has an extension 21 bearing a cam roll 22. This cam roll rides upon a cam on a drive shaft 23 as will be described below. The cam has been omitted from Fig. 1 to avoid confusion, but is shown in Fig. 9. The action of the cam is to hold the rolls in engagement as in Fig. 1 or to separate them by a slight amount as in Figs. 2 and 3. Whether the rolls are in contact or are separated, they are at all times continuously driven in opposite directions by interconnecting gearing 24, the separation of the rolls, as shown in Fig. 2, being insufficient to disengage the teeth of these gears while being enough to free the web of contact with both rolls simultaneously. In addition, the first roll 18 is positively and continuously driven by a gear 25 which is itself driven by a chain and sprocket connection 26 from the main shaft 23.

Prior to the start of the wrapping operation the rolls are pressed together and are continuously feeding out the web as indicated in Fig. 1. During this preliminary feeding movement the web is directed downwardly in front of the article *a* by a plate 27 preferably forming part of the cutter and movable therewith as will be described later. The roll separating cam is preferably arranged to move the rolls apart, and thus interrupt the feed of the web, as soon as the leading end of the web has been projected downwardly a sufficient distance to provide the underlap desired. In Fig. 2 the article is shown as just having been moved into a position where it clamps the leading end of the now stationary web between itself and the backing plunger 14. From this position to that of Fig. 3 it is desirable that the amount of wrapper fed out be controlled directly by the contour of the article and not by the continuous movement of the rolls. For this purpose the two feed rolls are kept separated although still continuously driven by the continued engagement of the teeth of their interconnecting gearing. It will be seen from a comparison of Figs. 2 and 3 that during the movement of the article onto the elevator the wrapper will be bent or snubbed around the lower roll 19. The surface of this roll is preferably of rubber or other frictional material, and the result will be

that the wrapper will be fed out as long as, and only as long as, a tension is maintained upon it by the advance of the article. The feed of the wrapper is automatically regulated in conformity with the pull exerted upon it by the article; for as it tends to lag it will be pulled tightly around the roll 19 and will be fed out by the latter, and if an excess starts to be fed out by the roll 18 the tension of the wrapper bent around this roll will instantly be released and feeding will be stopped. In practice the action is continuous and smooth, with the positive feed of the wrapper varying exactly with the amount required by the contour and speed of the article.

The next operation is the vertical ascent of the elevator and for this purpose it is necessary to drape the wrapper down the front side of the article as shown in Fig. 4. For this purpose a freely rotatable roll 30 is carried upon opposed arms 31 pivoted in a manner to be described upon bell cranks 32. These bell cranks are pivoted at the machine frame at 33 and one of them carries a cam roll 34 co-acting with a cam on shaft 23 to cause it to go through the illustrated cycle of movements. The cam control will be described in more detail below. At the time when the article starts to rise the roll is in the position of Fig. 3, not far above the top of the article. As the article starts to move upwardly all tension around the roll 19 will be released and the outward feed of the web will therefore cease, but since the wrapper is almost instantly bent around the roll 30 as in Fig. 4 and since the wrapper is still unsevered from the leading end of the web no lateral displacement of the wrapper on the article can take place.

As soon as the wrapper is drawn around the draping roll as in Fig. 4 a tension will be exerted upon that portion of the wrapper bent around the lower roll 19 and further feeding of the web will be resumed automatically. During the further ascent of the article the draping roll 34 is moved upwardly by its cam as shown in Fig. 5, corresponding with the movement of the article so that no slack is left in the wrapper. As the draping roll reaches its upper position as shown in Fig. 5 there is a short period in which it is necessary to feed out an additional length of web, this being automatically taken care of by the snubbing of the web around the upper roll 18. Here again no slack can be produced by the feed rolls since the slightest lessening of the tension around the roll 18 will cause the feed of the web to stop.

