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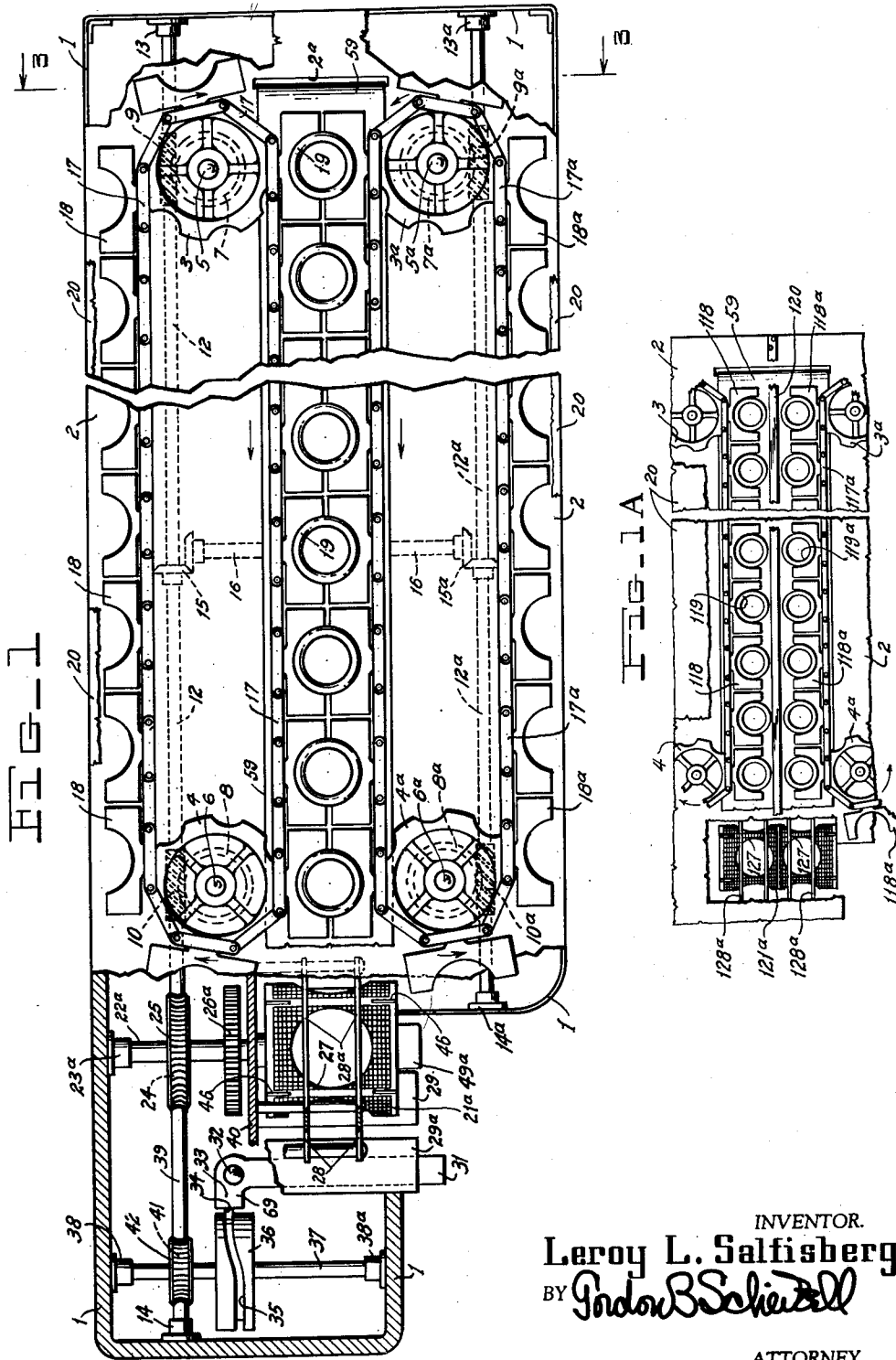
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PACKAGING APPARATUS

