

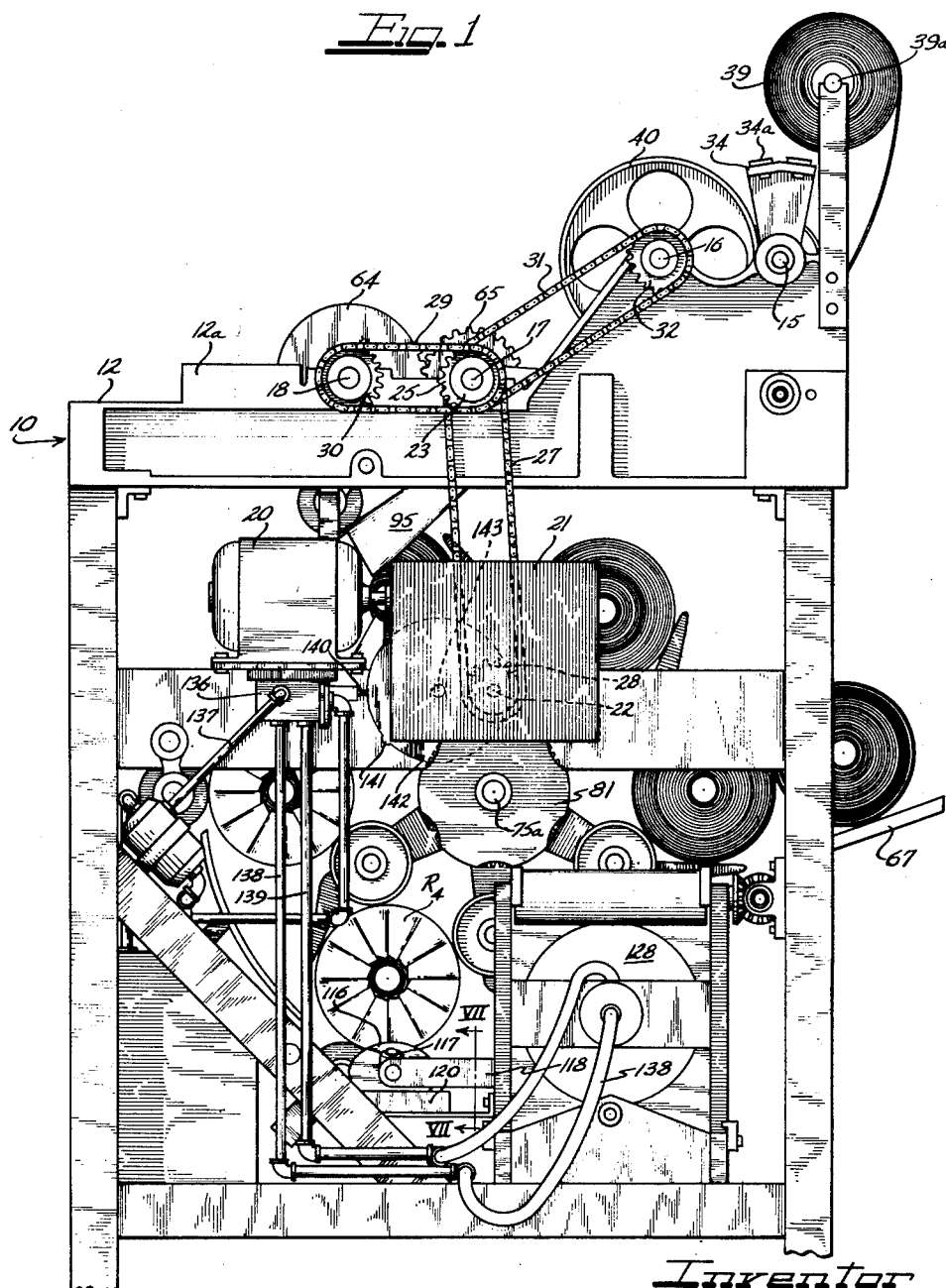
June 30, 1953

C. A. GERLACH
WRAPPING MACHINE

2,643,499

Filed Aug. 11, 1949

4 Sheets-Sheet 1



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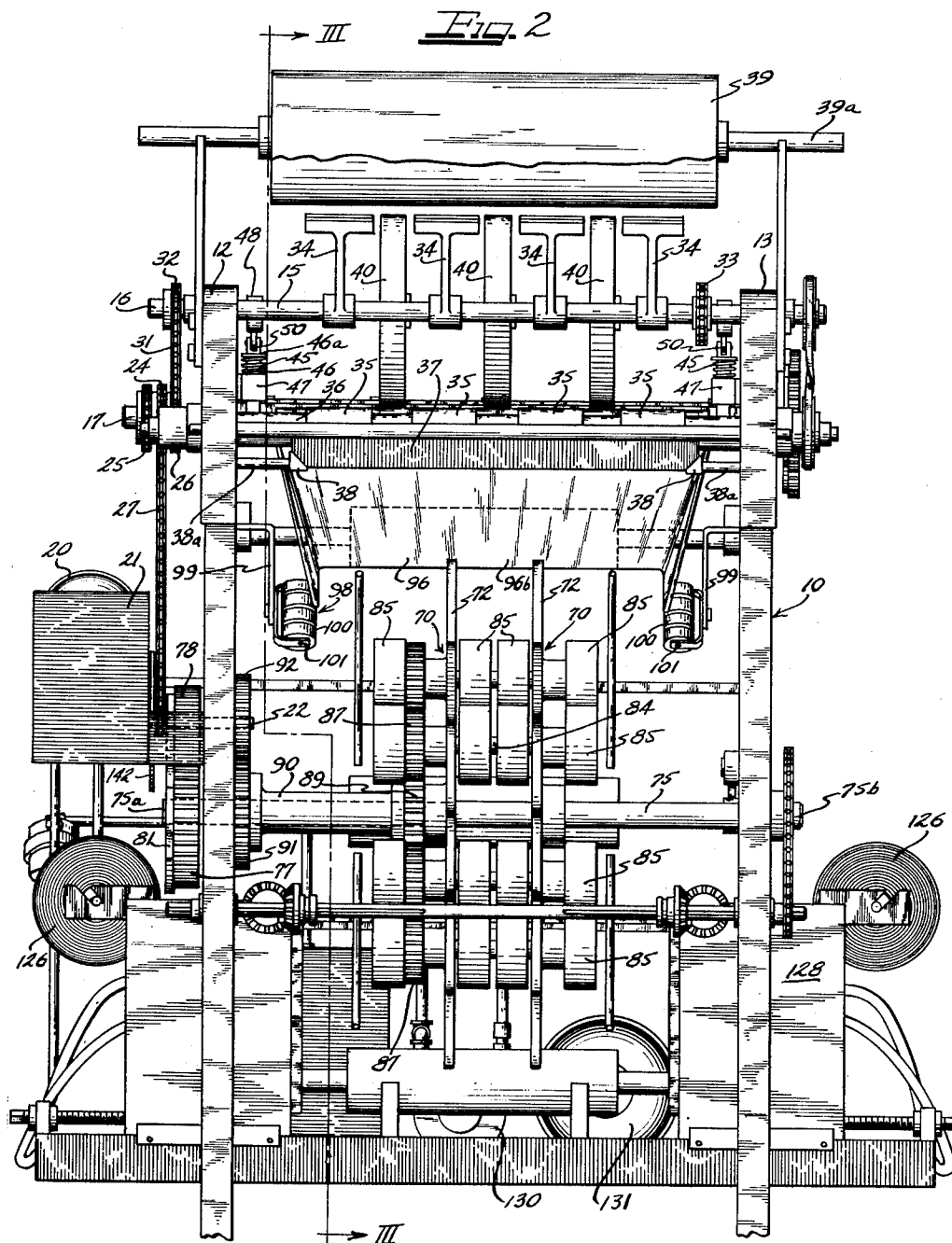
