March 27, 1951 S. J. CAMPBELL 2,546,721

WRAPPING MACHINERY AND METHOD

Filed May 4, 1946 2 Sheets-Sheet 1

Fig. 1

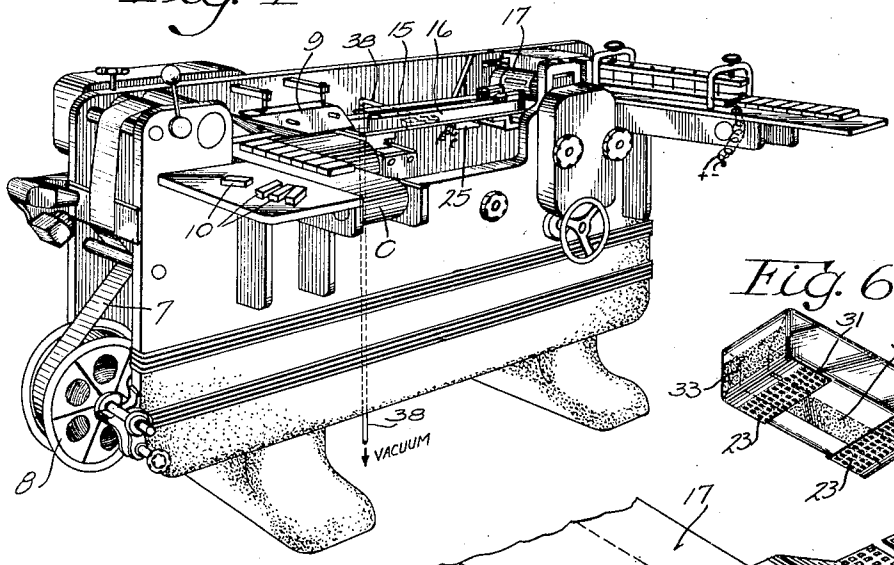
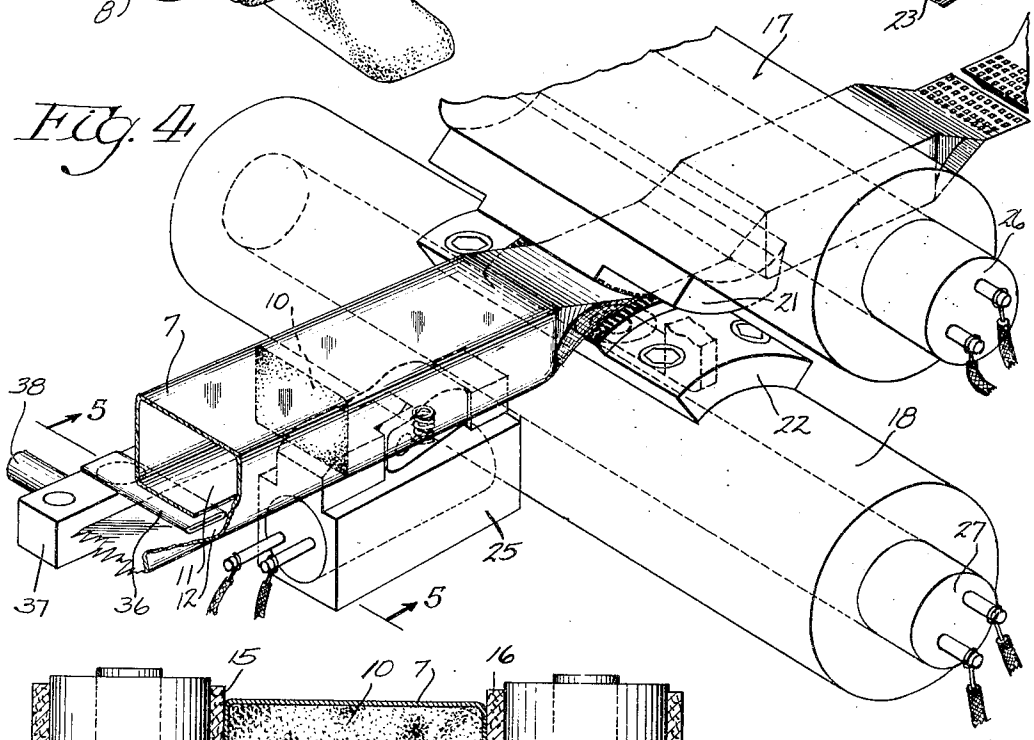