As the article is moved off from the elevator by the action of the ejector 15 (Fig. 6) the wrapper will be bent around the roll 30 and the article will be moved over the latter so that the wrapper will be held between them. At the same time the arm 35 carrying the plate 27 and the lower cutting element, which is formed by a gap 36 between this plate and a neighboring bar 37, will rock as shown by a comparison of Figs. 5 and 6. For this purpose the arm 35 is provided with an extension 38 connected by a link 39 to a rocking lever 40. This lever carries a cam roll 41 contacting a cam on shaft 23 as will be described. As the arm 35 swings up it brings the gap 36 into position to straddle a knife 42 mounted in a stationary manner upon the lower side of the plate 16, thus severing the wrapper from the web. It should be noted that the wrapper has been completely carried around the article except for the short bottom flap while that part of the wrapper extending around the article is still secured to the main body of the web, so that displacement relative to the article cannot occur.

At the instant before the wrapper is cut it is desirably under a slight tension to insure that the last part of the severed wrapper will be tightly folded around the lower corner of the article. For this purpose the arms 31 are pivotally connected at 43 to the bell cranks 32 and are provided with compression springs 44 so that the roll 30 will be free to move slightly toward the right as viewed in Fig. 1. Excessive movement in the opposite direction is prevented by a tail portion 45 of each arm 31 which rests against the corresponding bell crank and excess compressive movement of the spring is avoided by an adjustable stop 46. To hold the web taut during the time it is being cut the arms 35 are preferably provided with rearward extensions 47 which carry a brake 48 acting on the web as shown in Fig. 6.

It will be seen that in spite of the fact that the articles wrapped may be of widely varying contour, such as loaves of bread, and may be moved through their angular path with varying speeds, the amount of wrapper fed out will be adjusted automatically to produce a wrap of the desired tightness. Furthermore, by having the wrapper maintained as an integral part of the body of the web throughout the operation of circumferentially wrapping it about the article, and by feeding it out under controlled conditions only as fast as is required, exact registration of the web transversely of the article is maintained. The machine is preferably provided with a control mechanism whereby the web will be fed out only when an article is present to be wrapped, and this control mechanism is arranged so that transverse displacement of the web will be prevented during periods when no feeding occurs due to a break in the continuity with which articles are fed to the machine. This control mechanism will now be described.

The shaft 23 extends through the frame 10 as best shown in Fig. 8, and on its outer end bears a detector operating cam 50 and a resetting cam 51. In general the operation of these cams is the same as in the Smith and Hoppe Patent 1,953,195, but a brief description will be necessary in order to clarify the actuation of the paper feeding device described above. The detector cam 50 actuates a cam roll 52 mounted on a bell crank 53 forming one part of a parallel motion linkage carrying a detector plate 54. The cam 50 is shaped to cause the detector 54 to be lowered periodically at the time when a loaf of bread should be located underneath it upon the support 11. If the loaf is there the detector will be arrested in its descent since the spring 55 which normally tends to cause the detector plate to press downwardly is unable to overcome the resistance of the loaf of bread and the cam roll 52 will not follow its cam. If no loaf is present the detector plate will descend the full distance permitted by the cam and a roll 56 carried by the parallel motion will press a vertical slide 57 downwardly. This has been shown as similar to the slide 318 in the Smith and Hoppe Patent 1,953,195 to which reference may be made for a full description. It may be remarked that it is not necessary to utilize the slanting plates 313 and 317 of that patent since they were employed in that case to determine the length of wrapper to be fed, whereas in the present case this is automatically taken care of by the article itself. However, the exact structure may be used in the

present case if desired and the specific construction has therefore not been indicated in the drawings. It is sufficient to state that if no loaf is present the full descent of the vertical slide 57 causes the diagonal plates 317 to lock in the position of Fig. 26 of the Smith and Hoppe patent.

With no loaf present the bar 58 corresponding to the bar 313 of the patent will hold the tail 59 of a bell crank 60 so as to place a resetting shoe 61 in about the position shown in Fig. 7. In this position the shoe is in the path of the tail of a pawl 62, as shown in Fig. 10. The pawl is pivoted at 63 to the side of the cam 50 and its active end 64 is by this means drawn out of the path of the cooperating single tooth ratchet 65. This ratchet is formed as a part of a sleeve 66 which passes through the frame of the machine and to which are secured certain cams to be referred to. The resetting cam 51 in its travel actuates a roll 67 on the bell crank 60, permitting the pawl to be released periodically. When the pawl is released a spring 68 causes it to be drawn toward engagement with the ratchet.