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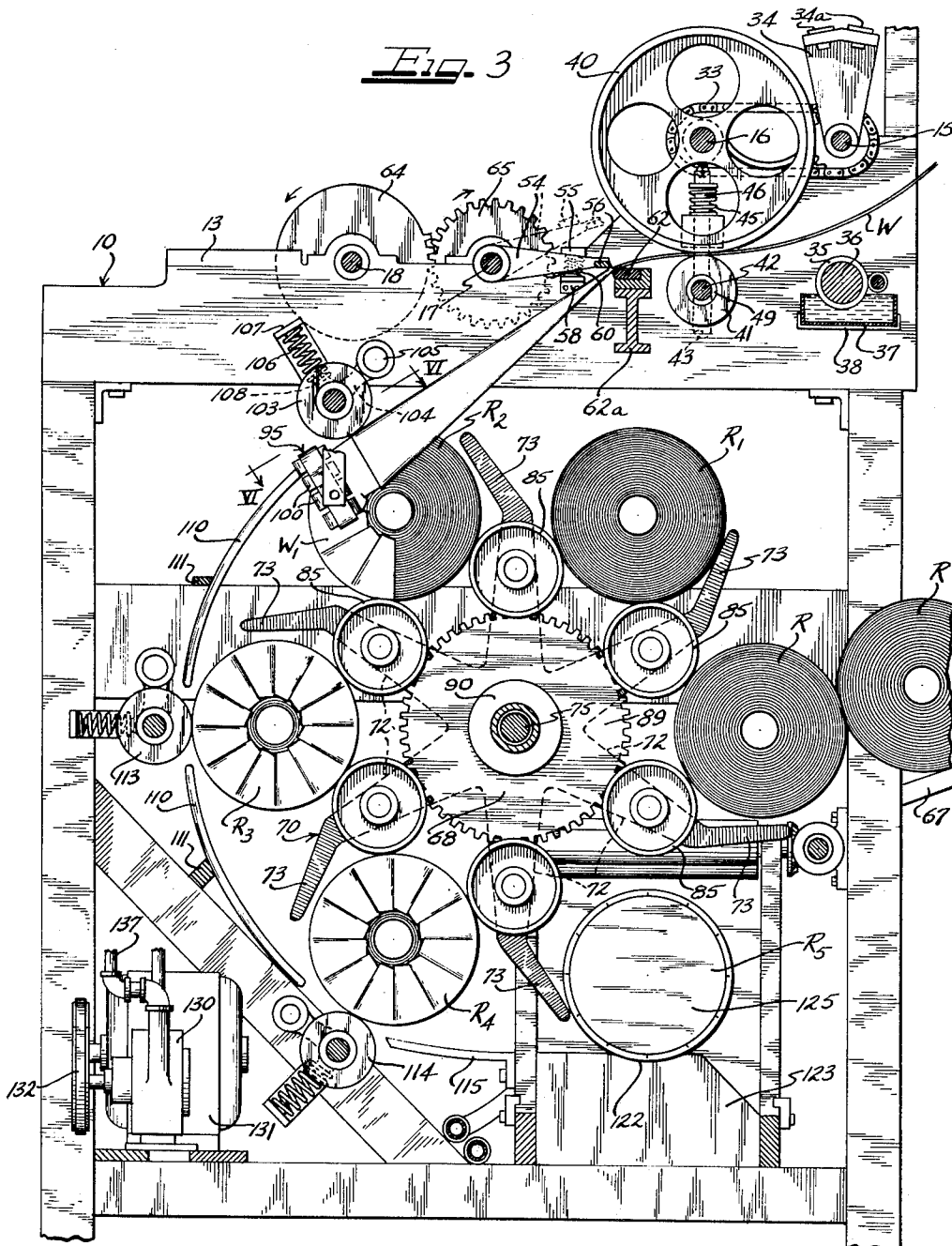
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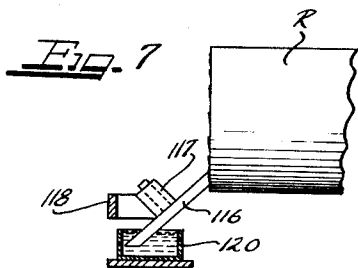
