Nov. 24, 1942. C. D. FARMER ET AL 2,302,846

MEANS FOR THE AUTOMATIC WRAPPING OF ARTICLES

Filed April 15, 1940

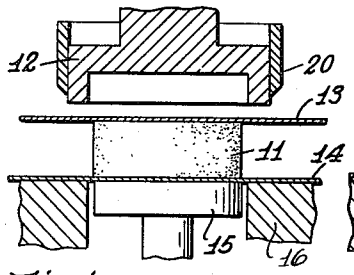


Fig. 1.

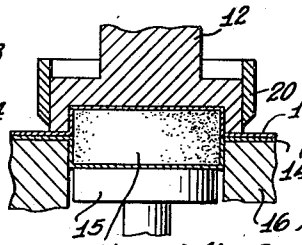


Fig. 2.

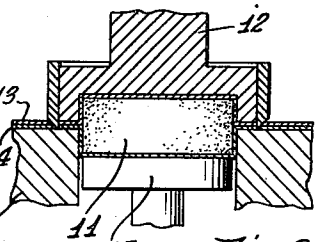


Fig. 3.

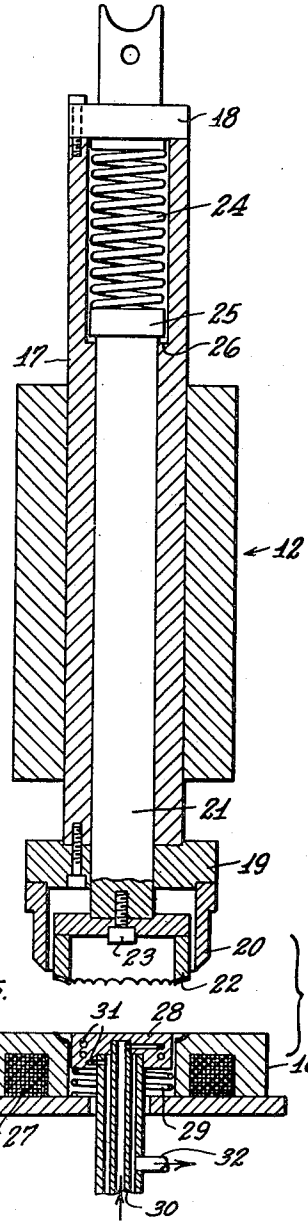


Fig. 5.

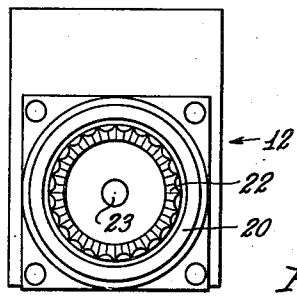


Fig. 6.

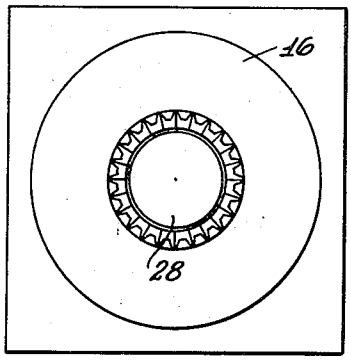


Fig. 7

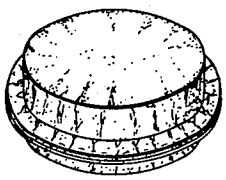


Fig. 4.

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MEANS FOR THE AUTOMATIC WRAPPING OF ARTICLES

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Detroit, Mich.

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13 Claims. (Cl. 93—2)

This invention relates to means for automatically wrapping articles with a covering of Cellophane or any of the other forms of "Glassine" or waxed papers. The principal object of the invention is to accommplish this wrapping in one operation.

Another object is to cut and trim the paper with which the article is wrapped by means of a cutter shaped to conform to the outline of such article and moved by suitable mechanism against a cutting block upon which the paper is positioned, this method being commonly known as "die cutting."

A further object is to tightly wrap the article on all of its surfaces.

Die cutting of most of the papers above referred to, and particularly Cellophane, which is fast becoming the universal package covering, has been proved to be impossible by the use of any of the methods heretofore attempted to be employed. This is due to the fact that when such material is subjected to the action of a cutting die the extremely thin and flexible nature of the material results in a crushing rather than a clean severing of the paper by the cutting die. In this invention, however, die cutting is made possible and successful by the discovery that papers of this character become quite brittle and, therefore, easily severed when raised to a suitable temperature, the application of this heat being another object of this invention.