Original Filed Oct. 15, 1935

3 Sheets-Sheet 1



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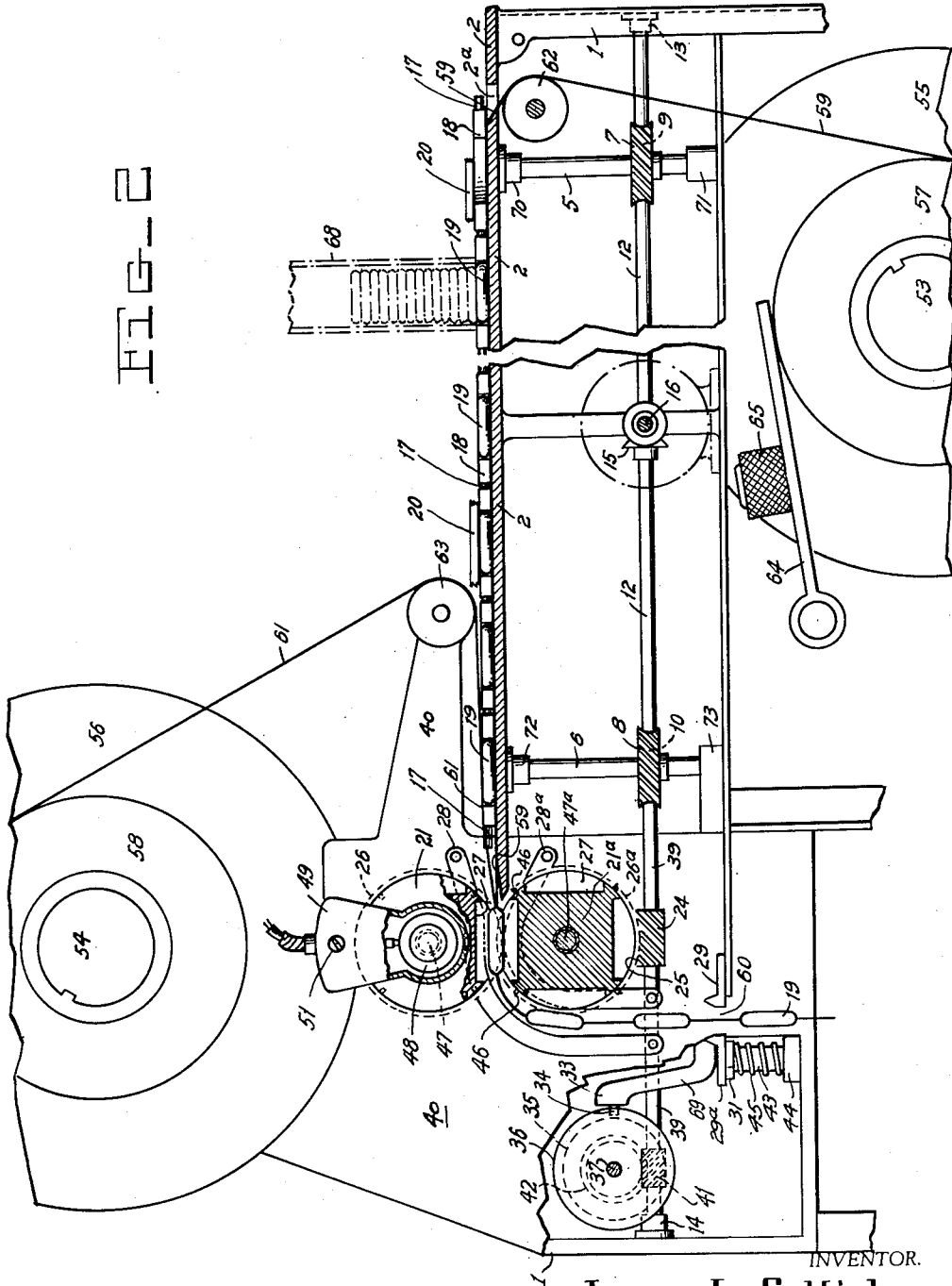
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PACKAGING APPARATUS

