Oct. 26, 1954 D. C. THOMPSON 2,692,464

MACHINE FOR WRAPPING ANNULAR ARTICLES

Filed Aug. 25, 1948 4 Sheets-Sheet 1

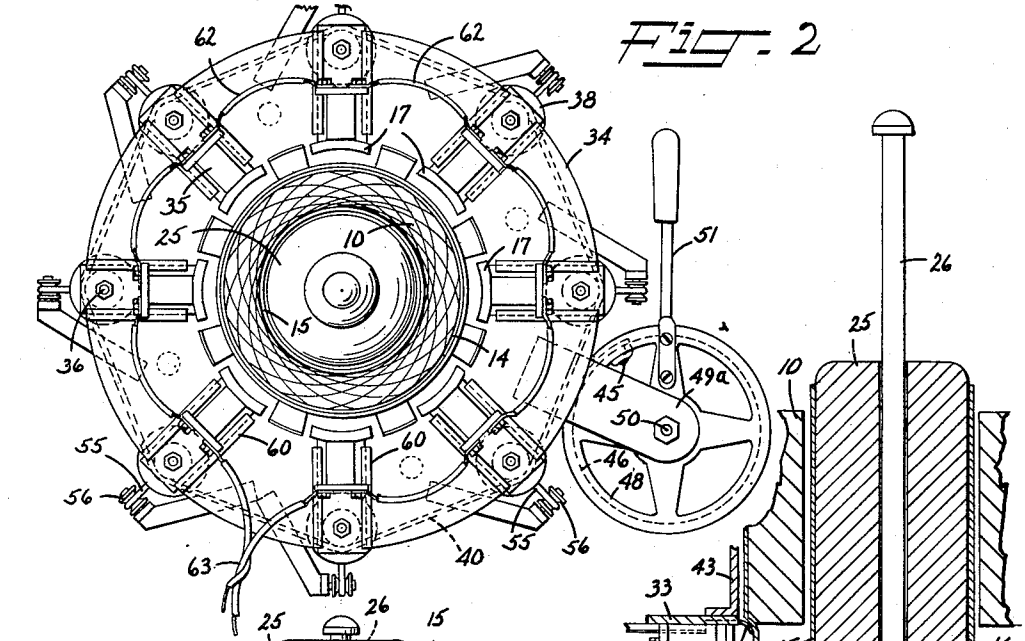


Fig. 2

Fig. 3

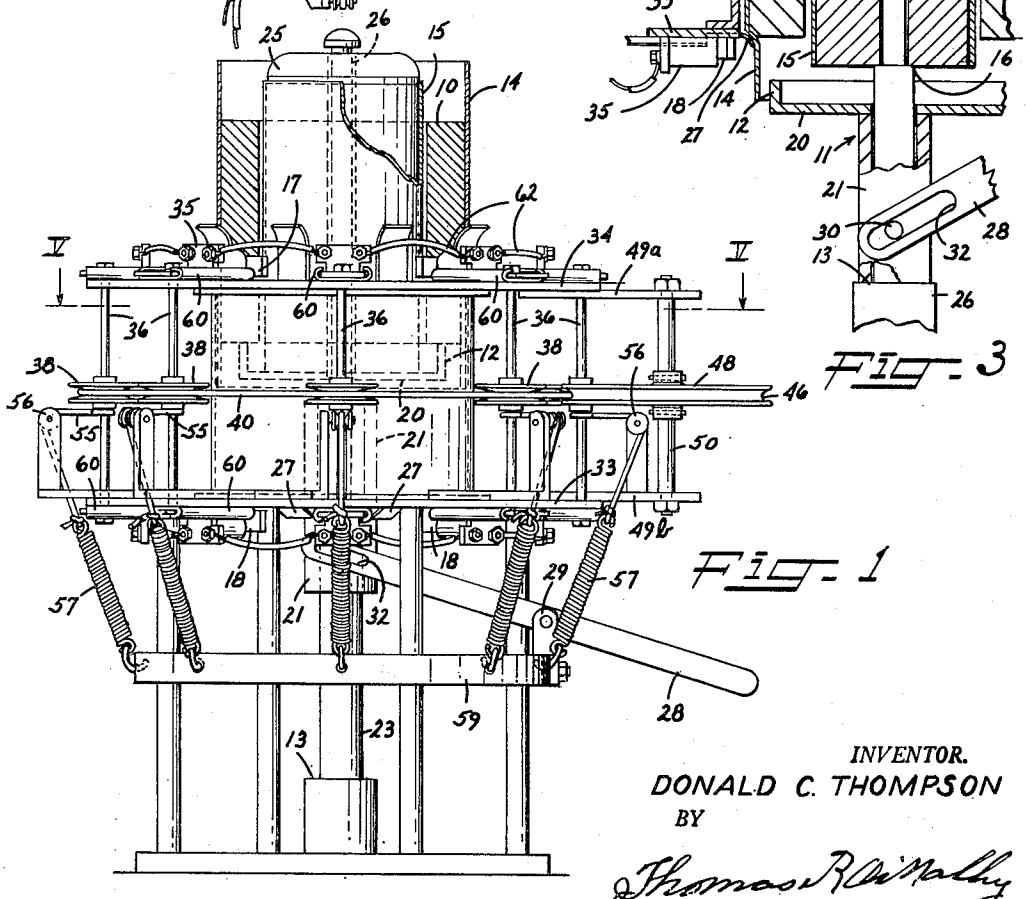


Fig. 1

INVENTOR.
DONALD C. THOMPSON
BY
Thomas R. McNally

Oct. 26, 1954 D. C. THOMPSON 2,692,464

MACHINE FOR WRAPPING ANNULAR ARTICLES

Filed Aug. 25, 1948 4 Sheets-Sheet 2

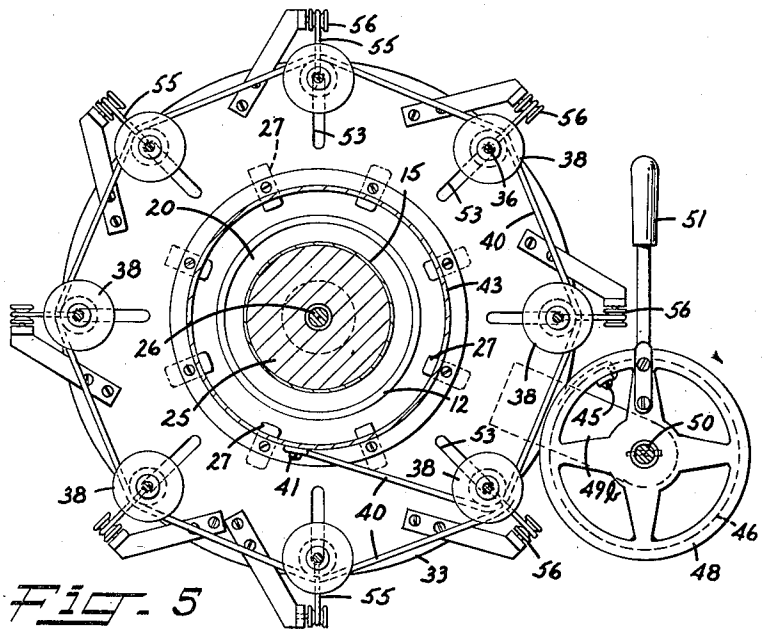


Fig. 5

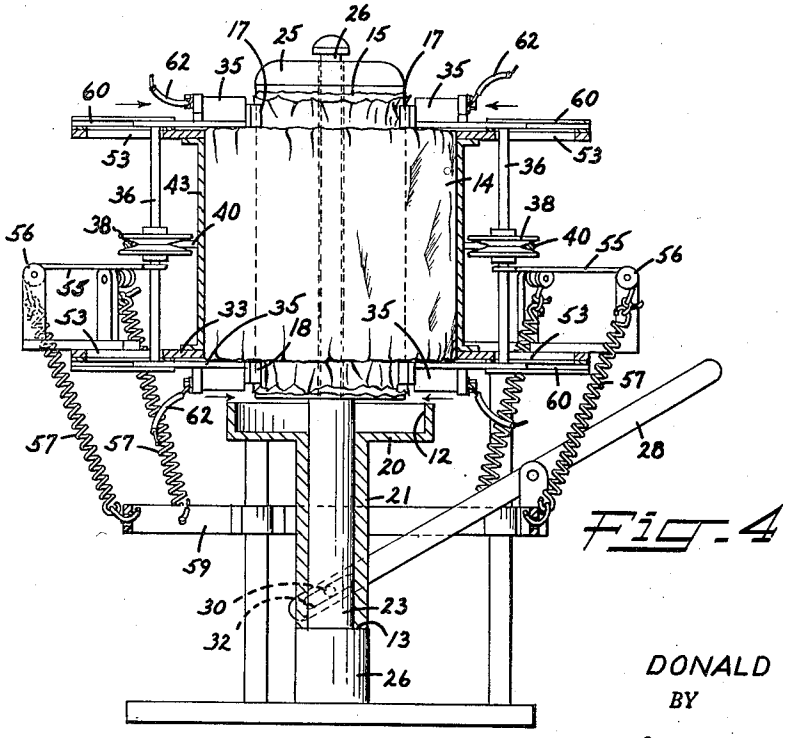


Fig. 4

INVENTOR.