A further object is to utilize this same heat applied to achieve a successful die cutting of the material and in combination with suitable mechanism so that a sealing of the paper will be effected in conjunction and substantially simultaneously with the die cutting operation.

Another object is to provide means to prevent the heat used to effect this cutting and sealing from having an injurious effect upon the article being wrapped.

The drawing accompanying this specification shows how the wrapping, sealing and cutting is effected by a series of diagrammatic views of these operations and also the essential mechanical elements by which these operations and the above objects are accomplished. In practice the mechanism illustrated is used with a combination of other machine elements so that the result is a completely automatic machine which accomplishes the wrapping.

Fig. 1, then, shows the first step in this operation, the article to be wrapped having been placed in the correct position therefor by extraneous means (not shown), the sealing and cutting head being positioned immediately above it.

Fig. 2 pictures the next step. The sealing and cutting head has been lowered so that the article is completely surrounded by paper and by means of heat and pressure the sealing is being effected.

In Fig. 3, the sealing having been completed, the cutting portion of the head has moved down and severed the paper.

Fig. 4 shows a perspective view of the wrapped article.

Fig. 5 is a vertical sectional view taken through the center of the sealing and cutting head and the cutting block showing the essential elements thereof.

Fig. 6 is an inverted plan view of the cutting and sealing head shown in Fig. 5 and Fig. 7 is a plan view of the cutting block.

For simplicity of illustration, the article being wrapped as shown by the drawing is a cylindrical object 11, such as a soap or deodorant cake.

As shown in Fig. 1, the wrapping paper is fed under the cutting and sealing head 12 in two separate strips 13 and 14 and immediately prior to the instant of the operation illustrated in Fig. 1 the article 11 has been placed between these two strips of paper and rests upon a support 15 which forms a movable platen in the center of an annular cutting block 16. The action of sealing and cutting, shown in Figs. 2 and 3 respectively, may be better understood after an examination of the mechanism shown in Fig. 5 which operates with a reciprocating motion imparted by any suitable actuating mechanism which is not shown as it forms no part of the present invention. Structurally, the cutting and sealing head 12 consists of a tubular head 17, to the upper end of which a connecting member 18 is attached to join the head to the actuating means, and to the lower end of which a support 19 for the cutting die 20 is secured. Slidably mounted for reciprocation within this tubular member 17 is a center plunger 21 having an annular sealing die 22 attached to its lower end. The upper enlarged end 25 of said plunger abuts against a spring 24 and is normally urged downwardly thereby, the extent of this downward movement being limited by the engagement of said end 25 with a shoulder 26 formed by a counterbore provided in the upper end of the tubular member 17. The dimensions of these parts and especially the length of the center plunger 21 and the position of the shoulder 26 on the tubular member 17 are such that the sealing die 22 normally projects beyond the cutting die 20, so that in the cycle of operation,

sealing of the paper will be effected immediately prior to the cutting thereof, as illustrated in Fig. 2.

In the construction of the cutting block 16 upon which the steps of sealing and cutting take place by the engagement of the respective sealing and cutting dies with the surface of this cutting block, a heating element 27 is incorporated to provide a temperature at which these steps will be effected. During these steps the article being wrapped is positioned upon a small platen 28 which is accurately dimensioned and shaped to correspond with the size and shape of the article thereby to permit a wrapping of the article on all its surfaces. The platen 28 is normally held with its upper surface in the plane of the surrounding surface of the cutting block by a spring 29 so that as the sealing die 22 moves downwardly it first engages the upper strip of paper 13 and as it continues its downward travel it folds such strip around the upper portion of the article to be wrapped. During this time, the downward pressure exerted will cause a downward movement of the platen to the position shown in Fig. 2, thereby folding the lower strip of paper 14 around the lower portion of the article to be wrapped, and as a result, the wrapping paper is made to completely and closely surround the surfaces of the article.

