

March 13, 1956

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2,737,764

METHOD AND APPARATUS FOR PACKAGING ARTICLES

Filed Jan. 30, 1953

3 Sheets-Sheet 1

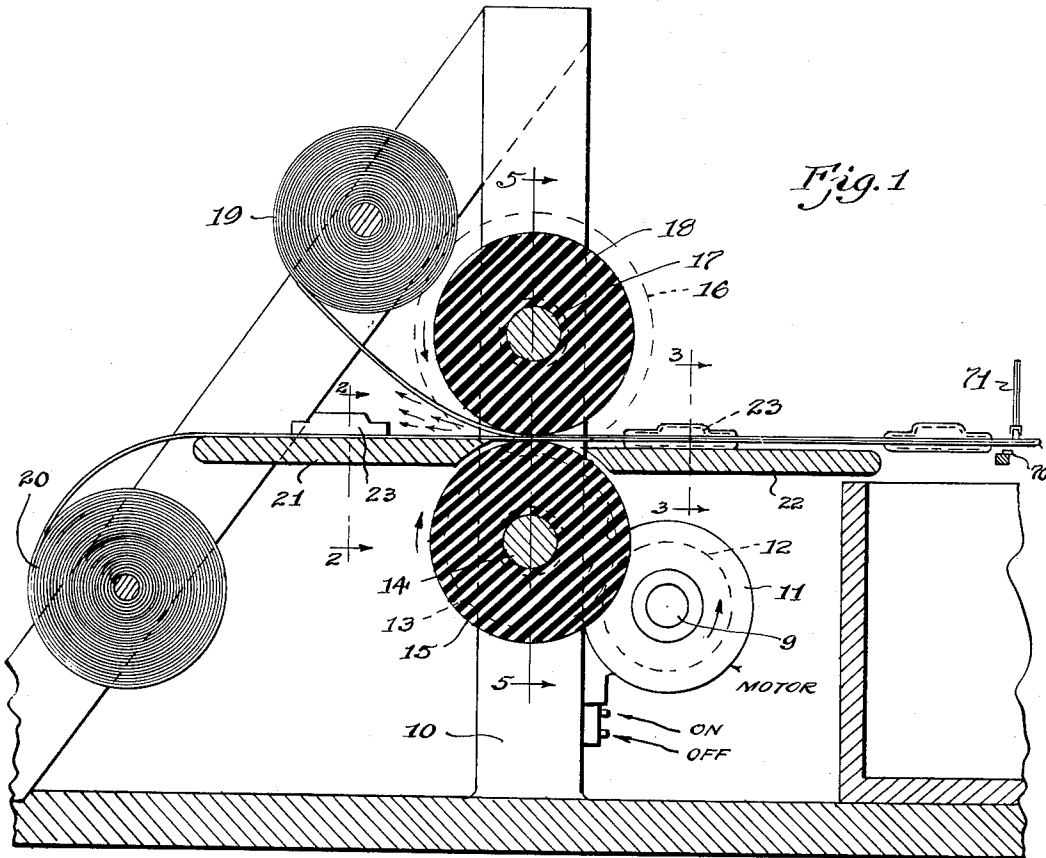


Fig. 1

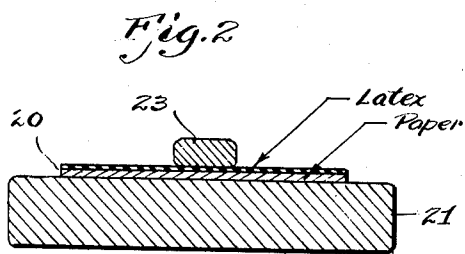


Fig. 2

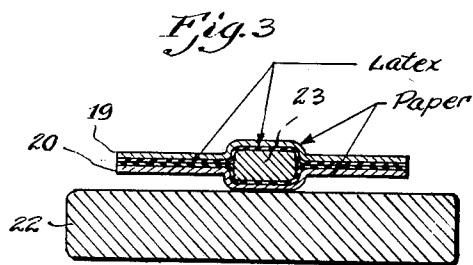


Fig. 3

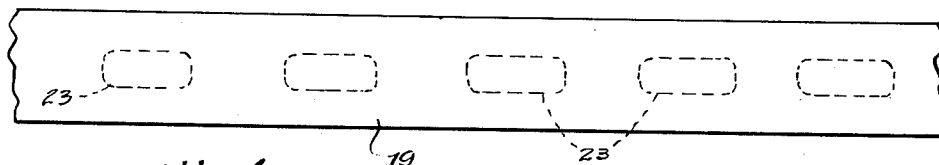