The sleeve 66 carries a cam 70 for engagement with the roll separating cam roll 22. This cam is preferably made in two parts, 71 and 72, one of which has an arcuate slot and the other a cooperating clamp screw 74. One-half of the cam is secured to the sleeve while the other is free upon it except as clamped by the screw 74. The purpose of this construction is to permit the circumferential length of the high portion of the cam to be adjustable, the high portions of the two cams acting as a unit on the roll 22. By changing the setting of this adjustable cam the length of the web hat is positively fed out prior to the commencement of the wrapping operation can be varied as desired, thus controlling the length of the bottom wrapper fold.

The sleeve 66 also carries a cam 75 cooperating with the knife cam 41. The cam roll 34 controlling the draping roll may be operated by a cam mounted directly on the shaft 23 and hence operating continously, as it is not necessary that the draping roll be stopped when there is no article present. It should be noted that on Fig. 1 the various levers have been shown in the back of the central plate 17 for clarity, whereas in practice these levers would generally be in front of the plate so as to coact with the cams 70 and 75, which, as described above, are located adjacent the frame of the machine.

In operation the rolls 18 and 19 will be operated continually at all times whether or not articles are being fed into the machine. They will be moved together for the initial feeding operation, however, only whenever the approach of an article is detected by the plate 54. If no article is present the rolls will remain running but will be left continuously separated. The knife cam 75, however, is so fixed on the sleeve 66 that when the machine is stopped by the tripping of the pawl 62 it will hold the lower knife member in the position of Fig. 6. In this position the clamp 48 (which may be spring pressed if desired) is holding the web of paper and the lower knife member closes off the forward faces of the two feed rolls, so that the web cannot be disturbed in its alignment. During the entire period when no loaves are coming in the two rolls 18 and 19 rotate idly in their separated position shown in Fig. 6 with the end of the web clamped by the member 48. No feeding or displacement of the web can thus occur.

It will be understood that the feeding mechanism described above is not limited to the particular type of wrapping machine set forth above, but that it is applicable to any type of wrapping mechanism in which the wrapper is to be drawn out by the article in accordance with the amount required by the wrapping operation from instant to instant. Furthermore, various changes in the specific mechanical details of the wrapping machine may be made while preserving the feature of combining a positive feed of the wrapper prior to the commencement of the wrapping operation with a frictional feed limited by the amount which the article requires as the wrapping operation proceeds.

I claim:

1. A wrapping machine comprising a pair of web feed rolls, means for holding said rolls slightly separated one from another, means for rotating the rolls in opposite directions while so separated, and means for moving past the rolls an article engaged with the leading end of a web projecting through the rolls, whereby the web will be fed towards the article by frictional contact first with one roll and then with the other.

2. A wrapping machine comprising an article carrier, means carried by the carrier to clamp to an article the leading end of a web of wrapping material, and a feed roll positioned adjacent the path of motion of the carrier in position to cause the web to be bent over it during the movement of the article carrier, said roll for at least a part of the web-feeding operation making the sole feeding contact with the web, whereby the web will be fed to the article by impositive frictional contact only.

3. A wrapping machine comprising a pair of web feed rolls, means for rotating the rolls continuously in opposite directions, an article carrier movable to carry past the rolls an article engaged with the leading end of a web projecting through the rolls, mechanism for moving the rolls into engagement with each other to feed a web positively between them and for separating the rolls during the movement of the article carrier past them to feed the web by frictional contact only.

4. A wrapping machine comprising an article carrier, means for shifting the carrier back and forth between an article feeding and an article delivering station, a pair of continuously rotating web feed rolls located between the stations, means for shifting the rolls to a position in contact with each other to feed out a length of web between the carrier and the feeding station and for holding the rolls separated during motion of the carrier to cause the web to be fed out by impositive frictional contact only, means to feed an article onto the carrier at the feeding station, means to deliver a partially wrapped article out of the carrier at the delivery station, and a web cutter operable to sever the web when the article carrier is positioned adjacent the delivery station.