DONALD C. THOMPSON
BY

Thomas B. Kinsley

Oct. 26, 1954 D. C. THOMPSON 2,692,464

MACHINE FOR WRAPPING ANNULAR ARTICLES

Filed Aug. 25, 1948 4 Sheets-Sheet 3

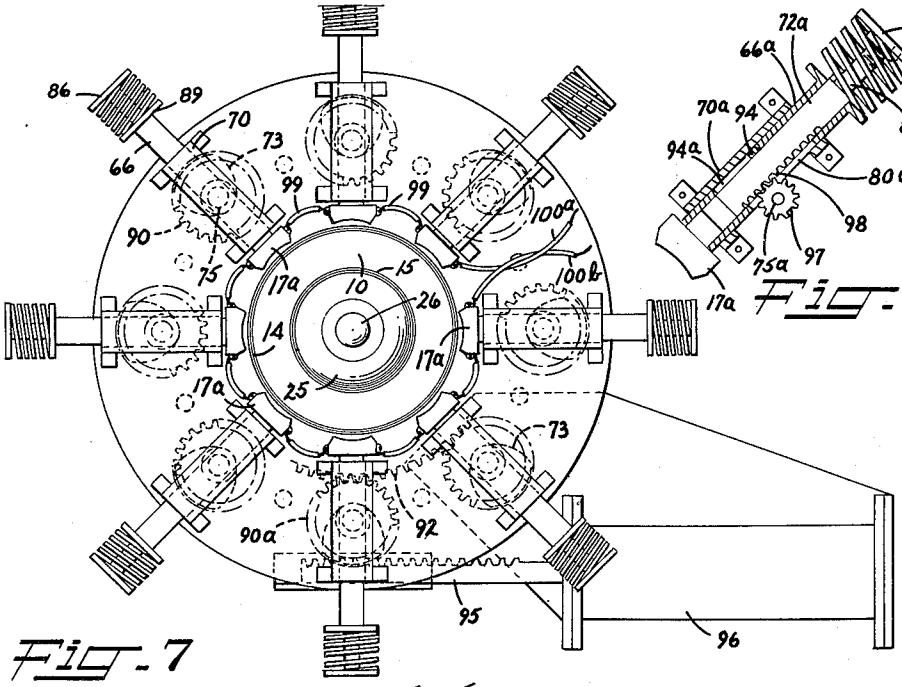


Fig. 7

Fig. 10

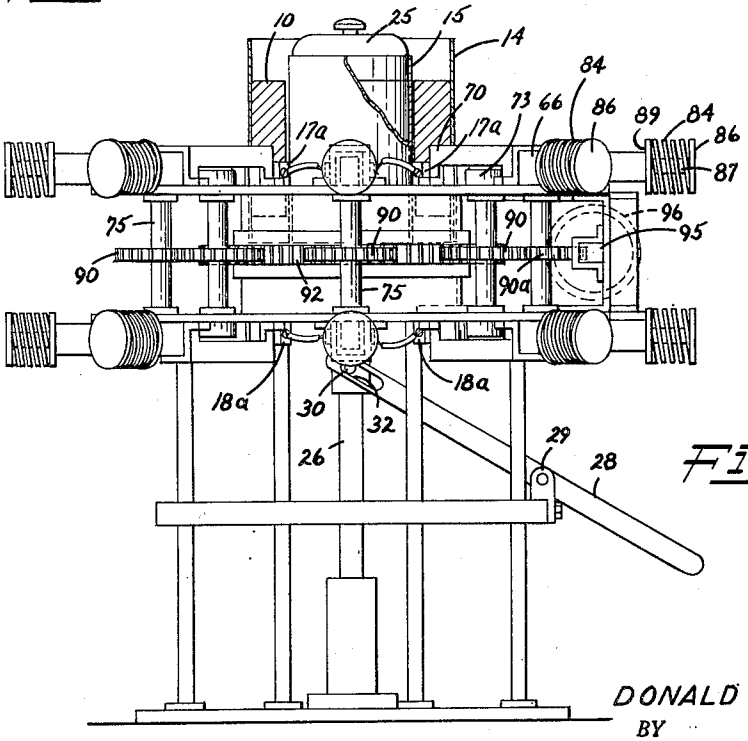


Fig. 6

INVENTOR.
DONALD C. THOMPSON
BY
Thomas B. O'Malley

Oct. 26, 1954 D. C. THOMPSON 2,692,464

MACHINE FOR WRAPPING ANNULAR ARTICLES

Filed Aug. 25, 1948 4 Sheets-Sheet 4

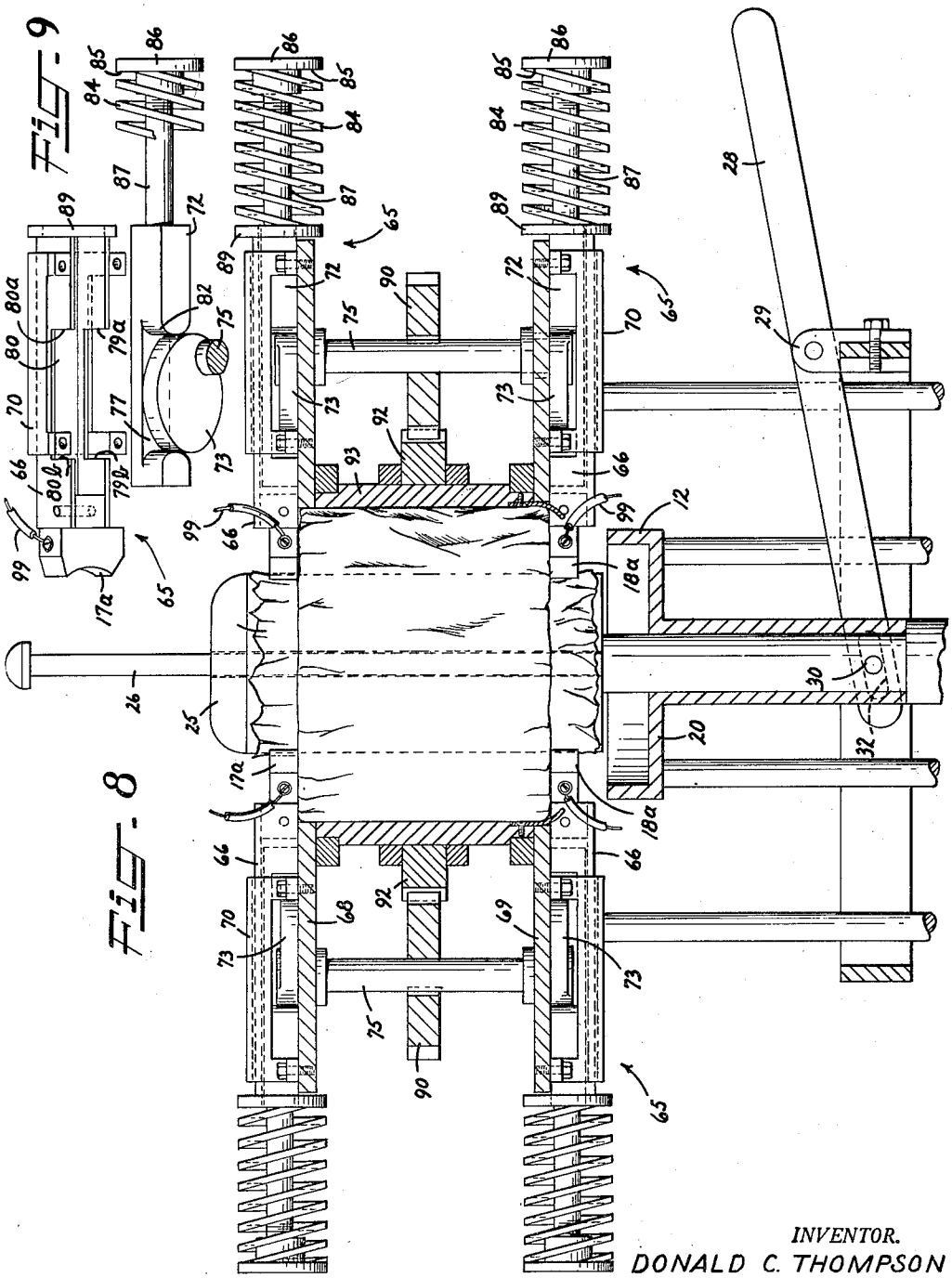


FIG. 8

FIG. 9

INVENTOR.
DONALD C. THOMPSON
BY
Thomas R. Kinsley

Patented Oct. 26, 1954

2,692,464

UNITED STATES PATENT OFFICE

2,692,464

MACHINE FOR WRAPPING ANNULAR ARTICLES

Donald C. Thompson, Sao Paulo, Brazil, assignor to American Viscose Corporation, Wilmington, Del., a corporation of Delaware

Application August 25, 1948, Serial No. 46,076

19 Claims. (Cl. 53—102)

1

This invention relates to protectively covering textile packages and particularly to an apparatus for applying a wrapper to an annular article such as strand packages.

