This invention relates to a paper-feeding mechanism in the form of a power-driven roller attachment for wrapping machines of the type commonly employed in bread-wrapping operations or for wrapping boxes of buns or rolls and similar articles.

These machines depend upon engagement between the articles to be wrapped and the wrapping paper therefor for causing the article, in moving to the wrapping location, to draw the paper to the wrapping location simultaneously. In the case of relatively soft articles such as partially baked rolls, the strain of drawing the paper may result in damage to the articles and/or their container and also may result in lack of uniformity in the wrapped packages and may otherwise impair their attractiveness, even to the point of requiring numerous rewraps.

The principal object of the invention is to provide an automatic paper-feeding mechanism for supplying paper to the wrapping location and thereby insure uniformly sealed packages. Paper-feeding of the paper avoids damage to the articles from the wrapping process, assures uniformity in packaging, and minimizes rewraps.

Power-feeding, according to the invention, is accomplished by providing a pair of cooperating feed rollers actuated from the power drive of the machine and synchronized thereby to feed the proper amount of paper at the proper time. The feed rollers are embodied as roller attachments for the wrapping machine and are mounted thereon in a manner requiring a minimum of modification. Adjustments are provided for controlling the timing of the paper-feeding rollers in accordance with requirements.

Other objects and advantages will become apparent during the course of the following description.

In the accompanying drawings forming a part of this specification and in which like numerals are employed to designate like parts throughout the same:

Fig. 1 is a diagrammatic side-elevational view of the pertinent parts of a conventional wrapping machine having applied thereto the feeding mechanism of the invention;

Fig. 2 is a diagrammatic view corresponding to the left side of Fig. 1 and illustrating a different stage of the wrapping cycle;

Fig. 3 is a fragmentary end sectional view as seen from the discharge end of the wrapping machine, with parts broken away and sectioned for purposes of illustration;

Fig. 4 is a circuit diagram of the control circuit for the paper-feeding mechanism of the invention; and

Figs. 5 and 6 are detail views of the control cams employed for timing the paper-feeding mechanism, and they are shown, respectively, on the lines 5—5 and 6—6 of Fig. 3.

For purposes of disclosure, the invention is shown embodied as an attachment to a conventional bread-wrapping machine of the type that relies upon frictional engagement between the bread and the wrapping paper for drawing the wrapping paper to the wrapping location simultaneously with the movement of the bread. These so-called bread-wrapping machines are useful for wrapping numerous types of articles and, for purposes of disclosure, the invention is illustrated in connection with the wrapping of a box B of cluster buns or coneyes, since such items are more difficult to wrap with these machines.

Such wrapping machines are fed from a material-supplying conveyor 10 having a runway plate 11 along which the material moves in contained alignment against a lengthwise extending, upstanding plate 12. A pusher bar 13 is reciprocably movable through the plane of the plate 12 to transfer articles individually from the supply conveyor 10 to a wrapping table 14 which is swingable from a lower position, shown in full lines in Fig. 1, wherein it receives the article to be wrapped, to an upper position, shown in dotted lines in Fig. 1, wherein it presents partially wrapped articles to a flight chain 15 that carries pusher arms 16 at spaced points thereon for transferring the partially wrapped articles to a bottom folder plate 17 along which the final wrapping operations are carried out in a well-known manner.

The wrapping paper P for the articles to be wrapped is supplied along a paper-supporting table 18 which, as shown in Fig. 1, extends toward and above the receiving edge of the wrapping table 14 to support the paper, with the free end thereof extending between the supply conveyor 10 and the receiving edge of the wrapping table 14 to a point beneath the conveyor.

The conventional wrapping operation begins with the parts in the position in which they are shown in Fig. 1. The pusher arm 13, which is periodically actuated through facilities (not shown) energized from the wrapping machine, initiates the wrapping cycle by transferring an article to the wrapping table 14 and as the article moves across the receiving edge of this table it carries the free end of the paper with it and becomes partially enveloped therein. It may be seen in Fig. 2 that the edge of the wrapping paper P underlies a portion of the article being wrapped. During the forward movement of the pusher arm 13, a clamping roller 20 is operative to engage the free end of the paper against the adjacent edge of the conveyor 10 to slightly restrain the paper and prevent it from being drawn from underneath the article being wrapped. The action of this roller is well known and plays no part in the present invention, except it should be noted that its restraining action is supplemented by the drag that exists between the wrapping paper and the article being wrapped to insure a properly wrapped package.