Fig. 4

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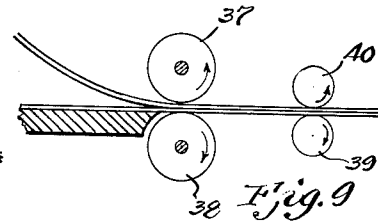
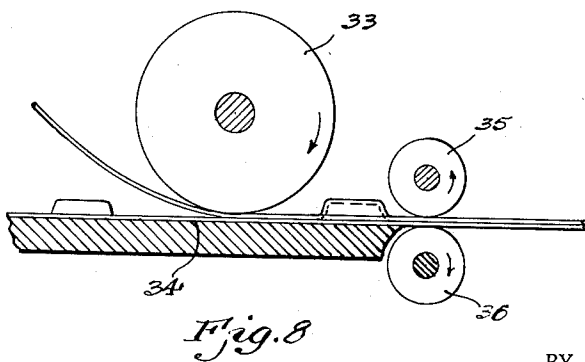
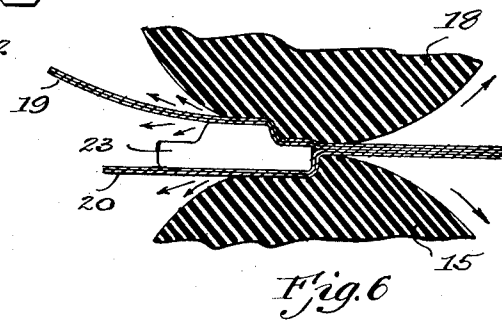
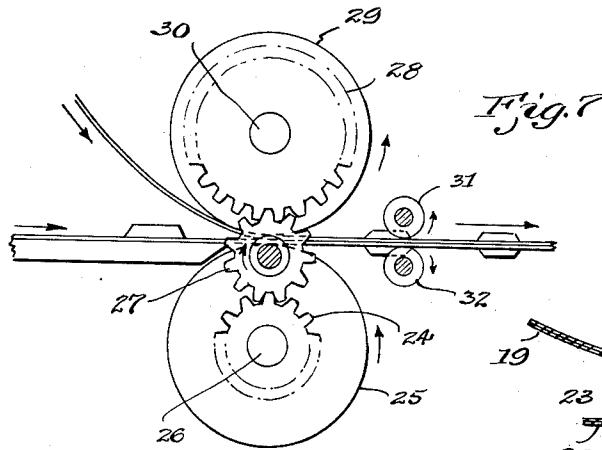
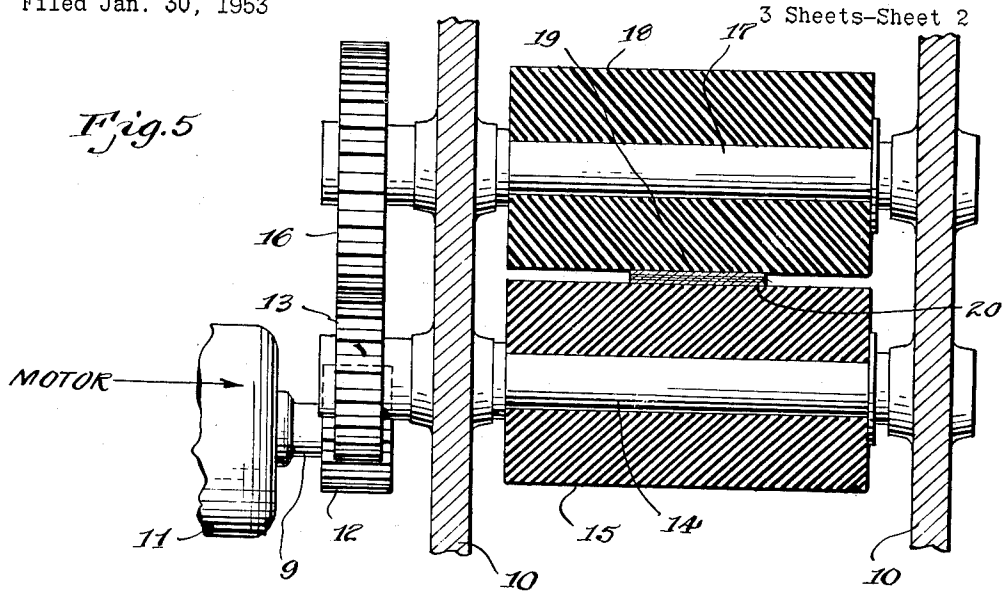
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METHOD AND APPARATUS FOR PACKAGING ARTICLES