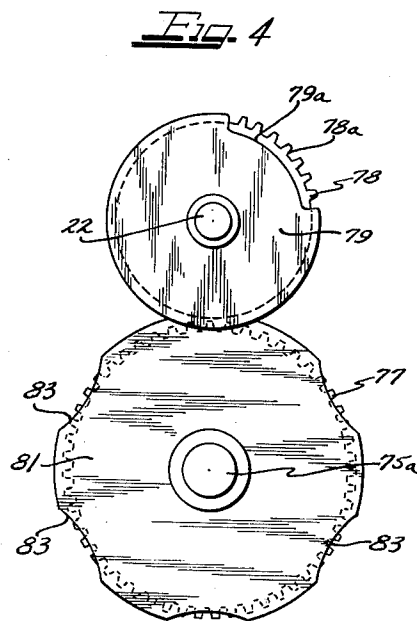
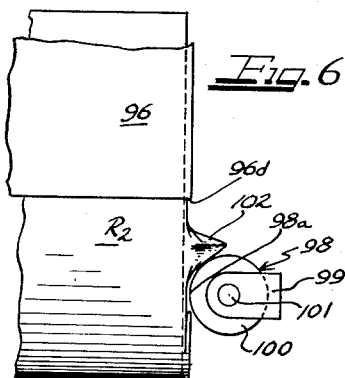
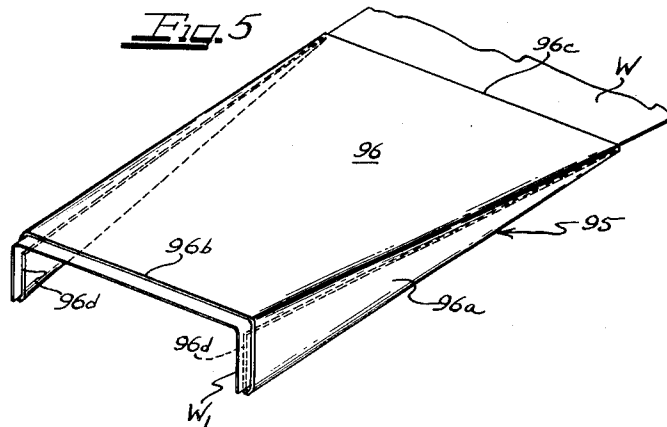
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WRAPPING MACHINE