Fig. 6

Fig. 4



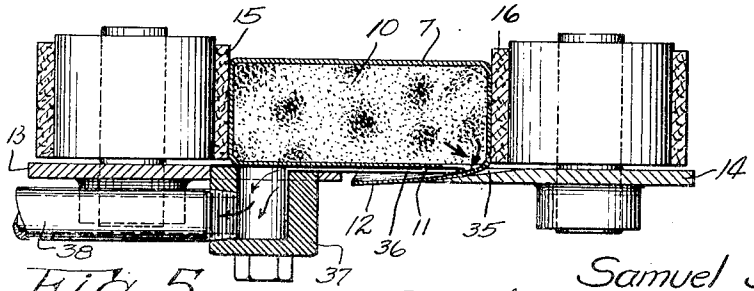


Fig. 5

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WRAPPING MACHINERY AND METHOD

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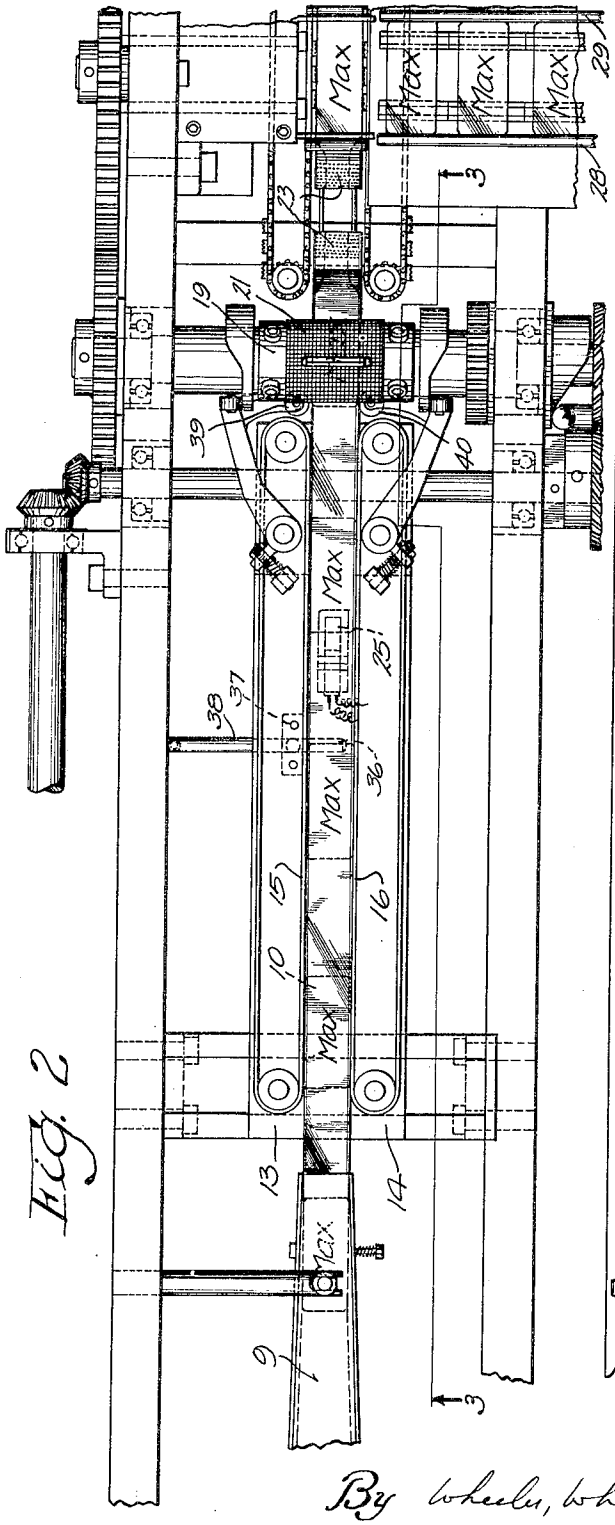


