June 10, 1958 C. R. GIBBONS 2,837,884

PACKAGE WRAPPING MACHINE

Filed Dec. 13, 1955 4 Sheets-Sheet 1

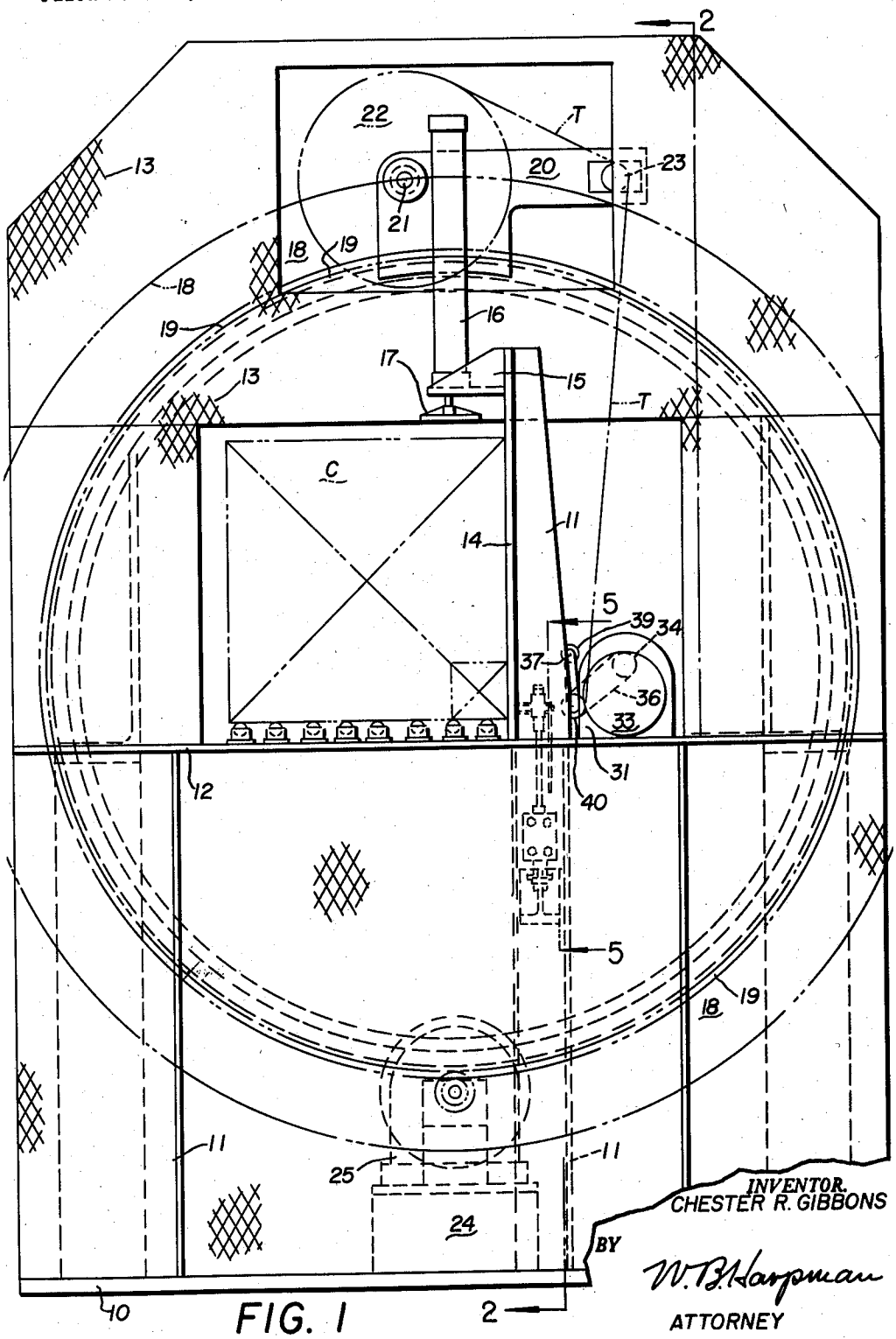


FIG. 1

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June 10, 1958 C. R. GIBBONS 2,837,884