Cakes of rayon yarn made by the viscose process, for example, after being removed from the spinning box are subjected to various treatments, such as washing, drying and dyeing. To prevent the strand and the cake from becoming tangled, snagged or broken during the handling involved in such operations, a cover is placed around the package which holds the windings of a strand substantially in their relative positions. The conventional cover used for this purpose is a sleeve 12 or 18 inches long of a knitted material such as rayon thread applied to a rayon cake by inserting it through the middle of the cake and folding the ends of the sleeve around each end of the cake and along the exterior annular walls of the cake with one end of the sleeve overlapping the other. The cost entailed in providing cake covers of this type is substantial and such that the covers must be used repeatedly until they are worn out. In fact the cakes are frequently shipped in the cover to textile manufacturers who remove the covers and return them to the yarn manufacturers for a rebate or credit.

It is an object therefore to provide an inexpensive strand package cover which may be discarded after being once used. Still a further object is to provide apparatus for enclosing a strand package with a discardable cover. Still another object is to provide a replaceable cake cover of sufficient durability to withstand handling and processing to which strand packages such as rayon cakes may be subjected in being prepared for weaving and knitting operations. It is an object also to provide an apparatus adaptable to modern automatic packaging machinery wherein many packing operations are carried out in rapid sequence and/or automatically. Other objects, features, and advantages of the invention will be apparent from the following description of the invention and the drawing thereof in which,

Fig. 1 is an elevation of one embodiment of the invention showing a strand package and package holder partly sectioned and in an elevated position.

Fig. 2 is a top view of the machine shown in Fig. 1;

Fig. 3 is an elevation partly in section and with parts broken away showing a support structure used in all of the apparatus herein illustrated;

Fig. 4 is an elevation in section of the machine

2

shown in Fig. 1 but with the package and package holder shown unsectioned and in a lower position;

Fig. 5 is a section of the apparatus shown in Fig. 1 taken along line V—V of Fig. 1;

Fig. 6 is an elevation partly in section of another embodiment of the invention for accomplishing the same operations as the apparatus of the first four figures;

Fig. 7 is a top view of the machine illustrated in Fig. 6;

Fig. 8 is an enlarged elevation view partly in section of a portion of the machine shown in Figs. 6 and 7 with parts thereof in position for sealing a cover;

Fig. 9 is an exploded view of the mechanism used to cause engagement of pressure elements with package cover portions; and

Fig. 10 is a fragmentary top view of a modification of a part of the apparatus illustrated in Figs. 6 and 7.

In brief, this invention comprises an apparatus for wrapping an annular article by placing the article between two concentric sheets and bringing the ends of the sheets projecting beyond each end of the article together in bonding engagement. While an article wrapped according to the invention may be completely enclosed and sealed, the central space or passageway is not enclosed by the wrapper and the contour of the space need not be substantially changed. The apparatus used to perform the wrapping is adapted to receive and support the package and the wrapper elements in such a relationship that parts of the apparatus may be caused to press together portions of the wrapper elements to be joined, and subject them to heat, if desired, and thereafter place the wrapped package in a position from which it may be removed manually or by automatic conveyor means.

Fig. 1 illustrates an apparatus which constitutes one embodiment of the invention wherein an article 10 such as a strand package may be placed on a vertically movable flange 12. A cylindrical wrapping portion 14 is supported on the exterior annular surface of the article or package 10 by means such as a rubber band temporarily placed around the portion 14 or a piece of adhesive tape placed on the outer surface of the portion across the edge of a circumferentially overlapping section. Wrapper portion 15 is supported within the central opening of the article on a mandrel 25. The package 10 and wrapping portions 14 and 15 when arranged on the supports therefor, may be lowered to a position

wherein the package 10 is supported in a region located vertically intermediately of upper and lower concentrically arranged pressure elements 17 and 18. The upper pressure elements 17 are moved radially inwardly to press the margin of portion 14 against the upper margin of portion 15 protruding above the package 10; the pressure elements 18 are operated similarly with respect to the lower margins of wrapper portion 14 and 15.

A supporting member 11 (refer to Fig. 3) comprising a flange 12, a disc portion 20, and a sleeve portion 21 normally carries the package 10 when the package is raised or lowered, such as before and after the sealing operation. However, the member 11 drops away from the lower end of package 10 and comes to rest on a shoulder 13 of a lower portion of shaft 26 as illustrated on Fig. 3. The package 10 on reaching its lowermost position relative to shaft 26 is supported by detents 27 which project radially inwardly from a plate 33 constituting a portion of the support structure of the apparatus. Detents 27 extend radially inwardly from the periphery of the central aperture of a plate 33 to engage the outer margin of the surface of the lower end of the package 10; detents 27 are attached to the plate 33 as by welding in the spaces between the pressing and sealing elements 18.

The shaft 26 consists of sections of decreasing diameter looking upwardly along the shaft. The shoulder 13 is the upper extremity of the lowest and largest portion; the next upper and smaller portion terminates in the shoulder 16 which determines the lowest position reached by a cylindrical member or mandrel 25 having a central bore of such diameter as to loosely fit the uppermost and smallest section of the shaft 26. When the upper surface of the disc portion 20 is above the shoulder 16, it supports the cylinder 25. However, when the package 10 and the cover elements 14 and 15 are positioned for the sealing operation, it is necessary that the member 11 drop away from the package being supported by the detents 27, to provide clearance for lateral movement inwardly along the end surface of the package 10 by the elements 18. After the cover sealing operation, the member 11 is used to raise the covered and sealed package to an elevation from which it may easily be removed from the apparatus. The assembly comprising the cylinder 25 and the member 13 is raised and lowered by a lever 28 pivoted on a bracket 29 and acting on a pin 30 attached to the sleeve 21. The pin extends through a slot 32 in the end of the lever 28.