Fig. 2

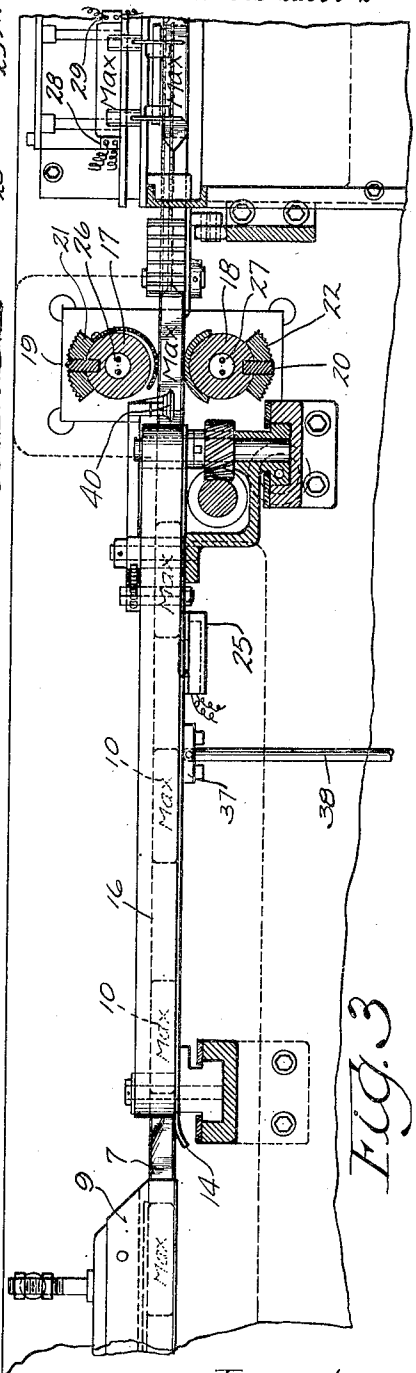


Fig. 3

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WRAPPING MACHINERY AND METHOD

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Application May 4, 1946, Serial No. 667,398

13 Claims. (Cl. 93—3)

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This invention relates to improvements in wrapping machinery and methods. The present application is a companion to my application entitled "Wrapping Machines," No. 650,593, filed February 27, 1946.

It is the primary object of the present invention to facilitate the closely fitting application of a wrapper to an object of irregular shape or varying size and to facilitate the folding and sealing of the wrapper about such an object irrespective of its shape or size, and to enhance the keeping qualities of the wrapped product, particularly if such product be a perishable commodity such as food.

All of the foregoing objectives and other advantages are achieved by the method and apparatus herein disclosed, whereby successive products entubed in a continuous web of wrapping material are subjected within the tube to a partial vacuum immediately prior to the severance and sealing of the wrapper material, such vacuum reducing the amount of air remaining within the package and causing external atmospheric pressure to mold the wrapper tube upon the wrapped articles and to tend to collapse the tube and thereby to facilitate the wrapping operation. The actual pleating and folding of the wrapper becomes easier both because of the pressure differential and particularly because of the more intimate manner in which the wrapper is held by external pressure to the article. Decrease of the air content within the package minimizes oxidation and is particularly desirable from the standpoint of prolonging the period for which such food products as bread and candy will remain fresh.

In the drawings:

Fig. 1 is a view in perspective showing the general organization of a wrapping machine such as that disclosed in the companion application above identified.

Fig. 2 is an enlarged plan view of that portion of the machine with which the present invention is concerned.

Fig. 3 is a view in longitudinal section through the portion of the machine shown in Fig. 2.

Fig. 4 is an enlarged detail view in perspective showing the relation of the air evacuating means to the sealing means.

Fig. 5 is a view taken in section on the line 5—5 of Fig. 4.

Fig. 6 is a view in perspective showing a finished package wrapped in accordance with the present invention.

For details of the wrapping machine and its operation, reference is made to the companion

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application 650,593. The web 7 of wrapping material supplied from reel 8 is shaped by a former 9 to entube, in the course of its advance, a series of spaced articles 10 which are delivered to the wrapper and former by an infeed conveyor C. The web of wrapping material is so entubed about the work pieces 10 that the side margins 11 and 12 of the wrapper web 7 are lapped beneath the work pieces as best shown in Figs. 4 and 5.

In leaving the former or entubing device 9, the tubed wrapper and entubed work pieces spaced therein pass along supporting plates 13, 14 subject to the lateral, confining pressure of conveyor belts 15, 16. These belts and the plates terminate shortly before the station at which rolls 17 and 18 are located, these rolls carrying complementary cutting dies 19, 20 and crimping dies 21, 22 as best shown in Figs. 3 and 4. As each work piece and its entubing portion of the wrapper is severed, the crimping of the projecting end portions of the wrapper completes its sealing, the lapping margins 11 and 12 having already been sealed, as will hereinafter be explained. In the remaining portions of the machine, the crimped ends 23 are compactly folded beneath the wrapped work piece and sealed in place as shown in Fig. 6.