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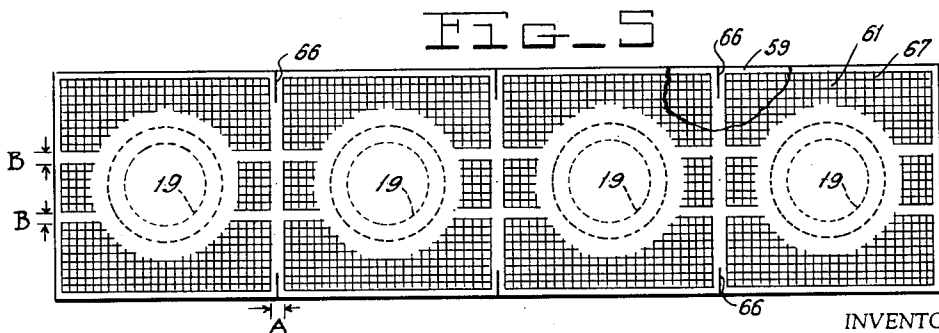
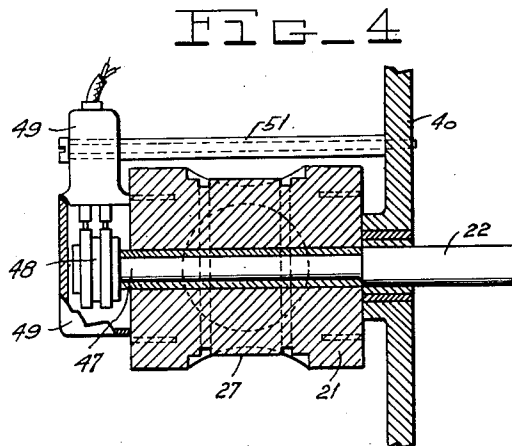
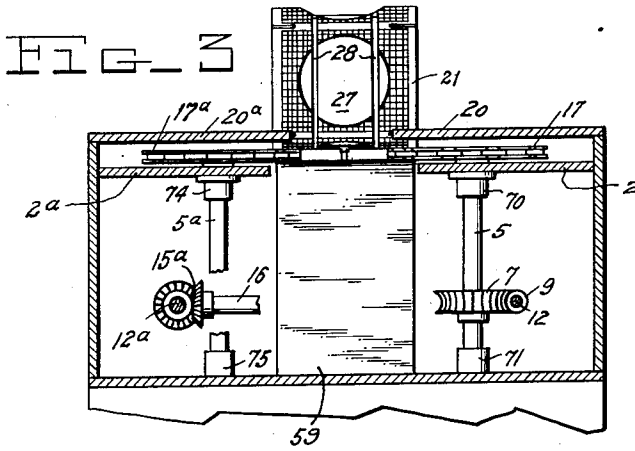
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PACKAGING APPARATUS

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# UNITED STATES PATENT OFFICE

2,083,618

## PACKAGING APPARATUS

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14 Claims. (Cl. 93—2)

This invention pertains in general to packaging equipment and specifically relates to a form of automatic packaging machine.

One of the objects of the invention is to provide a construction of packaging machine for effecting a continuous and rapid process in the production of packages.

Another object of the invention consists in producing a machine organization for effecting the rapid and continuous conveyance of commodity articles of unusual character, form and size, from a feeding source to packaging rollers.

Another object of the invention comprises providing a machine organization for the fabrication of packages having individual commodity containing enclosures for packaged commodities.

A further object of the invention comprises providing a construction of a packaging machine employing a plurality of sources of packaging material utilized in a continuous packaging operation for producing packages of a novel character.

These and other objects reside in a construction of packaging machine and a method of manufacture as will be readily apparent from the following description in conjunction with the appended drawings in which like reference numerals designate corresponding parts and in which:

Fig. 1 is a plan view of one embodiment of a packaging machine in accordance with the invention;

Fig. 1A is a plan view of an alternative form of the construction shown in Fig. 1;

Fig. 2 is a vertical and longitudinal sectional view taken centrally of the representation of Fig. 1;

Fig. 3 is a vertical cross sectional view taken along the line 3—3 of Fig. 1, showing an arrangement of power driven units of a link chain drive utilized in the invention.