5. A wrapping machine comprising an article carrier, means for shifting the carrier back and forth between an article feeding and an article delivering station, a pair of continuously rotating web feed rolls located between the stations, means for shifting the rolls to a position in contact with each other to feed out a length of web between the carrier and the feeding station and for holding the rolls separated during motion of the carrier to cause the web to be fed out by impositive frictional contact only, means to feed an ar-

ticle onto the carrier at the feeding station, guiding means engaging the wrapper to drape it around the article, means to deliver a partially wrapped article out of the carrier at the delivery station, a web cutter operable to sever the web when the article carrier is positioned adjacent the delivery station, an article detector, and means operable by the detector in the absence of an article to be wrapped for holding the rolls separated.

6. A wrapping machine comprising an article carrier, means for shifting the carrier back and forth between an article feeding and an article delivering station, a pair of continuously rotating web feed rolls located between the stations, means for shifting the rolls to a position in contact with each other to feed out a length of web between the carrier and the feeding station and for holding the rolls separated during motion of the carrier to cause the web to be fed out by impositive frictional contact only, means to feed an article onto the carrier at the feeding station, means to deliver a partially wrapped article out of the carrier at the delivery station, a fixed cutter located adjacent the delivery station, a movable cutter movable into adjacency with the fixed cutter to sever the web, a clamp movable to hold the portion of the web to the rear of the rolls during cutting, an article detector, and means operable by the detector in the absence of an article to be wrapped for holding the rolls separated, the movable cutter in front of the rolls, and the clamp in engagement with the web.

7. A wrapping machine comprising an article carrier, means for shifting the carrier back and forth between an article feeding and an article delivering station, a pair of continuously rotating web feed rolls located between the stations, means for shifting the rolls to a position in contact with each other to feed out a length of web between the carrier and the feeding station and for holding the rolls separated during motion of the carrier to cause the web to be fed out by impositive frictional contact only, means to feed an article onto the carrier at the feeding station, guiding means engaging the wrapper to drape it around the article and movable therewith towards the delivery station, means to deliver a partially wrapped article out of the carrier at the delivery station, and a web cutter operable to sever the web when the article carrier is positioned at the delivery station.

8. A wrapping machine comprising an article carrier, means for shifting the carrier back and forth between an article feeding and an article delivering station, a pair of continuously rotating web feed rolls located between the stations, means for shifting the rolls to a position in contact with each other to feed out a length of web between the carrier and the feeding station and for holding the rolls separated during motion of the carrier to cause the web to be fed out by impositive frictional contact only, means to feed an article and the leading end of the web onto the carrier at the feeding station, means to deliver a partially wrapped article out of the carrier at the delivery station, and a web cutter operable to sever the web.

9. A wrapping machine comprising a web supply, a pair of web feed rolls, means for rotating the rolls continuously in opposite directions, means for moving the feed rolls together temporarily for a predetermined length of time to feed out a predetermined amount of the leading end of the web, mechanism for associating an article with the leading end of the web so fed out and for manipulating the associated article and web to cause the leading end of the web to be wound circumferentially around the article while bending the web over one or the other of the separated feed rolls, whereby the web will be fed out by impositive frictional contact with said roll in the exact quantity required for said circumferential winding action, and means for severing the web between the rolls and the wrapped article.

10. A wrapping machine comprising a web supply, a pair of web feed rolls, means for rotating the rolls continuously in opposite directions, means for moving the feed rolls together temporarily for a predetermined length of time to feed out a predetermined amount of the leading end of the web, mechanism for associating an article with the leading end of the web so fed out and for manipulating the associated article and web to cause the leading end of the web to be wound circumferentially around the article while bending the web over one or the other of the separated feed rolls, whereby the web will be fed out by impositive frictional contact with said roll in the exact quantity required for said circumferential winding action, means for severing the web between the rolls and the wrapped article, an article detector, and mechanism controlled by the detector in the absence of an article to be wrapped for maintaining the rolls in separated position.