PACKAGE WRAPPING MACHINE

Filed Dec. 13, 1955 4 Sheets-Sheet 2

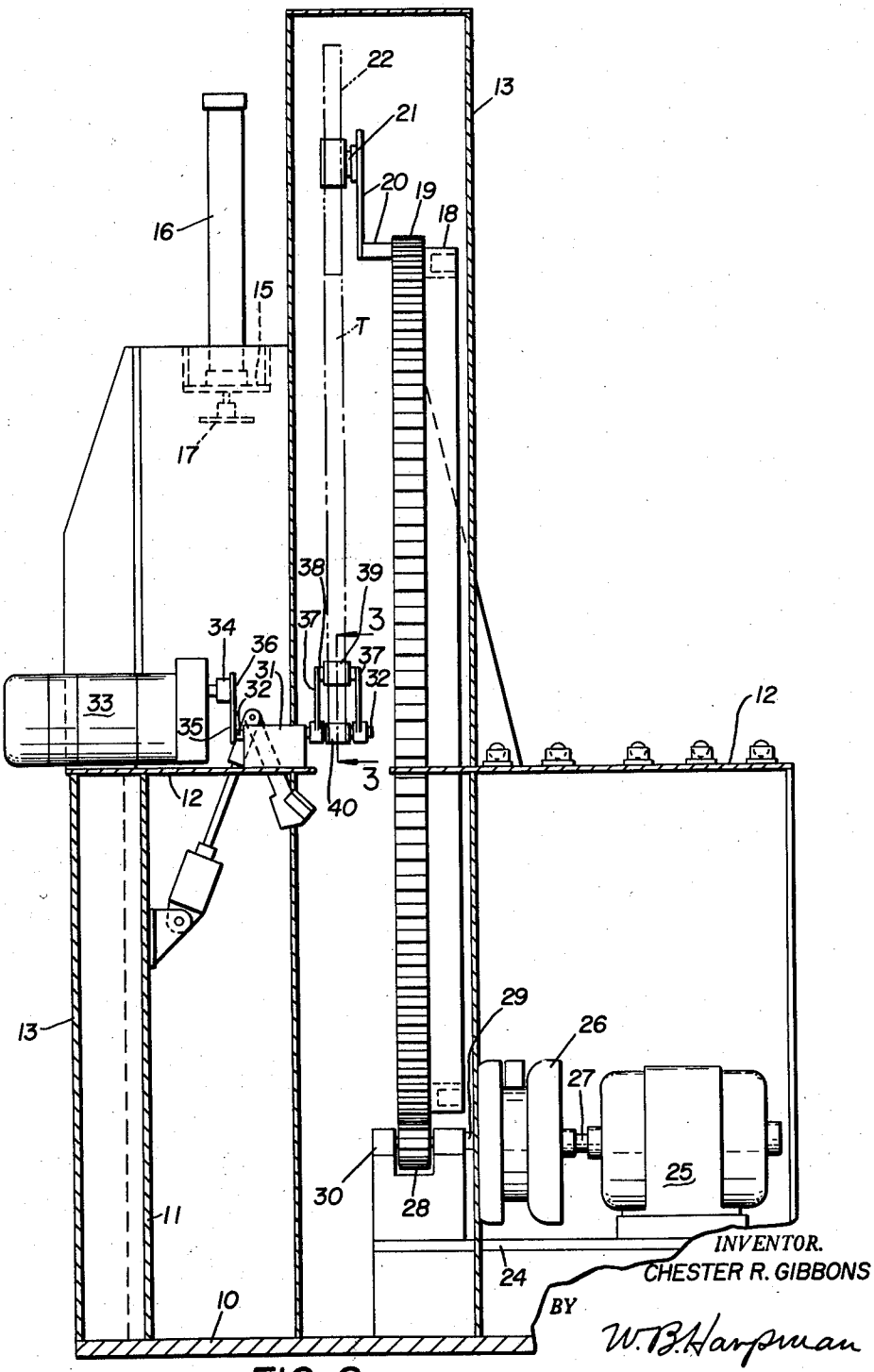


FIG. 2

June 10, 1958 C. R. GIBBONS 2,837,884

PACKAGE WRAPPING MACHINE

Filed Dec. 13, 1955 4 Sheets-Sheet 3

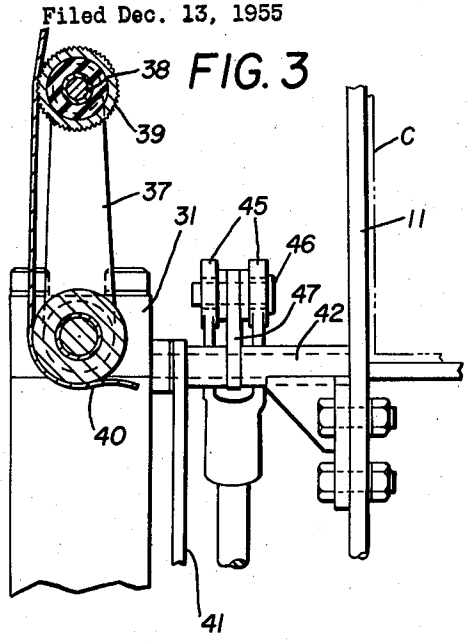


FIG. 3

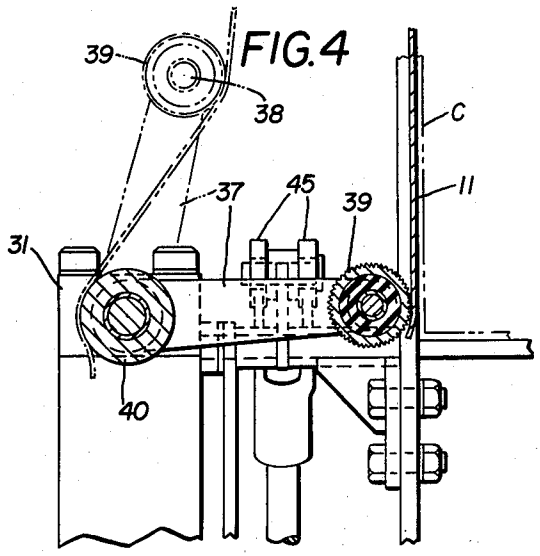


FIG. 4