In the next stage of the wrapping cycle, suitable lifting facilities (not shown) raised the wrapping table 14 to its dotted-line position of Fig. 1 wherein it presents the partially wrapped article to the flight chain 15, whose pusher arms 16 transfer the article to the bottom wrapping plate 17. At this stage, a knife edge 21 is actuated by suitably timed facilities (not shown) controlled by the wrapping machine and moves from its full-line position of Figs. 1 and 2 to its dotted-line position of Fig. 1 to cut the trailing edge of the length of paper that is wrapped about the article being transferred to the bottom wrapping plate 17. The free end of the wrapping paper then assumes the position in which it is shown in Fig. 1 and another wrapping cycle is initiated when the pusher arm 13 transfers the next article to the wrapping table.

The present invention provides a power-driven paper-feeding mechanism 25 arranged to operate at periodic intervals in timed relation to the action of the pusher arm 13 for power-feeding predetermined lengths of paper to the wrapping location in synchronism with the arrival thereof of the article to be wrapped. It will be understood that the conventional wrapping cycle remains essentially the same in that the paper is fed to the wrapping location to supplement the restraining action of the
clamping roller 20 and thereby eliminate the necessity of relying upon the paper-drawing action of the article in its movement to the wrapping location. The remaining steps, including the lifting of the article into engagement with the flight chain and its subsequent transfer to the bottom wrapping plate 17, remain unchanged.

The power-driven feeding arrangement of the invention finds particularly advantageous use in the automatic wrapping of articles such as boxes of cluster buns, and its use in this connection has greatly reduced the number of rewraps, with a consequent significant saving in cellophane supporting paper. In addition, its use results in uniformly neatly wrapped packages, and this enhances their sales appeal.

A further advantage of power-feeding the paper results from the elimination of the pressures which are otherwise imposed on the buns and their packaging box by the paper as it naturally resists being drawn upward along the table 18. While such pressures are better resisted by the somewhat larger and heavier bread loaves with their protective crusts, they are known to be capable of crushing the buns and buckling their packaging box. The difficulties are eliminated by the powered paper feed of the present invention.

In the preferred arrangement, as best shown in the somewhat diagrammatic view of Fig. 1, the paper-feeding mechanism 25 includes a pair of vertically disposed horizontal feed rollers 26 and 27, respectively, adapted, when in cooperating paper-feeding relation, to engage opposite faces of the paper and power-feed it to the wrapping table. For this purpose the table 18 is formed with a suitable slot 28 through which the lower roller 26 projects for peripheral engagement with the driving near face of the paper P. The lower roller 26 is carried on a shaft 30, the outer ends of which are mounted for rotation in stationary bearings 31 and 32 which are fixed on the underneath side of the paper-supporting table 18. This bottom roller is in continuous power-driven engagement with the wrapping machine and towards this end, as is explained hereinafter, it is connected through a system of sprockets and chains for actuation by the flight chain 15, which runs continuously when the wrapping machine is in operation. The upper roller 27 is preferably an idler roller, and its shaft 33 is journalled at its outer ends in aligned bearings formed by a projecting pair of arms 34 (Figs. 1 and 3) carried on a positioning shaft 35 which is rotatably jour-nalled in stationary bearings 36 that are fixed on the opposite side of the paper-supporting table 18. As is explained hereinafter, the above shaft 35 rotates back and forth to move the idler roller 27 between a neutral position, shown in full lines in Fig. 1, wherein it is spaced from the paper on table 18 and a paper-feeding position, shown in dotted lines in Fig. 1, wherein it cooperates with the continuously revolving roller 26 to grip the paper P therebetween and power-feed it to the wrapping table 14.