The package 10 and cover portions 14 and 15 are placed in position on the elevated cylinder 25 and package supporting assembly 11 as shown in Fig. 1. They are then lowered into a position wherein the ends of the cover portions 14 and 15 projecting beyond the package 10 are brought into lateral alignment with the elements 17 and 18 by raising the outer end of a lever 28. The elements 17 and 18 may be thereafter moved radially inwardly to press together and seal the upper and lower ends of the elements 14 and 15. The detents 27 as they extend radially inward slant downwardly at a small angle, for example, 10 to 20 degrees to permit the package 10 to settle into a position whereby the elements 18 may move radially inward in close proximity or along the lower end of the package 10 so that the cover portion 14 will be folded neatly around the end of the package 10 and pressed against the end of the cover portion 15 which projects below the end of the package 10. Coinciding with the movement of the elements 18, the upper set of sealing elements 17 move inwardly over the upper end of package 10 to press together and seal the upper ends of the covers 14 and 15. The elements 17 and 18 are maintained at the inner position for sufficient time, i. e., a matter of a few seconds, for fusion and adhesion of the adjacent surfaces of the cover portions to take place. The elements 17 and 18 are heated by electrical means such as the coils 35 mounted thereon.

To move the elements 17 and 18 radially inwardly and outwardly along the surfaces of the plates 34 and 33 respectively, a cable pulley mechanism such as illustrated in Figs. 1, 2, 4 and 5 is used. Vertically disposed pairs of pressure elements 17 and 18 are connected by shafts 36. The upper end of each shaft 36 also extends through slots in the plates 34 and 33 which extend inwardly along these plates for a distance equaling the radial movement of the elements 17 and 18. This arrangement permits radial movement of the shafts 36 in a direction normal with their axes toward the axis of the package 10 and cylinder 25. A pulley 38 is secured on each of the shafts 36 midway between the plates 34 and 33. A cable 40 is anchored at 41 (Fig. 5) on a concentric support casing 43 which extends between and is secured to the plates 34 and 33. The cable 40 is led around the nearest pulley 38 in a counter clock-wise direction as viewed in Fig. 5, around the remainder of the pulleys 38 and is secured at point 45 within a peripheral groove 46 of a wheel or windlass 48. Wheel 48 is supported on bracket members 49*a* and 49*b* and a shaft 50 extending therebetween. Members 49*a* and 49*b* are secured to plates 34 and 33. Wheel 48 is provided with a lever 51 by means of which the wheel 48 may be rotated in a clockwise direction to exert tension on the cable 40. As the wheel 48 is rotated, the length of cable about the pulleys 38 is contracted and the pulleys and the shafts 36 are forced radially inwardly of the plates 34 and 33 along the slots 53. As the ends of shaft 36 are extended through journals therefor in the sealing elements 17 and 18, said elements are forced inwardly toward the package cover element 14. However, as soon as the cable 40 is released the shafts 36 are pulled outwardly by resilient means comprising cables 55 attached at one end to shafts 36, extending over pulleys 56 and attached by their other ends to springs 57 secured to a frame member 59 of the machine.

Each of the elements 17 and 18 is slidable within guides 60, best shown in Fig. 1, secured to plates 34 and 33 by welding or other means. The elements 17 and 18 in order that they may be heated are provided with electric coils 35 attached to the radially outward portions of the elements 17 and 18 and as shown in Fig. 1 electrically connected in series by wires 62 and connected with an electric power circuit by wires 63.

A modified form of the apparatus shown in Figs. 1, 2, 3, 4, and 5 is shown in Figs. 6, 7, 8, and 9 for sealing a strand package cover. It differs essentially from the earlier embodiment by the employment of gear means to obtain movement of radially movable sealing elements instead of the pulley-cable arrangement employed in the earlier described apparatus. The means for supporting and raising or lowering the package 10 and cover elements 14 and 15 therefor is the same as that used in the apparatus of Figs. 1, 2, 3, 4, and 5. The description of the present embodiment will proceed onward to the different

mechanism employed for joining the edges of the cover elements 14 and 15. Sealing of the upper and lower edges of the cover elements 14 and 15 is brought about by a radial movement of elements 17a and 18a which press the annular ends of cover portion 14 inwardly against the annular ends of the element 15 which project or extend beyond the ends of the package 10. Members 17a and 18a are mounted as shown in Fig. 8 on the ends of slidable rods or bars 66. These rods or bars are guided in their movement radially inwardly and outwardly of support plates 68 and 69 by guides 70.

A plurality of assemblies 65 are mounted on the upper surface of plate 68 and the lower surface of lower plate 69 in vertically disposed pairs. These assemblies 65 comprise the parts illustrated in Fig. 9 in an exploded view wherein the slidable channel member 66 to which an element 17a or 18a is attached, reciprocates within a guide member 70 secured to either plate 68 or 69. A slide bar member 72 normally fits within the channel of member 66 and is reciprocable therewithin. Members 72 and 66 when in assembled relationship are moved radially inwardly and outwardly with respect to plates 68 and 69 by cams 73. A cam 73 is secured to each end portion of each shaft 75 projecting through the plate 68 and 69. The cam 73, referring again to Fig. 9, moves the slidable portion of the assembly 65 by rotating within the notch 77 of the bar 72. In the most outward position of the members 66 and 72, the periphery of the cam 73 works against the edges 79a and 80a as well as the end 82 of the notch 77 This relationship is caused by the urging of bar 72 lengthwise to the right (as viewed with the parts oriented as they are in Fig. 9) within the channel member 66 by the spring 84 which bears on a surface 85 of a flanged nut 86 secured on the stud portion 87 of bar 72. The other end of the spring bears against the flange 89 of the channel member 66. However, when the cam 73 rotates clockwise from the position of the cams as shown in Fig. 7 to force the members 72 and 66 inwardly toward the package cover member 14, the element 17a or 18a attached thereto progresses inwardly until the end of the package cover 14 is pressed against member 15 of the package cover. When contact between the members 14 and 15 is first established, the spring 84 is distended holding the member 72 as far to the right as possible relative to member 66. However, as the cam continues to turn, member 72 moves to the left within member 66 held stationary as a result of its contact with the package cover members. The compression of spring 84 as the result of relative movement of members 66 and 77 results in resilient engagement of the element 17a or 18a with the work. In this manner uniform pressure is brought to bear on all the elements 17a or 18a engaging and sealing the ends of the package cover elements. To obtain this result, the cams 73 secured on opposite ends of shaft 75, must be exactly in phase with each other.