It will be noted by referring to Fig. 5 that while the platen 28 is spaced slightly from the surrounding cutting block 16 and is, therefore, not in direct heat conducting relationship therewith, some heat transfer may occur by radiation. If the nature of the article being wrapped is such that heating thereof might be objectionable or deleterious, means is provided for circulating a coolant to the platen 28, such means comprising an intake pipe 30 from which the coolant flows through circulating pipes 31 in the body of the platen and leaves through a discharge pipe 32.

Figs. 6 and 7 show the sealing surfaces of the sealing die, which in this particular illustration are what might be termed fluted in form. Although this particular type of surface is not necessary, it has been found that some form of irregularities on the surface of the sealing die is desirable to take up the surplus material of the paper as it is folded around the article, and also as the sealing action is thereby improved over the type of seal obtained when mere flat surfaces are used. This fluted surface employed in the present illustration also adds to the attractiveness of the wrapping.

As the head 12 reaches its lowermost position of travel, the cutting die 20 contacts against the upper surface of the cutting block as shown in Fig. 3, thus severing the completed wrapping from the strips 13 and 14 while the pressure between the sealing dies becomes progressively greater until it reaches a point where under the influence of the heat supplied by the cutting block 16 a complete and continuous hermetic seal is effected around the periphery of the cake, joining the two separate wrappings together. The amount of pressure that is applied for this sealing work depends upon the nature of the spring 24 located within the upper portion of the tubular member 17 of the head, but by choosing a suitable spring and placing it, if desired, under precompression, an enormous pressure can be applied at the sealing die.

For simplicity of illustration, the showings and description herein have been narrowed down to the essentials of this invention. It is self-evident, however, that a great number of modifications of the structures and principles disclosed may be made. Other sizes and shapes of articles may be wrapped just as effectively as the cylindrical object shown by varying the sealing and cutting dies and the central core of the cutting block to conform to the periphery of each article, while at the same time modifying the inner portions of the sealing die and the surface of the central core to conform to the contour of such article. In some of these adaptations of the invention, it is often more advantageous or expedient not to mold the wrapping material closely to the entire surface of the article but rather to loosely encase the article in an envelope whose shape may or may not be similar to the shape of the article or articles contained therein. The sealing and cutting principles of this invention can readily be employed in the forming of such a wrapping, and when so used it is not necessary to incorporate the features which accomplish a molding of the wrapping material to the outlines of the article being wrapped, these features being the resilient mounting of the platen 28 and the shape of the inner portion of the sealing die 22. With these modifications and the optional provision of a cooled central platen, an almost endless variety of articles, including bottled goods, pies and individual chocolate-covered candies, etc., have been successively wrapped by means of the mechanism and principles of this invention. Therefore, it is understood that the scope of this invention is not to be considered as limited otherwise than by the following claims.

We claim:

1. In an apparatus of the character described means to support an article to be wrapped between spaced sheets of Cellophane or the like, a pair of forming members shaped to conform to the size and configuration of the article to be wrapped mounted adjacent to said supporting means, means for bringing said forming members into juxtaposed relationship to fold said sheets of material about said article, means for heating said material during the forming operation and pressure means associated with said forming members to press the material of said sheets into intimate engagement to form an hermetic seal and cutting means also associated with said forming means to sever the envelope formed about said article from said sheets while said material is in heated condition, said cutting means comprising a cutting die and a surface adapted to be contacted thereby.

2. In an apparatus of the character described means to support an article to be wrapped between spaced sheets of Cellophane or the like, a pair of forming members shaped to conform to the size and configuration of the article to be wrapped mounted adjacent to said supporting means, means for bringing said forming members into juxtaposed relationship to fold said sheets of material about said article, means for heating said material during the forming operation and pressure means associated with said forming members to press the material of said sheets into intimate engagement to form an hermetic seal, cutting means also associated with said forming means to sever the envelope formed about said article from said sheets while said material is in heated condition said cutting means comprising a cutting die and a flat surface and means for supplying a coolant to said supporting means whereby said article is not in-

juriously affected by said heating of said wrapping material.