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5 Claims. (Cl. 53—102)

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This invention relates to improvements in a wrapping machine. More particularly, it has to do with a machine featuring a rotary conveyor adapted to carry a cylindrical roll, such as a roll of heavy kraft paper, successively through a wrapper applying and tucking station, a glue applying station and end cap applying station.

While the invention will hereinafter be specifically described as a machine for wrapping large cylindrical rolls of paper, it should be understood that the invention has general utility for wrapping any article of cylindrical configuration.

According to the general features of this invention, a wound roll of paper is fed through the various stations of the wrapping machine on an intermittently operated wheel-like rotary conveyor. A plurality of arm members extend radially outwardly from the hub of the wheel carrying separately driven rollers adjacent their inner hub ends. A roll to be wrapped is fed into position between a pair of adjacent arms and against the constantly rotating rollers which frictionally grip the roll and rotate it about its own axis during its passage through a first station at which a previously cut wrapper is disposed around the roll and the end of the wrapper tucked down against the end of the roll and a second station where a rim of glue is applied over the tucked end of the wrapper. After the glue is applied, a hydraulically operated cutter mechanism cuts two circular pieces of paper from the feed roll and thrusts them against the glued surfaces to close the end of the wrapper.

It is then an object of the present invention to provide a mechanism for feeding a wrapper to a cylindrical object for wrapping around the object, applying glue to portions of said wrapper and applying end caps to the wrapper.

Another object of this invention is to provide an improved wrapping machine for wrapping cylindrical objects that will wrap approximately ten rolls per minute and requires a very small amount of floor space for operation.

A further object of this invention is to provide an improved means for covering a roll with a wrapper and tucking the overlapping ends of the wrapper down against the ends of the roll.

A further object of this invention is the provision of a novel end-tucking device for causing the overhanging edge of the wrapper sheet to automatically form upstanding flaps which are bent down against the end face of the roll.

A still further object of this invention is to

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provide a novel, more efficient shearing device for a wrapping machine.

Another and still further object of this invention is to provide an efficient, simple wrapping machine especially adapted for use in a small shop where floor space is limited.

Other and further features, objects and advantages of the present invention will be apparent to one skilled in the art from the following detailed description taken in connection with the accompanying drawings.

On the drawings:

Figure 1 is a fragmentary side elevational view of a wrapping machine constructed in accordance with the teachings of the present invention;

Figure 2 is a fragmentary front elevational view of the wrapping machine of Fig. 1;

Figure 3 is a fragmentary vertical sectional view taken on the line III—III of Fig. 2;

Figure 4 is a vertical side elevational view of the drive gears used in the wrapping machine of Fig. 1, shown in their operating position, but removed from the wrapping machine;

Figure 5 is a perspective view of the novel guide member used with the wrapping machine of the present invention for facilitating the wrapping and tucking of the wrapper on the roll;

Figure 6 is a fragmentary plan view taken on line VI—VI of Fig. 3; and

Figure 7 is a fragmentary vertical sectional view taken on line VII—VII of Figure 1.

As shown on the drawings:

In Figures 1, 2 and 3 the reference numeral 10 indicates a frame structure having a plurality of vertical and horizontal strap members suitably secured together, as by welding, to form a rigid box-like open structure. Upstanding plates 12 and 13 extend longitudinally along the top of the frame structure at each side of the machine. As seen in Figure 1 from the side of the machine, the plate 12, which is identical to plate 13, has a reinforced upper ledge portion 12a providing a bearing support for a plurality of shafts 15, 16, 17 and 18 which extend between the plates 12 and 13.