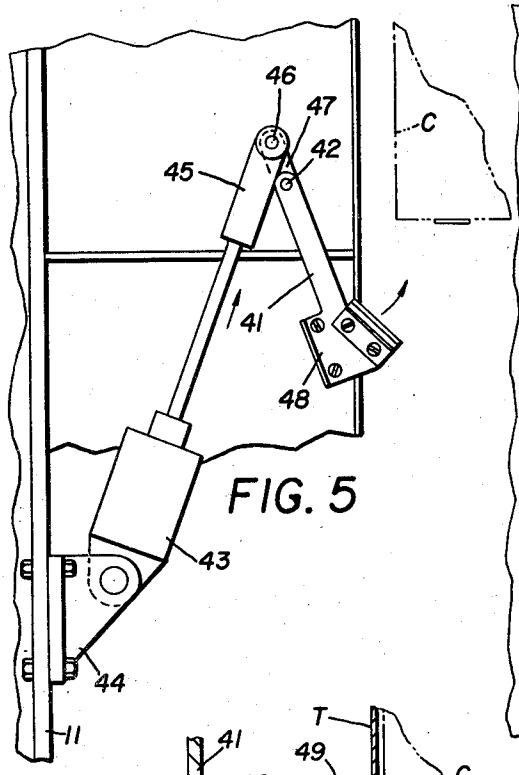


FIG. 5

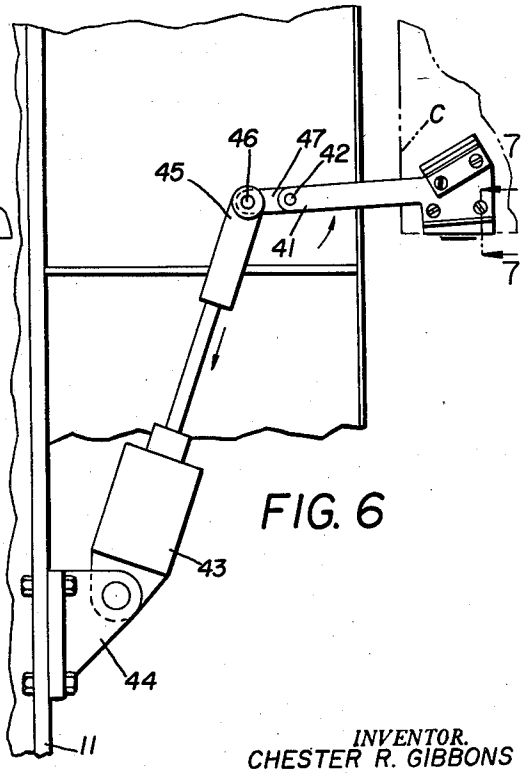


FIG. 6

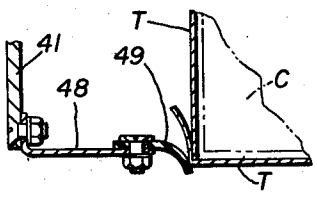


FIG. 7

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June 10, 1958 C. R. GIBBONS 2,837,884

PACKAGE WRAPPING MACHINE

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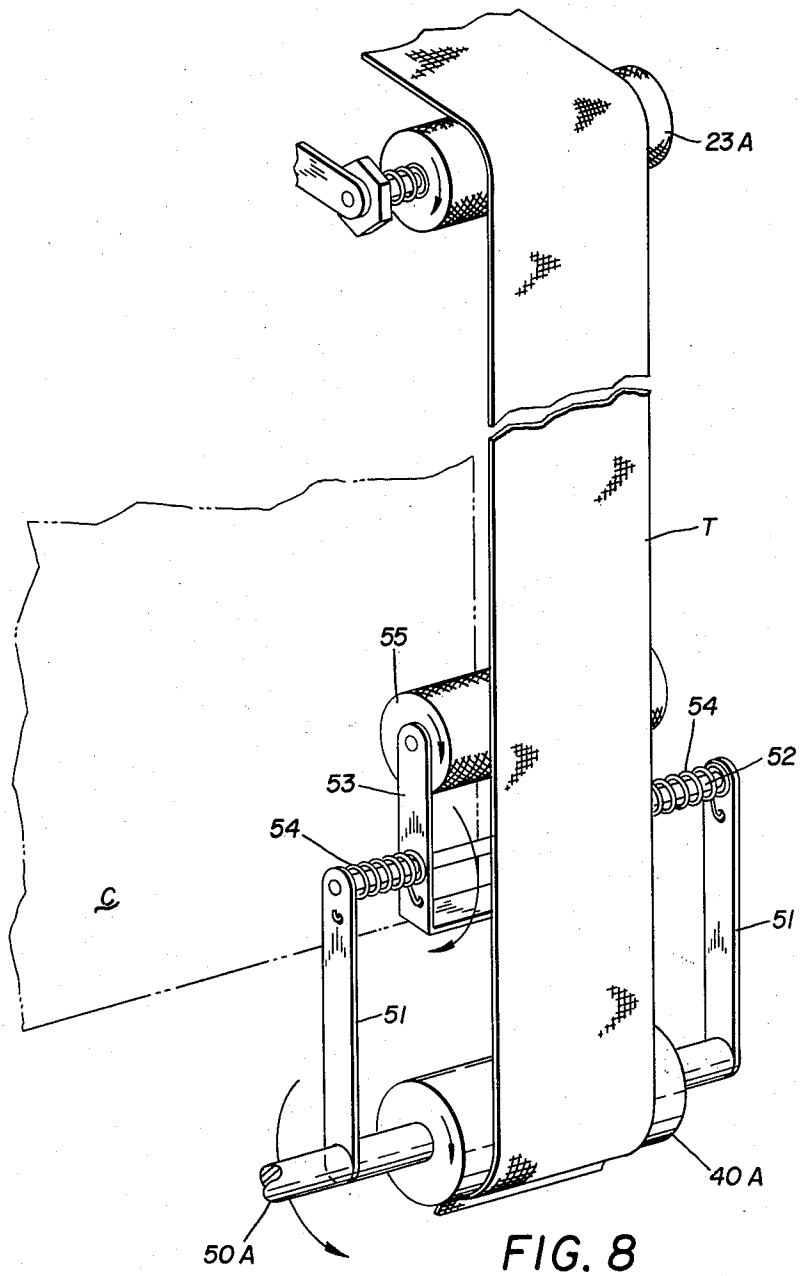


FIG. 8

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PACKAGE WRAPPING MACHINE

Chester R. Gibbons, Canfield, Ohio

Application December 13, 1955, Serial No. 552,818

6 Claims. (Cl. 53—198)

This invention relates to a machine for wrapping packages, cartons and the like with adhesive tape so as to close and seal the same.