3. In an apparatus of the character described means to support an article to be wrapped between spaced sheets of Cellophane or other material having thermoplastic surface properties, said means comprising a platen shaped to conform to the size and configuration of the article to be wrapped, a forming member adapted to engage said material and fold the same about said article, means for imparting a reciprocating motion to said forming member, means for applying heat to said material, pressure means associated with said forming member to press the material of said sheets into intimate engagement during the said application of heat to form an hermetic seal about said article, and cutting means mounted in conjunction with said forming member comprising a cutting member and a flat surface to sever the envelope formed about said article while the material of which said envelope is composed is in a heated condition.

4. In an apparatus of the character described means to support an article to be wrapped between spaced sheets of Cellophane or other material having thermoplastic surface properties, said means comprising a platen shaped to conform to the size and configuration of the article to be wrapped, a forming member adapted to engage said material and fold the same about said article, means for imparting a reciprocating motion to said forming member, means for applying heat to said material, a sealing die having one surface thereof adjacent said platen and a complementary surface located on said forming member, pressure means associated with said forming member to press the material of said sheets into intimate engagement between said surfaces of said sealing die during the said application of heat to form an hermetic seal about said article, and cutting elements comprising a cutting member and a flat surface to sever the envelope formed about said article while the material of which said envelope is composed is in a heated condition, one of said elements being associated with said forming member.

5. In an apparatus of the character described means to support an article to be wrapped between spaced sheets of Cellophane or other material having thermoplastic surface properties, said means comprising a platen shaped to conform to the size and configuration of the article to be wrapped, said platen being mounted for limited movement relative to the adjacent surface of the apparatus whereby the sheet of material resting upon said platen is folded about and made to completely encase a portion of the article, a forming member adapted to engage said material and position the same about the remaining portion of said article, means for imparting a reciprocating motion to said forming member, means for applying heat to said material, a sealing die having one surface thereof adjacent said platen and a complementary surface located on said forming member, pressure means associated with said forming member to press the material of said sheets into intimate engagement between said surfaces of said sealing die during the said application of heat to form an hermetic seal about said article, and cutting elements comprising a cutting member and a flat surface to sever the envelope formed about said article while the material of which said envelope is composed is in a heated condition, said cutting member substantially conforming to the outline of said article, and one of said cutting elements being associated with said forming member.

6. In an apparatus for automatically wrapping an article in Cellophane or other material having thermoplastic surface properties, a tubular shaft, means for imparting a reciprocating motion thereto, a plunger positioned within said shaft, a combined sealing and forming member attached to one end of said plunger, said sealing and forming member being shaped to substantially conform to the size and configuration of the article to be wrapped, a second combined sealing and forming member positioned adjacent said first sealing and forming member and adapted to be engaged thereby, said second member being provided with an aperture shaped to substantially conform to the configuration of the article, a movable platen adapted to support said article mounted within said aperture, cooperating cutting means for severing the wrapped article from the wrapping material associated with each of said sealing and forming members and means for heating said material during the sealing and cutting thereof.

7. In an apparatus for automatically wrapping an article in Cellophane or other material having thermoplastic surface properties, a tubular shaft, means for imparting a reciprocating motion thereto, a plunger positioned within said shaft, a combined sealing and forming member attached to one end of said plunger, said sealing and forming member being shaped to substantially conform to the size and configuration of the article to be wrapped, a second combined sealing and forming member positioned adjacent said first sealing and forming member and adapted to be engaged thereby, said second member being provided with an aperture shaped to substantially conform to the configuration of the article, a movable platen adapted to support said article mounted within said aperture, means for severing the wrapped article from the wrapping material comprising a cutting die substantially conforming to the configuration of said article and a flat surface surrounding said second sealing and forming member, said wrapping material being severed between said cutting die and said flat surface, and means for heating said material during the sealing and cutting thereof.

8. In an apparatus for automatically wrapping an article in Cellophane or other material having thermoplastic surface properties, a tubular shaft, means for imparting a reciprocating motion thereto, a plunger positioned within said shaft, a combined sealing and forming member attached to one end of said plunger, said sealing and forming member being shaped to substantially conform to the size and configuration of the article to be wrapped, a second combined sealing and forming member positioned adjacent said first sealing and forming member and adapted to be engaged thereby, said second member being provided with an aperture shaped to substantially conform to the configuration of the article, a movable platen adapted to support said article mounted within said aperture, means for severing the wrapped article from the wrapping material comprising a cutting die substantially conforming to the configuration of said article and a flat surface surrounding said second sealing and forming member, said wrapping material being severed between said cutting die and said flat surface, means for heating said material during the sealing and cutting thereof comprising a heating element located in said second sealing and

forming member, and means for supplying a coolant to said movable platen to prevent said article from being injuriously affected by the heating of said wrapping material.