Power for rotating the shafts 15, 16 and 17 is provided by an electric motor 20 driving through a speed reducer 21 and a take-off shaft 22 extending from the reducer. A collar 23, freely rotatable on the shaft 17, carries three sprockets 24, 25 and 26 (Figure 2) and is driven by a chain 27 disposed over a sprocket 28 on the shaft 22 and over the sprocket 24. When the collar 23 is rotated, a chain 29 which is trained over the sprocket 25 and over a sprocket 30 keyed to the shaft 18, causes rotation of the shaft 18. A chain 31,

trained over the sprocket 26 and a sprocket 32 on the shaft 16 causes rotation of this shaft 16. The shaft 15 is driven from the shaft 16 by a sprocket and chain drive 33. Thus, when the motor 20 is operating, the shafts 15, 16 and 18 are being continuously rotated. It is to be noted that the shaft 17 is stationary at this time.

For the purpose of applying glue to the web W of the wrapping machine, four axially spaced shoes 34 are keyed to the shaft 15. Each shoe carries two spring pressed pads 34a (Fig. 3) which, when the shaft 15 is rotated, contact the web of wrapping paper W and press it downwardly against four spaced glue rollers 35. The rollers 35 are mounted on a shaft 36, which is rotatably journaled on the plates 12 and 13. A glue pot 37 is supported beneath the rollers 35 by angle members 38 (Figure 2) which are mounted by rods 38a from the plates 12 and 13. Thus four sets of spaced pairs of glue spots are applied to the wrapper. As will be described hereinafter, a cutter mechanism is synchronized with the movement of the web and is effective to sever the web laterally of the machine at a point between the glue spots so that both the trailing end of the first wrapper sheet and the leading edge of the next wrapper sheet will have four laterally spaced spots of glue.

The web W is drawn from a supply roll 39 mounted on a rod 39a which is freely journaled between upright members of the frame structure. The width of the paper is, of course, greater than the width of the roll to be wrapped.

After the glue spots are applied to the web W, the web passes between a plurality of feed rollers 40 keyed to the shaft 16 and a cooperating roller 41 which is freely journaled on a shaft 42. This shaft 42 is guided at both ends for vertical movement in slot 43 in the plates 12 and 13. The roller 41 is urged against the roller 40 by springs 45 which are mounted on a rod 46 between a shoulder 47 secured to the plate 12 and a flange 46a on the rod. The rod 46 has a collar 49 disposed around the shaft 42. Thus, the cooperating rollers 40 and 41 frictionally advance the web for a predetermined distance until cams 48 secured to the shaft 16 contact rollers 50 on the top of the rods 46 causing the rods and the shaft 42 at the lower end thereof to move downwardly in the slot 43. Thus, while the high points of the cam 42 are in contact with the rollers 50 the web will be motionless.

During the interval in which the web W is motionless, a cutter mechanism 52 severs the web laterally of the machine between the two lines of laterally spaced glue spots as previously mentioned. This mechanism comprises a plurality of cutter arms 54, Figure 3, keyed to the shaft 17 and spaced laterally thereacross, having a cross brace 55 welded to the top surfaces of the arms and a blade 56 secured to the outer free end of the arm. Angle members 58 are secured to the inner face of plates 12 and 13 to support coil springs 60 which extend between the angle members 58 and the cross brace 55. The springs 60 normally urge the cutter blade upwardly in a counterclockwise direction to the dotted line position of Fig. 3.

The stationary blade 62 is supported by a cross frame member 62a and cooperates with the swinging knife blade 56 to effect the cutting of the web.

The cutter blade 56 is swung downwardly in a cutting stroke by means of a segmental gear 64 which is keyed to the shaft 18 and in mesh, dur-

ing a portion of its rotation, with a gear 65 keyed to the shaft 17. As seen in Fig. 3, the cutter blade 56 is normally urged to its upper dotted line position by the springs 60. When the teeth on the gear 64 mesh with the teeth on the gear 65 the gear 65 is rotated in a clockwise direction causing the shaft 17 and the cutter arms to rotate and move the blade 56 down to cutting position opposite the stationary blade 62.

The length of the sheet that is cut is somewhat greater than the periphery of the roll so that the trailing end will overlap the leading edge and be glued thereon.

The rolls of paper to be wrapped are fed into the machine from the front on a ramp 67 which is inclined to permit the rolls to move by gravity into position on a rotary conveyor 68. The conveyor 68 comprises a pair of identical spider members 70 having radially extending arms 72 that have slightly hooked outer end portions 73. As seen in Fig. 2, each spider is keyed to a shaft 75 that is journaled in the members of the frame structure 10 and have end portions 75a and 75b that extend slightly beyond the frame.