For convenience in illustration, certain parts of the driving system for the bottom roller 26 are omitted from the diagrammatic view of Fig. 1, and reference may now be had to Fig. 3 for understanding the physical arrangement of these parts. The upper and lower runs of the flight chain are designated 15U and 15L, respectively, with the lower run 15L shown in driving engagement with a sprocket 40 carried at one end of a stub shaft 41 which is jour-nalled in suitable bearings 42 carried on an angle bracket 43 which is anchored to and extends above a lengthwise extending main frame member 44 of the machine. At its opposite end, stub shaft 41 carries a sprocket 45 which has a driving-chain connection with a somewhat larger sprocket 46 carried on a second stub shaft 47, which in turn, is mounted in suitable bearings 48 carried on an angle bracket 49. Stub shaft 47 also carries a large-diameter sprocket 50 having a driving-chain connection with a small sprocket 51 carried on the outer end of the shaft 30, which drives the bottom roller 26.

The swingable upper roller 27 is normally held in its neutral position, shown in full lines in Fig. 1, by a pair of springs 59 and 51 connecting between the armature 52 of a solenoid 53 and a fixed point on the machine, which is here shown as being the pusher slide bracket shaft 54. As shown in Fig. 3, the solenoid is carried on the horizontal arm of a suitably bracketed horizontal armature 55 which is fixed on a longitudinally extending main frame member 56. The upper spring 50 is the stronger of the two springs, and their adjacent ends are connected to the extremity of a radial arm 56 carried by the positioning shaft 35. The arrangement is such that the springs bias the shaft 35 for rotation in a direction away from the paper-feeding position and a stop lug 57 carried on the positioning shaft 35 engages the table 18 to resist this spring bias and determine the neutral position of the shaft 35 and, correspondingly, of the idler roller 27. This stop lug 57, as best seen in Fig. 3, is carried adjacent the opposite end of the positioning shaft 35.

When the solenoid 53 is energized to raise armature 52, the relatively weaker lower spring 59 yields, permitting the arm 56 to rotate counterclockwise about the axis of positioning shaft 35 to bring the idler roller 27 into paper-feeding position, shown in dotted lines in Fig. 1. In this relation, the roller 26 and 27 cooperate to power-feed the paper P upwardly along the table 18.

The timing of the power-feeding of the paper is important in order that the paper will be supplied to the wrapping table at the proper time and in the proper amount; and to synchronize the feeding action of the rollers 26 and 27 with the arrival at the wrapping table of an article to be wrapped, the control circuit arrangement of Fig. 4 is employed.

In the illustrated arrangement, the control circuit is shown embodied in association with the coil 60 of a magnetic contactor of a type commonly employed for starting and stopping these wrapping machines. The coil 60 controls a pair of normally open contacts 61C and 62C which are arranged, when the coil 60 becomes energized, to bridge across terminal pairs 61 and 62, respectively. The circuit includes a microswitch 63 in series with the coil 60 for controlling its energization.

The microswitch 63 is shown at the left side of Fig. 3 mounted on the upstanding plate 12 of the material-supplying conveyor 10 to detect the presence of articles approaching the wrapping station. So long as a supply of articles is available, the switch 63 is held closed. A conventional spring hinge actuator (not shown) may be employed for contacting with the article B to actuate microswitch 63 to sense the presence of articles B. Thus, the microswitch 63 is arranged to control the operation of the entire wrapping machine through its series-connection with the contactor coil 60 which, simultaneously, through contacts 61C and 62C, conditions the control circuit for solenoid 53 that controls the positioning of the idler roller 27.

The control circuit includes a normally open "start" microswitch 65 which is controlled by the inside cam 66, carried on stub shaft 47, and a normally closed "stop" microswitch 67 which is controlled by the outside cam 68 carried on stub shaft 47. The microswitches 65 and 67 are fixedly mounted on a suitable bracket 69 which, as shown in Fig. 3, may be attached to angle bracket 43.

It will be apparent, therefore, that when the contactor coil 60 is energized through article detector microswitch 63 to energize the main power drive for the machine, the flight chain 15 is actuated at a steady speed and, through sprocket 50, will drive stub shaft 47 to continuously drive the bottom roller 26 and simultaneously to rotate the control cam 66 and 68. Control cam 66 is shown in Fig. 5, and it is arranged so that when its leading edge 70 engages the microswitch roller, it will close microswitch 65 to energize solenoid...
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5 and bring the idler roller into paper-feeding position. The idler roller will remain in paper-feeding position until the leading edge 71 of cam 68 (see Fig. 6) engages its microswitch roller and opens switch 67. Obviously a single microswitch controlled by a single cam of suitable contour could be mounted on stub shaft 47 to control the timing of the paper feeding operation; however, the use of separate cams each adjustably positionable on stub shaft 47 through the use of set screws 73 is preferred, since this facilitates adapting the paper-feeding cycle to the particular conditions associated with each type of article to be wrapped.