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3 Sheets-Sheet 3

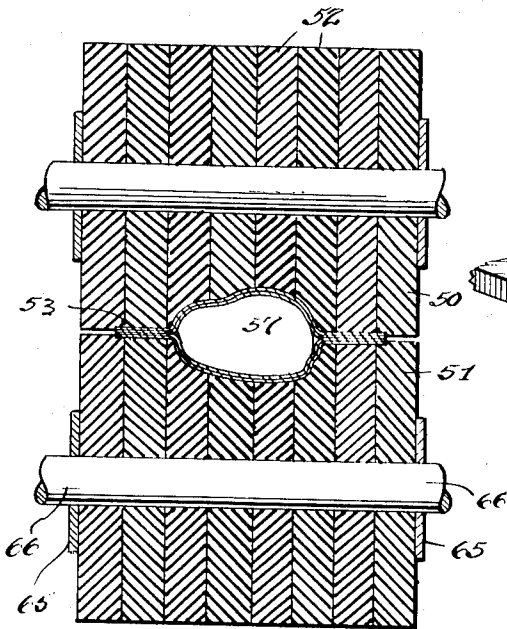
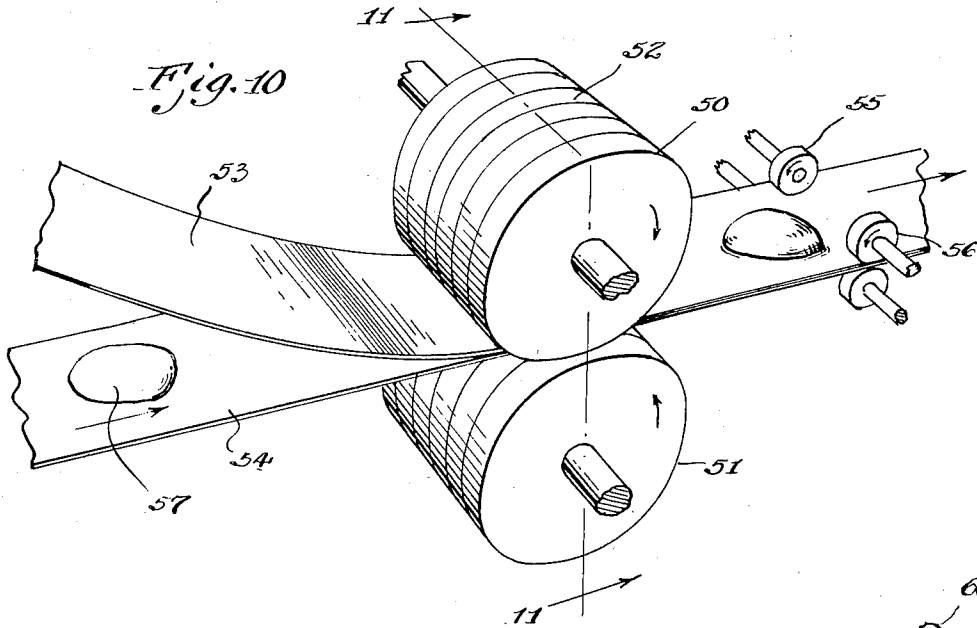