While the present invention is not directly concerned with the manner in which the wrapper is sealed, it should be noted that the wrapper is preferably sealed hermetically in several successive sealing operations. First of all, the lapping margins 11 and 12 are sealed to perfect the tube of wrapping material about the work pieces, this occurring before such tube is severed. Secondly, the leading end of each wrapper section is sealed at the severing and crimping die when the preceding wrapper section is cut therefrom. Thirdly, the trailing end of each wrapper section is sealed behind the work piece when such section is severed from the ensuing portions of the wrapper tube. Finally, the crimped and sealed ends of the wrapper are adhered to the lower surface of the wrapper to complete the package shown in Fig. 6. It is broadly immaterial to the present invention whether the adhesion required for the sealing of the wrapper and the fixation of its ends is brought about by means of an adhesive or by a so-called heat sealing operation, such as is used where the wrapping web is impregnated with paraffin or other thermoplastic or thermosetting materials, such heat sealing as well as adhesive sealing being well known to the art. For illustrative purposes, heat sealing is herein disclosed. The adhesion which seals the lapping margins 11 and 12 of wrapper 7 is effected

by the electrically heated element 25 best shown in Fig. 4. The heat sealing of the successive wrapper ends 23 is effected by incorporating electrical heating elements 26, 27 in the respective rollers 17, 18, which carry the crimping dies 21, 22. The adhesion of the wrapper ends to the ends of the package is effected by one or more heating elements at 28, 29. As shown in Fig. 6, the finished package has one heat sealed zone at 30, others at 31, 32 on the crimped ends and others at 33 at the ends of the package, only one of which is shown in Fig. 6.

In order to effect the neat folding of the wrapper about the article and to take maximum advantage of the hermetic seal achieved, air is exhausted from the wrapper tube immediately prior to the sealing thereof. For this purpose, the supporting plate 14 is relieved at 35 as best shown in Fig. 5, thus allowing the wrapper margin 12 to drop slightly. A flat tube 36 connected by fitting 37 with a vacuum line 38 is inserted between the lapping margins 11 and 12 of the wrapper tube to a position where it is continuously withdrawing air from the interior of the tube. The partial vacuum thus created within the tube establishes a pressure differential between the outside and inside of the tube so that atmospheric pressure forces the tubed wrapper tightly against the entubed work pieces and holds the lapping margins 11, 12, of the wrapper tightly to each other upon the work pieces. Such pressure also tends to collapse the tube wrapper between the work pieces and thus facilitates the operation of the pleating rollers 39, 40 described more particularly in the companion application aforesaid. Since the wrapper is held by atmospheric pressure tightly upon the work pieces, both the crimping of the ends and the subsequent folding of the ends is greatly facilitated and substantially all air is excluded from direct contact with the work pieces in the finished package. While this is of great value in the protection of all food products which are subject to oxidation (as, for example, cheese, butter, bread and candy), the method has particular value where the objects wrapped have irregular form, or vary in size, and hence are ordinarily difficult to wrap neatly. Examples are loaves of bread and bars of candy, both of which are quite irregular in shape and are subject to very substantial variation in size.

I claim:

1. A method of wrapping single articles of self-sustaining form which includes continuously advancing a wrapper, entubing spaced articles within said wrapper in the course of continuous advance thereof, withdrawing air from the tubed wrappers between such articles during the continuous advance of the articles and wrapper, an article in the tube behind the point of withdrawal filling the tube against ingress of atmospheric air along the tube, whereby to establish a pressure differential such that atmospheric pressures exterior to the tubing tend to mold the wrapper to the articles therein, and subsequently completing and sealing the wrapper about the respective articles during such advance and while the wrapper remains subject to said pressure differential.

2. A method of wrapping which comprises the tubing of a wrapper with lapping margins, entubing at spaced intervals in the tubed wrapper articles to be wrapped, withdrawing air from between the lapped margins of the tubed wrapper between the articles spaced therein at a given point during the advance of the wrapper and entubed articles, whereby to collapse the wrapper tube upon such articles, sealing the lapped margins of the wrapper tube immediately after air has been evacuated therefrom and in advance of said point, and subsequently severing such tube between the articles spaced therein and sealing the severed ends of the wrapper adjacent the point of severance.

3. The method recited in claim 2 in further combination with the step of folding the severed and sealed ends of the wrapper upon the individual work pieces therein contained, the folding operation being facilitated by the effect of atmospheric pressure in holding the wrapper to the entubed article by reason of the partial vacuum about such article.