With the illustrated arrangement, synchronism is assured since the pusher arm 13, the pivotable wrapping table 14, and flight chain 15 are all operated in timed relation. The paper-feeding rollers 26 and 27 are driven from the flight chain 15 by an adjustable arrangement that permits of synchronizing the feeding of paper with the other operations of the machine.

The paper-feeding mechanism is built into the machine in a compact and practical arrangement and permits of packaging relatively soft articles, such as an open-topped box of unbaked rolls, without damaging either the box or the rolls. In addition, it achieves a uniformly neat package and minimizes the number of re-wraps involved. These advantages add up to important economies and enhance sales appeal.

It should be understood that the description of the preferred form of the invention is for the purpose of complying with Section 112 of the U.S. Code and that the claims should be construed as broadly as prior art will permit.

I claim:

1. In a wrapping machine for individually wrapping a plurality of articles successively supplied thereto, a wrapping table, material-supplying means having a plurality of articles in contained alignment therein and periodically transferring articles individually to said table across one edge thereof, a feed table having a paper-supporting surface for paper supplied theretofore to said wrapping table, a power drive for said machine including control means for periodically actuating said supplying means; a paper-feeding attachment mechanism for engaging paper on said feed table and in power-driven engagement with said power drive, said mechanism comprising a pair of rollers mounted for rotation about spaced apart parallel axes disposed, respectively, above and below an intermediate opening provided in said feed table for peripheral engagement with the upper and underneath faces of the portion of said paper spanning said opening, means connected for actuation by said power drive for continuously rotatably driving one of said rollers, and positioning means for shifting one of said rollers between a neutral position in spaced relation to said feed table and a paper-feeding position adjacent said feed table wherein said rollers grip said paper therebetween in peripheral frictional driving engagement, said positioning means including an electrical control circuit having first switch means and second switch means connected in series relationship with actuating means for positioning said one roller, means responsive to the positions of articles in said material supplying means for holding said first switch means closed and means connected to said power drive and responsive thereto to periodically open and close said second switch means in timed relation with the control means for said material supplying means to operate said positioning means for synchronizing the supply of paper to said wrapping table with the transfer thereto of an article to be wrapped.

2. The arrangement of claim 1 wherein said second switch means is actuated by cam surfaces having rotatably driven engagement with said power drive.

3. The arrangement of claim 1 wherein said second switch means comprise first and second series-connected cam-operated switches, and a rotatably mounted shaft having rotatably driven engagement with said power drive carries first and second cams for said switches respectively, with each of said cams being adjustably positionable about the periphery of said shaft for adjusting the time of action of said paper-feeding mechanism.

4. In a wrapping machine for individually wrapping a plurality of articles successively supplied thereto, a wrapping table, material-supplying means having a plurality of articles in contained alignment therein and periodically transferring articles individually to said table across one edge thereof, a feed table having a paper-supporting surface for paper supplied theretofore to said wrapping table, a power drive for said machine including control means for periodically actuating said supplying means; a paper-feeding attachment mechanism for engaging paper on said feed table and in power-driven engagement with said power drive, said mechanism comprising a pair of rollers mounted for rotation about spaced apart parallel axes disposed, respectively, above and below an intermediate opening provided in said feed table for peripheral engagement with the upper and underneath faces of the portion of said paper spanning said opening, means connected for actuation by said power drive for continuously rotatably driving one of said rollers, and positioning means for shifting one of said rollers between a neutral position in spaced relation to said feed table and a paper-feeding position adjacent said feed table wherein said rollers grip said paper therebetween in peripheral frictional driving engagement, said positioning means including an electrical control circuit having one roller means to its neutral position and including an electrical control circuit having a solenoid connected to said one roller and first switch means and second switch means connected in series relationship with said solenoid, means responsive to the positions of articles in said material supplying means for holding said first switch means closed and means connected to said power drive and responsive thereto to periodically open and close said second switch means in timed relation with the control means for said material supplying means to operate said solenoid means for synchronizing the supply of paper to said wrapping table with the transfer thereto of an article to be wrapped.

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