9. In an apparatus for automatically wrapping an article in Cellophane or other material having thermoplastic surface properties, a tubular shaft, means for imparting a reciprocating motion thereto, said shaft having a counter-bored portion at its upper end, a plunger positioned within said shaft, said plunger having a collar on one of its ends, a spring contained within said counter-bored portion of said shaft, said spring bearing against said collar of said plunger and normally urging said collar into contact with a shoulder formed on the inner diameter of said tubular shaft by said counter-bored portion thereof, a forming and sealing member attached to the other end of said plunger, said forming and sealing member being shaped to substantially conform to the size and configuration of the article to be wrapped, a second combined sealing and forming member positioned adjacent said first sealing and forming member and adapted to be engaged thereby, said second member being provided with an aperture shaped to substantially conform to the configuration of the article, a movable platen adapted to support said article mounted within said aperture, and cooperating cutting means for severing the wrapped article from the wrapping material comprising a cutting die mounted on said shaft adjacent said first forming and sealing member, said cutting die being shaped to substantially conform to the configuration of said article, said first sealing and forming member projecting beyond said cutting die so that the forming and sealing of said wrapping material occurs prior to the cutting thereof and means for heating said material during the sealing and cutting thereof.

10. In an apparatus for automatically wrapping an article in Cellophane or other material having thermoplastic surface properties, a tubular shaft, means for imparting a reciprocating motion thereto, said shaft having a counter-bored portion at its upper end, a plunger positioned within said shaft, said plunger having a collar on one of its ends, a spring contained within said counter-bored portion of said shaft, said spring bearing against said collar of said plunger and normally urging said collar into contact with a shoulder formed on the inner diameter of said tubular shaft by said counter-bored portion thereof, a forming and sealing member attached to the other end of said plunger, said forming and sealing member being shaped to substantially conform to the size and configuration of the article to be wrapped, a stationary sealing and cutting member positioned adjacent said reciprocating shaft, means for supporting the article to be wrapped and forming the wrapping about a portion of said article comprising a movable platen located in said stationary member, a spring normally holding the upper surface of said platen in the plane of the surrounding surface of said stationary member, said platen conforming to the configuration of the article to be wrapped, a sealing surface surrounding said platen and adapted to be engaged by said forming and sealing member, said sealing surface being serrated to fold excess wrapping material, and cooperating cutting means for severing the wrapped article from the wrapping material comprising a cutting die mounted on said shaft adjacent said forming and sealing member associated with said plunger, said cutting die being shaped to substantially conform to the configuration of said article, said sealing and forming member projecting beyond said cutting die so that the forming and sealing of said wrapping material occurs prior to the cutting thereof and means for heating said material during the sealing and cutting thereof, comprising a heating element located in said stationary member.

11. A mechanism for sealing and cutting a wrapping comprising a pair of spaced sealing members, cutting elements mounted adjacent each of said sealing members, said cutting elements comprising a cutting die and a flat surface, said sealing members and said cutting elements being adapted to be brought into respective contact, and means for applying heat to the wrapping in the region of contact between said sealing members and said cutting elements.

12. A mechanism for sealing and cutting a wrapping comprising a stationary sealing member, a movable sealing member positioned adjacent said stationary member and adapted to be brought in contact therewith, a cutting die operating in conjunction with said movable sealing member, a flat surface adjacent said stationary sealing member and adapted to be contacted by said cutting die and means for applying heat to the wrapping adjacent said sealing members and cutting die.

13. A mechanism for molding a wrapping to conform to the configuration of an article being wrapped, comprising a supporting surface, a platen mounted in said supporting surface for limited movement relative thereto, said platen being adapted to support the article being wrapped, said platen and the portions of said supporting surface adjacent thereto being shaped to substantially correspond to the configuration of a part of said article, a forming member mounted adjacent said platen, said forming member being movable relative to said supporting surface, and said forming member having a recessed portion shaped to substantially conform to the configuration of the remaining part of said article.

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