The end 75a carries a gear 77 which is in mesh with a gear 78 keyed to the take-off shaft 22. The gear 78 is a segmental gear having teeth 78a (Figure 4) on only a portion of its periphery. A circular plate 79 is suitably secured to the gear 78 for rotation therewith and is provided with a peripheral recessed portion 79a directly adjacent the teeth 78a. The gear 77 carries a cam plate 81 of substantially circular configuration. A series of equally spaced arcuate cut outs 83 are provided in the periphery of the plate 81. These cut outs 83 have the same curvature as the periphery of the plate 79, so that the plate 79 will freely pass through these cut outs as the gear 78 rotates, but will prevent the plate 81 and the gear 77 from rotating.

The number of teeth 78a on the gear 78 corresponds to the number of teeth on the gear 77 between adjacent cut outs 83. Thus, as the shaft 22 rotates, the gear 78 will periodically index the gear 77 and the shaft 75 from one cut out to the next. The spiders 70 secured to the shaft 75 are, therefore, arranged to be rotated periodically to move the rolls R through the wrapping machine.

It is a feature of the wrapping machine that the cylindrical rolls to be wrapped are continuously rotated about their own axis as they are carried along by the conveyor. As will be seen hereinafter, this rotation of the roll causes the wrapper to be disposed around the roll, aids in the tucking down of the end portions of the wrapper and effects the application of a ring of glue on the ends of the wrapper.

To obtain this rotation of the roll shafts 84 are disposed between the arms 72 of the spider members 70. These shafts 84 are freely rotatable in the arm and carry spaced rollers 85 against which the cylindrical rolls rest while they are on the conveyor. A gear 87 is keyed to each shaft and is in mesh with a large central gear 89 that has an integrally formed cylindrical sleeve portion 90 disposed over the drive shaft 75. This sleeve is pinned to a gear 91 that is in mesh with a gear 92 driven from the take-off shaft 22.

Thus, the spider members 70 with their arms 72 are positively driven through the shaft 75 while the rollers 85 are independently rotated through the gears 87, 89, 91 and 92 from the take-off shaft 22.

Referring to Fig. 3, the rolls R are fed into the

conveyor from the chute 67 against the rollers 85. An arm 73 of the spider member 70 lifts the roller R and starts it through the wrapping machine.

When the roll gets into position of the roll R₁, as illustrated in Fig. 3, the weight of the roll itself holds it against the rollers 85 and the arms 73.

When the carrier 68 is indexed two positions and the roll gets into the position indicated by roll R₂, the leading glued edge of a wrapper W is pressed against the roll by a wrapping and tucking mechanism 95 and subsequent rotation of the roll R₂ by the rollers 85 causes the wrapper to be completely folded around the roll and the trailing glued edge is pressed down in overlapping relation on the leading edge.

As best seen in Fig. 5, the wrapping and tucking mechanism 95 comprises a guide plate 96 of heavy gauge sheet metal that has side marginal portions 96a folded downwardly at an angle so that the forward edge 96b of the plate is narrower than the rear edge 96c and corresponds in width substantially to the width of one of the cylindrical rolls being wrapped. The folded down portions 96a are folded upwardly toward the inside to provide an inner wall 96d that decreases in height toward the rear of the plate. The web W is threaded into this guide plate at the rear end and emerges at the forward end in an inverted channel-shape with down turned ends W₁ that fit over the edge of the cylindrical roll R and are tucked thereagainst as shown in Fig. 3.

At each side of the guide plate 96, Fig. 2, a roller assembly 98 is mounted on a bracket 99 supported from the frame 10. Each roller assembly includes a plurality of roller elements 100 that are freely rotatable on shaft 101 and are positioned close against the roll R₂ so that the wrapper must pass between the roll R₂ and the roller 100 as shown in Fig. 6. Thus, the roller assembly will tend to flatten the wrapper end against the roll R₂.

As seen in Figs. 3 and 6, the channel-shaped wrapper is being drawn around the roll R₂ due to the fact that the leading edge of the wrapper is glued thereon. Since the side edge of the wrapper is confined at the point 96d by the guide plate 96 and at the point 98a by the roller assembly 98, it will tend to buckle between these two confining points and form an upstanding flap 102. Then, as the roll R₂ continues to rotate the flap 102 is ironed down by the roller assembly 98. As each succeeding flap 102 is formed, it is pressed down until the entire roll is enclosed with end flaps as shown in Fig. 3.