Fig. 11

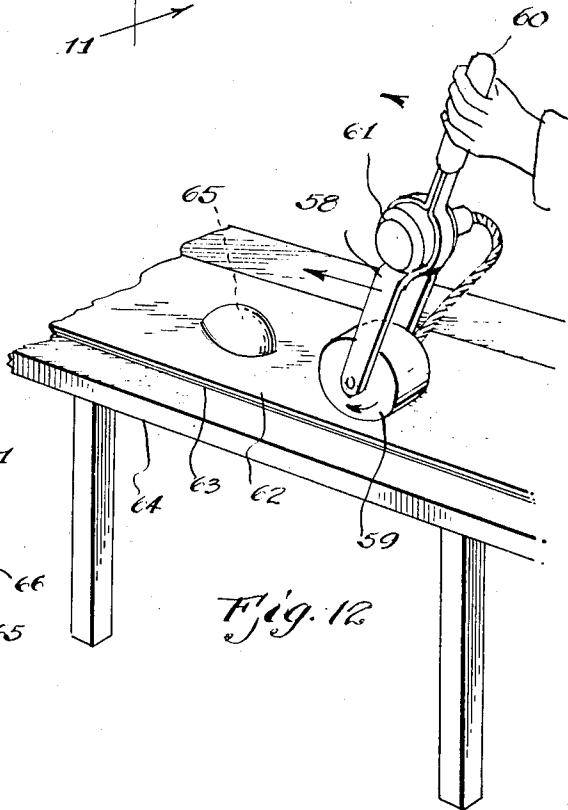


Fig. 12

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2,737,764

METHOD AND APPARATUS FOR PACKAGING ARTICLES

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Application January 30, 1953, Serial No. 334,123

7 Claims. (Cl. 53—9)

This invention relates to a method and apparatus for packaging articles.

This application is a continuation-in-part of my pending application Serial No. 527,968, filed March 24, 1944, which has now become abandoned.

The patent to Lloyd G. Copeman, Reissue No. 21,065, issued May 2, 1939, discloses the use of an aqueous dispersion of rubber in the packaging of articles in rubber between two sheets of paper, but before the rubber in the latex has been deposited out as a thin membrane. Outside of the occasional difficulty of the article to be packaged rubbing against the paper, and before the rubber is deposited as a membrane, this method of packaging has been found to be generally satisfactory where the article to be packaged is not affected by the presence of water or moisture.

The present invention is an improvement over the packaging method disclosed by Reissue Patent No. 21,065, in that it is based on the discovery that if latex coated paper is completely dried but wrapped in a roll before it is completely set up or cured, such deposited membrane of rubber will unwrap without blocking and will cohere to a like surface to form one continuous membrane of rubber.

It is an object of this invention to provide a method and a means for automatically dry packaging articles. The method and means referred to substantially hermetically seal the packaged article simultaneously with the packaging thereof. The article is placed between two strips of paper having layers of dry but partially set up rubber, such as a membrane of temporarily cohesive rubber deposited from latex, on at least one of the adjacent sides thereof. The strips of premade paper with surfaces of temporarily cohesive rubber are pressed together and a rubbing action imparted to at least one of said paper strips to exclude air or air laden with moisture therefrom as the rubber bonds the paper strips together around the article. Air inclusions around the article may harm it by corrosion or oxidation depending on the type of article.