So that all of the sealing members may be moved in unison, the shafts 75 are interconnected by a gear system comprising a gear 90 mounted on each shaft 75, and a ring gear 92 supported concentrically about a casting 93 which extends between the plates 68 and 69. Ring gear 92 meshes with each of the gears 90; movement thereof results in a simultaneous rotation of all the gears 90. Movement of gear 92, however, is obtained as a result of rotation imparted by a straight rack gear 95 to gear 90a, similar to gear 90 and best shown in Fig. 7, in mesh also with ring gear 92. Rack gear 95 is reciprocated by a piston on the end thereof working within a conventional air cylinder 96 which may be caused to travel right or left in the apparatus of Fig. 7. Movement of the rack gear 95 to the right as shown on Fig. 7 causes clockwise rotation of the gears 90 and the cams 73 as shown by the arrows. Members 66 and 72 are forced toward the mandrel 25. They are retracted by a reverse movement of the rack gear 95. The valves (not shown) which control the air cylinder 96 may be operated manually, or by automatic control means such as a cyclical controller commonly used in the operation of automatically timed processing machinery.

In Fig. 10, an alternative means is shown which may be uesd instead of the cam system of the apparatus illustrated in Figs. 5, 6, 8, and 9. To obtain radial movement of the element 17a or 18a of the figures, instead of cams, small gears such as the gear 97 are mounted on the end of shafts 75a. A slide bar 72a, instead of having a notch such as the notch 77 of member 72 in Fig. 9, is provided with teeth 98 along a side thereof which mesh with the teeth of gears 97. A notch 80c is made through the side of the channel member 66a to permit extension therethrough of the gear 97 to make contact with the teeth of plunger 72a. The spring 84a and a nut 86a is used to support it along a stud section 87a with the plunger 72a for the same purpose as the analogous parts found in the apparatus in Fig. 9. However, to aid the plunger 72a in carrying the channel member 66a radially away from the package cover region, a pin 94 extends laterally away from the side of plunger 72a opposite the toothed side. The pin 94 slides within a slot 94a through the side wall of the channel member 66a in slidable contact with the plunger. The relationship of the slot 94a and the pin 94 are such that when the plunger 72a has moved outwardly within the channel member 66a, the spring 84a is substantially decompressed. The pin 97 contacts the end of the groove 98 and moves the channel member 66a also radially outwardly away from contact with the package or package cover.

As shown in Fig. 7 all the elements 17a and 18a are interconnected with wires 99 which may be connected in series, if preferred, as shown. Wires 100a and 100b lead off to an electric power source. The elements 18a also contain electrical heating means and may be connected in a similar manner.

In the various embodiments described and shown herein independent means are shown for controlling the position of the article or package and cover portions therefor, and the pressing and sealing means. Obviously these movable portions of the apparatus of the invention may be controlled automatically in timed sequence by cyclical controllers of conventional design. The apparatus provided by this invention may be used as a simple machine substantially as described, or incorporated merely as a portion into a larger machine comprising many such units. It may be considered as a unit of packaging an article or package of specific shape such as cakes of artificial filaments and adaptable for incorporation into large high speed packaging machinery of a general type which already exists.

The embodiments of the invention herein described are merely illustrative of mechanical

means which may be employed to support and elevate or lower the article or package and the cover portions and to press together and seal the end of the package cover. Other means than the electrical means employed are available for heating the cover portions being joined. For example, they may be heated by heated air or gas, or by a high frequency electrical field.

The material constituting the wrapper portions may be of any sheet material desired; in one preferred form it consists of a permeable tissue or tea bag paper having a very light permeable coating of a thermoplastic resin on one side of the paper and suitable for covering annular strand packages which are treated with liquids. The wrapper material may comprise also sheets to which an adhesive is applied merely to portions to be joined, or by still another expedient, a strand, strip, filament, or thread of a thermoplastic material may be inserted between surfaces to be joined before or during the wrapping process. This invention is not limited to any particular adhesive or resin however, and it is to be understood that any form of glue or cement may be applied instead of the thermoplastic filaments or yarns. If desired, one of its intertwisted filaments or yarns may be of a heat resistant type so that even after the sealing, the heat resistant thread remains to facilitate tearing the juncture of the package open or apart. If desired, the wrapping material may comprise thermosensitive material which becomes adhesive upon the application of heat. For example, a paper may comprise a substantial proportion (15 to 100%) of thermosensitive fibers, for example thermoplastic fibers formed of vinyl resins of which "Vinyon" is representative. In this case, the application of sealing means is unnecessary.

After application of the sealing means about the circumference of each protruding portion of the wrapper, when such sealing means is necessary, a second wrapper sheet or tube of permeable paper or paper-like material is placed about the outer circumference of the package preferably so that it fits snugly thereabout through a small amount of looseness may be tolerated.

Thereafter the protruding ends of the outer wrapper are folded down to engagement with the inner wrapper or, when the wrappers do not contain thermosensitive material, with the sealing means. The package may be sealed by the application of a hot iron or the element 17, 18, 17*a* and 18*a* of the drawings. Sealing may extend completely all the way around the package or it may be accomplished at spaced spots thereabout. The heat-resistant thread, where used, may extend out from the seal so that it is available for subsequent tearing after the treatment and the shipping of the package is completed.

The portions of the wrapper projecting outwardly from the sealed wrapper may be torn at spaced points and then folded back against the annular ends of the cake.