4. A wrapping method comprising the steps of entubing successive articles slightly differing from each other in size and each being of predetermined but somewhat irregular form in spaced relation in a tubing wrapper, lapping the margins of such wrapper, advancing the tubed wrapper and entubed articles while withdrawing air from the interior of the tubed wrapper whereby to establish a pressure differential between the interior and exterior of the wrapper such that exterior atmospheric pressure will hold the lapped margins to each other and to hold the wrapper to the articles entubed therein, thereafter sealing the lapping margins of the entubed wrapper while such pressure differential remains effective, crimping, sealing and severing the tubed wrapper between entubed articles whereby hermetically to seal such articles within individual wrapper sections, enfolding the crimped, sealed ends of such wrapper sections on the ends of the wrapped articles with the assistance of the pressure differential holding the wrapper sections to the respective articles, whereby to effect a neat wrap irrespective of differences in size or irregularities in form of the articles wrapped.

5. The method recited in claim 4 in which the entubing of the wrapper, the withdrawal of air, the sealing of the lapping margins, and the severance, crimping and sealing of the ends of wrapper sections are effected in the course of continuous movement of the wrapper tubing and entubed articles.

6. In a wrapping machine having guideway for a tubed wrapper with lapping margins and articles entubed therein for wrapping, and a cutting and crimping die means provided with mechanism for its operation upon the tubed wrapper between entubed articles, the combination with such guideway of an eductor nozzle provided with a vacuum pipe connection and positioned to penetrate between the lapping margins of the wrapper tube, means for sealing such margins subsequent to their passage beyond such nozzle, and means for sealing wrapper portions adjacent their severance, whereby hermetically to seal wrapped articles within such wrapper.

7. The apparatus set forth in claim 6 in further combination with end folding means for folding the sealed ends of severed wrapper sections upon respective articles wrapped therein.

8. In a wrapping machine having a wrapper tube former adapted to form a wrapper web into a tube with lapping margins, the combination with a guideway leading from such former, of a flat eductor nozzle positioned along said guideway to project laterally thereof between the lapping margins of the tube wrapper, and a vacuum pipe connection leading from such nozzle.

9. In a wrapping machine having means for feeding a wrapper web, means for tubing such

web with lapping margins, and means for delivering articles into the web to be entubed therein at spaced intervals, the combination with a guideway leading from the former and along which the tubed web and entubed articles move, of a flat eductor nozzle positioned to lie beneath one of said lapping margins and above another in a position to evacuate air from within the tubed wrapper, a vacuum pipe connection for said nozzle, means located in the path of wrapper web advance beyond said nozzle for sealing the lapping margins of the tubed wrapper web, means for severing and sealing the tubed web transversely between the articles entubed therein, and means for subsequently folding upon the ends of such articles the severed ends of wrapper sections thus severed.

10. The device set forth in claim 9 in which such guideway comprises supporting means for the lapping wrapper web margins, one of said supporting means being relieved opposite said nozzle whereby to permit the displacement of such lapping margin sufficiently to accommodate the nozzle.

11. In a wrapping machine, the combination with a tube former having lapping flanges for forming a wrapper tube with lapped margins, and means for drawing a web therethrough in continuous movement, of a suction tube projecting laterally between the moving margins for evacuating air from the interior of the wrapper tube in the course of such movement, and a sealer positioned to engage and seal such margins in the course of the advance of such wrapper tube beyond the suction tube.

12. A method of wrapping which includes the continuous movement of a wrapping web, forming the web about successive articles to be wrapped and lapping side margins of said web longitudinally of said articles in the direction of web advance, withdrawing air from between the lapped margins of the entubing wrapper in the course of its continuous movement with articles entubed therein, whereby pressure differential will assist in molding the entubing wrapper about

such articles, thereafter sealing the lapping margins of the entubing wrapper and subsequently severing and sealing the wrapper between entubed articles.

13. In a wrapping machine, the combination with a wrapper tube former, means for continuously drawing tubed wrapper therefrom, and means for intermittently feeding into the wrapper successive, spaced articles to be entubed and wrapped and to move with the wrapper tube toward said drawing means, said former operating to lay one lateral margin of the wrapper tube into face contact with the opposite margin thereof, of means for collapsing the wrapper tube upon the entubed articles and upon itself intermediate said articles, said tube collapsing means comprising an eductor nozzle provided with a vacuum pipe connection and projecting laterally between the said margins before said wrapper drawing means and after the point where the wrapper is tubed about two successive articles, the said nozzle withdrawing air from said wrapper between said articles while the collapse of said wrapper upon said articles precludes the ingress of air in either direction along the wrapper tube to said nozzle, and means disposed beyond said nozzle and between it and tube drawing means in the path of wrapper tube advance with entubed articles for subsequently sealing the wrapper tube margins and effecting a seal transversely of the tube between the successive entubed articles while the tube remains collapsed.

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