Soft rubber rolls are used to press the paper strips together over the article. It has been found that by rotating one roll faster than the other, a rubbing action is obtained; that is, the slower moving roll rubs the surface of the paper strip in a direction opposite to the direction of travel of the said strip. This forces air out from between the dry rubber membrane of paper strips and around the article as the strips are bonded together. It is to be understood that a rubbing action to extrude air could be accomplished manually. A similar action could be obtained with but one roll and a cooperating table surface between which the paper strips and the article move. It would be necessary to have the roll rotate in a direction opposite to the path of travel of the paper and therefore an additional means to move the paper would be required. Similar results could also be obtained by the use of two rolls rotating in the same direction. This would, however, not feed the paper and additional means to do so would be required.

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A further object of the invention is to provide laminated sponge rubber rolls peculiarly adapted to conform to the irregularities on the surface of the article and rub the air therefrom.

Another feature of this invention is that by using a dry, but temporarily cohesive, membrane on the surface of the premade rolls of paper, if the irregular or unusual shape of the article being packaged protrudes sufficiently to break the paper, the membrane will still, because of its resiliency, retain the seal around the article.

It is to be understood that although paper strips are referred to herein, other flexible impervious materials could be used. In addition, although the bonding agent will be referred to as latex, other suitable dry, self-adhering, materials may be used.

In the drawings:

Figure 1 is a vertical section of a device embodying the invention and showing the rolls rotating in opposite directions to feed the paper and article therethrough.

Figure 2 is a section on the line 2—2 of Figure 1.

Figure 3 is a section on the line 3—3 of Figure 1.

Figure 4 is a plan view of a row of packaged articles.

Figure 5 is a vertical section on the line 5—5 of Figure 1.

Figure 6 is a side view showing the strips of paper and an article passing between the flexible rolls.

Figure 7 shows a modified form of the invention wherein rolls which rotate in the same direction are provided with a separate paper strip feeding means.

Figure 8 shows a modified form of the invention wherein a roll and table surface cooperate as the bonding and rubbing means.

Figure 9 shows a modified form of the invention wherein a pair of bonding rolls rotate slower than the feed of the paper strips.

Figure 10 is a perspective view of a pair of laminated sponge rubber rolls.

Figure 11 is a section on the line 11—11 of Figure 10.

Figure 12 is a perspective view of a hand operated device.

In Figure 1 a frame member 10 supports a motor 11 provided with a gear 12 keyed to the driven shaft 9. The gear 12 meshes with and drives a gear 13 geared to shaft 14 which is rotatably mounted in the frame 10 and on which a soft rubber roll 15 is keyed. The gear 13 also meshes with a larger gear 16 on a rotatable shaft 17 having a roll 18 keyed thereto. The rolls are parallel and rotate in opposite directions to feed the paper strips through between them. The roll 18 rotates slower than the roll 15, however, due to the relative sizes of gears 13 and 16.

Latex coated paper strips 19 and 20 are mounted upon spools fastened to frame 10. At least one of the paper strips, and preferably both, are coated on one side with a dry cohesive substance, preferably a rubber membrane deposited from latex. The free ends of the strips are fed between the rolls 15 and 18 so that the latex coated side contacts the other strip. The two strips are fed between the rolls as shown in Figure 5 and bonded together. Due to the adhesive qualities of the dry latex membrane the two strips are sealed together.

The latex coated rolls such as shown at 19 and 20 in Figure 1 are preferably made by first coating one side of the paper with a film of latex placed thereon by passing the paper over an applicator roller rotating in a bath of latex or by spraying, the amount of wet latex picked up by the paper determining the subsequent thickness of the membrane. After the paper is coated with latex it is then dried by passing over suitable heated rollers, preferably supplemented by infra-red lights, until the membrane on the paper, deposited from the wet latex, is completely dry. The latex when wet will have penetrated