In general, the materials from which the covers of this invention are made comprise those papers or paper-like felts which are highly permeable and have good wet strengths. Such papers as have found use in the manufacture of individual portion tea bags are satisfactory. Papers made from regenerated cellulose fibers, such as are obtainable from viscose or cuprammonium cellulose solutions, lengths from about 3/15 inch to one inch or longer have high wet strengths and may be used successfully in the practice of this invention. Any permeable paper which has increased wet strength as the result of resin impregnation during or subsequent to their formation into a sheet is suitable. Examples of such papers are those which are formed from fibers impregnated with urea-formaldehyde, phenol-formaldehyde, melamine formaldehyde resins and the like. Other suitable covering materials are those of paper-thin felts made from fibers either of paper- or textile-making length comprising a small proportion of heat-activatable fibers or consisting entirely thereof which are caused to adhere to each other as well as the non-activatable fibers, if any, wherever they touch by activation to an adhesive state and subsequent deactivation. Suitable activatable fibers include thermoplastic fibers of the cellulose ester type, such as cellulose acetate, and of the vinyl resin type, such as the polyvinyl chlorides, copolymers of vinyl chloride with vinyl acetate, and after-chlorinated polyvinyl chlorides or copolymers of vinyl chloride and vinyl acetate. Such fibers may be activated to an adhesive condition by heat or by solvent or swelling agents. The papers or paper-like felts containing such fibers may be compacted under pressure while the fibers are in adhesive condition to assure adhesion together at their points of crossing and may be deactivated by cooling or evaporation of solvent. The use of the vinyl resin fibers is especially advantageous where the processing liquids to which the wound packages are subjected are highly corrosive, and for this purpose, a paper composed entirely of chemically resistant vinyl resin fibers may be used, the permeability and wet strength in such case being controlled either by careful control over the conditions of activation or by mixing a selected proportion of vinyl resin fibers which are activatable at a lower temperature or by a lower concentration of solvent agent than the rest of the vinyl resin fibers. Thus fibers made of the less easily activated after-chlorinated copolymers of 70 to 95 parts by weight vinyl chloride with 30 to 5 parts by weight of vinyl acetate may be mixed with a predetermined proportion of fibers made of the corresponding unchlorinated copolymers.

The wrappers may be perforated or slitted, but preferably they are of sufficient permeability without perforation or slitting to allow free passage of the treating liquids and the gases during liquid treatment, vapor treatment, and the like. As another expedient, it may be preferred to feed molten resinous material into the region between the parts to be joined to eliminate the heating means for obtaining bonding or sealing of the cover portions.

While preferred embodiments of the invention have been shown, it is to be understood that changes and variations may be made without departing from the spirit and scope of the invention as defined in the appended claims.

I claim:

1. An apparatus for forming and sealing a wrapper about an annular article and arranged around a principal axis comprising a mandrel concentrally and movably supported along the axis, a lifting member concentrically and movably supported along the axis having an annular radial surface adapted for lifting and lowering the mandrel and an upwardly extending flange contiguous with the surface for supporting the article, two groups of elements spaced from each other in substantially parallel planes at a distance approximately equal to the length of the article and spaced from the axis of the mandrel

at a distance greater than the radius of the article including an exterior wrapper therefor, said elements being movable inwardly toward the mandrel, detent means for limiting the descent of the article to a position between the planes of the elements, detent means for limiting the descent of mandrel to a position between the planes of the elements, and means for lowering the lifting member to provide clearance for passage of the lower group of elements laterally past the lower end of the article.

2. An apparatus for forming and sealing a wrapper about an annular article comprising a central pedestal, a mandrel concentrically and slidably supported on the pedestal having an annular radially extending surface adapted for lifting and lowering the mandrel and an upwardly extending flange contiguous with said surface for supporting the article, two groups of elements spaced from each other in substantially parallel planes at a distance approximately equal to the length of the article and spaced from the axis of the mandrel at a distance greater than the radius of the article including an exterior wrapper therefor, said elements being movable inwardly toward the mandrel, support means for the elements, detent means for limiting the descent of the package to a position between the planes of the elements, detent means for limiting the descent of the mandrel to a position between the planes of the elements, and means for lowering the lifting member to provide clearance for passage of the lower group of elements laterally past the lower end of the article.

3. An apparatus as in claim 2 wherein the supporting means for the elements comprises two spaced substantially parallel plates apertured to permit insertion therethrough of an article and an outer cover member therefor, each of said plates supporting a group of elements laterally slidable with respect thereto.

4. An apparatus as in claim 2 comprising also vertical shafts opposite ends of which extend through corresponding members of the upper and lower groups of the elements, and means for moving the shafts sidewise toward the axis of mandrel.

5. An apparatus as in claim 2 comprising two spaced substantially parallel plates apertured to permit insertion therethrough of an article and an outer wrapper portion each of said plates supporting a group of elements slidably with respect thereto, vertical shafts the opposite ends of which extend through corresponding members of the upper and lower groups of the elements, radial slots in the plates each along an area contacted by an element for extension therethrough of the shafts, and means for moving the shafts sidewise toward the axis.

6. An apparatus as in claim 5 comprising also a pulley secured to the middle portion of each shaft, a cable extending around the apparatus over the pulleys radially exteriorly of the shaft axes, and means for contracting the length of the cable around the apparatus.

7. An apparatus as in claim 5 comprising also a pulley secured to the middle portion of each shaft and a cable anchored at one end to a frame member of the apparatus extending around the apparatus over the pulleys radially exteriorly of the shaft axes and terminating in an end secured to a windlass mounted on the apparatus.

8. An apparatus as in claim 2 comprising two spaced substantially parallel plates apertured to permit insertion therethrough of an article and an outer wrapper portion therefor constitute the support means for the elements and each of the plates support a group of the elements slidably with respect thereto, vertical shafts extending through bearings therefor in the plates, cams secured to opposite end portions of each shaft, cam following surfaces on the elements in engagement with the cams, a gear secured on each shaft, gear means meshing with and interconnecting for the gear means for imparting clockwise and counter-clockwise movement to the gear means.

9. An apparatus as in claim 8 wherein the gear means is a ring gear meshing with the shaft gears spaced along its periphery, and the driving means for the gear means comprises a rack gear in mesh with a shaft gear, and a fluid cylinder operatively connected with the rack gear.

10. An apparatus as in claim 2 comprising two spaced substantially parallel plates apertured to permit insertion therethrough of an article and an outer wrapper portion therefor and constituting the support means for the elements whereby each of the plates slidably supports a group of elements, vertical shafts extending through bearings therefor in the plates, gears secured to the opposite end portions of each shaft, a side of the elongate portions of each of the elements provided with teeth in mesh with a gear, and an intermediate gear secured on each shaft to the portion extending between the plates, gear means meshing with and interconnecting all of the intermediate gears in simultaneous movement, and a driving means for the gear means for imparting clockwise and counter-clockwise movement to the gear means.