The principal object of the invention is the provision of a machine that will automatically wrap a package or carton or the like with adhesive tape and cut off and apply the cut off end of the tape to the carton to effectively hold the same in closed sealed relation.

A further object of the invention is the provision of a carton wrapping machine which will automatically reset itself for subsequent operation following each wrapping cycle.

A still further object of the invention is the provision of an automatic wrapping machine which will hold a package in closed position, wrap tape thereabout and apply the cut ends of the tape to the package quickly and efficiently.

A still further object of the invention is the provision of a machine for applying adhesive to a carton to be closed thereby which incorporates means for tensioning the tape prior to, during and following application of the same to the carton so that the tape is tightly affixed to the carton to properly hold the same.

A still further object of the invention is the provision of a machine for applying adhesive tape about a carton to close the same and incorporating means for automatically cutting off the tape after the carton has been wrapped and applying the cut off end of the tape in a substantially overlapping manner with respect to the portion of the tape initially applied to the carton.

A still further object of the invention is the provision of a machine for wrapping packages, cartons, etc., with adhesive tape under tension which will operate rapidly and efficiently and is capable of re-cycling without adjustment or other attention.

The machine for wrapping packages, cartons or the like with adhesive tape as disclosed herein comprises an improvement in the art of closing and securing cartons in particular such as pasteboard cartons in which various merchandise is commonly packaged and shipped.

Such cartons have heretofore been commonly closed by hand and held in closed and/or sealed relation by the application of gummed tape usually incorporating a water soluble adhesive and sometimes incorporating a pressure sensitive adhesive.

Such machines as have heretofore been proposed for wrapping a carton while holding the same in properly closed and sealed position have been unable to apply the tape to the carton under sufficient tension to insure a proper and satisfactory closing.

The present invention relates primarily to an improvement in package wrapping machines which provides a machine that can and does tightly close the carton and tightly wraps the closed carton with adhesive tape and applies the tape to the carton in desired areas thereof and at the same time overlaps the ends of the tape applied a sufficient degree to insure the proper retention of the tape thereon.

In the disclosure of the machine herein made, reference is made to a carton and it will be understood that other objects such as packages or groups of objects such as commercial articles may be presented to the machine and wrapped thereby with efficiency equal to the disclosed embodiment.

With the foregoing and other objects in view which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being the intention to cover all changes and modifications of the example of the invention herein chosen for purposes of the disclosure, which do not constitute departures from the function and scope of the invention.

The invention is illustrated in the accompanying drawing, wherein:

Figure 1 is a back plan view of the package wrapping machine.

Figure 2 is a vertical section taken on line 2—2 of Figure 1.

Figure 3 is an enlarged detailed section taken on line 3—3 of Figure 2.

Figure 4 is an enlarged detailed section similar to Figure 3 showing progressive motion of the respective parts.

Figure 5 is an enlarged detail taken on line 5—5 of Figure 1.

Figure 6 is an enlarged detail similar to Figure 5 showing movement of the respective parts.

Figure 7 is an enlarged detail taken on line 7—7 of Figure 6.

Figure 8 is an enlarged detail of a portion of the tape feeding section of the machine of Figure 1 illustrating a modified tape applying section comparable with that illustrated in Figures 3 and 4 of the drawings.

By referring to the drawings and Figures 1 and 2 in particular it will be seen that the package wrapping machine comprises a base 10 having upstanding frame members 11—11 thereon and a transverse table-like section 12 supported on said frame members 11—11. A protective cage 13 is positioned on the base 10 and extends upwardly and over the respective portions of the machine with the exception of oppositely displosed openings in the front and back of the machine which permit a carton such as indicated by the letter C to be positioned on the table 12 and moved into the otherwise enclosed operating area of the machine.

Two of the upstanding frame members 11—11 form vertically standing guides defining one side of the opening through the cage 13 and against which the side of the carton to be wrapped is presented. The vertically standing guides of the upstanding frame members 11—11 are flanged as at 14 and the uppermost end of the same is offset as at 15 to support a vertically acting air cylinder and piston assembly 16, the piston portion being integrally formed with a vertically moving pressure plate 17.