into the interstices of the paper, and when completely dry it will be seen that the rubber membrane will have been locked or securely bonded to the paper. However, before the dry membrane of rubber is completely set up or cured, it has a property of being temporarily cohesive in that when it touches another similar surface it will cohere to the same and form one homogeneous layer of rubber. Before the membrane is completely set up or cured, and while it still retains this cohesive property, it is rolled up into a roll of paper such as shown at 19 and 20 in Figure 1, whereby air is excluded therefrom and the cohesive property of the membrane maintained indefinitely. In rolling up the membrane coated paper into rolls it is equally important that the rolling should not take place too soon because even after the water is completely removed from the wet latex and the latex deposited into a membrane, if such membrane is not allowed to sufficiently set up it will adhere to the back of the paper being rolled up, or "lock" to the same, making it impossible to unroll the membrane coated paper from the roll. The condition of the rubber membrane as it is rolled into the rolls 19 and 20, and as it is unrolled from such rolls, is cohesive and substantially non-tacky; it is not pressure sensitive in that it would stick to the articles being packaged but it may have a slight adhesiveness in packaging strips of prefinished metal or the like, in which case the membrane coated paper would preferably cohere along the edges of the metal passing through the rolls 15 and 18 but would also slightly adhere to the metal in which case the protective layer of paper and rubber membrane could be peeled away from the sheet of metal or similar article or could be left thereon in case the metal would be subsequently stamped such, for instance, as disclosed in the patent to Copeman No. 2,120,461.

Suitable tables 21 and 22 are positioned substantially horizontally in plane with the intersection of the rolls. The articles 23 to be packaged are placed on the strip of paper 20 as it passes over the table 21 as shown in Figure 2. As the two strips of paper 19 and 20 and article 23 are fed between the rolls 15 and 18, the paper is bonded together all around the article as shown in Figure 3. The operation is continuous so that at intervals in between the bonded strips, an article is sandwiched as shown in Figure 4. Suitable cooperating shearing blades 70 and 71 may be mounted on opposite sides of the continuously moving bonded strips and actuated periodically to cut the strips to convenient handling size. The actuation may be either manual or by power means not shown.

The roll 18 has been described as rotating slower than the roll 15 due to the difference in the sizes of gears 13 and 16. Referring to Figure 6, it is seen that as the paper strips and article are passed between the rolls 15 and 18 they are subject to a rubbing action in the direction of the trailing end of the paper strips so that air is forced out from between the respective strips and article as they are brought close together. This prevents air inclusions which might damage some articles, for example, by corrosion or oxidation, depending upon the nature of the article. The rubbing action also tends to remove air laden with moisture from between the strips.

A modified form of the device is shown in Figure 7. The principal difference from the form previously described is that the bonding rolls rotate in the same direction and a supplemental pair of rolls is provided to draw the paper strips between the bonding rolls. In this form of the device a gear 24 is rotated by a power means not shown. The gear 24 and a roll 25 are keyed to a rotatable shaft 26. The gear 24 meshes with an intermediate gear 27, which in turn meshes with a gear 28. A gear 28 and a roll 29 are rotatably mounted upon a shaft 30. It is therefore apparent that the roll 25 and the roll 29 will rotate in the same direction, but the roll 29 will rotate slower than the roll 25 due to the

size of the respective gears. The rubbing action heretofore described will be obtained by the lag of roll 29 as the strips and articles pass between the rolls. In this embodiment it is necessary to provide a feeding means to draw the paper strips between the rolls. To this end a pair of supplemental rolls 31 and 32 are provided to engage the leading end of the paper strips. Rolls 31 and 32 are power driven by a source not shown and caused to rotate in opposite directions to draw the paper strips between the rolls 25 and 29. The rolls 31 and 32 could be placed to engage the edges of the strips if desired so that they would not interfere with the article.

In Figure 8 a further modification is shown wherein one large roll 33 is provided to cooperate with a table surface 34. The roll 33 rotates in a direction opposite to the direction of travel of the paper strips and resiliently rubs the paper strips and articles as they pass between roll 33 and the table surface 34. A small pair of supplemental rolls 35 and 36 may be provided as in Figure 7 to draw the paper strips between roll 33 and the table surface 34.