Fig. 4 is a sectional view of the composite heating, crimping and sealing equipment employed in the invention.

Fig. 5 is a view of a typical package which may be fabricated in accordance with the invention.

This invention contemplates the use of a plurality of feeder rolls of packaging material which are positioned for feeding toward centrally positioned sealing and crimping equipment associated with a feeding mechanism in the form of a link chain drive which permits a continuous and rapid manufacturing process in the fabrication of packages of the type indicated. The link chain drive feeding mechanism of this invention facilitates the feeding to the packaging rollers of commodity articles, composed of rubber or like materials

which are unusually flexible and difficult to handle by ordinary means, as well as articles which may come in various indefinite and indeterminate shapes.

This feeding mechanism cooperates with the sealing and crimping roller equipment to properly position commodity articles between opposed layers of packaging material at spaced intervals while the sealing equipment crimps the packaging materials together at areas other than those occupied by the package, at the same time heating these areas in an oxidation process to form, by rapid production methods, a novel form of package.

Referring to the drawings in detail and particularly to Fig. 1, there is provided a general mounting structure 1, upon which there is secured a table plate 2. On the top of this plate 2 and movable along its surface, there is provided a link chain mechanism for conveying the commodity articles to the packaging equipment. This link chain mechanism consists of two parallel units similar to each other in construction. These units include endless link chain systems 17 and 17a, moving in the same direction around the radii of sprockets 3, 4, 3a, and 4a. To the alternate links of each chain there are attached conveying elements 18 and 18a, provided with circular recesses which act to enclose commodity articles 19. In moving along the top plate 2, the inner recesses of the conveying elements come into mutual engagement and form circular enclosures into which the commodity articles may be placed by operators stationed on opposite sides of the table. As the link chain mechanisms move toward the packaging equipment, there are always a multiplicity of the conveyor elements of the oppositely facing link mechanisms in engagement to form article receiving and conveying units.

A package forming cellulose strip 59 is fed through a slot opening 2a in the plate 2, and extends lengthwise along the top of the plate 2, between the opposed sides of the link chain mechanism. When a commodity article is deposited in a circular enclosure formed by the engagement of conveying elements 18 and 18a to form article retaining and propelling units, the commodity article is in constant contact with the packaging strip 59 as it moves toward the package forming equipment.

Although the enclosures formed by opposing conveying elements 18 and 18a are circular in the present instance, they may be of any desired form or shape. The commodity articles repre-

sent in the drawings are rubber teething rings, but various other corresponding commodities may be similarly packaged. The system of the invention is particularly well adapted for receiving and propelling articles which are flexible and otherwise difficult to handle, as well as articles which may come in various indefinite shapes. In some instances, it may be desirable to employ a form of automatic feeding in place of hand feeding by operators positioned on opposite sides of the machine. In such an arrangement as shown in Fig. 2, a chute 68 may be provided centrally disposed along the plate 2. The articles such as the teething rings disposed within the chute 68 are permitted to fall within the recesses formed by the elements 18 and 18a as they pass underneath. Since the elements 18 and 18a otherwise present a substantially flat surface, the commodities are retained within the chute 68 while the elements pass therebeneath, except when one of the circular openings formed by coincidence of two of the finger elements comes into alignment with the chute, whereupon one of the articles is permitted to drop therein.

As may be seen in Figs. 1 and 3, cover plates 20 and 20a are provided extending over the link mechanism to shield the moving parts of the link chains from the operators. The plates cover all of the mechanism except the conveying elements as they come into engagement with each other from the oppositely disposed link mechanisms.

In Fig. 1 there are provided four sprockets 3, 4, 3a, and 4a disposed at the four corners of the top plate 2. The teeth of the sprockets engage the links of the link chain mechanisms 17 and 17a so as to rotate the two units of the mechanism in timed relationship, in the same direction, causing the conveying elements on the links to come into mutual engagement and their inner recesses to form circular enclosures to propel the commodity articles toward the packaging and crimping equipment.