The upstanding frame members 11—11 also support and position a circular frame 18 which mounts a ring gear 19 which in turn has a bracket 20 thereon which carries a spindle 21 on which a roll 22 of adhesive tape T is mounted. A portion of the bracket 20 is offset with respect to the spindle 21 and carries an idler 23 over which the tape T extending from the roll 22 is trained after leaving the roll of tape 22.

The base 10 supports a secondary base 24 which in turn mounts a driving motor 25 which is coupled to a gear reducing and indexing mechanism 26 by a shaft 27. The gear reducing and indexing mechanism 26 drives a pinion 28 on a shaft 29 which is journaled in bearings 30 and which is engaged with the periphery of the ring gear 19. It will thus be seen that when the driving motor 25 is

energized rotatable motion is imparted to the ring gear 19 which thereby revolves carrying the bracket 20 and the roll of tape 22 in an annular path around and about the openings in which the carton C is positioned.

Limit switches (not shown) are mounted on the circular frame 18 for engagement by the bracket 20 as it moves in its annular path. The limit switches are used to control the driving motor 25 so that the bracket 20 will be repositioned at the uppermost portion of the circular frame 18 at the completion of each cycle.

The transverse table-like section 12 does not extend through the machine from front to back but is separated by a gap, as best shown in Figure 2 of the drawings, and about which the bracket 20 and roll of tape 22 pass in describing their annular passageway around and about the carton positioned on the transverse table-like section 12.

A support member 31 is positioned on one portion of the transverse table-like section 12 and rotatably supports a shaft 32 which is driven by an adjacently positioned secondary driving motor 33 by way of pulleys 34 and 35 and a belt 36 which interconnects the same. The shaft 32 is thereby adapted to be revolved at such times as a limit switch engaged by the bracket 20 on the ring gear 19 energizes an electrical circuit (not shown) connected with the motor 33, and a pair of arms 37—37 secured to the shaft 32 in spaced relation will thereby be revolved. The outer ends of the arms 37—37 are interconnected by a shaft 38 which in turn carries a roller 39 which is formed of resilient yieldable material. The surface of the roller 39 is serrated or knurled, as best illustrated in Figures 3 and 4 of the drawings.

A secondary roller 40 also having a serrated or knurled surface is rotatably positioned on the shaft 32 intermediate the ends of the arms 37—37 which are secured thereon, as aforesaid, and the tape T, after passing over the idler 23 on the offset portion of the bracket 20, descends substantially vertically and is trained over the roller 40 with the adhesive side thereagainst. In such position, as best shown in Figures 1 and 2 of the drawings, the arms 37—37 are disposed slightly to the left of a vertical line through the roller 40 while the tape T descends on a line slightly to the right of the same center line. When the motor 33 is energized, as aforesaid, the shaft 32 carrying the arms 37—37 and the roller 39 revolves two counterclockwise revolutions as seen in Figure 1 of the drawings (clockwise as seen in Figure 4 of the drawings), moving from the position illustrated in Figure 2 of the drawings, where the roller 39 is near the top of its circular path, one complete revolution so as to engage the opposite side of the tape T extending from the idler 23 to the roller 40.

In the first part of its second revolution, the roller 39 pushes the tape T over and against the carton C and forcibly engages it against the side of the carton rolling down along the side of the surface of the roller 39 following a substantially vertical plane during this part of its revolution as it is distorted by its engagement against the side of the carton and thereby is capable of securely affixing the end of the tape to the lower right hand side of the carton, as seen in Figure 1 of the drawings.

As this occurs, the bracket 20 travels counterclockwise one revolution thereby wrapping the tape T successively around the right side, top, left side and bottom of the carton and from the bottom of the carton passing beneath and up and around the roller 40 where the adhesive tape again sticks. The tape T is tightly wrapped due to tension applied thereto at the idler 23 which is spring tensioned so as to cause the tape to pull tightly. Additional spring tension may be applied on the roll of tape 22 at the spindle 21, if desired, as by friction or spring means known in the art.