In Figure 9 a diagrammatic view of a further modification is presented. In this form of the invention the bonding rolls 37 and 38 rotate at the same speed in opposite directions corresponding to the direction of travel of the paper strips. Supplemental rollers 39 and 40 are, however, provided to feed the paper through rolls 37 and 38 at a predetermined speed in excess of the linear speed of a point on the circumference of rolls 37 and 38. The same effect could be produced if the rolls 37 and 38 were not power driven but a braking means rendered them not freely rotatable. The paper strips moving between the rolls 37 and 38 would rotate them in the direction shown. The braking means would assure that their rate of rotation would be slower than the rate of travel of the paper strips. The fact that the paper strips are drawn between rolls 37 and 38 faster than they can rotate causes the latter to rub against the paper strips and extrude air from between them toward the trailing end of the paper strips.

In Figures 10 and 11 are illustrated a pair of rubber rolls 50 and 51 which comprise a plurality of laminations 52 of sponge rubber. The laminations 52 are in the form of circular discs of similar size. They are assembled in parallel relationship on a common axis to form a roll. Supplemental means to feed the strips 53 and 54 between the rollers is shown as small rollers 55 and 56, power driven by a source not shown. Suitable collars 65 may be used to retain the lamination upon the shaft 68 as shown in Figure 11.

Referring to Figure 11 the advantages of such a roll are apparent. The individual discs 52 are elastic and compensate for slight irregularities in the article 57 to be packaged. Adjacent discs may, however, accommodate a relatively large irregularity in the article. If the roll 50 of Figure 11 was merely made of one piece of soft rubber in the form of a cylinder, a surface engaging the article 57 would have a gradual curve. With the disc like formation in the roller separate laminations may achieve a stepped relation which facilitates a close engagement with the article to the end that a minimum of air space will be present between the article and the latex covered paper 53. The laminated roll construction has been found by experiment to work better than a roll made up of bristles. The rubbing action is normal to the effective surface of the roll and the laminated roll can not bend like bristles. There is, therefore, a more firm engagement with the article. It has further been found that it is not necessary to place the rolls under high pressure. With the laminated sponge rubber roll the rubbing action works satisfactorily with light pressures.

The sponge rubber discs 52 should be formed so that the raw edges are present about the circumference of the roll. A sponge rubber skin should not be placed about the peripheral edges of the disc for the raw edges of the sponge rubber compress more than the surface which is

covered with a skin. In addition, the rough surface of the sponge rubber helps the rubbing action. It is common knowledge that sponge rubber has pockets and presents a rough surface.

In Figure 12 a hand operated device is shown. In this device a fork 58 has a roller 59 rotatably supported therein and a handle 60 fastened thereto. Suitable power means, such as an electric motor 61, may be used to rotate the roller 59. The operator by grasping handle 60 may cause linear movement of the device. The linear movement of the device and the direction of rotation of roller 59 should be correlated so that the rotation of the roller 59 resists the linear movement of the device. This effects the rubbing action as described in connection with other forms of the invention. In Figure 12 the latex covered strips of paper 62 and 63 are shown positioned on a table 64, and an article 65 to be packaged is positioned between the strips of paper 62 and 63.

It will thus be seen that by forming rolls of latex coated paper in which the latex is in the form of a deposited dry temporarily cohesive continuous membrane, it is possible to store the rolled up membrane coated paper into rolls ready for use and thus it is not necessary to maintain a bath of latex which has to be constantly agitated to maintain its efficiency. Since the premade latex coated surfaces are dry, the articles to be protected and/or packaged, whether flat sheets or having irregular surfaces, may be fed directly in between the layers of latex coated paper without wrapping the same with wax paper or other moisture protective mediums. The temporary cohesive membrane, being dry, will have no moisture content to affect the article being protected or packaged; and being substantially non-tacky and only slightly adhesive it will not leave any deposits upon the article, as is the case with many pressure sensitive materials, and can be easily removed from the packaged article; the dry surface being temporarily cohesive will, when it contacts a similar surface, form a homogeneous membrane of rubber around the article thus completely sealing the same. Furthermore, the membrane being dry, if a highly irregular article in passing through the rolls should cause one or both sides of the paper to break, the membrane being elastic would be stretched and still seal the article; such sealing would not be possible if the latex coating were not completely dry because then the irregular article would protrude through the latex just as easy, if not easier, than through the paper.