11. An apparatus as in claim 10 wherein the gear means is a ring gear meshing with the intermediate gears spaced along its periphery and the driving means comprises a rack gear in mesh with an intermediate gear, and a fluid cylinder operatively connected with the rack gear.

12. An apparatus as in claim 2 having means for reciprocating the elements wherein an element comprises a channel member having a wrapper engaging end portion supported within a guide mounted on the support means for the elements, a bar member supported slidably within the channel member and positively reciprocated by the reciprocating means, resilient means acting between positions of the bar member and the channel member to urge the channel member lengthwise of the bar member toward the mandrel, and detent means acting between the bar member and the channel member limiting the relative movement of the two members whereby the element may be disengaged from the wrapper during its radially outward movement from the mandrel but resiliently engages the wrapper at the extremity of its ambit toward the mandrel.

13. An apparatus as in claim 2 wherein each of the elements are heated.

14. An apparatus as in claim 2 wherein each of the elements have electric heating coil means attached thereto.

15. An apparatus for forming and sealing a wrapper about an annular article and arranged around an upwardly-extending principal axis comprising detent means for supporting the article with its axis extending upwardly, said detent means being arranged concentrically about said principal axis to engage an outer margin of the lower end surface of the article, a mandrel supported in generally coaxial relationship with said principal axis, said mandrel being adapted

to extend through the central opening of an article supported by the detent means with a portion of the wrapper for the article extending around the mandrel, the mandrel being longer than the article and extending beyond an end thereof, and at least one group of movable elements supported in the normal position thereof spaced from the principal axis at a distance greater than the radius of the article including an exterior wrapper portion therefor, said elements being disposed for movement inwardly toward the mandrel in immediate proximity with an end of said article seated on the detent means to engage the mandrel or said sheet material.

16. An apparatus for forming and sealing a wrapper about an annular article and arranged around an upwardly-extending principal axis comprising detent means for supporting the article with its axis extending upwardly, said detent means being arranged concentrically about said principal axis to engage an outer margin of the lower end surface of the article, a mandrel supported in generally coaxial relationship with said principal axis, said mandrel being adapted to extend through the central opening of an article supported by the detent means with a portion of the wrapper for the article extending around the mandrel, the mandrel being longer than the article and extending beyond at least one end of the article, and at least one group of movable elements supported in the normal position thereof spaced from the principal axis at a distance greater than the radius of the article including an exterior wrapper portion therefor, said elements being disposed for movement inwardly toward the mandrel in close proximity with an end of the article to engage the mandrel or said sheet material, and lifting means for moving the article lengthwise of the principal axis between its position in engagement with the detent means to a position above the detent means and said elements.

17. Apparatus for forming and sealing a wrapper about an annular article and arranged around an upwardly-extending principal axis comprising detent means for supporting the article with its axis extending generally upwardly, said detent means being arranged concentrically about said principal axis to engage an outer margin of the lower end surface of the article, a mandrel supported in generally coaxial relationship with said principal axis, said mandrel being adapted to extend through the central opening of an article supported by the detent means with a portion of the wrapper for the article extending around the mandrel, the mandrel being longer than the article and extending beyond both ends of the article, and two groups of elements spaced from each other in substantially parallel planes at a distance approximately equal to the length of the article and spaced from said principal axis at a distance greater than the radius of the article including an exterior wrapper portion therefor, said elements being movable inwardly toward the mandrel to engage the mandrel or said wrapper portion extending therearound.

18. Apparatus for forming and sealing a wrapper about an annular article and arranged around an upwardly-extending principal axis comprising detent means for supporting the article with its axis extending upwardly, said detent means being arranged concentrically about said principal axis to engage an outer margin of the lower end surface of the article, a mandrel supported in generally coaxial relationship with said principal axis, said mandrel being adapted to extend through the central opening, and beyond both ends, of an article supported by the detent means with a portion of the wrapper for the article extending around the mandrel, two groups of elements spaced from each other in substantially parallel planes at a distance approximately equal to the length of the article and spaced from said principal axis at a distance greater than the radius of the article including an exterior wrapper portion therefor, said elements being movable inwardly toward the mandrel to engage the mandrel or said wrapper portion extending therearound, and lifting means for raising and lowering the article between a position thereof above the upper group of elements and the position of the article when it rests on the detent means.

19. Apparatus for forming and sealing a wrapper about an annular article and arranged around an upwardly-extending principal axis comprising detent means for supporting the article with its axis extending upwardly, said detent means being arranged concentrically about said principal axis to engage an outer margin of the lower end surface of the article, a mandrel supported in generally coaxial relationship with said principal axis, said mandrel being adapted to extend through the central opening, and beyond both ends, of an article supported by the detent means with a portion of the wrapper for the article extending around the mandrel, two groups of elements spaced from each other in substantially parallel planes at a distance approximately equal to the length of the article and spaced from said principal axis at a distance greater than the radius of the article including an exterior wrapper portion therefor, said elements being movable inwardly toward the mandrel to engage the mandrel or said wrapper portion extending therearound, and lifting means for engaging the lower end of the article, said lifting means being movable lengthwise of the principal axis to raise or lower the article between a position thereof above the upper group of elements and the position of the article when it rests on the detent means, said lifting means being movable inwardly away from the end of the article to provide clearance for the passage of the lower group of elements laterally past the lower end of the article.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
1,134,208	Landin	Apr. 6, 1915
1,354,371	Angier	Sept. 28, 1920
1,380,448	Wheildon et al.	June 7, 1921
1,978,630	Hesson	Oct. 30, 1934
2,068,144	McAleer	Jan. 19, 1937
2,078,314	Busche	Apr. 27, 1937
2,168,583	Ringler	Aug. 8, 1939
2,301,016	Cannard	Nov. 3, 1942
2,371,858	Tuthill et al.	Mar. 20, 1945