11. A wrapping machine comprising an article carrier, means for shifting the carrier back and forth between an article feeding and an article delivering station, a pair of continuously rotating web feed rolls located between the stations, means for shifting the rolls to a position in contact with each other to feed out a length of web between the carrier and the feeding station and for holding the rolls separated during motion of the carrier to cause the web to be fed out by impositive frictional contact only, means to feed an article onto the carrier at the feeding station, means to deliver a partially wrapped article out of the carrier at the delivery station, a web cutter operable to sever the web when the article carrier is positioned adjacent the delivery station, an article detector, and means operable by the detector in the absence of an article to be wrapped for holding the rolls separated.

12. A wrapping machine of the type having superposed feeding and discharge platforms, a carrier movable back and forth between the platforms, and devices for pushing an article from the feeding platform onto the carrier and from the carrier onto the discharge platform; characterized by wrapper feeding mechanism comprising a pair of separable rolls positioned between the platforms and adjacent the path of the carrier, mechanism for driving the rolls both when separated and when together, a cutter operable to sever the wrapper between the article and the rolls when the carrier is adjacent the discharge platform, and means for holding the rolls separated during at least the upward movement of the carrier and closed together during the remaining part of the cycle.

13. A wrapping machine of the type having superposed feeding and discharge platforms, a carrier movable back and forth between the platforms, and devices for pushing an article from the feeding platform onto the carrier and from the carrier onto the discharge platform; characterized by wrapper feeding mechanism com-

prising a pair of separable rolls positioned between the platforms and adjacent the path of the carrier, mechanism for driving the rolls both when separated and when together, a cutter operable to sever the wrapper between the article and the rolls when the carrier is adjacent the discharge platform, and means for holding the rolls separated at least from the time the article contacts the wrapper, during the upward movement of the carrier, and up to the operation of the cutter, and closed together during the remaining part of the cycle.

14. A wrapping machine of the type having superposed feeding and discharge platforms, a carrier movable back and forth between the platforms, and devices for pushing an article from the feeding platform onto the carrier and from the carrier onto the discharge platform; characterized by wrapper feeding mechanism comprising a pair of separable rolls positioned between the platforms and adjacent the path of the carrier, mechanism for driving the rolls both when separated and when together, a cutter operable to sever the wrapper between the article and the rolls when the carrier is adjacent the discharge platform, means for holding the rolls separated during at least the upward movement of the carrier and closed together during the remaining part of the cycle, and means for varying the time of separation of the rolls to control the amount of overlap of the wrapper folds.

15. A wrapping machine of the type having feeding and discharge platforms, a carrier movable between the platforms, and devices for pushing an article from the feeding platform onto the carrier and from the carrier onto the discharge platform; characterized by wrapper feeding mechanism comprising a pair of separable rolls positioned adjacent the path of the carrier, mechanism for rotating the rolls both when separated and when together, means for supplying a wrapper web to the rolls, a cutter operable to sever wrappers from the web extending between the rolls and an article on the carrier, and means for holding the rolls separated at least during part of the period of movement of the carrier from the feeding to the discharge platforms and in feeding contact prior to the delivery of an article from the feeding platform onto the carrier.

16. A wrapping machine of the type having feeding and discharge platforms, a carrier movable between the platforms, and devices for pushing an article from the feeding platform onto the carrier and from the carrier onto the discharge platform; characterized by wrapper feeding mechanism comprising a pair of separable rolls positioned adjacent the path of the carrier, mechanism for rotating the rolls both when separated and when together, means for supplying a wrapper web to the rolls, a cutter operable to sever wrappers from the web extending between the rolls and an article on the carrier, means for holding the rolls separated at least during part of the period of movement of the carrier from the feeding to the discharge platforms, a clamp for holding the web, and means for moving the clamp into and out of contact with the web to control the movement thereof when the rolls are separated.

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