It will also be seen that by using premade rubber covered paper wherein the covering is a dry temporarily cohesive membrane that the thickness of the rubber at the points where the rubber contacts the articles packaged or protected is always uniform and of the same original thickness; whereas if the articles were packaged or protected with latex at any stage short of being deposited in a dry membrane, it would cause the rubber to be squeezed out or thinned to various thicknesses, depending upon the pressure applied and the condition of the latex.

It will still further be seen that I have provided a machine and method for dry and cold packaging and protecting articles in a manner similar to the standard hot sealing method of protecting or packaging articles, except that it is not necessary to have heating equipment on hand and, also, the uniform thickness rubber membrane being cohesive, it will effectively seal the article so as to make the surface thereof waterproof and to a large extent moisture vapor proof.

The terms "latex," "aqueous dispersions of rubber," and "rubber" as used in the specification and claims are intended to cover both natural and synthetic materials or combinations of natural and synthetic materials, as well

as compounds or mixtures of natural or synthetic latices with other ingredients which may be added to impart stability, fluidity, viscosity and other desirable features to the coating bath, provided that the resultant film is non-tacky and has the property of self-adhesion.

What I claim is:

1. The method of dry packaging articles comprising periodically placing an article between two parallel strips of sheet material, such as paper, having a layer of partially set-up rubber bonded to at least one of said strips, feeding said strips and said articles between a pair of resilient rolls adapted to squeeze said strips and seal said articles between said strips without the application of heat by bonding said strips together with the layer of rubber, rotating said rolls in opposite directions to feed said strips therethrough, but at different speeds, whereby the slower moving roll rubs said strips over said article and extrudes air therefrom prior to final sealing of said article between said strips.

2. A device for packaging articles comprising a pair of resilient rolls, means to supply two parallel strips of sheet material, such as paper, having a layer of rubber bonded to at least one of said strips between said rolls, means to support an article placed on one of said strips at a point adjacent the entrance of said strips between said rolls, means to rotate said rolls in opposite directions and at different speeds whereby the slower of said rolls rubs said strips over said article in a direction opposite to its travel and expels air therefrom simultaneously with the bonding of said strips by said rubber around said article.

3. A device for packaging articles comprising a pair of resilient rolls, one or more of which is formed of a plurality of relatively narrow, coaxial disks of soft material in face-to-face relation, means to supply two parallel strips of sheet material, such as paper, having a layer of rubber bonded to at least one of said strips between said rolls, means to support an article placed on one of said strips at a point adjacent the entrance of said strips between said rolls, and means to rotate said rolls in opposite directions.

4. A device as set forth in claim 3 wherein each of said parallel strips of sheet material has a layer of rubber bonded thereto.

5. A device as set forth in claim 3 wherein said rubber is a partially set-up cohesive material which is self-sealing at room temperature.

6. A device as set forth in claim 5 wherein the said rubber is bonded to the adjacent faces of each strip.

7. A device for packaging articles, comprising a pair of resilient rolls, formed of a soft material giving the effect of a plurality of relatively narrow, coaxial discs of soft material in face to face relationship, means to supply two parallel strips of sheet material, such as paper, between said rolls, each of said strips having a layer of temporarily cohesive non-tacky layer of rubber bonded to the side thereof which faces the other sheet, means to support an article placed on one of said strips at a point adjacent the entrance of said strips between said rolls, and means to rotate said rolls in opposite directions.

References Cited in the file of this patent

UNITED STATES PATENTS

Re. 21,065	Copeman	May 2, 1939
1,160,278	Gray	Nov. 16, 1915
1,481,866	Heist	Jan. 29, 1924
2,027,232	Hutt et al.	Jan. 7, 1936
2,340,260	Clunan	Jan. 25, 1944
2,432,075	Jennings	Dec. 2, 1947
2,484,780	Clunan et al.	Oct. 11, 1949