The sprockets 3, 4, 3a, and 4a are mounted on spindles 5, 6, 5a, and 6a. Spindles 5 and 6 are journaled in bearings 70, 71 and 72, 73, respectively, as illustrated in Figs. 2 and 3. Spindle 5a is journaled in bearings 74 and 75 (Fig. 3), and spindle 6a is journaled in similar bearings, not shown. The spindles 5 and 6 are provided with gears 7 and 8, these gears being actuated by worms 9 and 10 which are in turn mounted on the driving shaft 12 (Fig. 2 and Fig. 3). A similar arrangement of driving gears 7a and 8a obtains for spindles 5a and 6a, with similar worm gears 9a and 10a mounted on driving shaft 12a. There are also mounted on drive shafts 12 and 12a, driven gears 15 and 15a (Figs. 2 and 3) which engage with driving gears mounted on a motor driven transverse shaft 16 (Figs. 2 and 3). This motor-driven shaft 16 acts through the gears 15 and 15a to cause the shafts 12 and 12a to rotate, which in turn actuate the sprocket spindles through the worm gears, thus causing the two lines of chain mechanism to move along the plate 2.

As shown in Figs. 1 and 2, the shaft 39 is an extension of shaft 12, and is journaled in bearing 14. This shaft has mounted upon it a worm 24 (Figs. 1 and 2), which engages gear 25 mounted on the shaft 22a journaled in bearing 23a. This shaft 22a has also mounted upon it a gear 26a which in turn engages with a similar gear 26 (Fig. 2) mounted on a shaft 22 which is journaled in bearings, not shown. These shafts 22 and 22a with the gears 26 and 26a cause the ro-

tion of packaging and crimping rollers 21 and 21a carried thereby (Fig. 2).

Referring again to Fig. 2, there is provided, on the general mounting structure 1, two reel spindles 53 and 54, positioned on opposite sides thereof. Mounted upon these reel spindles are reels 55 and 56, respectively. These reels are provided with central cores upon which rolls of packaging material 57 and 58 are respectively stowed for rotatable feeding purposes. The packaging material so provided is preferably of transparent strip or ribbon formation and is of a composition such as transparent regenerated cellulose with a heat treatment coating thereon, although other suitable material may be employed. Extending from the rolls 57 and 58 are leader strips 59 and 61, respectively. These leader strips feed into the heating and sealing equipment described later in detail.

Upon portions of the mounting structure 1 there is provided a pressure member 64 in the form of a bar pivotally mounted so as to engage in peripheral contact with the roll 57, to maintain the proper tension on the leader strip and avoid uncoiling of the roll of packaging material. This member 64 is provided with a longitudinal slot, not shown, within which a hand adjustable weight member 65 may be adjustably positioned. This weight member when adjusted back and forth in its slot regulates the pressure applied to the roll 57, to maintain the proper tension for different types of material. A similar arrangement is provided for roll 58.

The leader strips 59 and 61 extend centrally of the mounting structure in directions toward each other and pass over idler rolls 62 and 63, leader strip 59 passing up through a slot 2a and along the top of plate 2 and then in conjunction with strip 61 passing to the package forming and sealing equipment, the strips acting to enclose and hold the commodity articles 19 before passing into the packaging equipment. It is a feature of the invention that the strip 61 engages with the articles 19 while they are held by the mutual engagement of members 18, the strip 61 acting to hold the articles 19 in their proper spaced relationship after the members 18 have left the linear path of movement of the strip 59 and have begun to rotate about the sprockets 4 and 4a. The packaging equipment includes the rollers 21 and 21a, (Fig. 2) which combine several functions in their action and will now be considered more in detail.

Each of the rollers 21 and 21a is provided with one annular row of peripheral recesses 27, and in the present representation, there are four recesses in the row whereby each roller is provided with four recesses in all. It will be understood, of course, that the number of recesses and rows of recesses may be varied to meet various packaging requirements.