At the wrapper affixing station the roll R₂ is pressed against the rotating roll 85 by means of a pair of rollers 103 which are pivotally mounted from the plates 12 and 13 by levers 104 on pins 135. A compression spring 106 disposed between an upstanding flange 107 and an abutment flange 108 on the roller 103 urges the roller 103 against the guide member 96 to exert pressure against the roll R₂ to urge it against the rollers 85.

Guide bars 110 are spaced around the conveyor being welded to cross the braces 111 of the frame structure.

The roll R₃ is urged against the rollers 85 by means of a pressure roll 113 which is spring-loaded exactly in a manner similar to roller 103 previously described. Similarly the roll R₄ is urged against rollers 85 by means of spring-loaded pressure roller 114. In the station indicated by the roll R₄ a ring of glue is applied on the end tucked surface of the wrapper. Referring to Figs. 7

1 and 7 it is seen that a rotatable glue wheel 116 is freely journaled in a bearing 117 which is supported at the end of a bracket 118 from the frame of the machine. The roller 116 rotates through glue in a glue pot 120 and due to the rotation of the roll R₄ deposits a ring of glue around the tucked ends of the roll. It will, of course, be understood that one of the glue rollers is disposed on either side of the machine opposite the end of the roll for applying glue thereto.

In Fig. 3 a roll R₅ is illustrated in the end disk affixing position on a cradle-like support 122 at the upper end of a support member 123. While the roll is in this position, a disk 125 is cut out of a web of paper that is fed from a feed roll 126 (Fig. 2) into a hydraulically operated cutter mechanism 128. As fully described in my issued Patent No. 2,368,213, the hydraulically operated mechanism in the housing 128 includes means for cutting a circular disk of paper from the web and pushing it forwardly against the glued end surface of the wrapper. The pressure from the mechanism causes the end disk to be gripped by the glue and thus the roll R₅ is completely enclosed in paper. Subsequent movement of the conveyor 70 will cause the roll R₅ to be expelled from the machine into any suitable receptacle.

The hydraulic cutter mechanism 128 is supplied with fluid under power from a pump 130 (Fig. 3) driven from a motor 131 through a belt 132. Suitable piping is connected from the pump to the hydraulic cylinder by way of a control unit 136 (Fig. 1). A supply line 137 leads to unit 136 while a supply line 138 leads from the unit to one side of the hydraulic cylinder and a supply line 139 leads to the other side of the hydraulic cylinder. A plunger 140 extends out of the control unit 136 for contact with a cam 141 on a cam disk 142 which is driven from a take off shaft 143 from the speed reducer 21. The plunger 140 controls the flow of fluid under pressure to the supply lines 138 and 139. Thus, in one position fluid is directed to the line 138 to cause the cutter to move forwardly and sever a circular disk of paper from the feed web and press it against the end of the wrapper. In the other setting fluid is applied to the line 139 which is connected to the far side of the piston and cause the return of the piston to its initial position.

In summary this invention features a compact open frame support structure inside of which a rotary carrier 68 is intermittently rotated by means of the cam-gear drive illustrated in Figure 4. Rolls of paper to be wrapped are fed by gravity into the rotary carrier and are disposed between the arm members 72 and against the positively driven rollers 85 which are rotated about their own axis as the carrier moves the roll in a circular path.

At the wrapper applying station a sheet of paper of a length greater than the periphery of the roll and a width greater than the width of the roll is centered over the roll by the novel guide 95 and the leading edge of the wrapper, to which glue has previously been applied, is pressed down against the roll. Therefore, as the roll continues to rotate about its own axis, the wrapper is wrapped around the lateral surface of the roll.

The wrapper leaves the guide 95 in a channel shape with the overhanging edges bent downwardly against the side of the roll. The roll assemblies 98 press these edges against the end face of the roll causing flaps to be formed immediately in front of the roller assemblies. As

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the roll continues to rotate, the flaps are ironed down by the rollers.

At the next station of the wrapping machine a circle of glue is applied to the downturned flaps to subsequently receive an end cap thereon at the last station of the machine.

From the foregoing description it will be seen that there is provided in this invention, a compact efficient wrapping machine for completely enclosing a cylindrical object in a sheet of paper.

It will be understood that modifications and variations may be effected without departing from the scope of the novel concepts of the present invention.