The roller 39 completes its second revolution prior to the tape T being positioned between the bottom of the carton and around the secondary roller 40 so that the completion of the cycle finds the parts in the same position as at the beginning of the cycle (as shown in Figure 1 of the drawings) with the exception that the tape T extends from the bottom of the carton over to and around the lower right hand portion of the secondary roller 40.

A cutting and wiping arm 41 secured at one end to a shaft 42 is moved through an arc based thereon (as best shown in Figures 5, 6, and 7 of the drawings) upwardly toward the carton C where it engages the tape T extending from the bottom of the carton to the roller 40, severs the same and at the same time wipes the end attached to the carton C upwardly against the side of the carton and thereby overlaps the portion of the tape first applied thereto. The arm 41 is moved by a piston and cylinder assembly 43 which is pivoted at one of its ends to a mounting bracket 44 which in turn is carried on one of the vertical frame members 11.

The piston rod of the piston and cylinder assembly 43 is provided adjacent its outermost end with a bifurcated end section 45 which is connected by a pin 46 with one end of a lever 47 which in turn is secured to the shaft 42. The same source of air pressure (not shown) utilized by the machine for actuating the clamping piston and cylinder 16 is utilized to actuate the piston and cylinder assembly 43 and its action is controlled by solenoid valves (not shown) in the air supply line thereto and which in turn are controlled by limit switches engaged by the bracket 20 in its annular travel path around the carton.

The cutting and wiping arm 41 includes an offset portion 48 which engages and cuts the tape T and which offset portion 48 also mounts a section of resilient material 49 which wipes upwardly and against the tape T to cause it to overlap the other end of the tape first applied to the carton C, as best shown in Figure 7 of the drawings.

It will thus be seen that the sequence of operations performed by the wrapping machine comprises initially the clamping of the carton or other package positioned therein through the openings in the protective cage 13 so that the carton spans the gap between the transverse table-like sections 12—12, as seen in Figure 2 of the drawings, and so that the rollers 39 and 40 are lined up substantially opposite the portion of the carton about which the adhesive tape is to be wrapped.

The machine is initially actuated by an operator pressing a suitable control switch (not shown) which initially actuates the motor 25 and starts the ring gear 19 revolving which carries with it the bracket 20 and the roll of adhesive tape 22. As the bracket 20 begins its circular travel, it engages the aforementioned limit switches which energize the secondary driving motor 33 and cause the shaft 32 to revolve whereby the end of the tape which had previously been secured to the roller 40, as shown in Figure 3 of the drawings, is engaged on the opposite side thereof, as shown in Figure 4 of the drawings, and moved over and pushed against the carton C so as to adhere thereto. It will be observed that Figures 3 and 4 of the drawings are sectional views taken in the opposite direction from the view shown in Figure 1.

While this is occurring, the bracket 20 continues its revolution about the carton C and returns to its position thereabove where it stops, having wrapped the right side, top left side and bottom of the carton C, as shown in Figure 1 of the drawings, and with the tape extending outwardly from the bottom of the carton, as seen in Figure 1, to the right and around the bottom and right hand side of the roller 40 to which it is again adhered.

At this stage of the wrapping cycle the piston and cylinder is actuated and momentarily causes the cutting and wiping arm to swing and cut the tape at a point adjacent the roller 40 and wipe the end thereof upwardly onto the side of the carton C and overlap the end initially applied. The limit switches engaged by the bracket 20 in its annular travel initiate these various actions and finally shut off the driving motor 25 and release the clamping cylinder 16. The carton C may thereafter be removed from the machine in suitably wrapped condition.

It will be observed that the particular points of novelty

in the disclosure which are responsible for initially attaching the tape to the end of the carton are the arms **37** and the roller **39** carried between their outermost ends. The roller **39** is of a resilient and yieldable nature so that when it defines its two revolutions it first strikes the carton and the roller **39** yields to permit the arms to pass the carton and as it completes its first revolution it engages the opposite non-tacky side of the adhesive tape, and in its second revolution forcibly engages the tape against the side of the carton. It will be remembered that the free end of the tape is still adhering to the roller **40** (as shown in Figure 4 of the drawings) when the tape is first moved by the roller **39** onto the side of the carton, the subsequent motion thereof freeing the end from the roller **40**, as best shown in detail in Figure 4 wherein the tape is shown in dotted lines in its initial position and in solid lines in its applied position.