Referring to Fig. 2, the rollers 21 and 21a are provided with a plurality of stripper fingers 28 and 28a which are secured to a boss 40 on the general mounting structure 1. These stripper fingers are positioned in annular slots in the rollers 21 and 21a so as to occupy positions behind the recesses 27 at the point of intersection of the rollers 21 and 21a. The purpose of these stripper fingers 28 and 28a is to guide the leader strips 59 and 61 into and out of the rollers 21 and 21a and particularly to avoid any tendency of the packaging material to wrap around the rollers. In the area surrounding the recesses 27 on the rollers 21 and 21a there is provided cross-

hatched crimping surfaces. These crimping surfaces of the rollers 21 and 21a are complementary to each other and mesh with one another to produce an interdigitation of the opposed layers of packaging material fed to the rollers. However, the crimping area surrounding the recesses 27 is interrupted at spaced intervals and also provided with complementary cutting elements 46, (Fig. 1) which will be better understood in connection with the description of the product formed by the machine, as will be hereinafter pointed out.

The rollers 21 and 21a are secured upon the shafts 22 and 22a which are rotatably mounted through bearings in the boss 40. Referring to Fig. 4, it will be seen that the shaft 22 is hollow for a portion of its length coextensive with the roller 21. In this hollow portion a heater cartridge 47 is provided which includes a resistance element for heating the roller 21 to a temperature sufficient to cause oxidization and a physiochemical change in the regenerated cellulose packaging material when in contact therewith. At the outer extremity of the shaft 22 an insulating element 48 is provided with collector rings which connect with opposite terminals of the heater cartridge 47. The collector rings on the element 48 are engaged by contact brushes respectively carried by a terminal mounting 49 secured to the boss 40 by mounting element 51. The terminal mounting 49 is provided with suitable leads so that electrical energy may be supplied in the proper amount to the heater element internal of the roller 21. The roller 21a is provided with a similar heating arrangement. The complementary rotation of the rollers 21 and 21a is effected through the gears 26 and 26a, respectively, as shown in dotted line in Fig. 2. These two gears 26 and 26a engage each other so as to cause the rotation of the rollers 21 and 21a in timed relationship with respect to other moving parts of the packaging machine and with respect to each other in a manner such that the recesses 27 coincide with each other as the rollers 21 and 21a are rotated in opposite directions. The crimping surfaces of the rollers 21 and 21a then mesh with each other in a complementary fashion to cause a forced interdigitation of the layers of packaging material fed therebetween.

After passing through the crimping rollers 21 and 21a, the packaged commodity units, separated from the rollers by the stripping fingers 28 and 28a, follow through a prolongation of the stripping fingers into the cutting knife aperture 60, Fig. 2, where the packaged commodity is cut into units of predetermined lengths.

The arrangement of this cutting knife is shown in Figs. 1 and 2. There are provided two stationary cutting members 29 and 29a, rigidly fixed to the boss 40 and upon opposite sides of the course taken by the package structure as it emerges from between the rollers 21 and 21a. Beneath the two stationary members 29 and 29a and in abutting relationship thereto, there is provided a movable knife member 31, mounted upon a shaft 43 rotatably positioned in bearing 44. The bearing 44 is secured to a wall of the general mounting structure 1. A coil spring 45 is provided on the shaft 43 between the bearing 44 and knife member 31 for urging the latter into a predetermined position. At the upper end of shaft 43 a lever 69 is attached. This lever has a projecting end 33, provided with a follower element 34. The follower 34 engages in a groove 35 in a type of cylinder cam 36. The cam 36 in Fig. 1 is mounted upon a shaft 37 extending into

suitable bearings 38 and 38a in the walls of the general mounting structure 1. This shaft has mounted upon it a gear 42 which is driven by a worm 41, secured upon the extension shaft 39. The cam 36 and groove 35 therein, together with the driving gears therefor, are so constructed that a reciprocative motion is transmitted through the lever 33 to the movable knife member 31. This reciprocative motion produces a quick shearing effect between the knife member 31 and the cutting members 29 and 29a. This reciprocative shearing effect severs the finished package structure into composite units. The units may be of any desired length depending on the adjusted timing of the knife 31. As the package units are severed by the knife action they may fall into a suitable hopper or conveyor provided for the purpose.