I claim as my invention:

1. A wrapping machine comprising a support structure defining a central open space, a driven shaft journaled in said structure and extending across said space, a cam operated drive mechanism for intermittently rotating said driven shaft, a carrier having spaced web members keyed to said shaft, each web member having a plurality of angularly spaced, radially extending arms aligned with the arms of the other web member, a drive shaft journaled between each pair of aligned arms, rollers keyed to each drive shaft, means for rotating the drive shaft to cause continuous rotation of said rollers, means supported on said structure for delivering a roll to said carrier, means for pressing said roll against said rollers during movement of said carrier, power means for actuating said intermittent drive mechanism to cause movement of said carrier successively through a plurality of stations including a wrapping station, a gluing station and an end-capping station, a cutter arranged to cut a sheet of wrapping paper to a predetermined length, a mechanism for applying glue to the under surface of the leading and trailing edges of the sheet, feed rolls for delivering a sheet of wrapping paper to said wrapping station, a guide member for pressing said sheet against said roll to glue the leading edge of the sheet thereto, a second guide member contacting the edge of said wrapper sheet and pressing it against the end face of said roll and holding it thereagainst at two spaced points permitting buckling of the edge between the points to form a flap and pressing said flap down against the end face of the roll, a glue wheel on each side of said structure for applying glue to the end flaps of the wrapper, and means for cutting a circular cap member from a supply roll and pressing it against said glued end flap to seal the end of the wrapper.

2. A wrapping machine comprising an intermittently operated carrier for advancing a roll to be wrapped through a wrapping station comprising means for continuously rotating the roll about its axis while in the wrapping station, means for delivering a sheet of wrapping paper of a length greater than the periphery of the roll and a width greater than the width of the roll to said wrapping station, a guide member cooperating with said sheet delivering means and said continuously rotating roll for centering the sheet over the roll, wrapping the sheet of paper around the lateral surface of the roll and tucking the overlapping ends of the sheet down on the end faces of the roll, comprising an inverted U-shaped channel member having a width slightly greater than the width of the roll to be wrapped and leg portions extending parallel to the end faces of said roll.

3. A wrapping machine comprising a support

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structure, an intermittently operated carrier for advancing a roll to be wrapped through a wrapping station comprising means for continuously rotating the roll about its axis while in the wrapping station, means for delivering a sheet of wrapping paper of a length greater than the periphery of the roll and a width greater than the width of the roll to said wrapping station, a guide member cooperating with said continuously rotating roll for centering the sheet over the roll, wrapping the sheet of paper around the lateral surface of the roll, and tucking the overlapping end of the sheet down on the end faces of the roll comprising an inverted U-shaped channel member having a width slightly greater than the width of a roll to be wrapped and leg portions extending parallel to the end faces of said roll and rollers mounted on said support structure adjacent the end of said channel member at each side thereof and arranged to contact the edges of the wrapper that have been previously folded down by the legs of the channel member.

4. A wrapping machine comprising an intermittently operated carrier for advancing a roll to be wrapped through a wrapping station comprising means for continuously rotating the roll about its own axis while in the wrapping station, means for delivering a sheet of wrapping paper of a length greater than the periphery of the roll and a width greater than the width of the roll to said wrapping station, a guide member cooperating with said continuously rotating roll for centering the sheet, wrapping the sheet of paper around the lateral surface of the roll and tucking the overlapping edges of the sheet down on the end faces of the roll, comprising an inverted U-shaped channel member having a wrapper entrant portion of a width to receive the wrapper between short leg portions thereof and having a wrapper discharge portion of a width slightly greater than the width of a roll to be wrapped, and having relatively long leg portions adjacent the discharge portion adapted to bend the side edges of the wrapper down to form flaps for the end faces of the roll.

5. A wrapping machine comprising an intermittently operated carrier for advancing a roll to be wrapped through a wrapping station comprising means for continuously rotating the roll about its axis while in the wrapping station, means for delivering a sheet of wrapping paper of a length greater than the periphery of the roll and a width greater than the width of the roll to said wrapping station and a guide member cooperating with said continuously rotating roll for centering the sheet, wrapping the sheet of paper around the lateral surface of the roll and tucking the overlapping ends of the sheet down on the end faces of the roll comprising an inverted U-shaped channel member having a wrapper entrant portion with a central flat guide surface of a width to receive the wrapper therein between short downwardly extending legs at either side for centering the wrapper in the guide means and causing it to assume an inverted U-shape and having a wrapper discharge portion of a width slightly greater than the width of a roll and having relatively long leg portions adapted to bend the said edges of the wrapper down to form flaps for the end faces of the roll, and a wall member at each marginal edge spaced from said leg members confining the downturned edges of the wrapper between the

wall members and the leg members as it passes therethrough.

CARL A. GERLACH.

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