Modifications in the structure for resiliently or yieldably engaging the carton with the end of the tape will occur to those skilled in the art and one such modification is hereinafter set forth. Figure 8 of the drawings shows a perspective view of a portion of a wrapping machine so modified. In Figure 8 of the drawings a shaft **50A** is adapted to be rotated by the secondary driving motor **33** in a counter-clockwise direction so that spaced parallel arms **51—51** secured thereto revolve thereabout and carry a shaft **52** between their outermost ends which in turn has a U-shaped frame **53** pivotally mounted thereon with coil springs **54—54** positioned about the shaft **52** intermediate the U-shaped frame **53** and the arms **51** with their ends secured to these members, respectively, and whereby the U-shaped frame **53** is urged to a position wherein the arms are in spaced parallel position with the arms **51—51** as shown in Figure 8 of the drawings.

A resilient roller **55** is journaled between the ends of the arms of the U-shaped frame **53** and is a counterpart of the resilient roller **39** heretofore referred to. The tape T is passed over the tension roller **23A** the same as that heretofore referred to on the offset portion of the bracket **20** and downwardly and over a roller **40A** which is the counterpart of the roller **40**, heretofore referred to. Counterclockwise revolving motion of the shaft **50A** thus moves the roller **55** over and into engagement with the carton C where the roller **55** follows a vertical path rather than a circular path based on the axis of the shaft **50A**. During its second revolution it pushes the tape T over and against the carton C and the spring tension occasioned by the coil springs **54—54** and the resilient nature of the roller **55** cause the tape to adhere tightly ot the side of the carton C. The tape is then wrapped the remainder of the way around the carton as previously described and the cycle is completed after the cutoff and wipe-on of the tape which leaves the next section of tape with its end portion secured to the roller **40A** exactly as described in the preferred embodiment of the invention.

It will thus be seen that the several objects of the invention have been met by the package wrapping machine disclosed herein.

Having thus described my invention, what I claim is:

1. In a package wrapping machine, means for receiving an object to be wrapped, said means having a circular pathway thereabout and comprising a frame having a ring gear rotatably mounted therein, means for revolving said ring gear and a bracket on said ring gear for rotatably supporting a roll of adhesive tape, a device positioned in said machine adjacent said circular pathway for applying an end portion of said tape to said object to be wrapped, said device including a rotatable shaft, means for rotating said shaft, said rotatable shaft having a roller thereon, the adhesive side of one end of said tape from said roll being adhered to said roller, a secondary roller mounted in spaced parallel relation to said roller on arms carried by said shaft and movable by said shaft in a circle thereabout, said circle intersecting said object to be wrapped whereby revolving motion of said shaft will move said secondary roller around said circle into initial engagement with said object to be wrapped and then against the non-adhesive side of said tape intermediate said first mentioned roller and said roll of tape to move said tape to engage said end of said tape on said object to be wrapped and simultaneously pull the same free from said first mentioned roller while said ring gear, bracket and roll of tape thereon revolve about said object to be wrapped, reciprocally mounted means for engaging and cutting said tape between said object to be wrapped and said first mentioned roller and for engaging said tape and wiping the end thereof onto said object to be wrapper in overlapping relation to the end of said tape first applied thereto.

2. The improvement in a package wrapping machine set forth in claim 1 and wherein said reciprocally mounted means comprises an arm having a tape cutter and resilient wiper blade on one end thereof, a shaft, said arm secured to said shaft and means for moving said shaft back and forth in an oscillating motion.

3. The improvement in a package wrapping machine set forth in claim 1 and wherein said secondary roller is formed of resilient and yieldable material.

4. The improvement in a package wrapping machine set forth in claim 1 and wherein said rollers are formed of longitudinally ribbed rubber.

5. The improvement in a package wrapping machine set forth in claim 1 and wherein control means are disposed on said frame to be engageable by said bracket on said ring gear and wherein said means for rotating said shaft and said means for revolving said ring gear are responsive in operation to said control means.

6. The improvement in a package wrapping machine set forth in claim 1 and wherein said arms carried by said shaft and supporting said secondary roller comprise two-part arms having resilient means interconnecting the same normally urging said two-part arms into coplanar relation.

No references cited.