Fig. 1A represents an alternative embodiment of the structure of Fig. 1 in which several articles may be simultaneously fed to the packaging equipment. In this instance, the packaging equipment is in the form of a pair of rollers including lower roller 121a having adjacent rows of recesses 127 and plural sets of stripping fingers 128a. Chain systems similar to those shown in Fig. 1 are provided and have article propelling elements 118 and 118a mounted thereon. The article propelling elements 118 and 118a are disposed upon opposite sides of a stationary vertical spacing bar 120 extending from the structure 2 centrally along the strip 59. This bar 120 acts as a separation for the articles 119 and 119a deposited on the strip 59 upon opposite sides of the bar. The articles 119 and 119a are thus propelled in two parallel lines to the recesses 127 of the crimping and heating rollers. By this arrangement it is possible to produce plural packages. It will be understood that such an arrangement may be further modified to include various other forms of mechanisms for feeding articles into equipment for forming plural unit packages.

More detailed consideration will now be given to the package structure itself as produced by the packaging organization. Referring to Fig. 5, it will be seen that the packaged articles 19 are disposed in a longitudinal row between two layers of regenerated cellulose. This cellulose material has been interdigitated by the complementary crimping surfaces of the rollers 21 and 21a in areas surrounding each of the articles 19. It will be noted that the crimped area surrounding each article is in the form of a square and that the squares for the various articles are interrupted by a separation line "A" extending transversely of the packaging material. This separation line divides the articles and the accompanying packaging material into individual package squares. At the edge of the separation lines "A", perforations 66 are provided. These perforations extend entirely through both layers of the cellulose material and permit the easy separation of each of the package units from the composite package unit as a whole, so that the consumer can detach a square containing one article for individual use. The multiple package can be made to contain as many units as desired or they may be cut into individual units. Other lines "B" are provided running through the rows of commodity containing units.

The perforations 66 of the package structure are effected in the packaging material as they pass between the rollers 21 and 21a due to a cutting action of these rollers, brought about by

knife elements 46, provided on the roller 21, as shown in Fig. 1. These knife elements engage with complementary portions of the roller 21a and cut the packaging material to produce the perforations 66 as the package material passes between the rollers. It will be seen therefore that the rollers 21 and 21a simultaneously perform a multitude of operations consisting of the feeding of the packaging material, the positioning of the commodity articles between opposed layers of the material, the interdigitation of the layers under pressure in areas surrounding the commodity articles, and the heating of these areas within a range to produce oxidization and physio-chemical change of such areas to assume an embrittled character susceptible to easy tearing for promoting facile removal of the commodity articles from the packaging material. The package thus produced utilizes the normal tough and wiry nature of the regenerated cellulose for article containing envelope areas, while the seal or bond areas surrounding the same are of an embrittled nature for gaining easy access to the envelope enclosure areas. The machine in its entirety is operable for producing the continuous and rapid fabrication of package units each containing individual commodity articles maintained in sealed and segregated spaced relationship.

Although a preferred form of packaging apparatus has been disclosed, it will be apparent that various modifications and equivalent structures can be produced without departing from the intended scope of the invention. Therefore, I do not desire to limit myself to the foregoing except as may be pointed out in the appended claims.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. A packaging apparatus comprising, a pair of mechanically complementary rollers having alternately disposed crimping surfaces and recesses, means for feeding a strip layer of packaging material to said rollers in an extended path having predetermined cross-sectional formation, commodity article conveying means for conveying commodity articles adjacent said layer of packaging material in a spacing arrangement such as to cause said commodity articles to coincide with said recesses in said rollers when rotated, and means for feeding another layer of material adjacent said articles on said first mentioned layer of material and between said rollers to produce article package formations.

2. A packaging apparatus in accordance with claim 1 in which said article conveying means includes a plurality of article spacing elements and means for moving said spacing elements in synchronism with the movement of said first mentioned layer of material whereby said articles are moved towards said rollers in engagement with both said spacing elements and said layer of material.

3. A packaging apparatus in accordance with claim 1 including a rigid surface along which said first mentioned layer of material is moved over said extended path, said rollers being disposed at one end of said path.

4. A packaging apparatus in accordance with claim 1 including a plate member over which said first mentioned layer of material passes in an extended path in contact therewith, and in which said article conveying means includes spacing elements movable along said path adjacent the surface of said plate.

5. A packaging apparatus in accordance with claim 1 in which said article feeding means comprises an endless chain mechanism having commodity spacing means mounted thereon.

6. A packaging apparatus in accordance with claim 1 in which said article conveying means comprises a pair of endless conveyors positioned upon opposite sides of the path of said first mentioned layer of material and adjacent one surface thereof, said conveyors being provided with mutually disposed elements engageable in the area of said path for forming article receiving receptacles in proximity to said layer of material to propel said articles in contact with said layer toward said crimping rollers.

7. A packaging apparatus in accordance with claim 1 including a plate over which said first mentioned layer of material is fed, in strip formation, toward said rollers, said article conveying means comprising a pair of endless link chains disposed for movement in a rectilinear path adjacent the upper surface of said strip and upon opposite edges of said strip, article receiving elements mounted upon links of said chains, the article receiving elements of said two chain mechanisms being mutually engageable in pairs to form commodity spacing receptacles on the surface of said strip of packaging material, and means for moving said strip of material and said mutually engaged article receiving elements in synchronism toward said rollers.

8. A packaging apparatus comprising, package forming equipment, means for conveying an exposed surface of packaging material toward said packaging equipment, and means for engaging a plurality of commodity articles in spaced relationship on the surface of said layer of material and at the same time propelling said articles toward said packaging equipment.

9. A packaging apparatus comprising, package forming equipment, means for feeding a layer of packaging material to said packaging equipment, conveyor means for propelling commodities along said layer concomitantly with the movement thereof, and means for feeding another layer of material to engage said commodities in said conveyor to transfer said articles in a held position between said two layers of material to said package forming equipment.

10. A general mounting structure, including a fiat table-like plate, a pair of crimping rollers disposed at one end of said plate with their axes substantially parallel to the plane of said plate, said rollers having article recesses therein, means for feeding a layer of packaging material along the surface of said plate over a path extending intermediate said rollers, a pair of endless chain mechanisms disposed adjacent one surface of said layer, commodity spacing elements mounted on said chain mechanisms, the commodity spacing elements of said respective chain mechanisms being mutually engageable at a point near the beginning of said path to form commodity receptacles, said chain mechanisms being operable to move said mutually engageable elements along the path of movement of said layer of packaging material and concomitantly with the movement thereof, said endless chain mechanisms operating to disengage said elements at a point near said rollers, means for feeding another and complementary layer of packaging material to said rollers, and means for moving said chain mechanisms and said rollers in timed relationship to produce spaced package formations.

11. A packaging apparatus in accordance with

claim 8 in which said last mentioned means comprises a plurality of chain mechanisms having commodity spacing elements mounted thereon, and a stationary spacing device mounted between the elements of said respective chain mechanisms to form plural package formations.

12. Packaging apparatus comprising, package-forming equipment, article propelling mechanism having a plurality of article moving elements, means for moving a layer of packaging material adjacent said mechanism along the path of movement of said elements with articles supported by said layer and acted upon by said elements to propel the same towards said equipment in spaced formation, and means for feeding another layer of material to said package-forming equipment to engage said articles and transfer the same from said propelling mechanism to said package-forming equipment.

13. Packaging apparatus comprising, package-forming equipment, means for feeding plural layers of packaging material to said equipment to form packages, and a conveyor mechanism operable between said layers and having article spacing and propelling elements thereof movable along the surface of one of said layers for spacing and propelling articles supported on the surface of said layer.

14. In a system for feeding packaging material and commodity articles in spaced relation to a package-forming machine, means for feeding packaging material to support a plurality of commodity articles, and a conveyor operable alongside said material to engage said articles independently of said material and propel the same in spaced relationship concomitantly with the movement of said material.

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