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WRAPPING

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This invention relates to improvements in wrapping with a thermo-stretchable film, which is preferably also heat-sealable. It includes both the process and apparatus for carrying it out.

In recent years several thermo-stretchable wrapping materials have come onto the market, such as films of rubber hydrochloride, polymerized vinyl derivatives, cellulosic ethers and esters, etc., plasticized as necessary or desired. There has also been developed machinery for wrapping articles in such film by heating a piece of the film while holding it around the perimeter and then pushing the article into the heated film to stretch the film to conform to the shape of the article and after pushing the article into the film, twisting the article and the film which contacts it in order to completely enclose the article in the film. This process of wrapping has become known as stretch-wrapping.

According to this invention the film is stretched by blowing. A whole series of articles may be individually wrapped. The invention is best described in connection with the accompanying drawing in which Fig. 1 shows a section of apparatus designed for such wrapping. Fig. 2 is a view in section of such apparatus with an article partially wrapped. Fig. 3 is a view of the wrapped article.

The articles wrapped may be of any shape. For convenience, the drawing illustrates the articles to be wrapped as rubber balls which may be, for example, three inches in diameter. In practice the articles to be wrapped may be larger or smaller and of irregular shape, and the apparatus employed will be of the type here shown but adapted to accommodate the particular article being wrapped.

Fig. 1 shows a column 6 adapted to handle a plurality of these balls, for example, five or six or more. Preferably the column will be equipped with a feeding device for continuously supplying balls to the column as they are used for wrapping. In this way a constant supply of balls is provided.

The column 6 will advantageously be cylindrical if the articles being wrapped are spherical. It will preferably be slightly larger in internal diameter than the diameter of the articles to be wrapped. It is equipped at the bottom with clamping means which comprise annular ring 7 and the annular flange 8 which is affixed to the bottom of the column. The clamp is held to the flange by bolts 9 and the springs 10. The springs are provided to keep the clamping ring firmly clamped to the flange.

Across the bottom of the column is a film 11

of rubber hydrochloride film or other thermo-stretchable material. In the bottom of the column is a compartment 12 which is separated from the rest of the column by a sliding valve 13. The valve may be of any usual type which forms a relatively tight fit, so that air pressure may be maintained in the section 12. The pipe 14 leading into the section 12 is connected with an air pump. Above the valve 13 is a series of balls. The lowest one is supported by the valve, and the ones above it are separated from the lowest one by the plunger 15. Having described the various parts of the apparatus, the operation will now be described.

In operating the wrapping mechanism the valve 13 is closed and the balls or other articles to be wrapped are fed to the column, one being supported by the valve 13 and the balance being supported by the plunger 15. The film 11 which may be circular to conform to the shape of the column 6, or preferably square so that it may be fed from a roll of the film and cut to length as it is clamped in place, is clamped between the ring 7 and flange 8. The film is then heated to a temperature at which it is easily stretched. For rubber hydrochloride film temperatures between 90 and 100 C. will ordinarily be used. When film other than rubber hydrochloride film is employed a suitable temperature for heating will be selected.

The film is preferably heated by bringing a hot plate 16 up within the circumference of the ring 7 to within a fraction of an inch of the film until the film has been heated to the desired temperature. Then before the film cools, the valve 13 is opened, and the ball resting on it is dropped to the lower compartment 12. The valve 13 is then quickly closed, and gas, which may be heated air, is blown into the compartment through the pipe 14. The pressure within the compartment 12 stretches the film until finally it has reached a position approximating that shown in Fig. 2. The ball which has been lowered from the compartment 12 is now gripped by hand or mechanical means and twisted, so as to draw the film together around the top of the ball. The clamping ring 7 is then lowered by suitable means (not shown), a suitable distance to allow removal from the clamps. The excess film is preferably cut away to leave the article 5 wrapped in the film 11 with a twist 17 closing the film around the top of the article as shown in Fig. 3. If heat-sealable film such as rubber hydrochloride film is used the pressure applied to overlapping portions of the film in twisting it

should be sufficient for the overlapping portions to unite and form a tight seal.

A new sheet of film is then placed within the clamps. The plunger 15 is pulled out from the column a sufficient distance to allow one ball to drop onto the valve 13, and the operation is repeated.

Automatic means may replace the hand control means shown in the drawing. The valve 13 may be replaced by any suitable valve mechanism. For the wrapping of articles other than rubber balls the plunger 15 will be replaced by other suitable mechanism, such as that now known in the art for accomplishing the intended result.

Instead of dropping the ball into the lower compartment 12 after heating and before applying the air pressure it may be introduced at any other convenient time. For example, the lower compartment 12 may be provided with mechanical means for supporting the ball. With a ball supported by such means and after the film has been heated, air pressure may be applied before the ball contacts the film. The ball may thus be dropped onto the film either while the film is being stretched or after the stretching has been completed. Any suitable means for continuously supplying balls to and through the lower compartment and maintaining pressure on the lower compartment as required, may be employed.

The invention is not limited to wrapping single, solid articles, but may be used for packaging liquids and a plurality of small articles, as, for example, small pellets or grains and the like. For finely divided articles and liquids, it will generally be preferable to blow the film to a desired size before introducing the material to be packaged. Such material may be supplied from a suitable source which feeds a weighed quantity of the material directly into the stretched film. The equipment shown must be adapted where necessary to accommodate the material being packaged.

If desired, any inert gas such as CO₂ may be used in place of air to exert the desired fluid pressure. The stretching of the film may be aided by the use of vacuum on the side of the film opposite to that to which gas pressure is applied.

I claim:

1. Apparatus for wrapping an article in a thermo-stretchable film which comprises means for holding the film taut, means for heating the film, means for blowing the heated film to stretch it and means for supplying to the stretched film the article to be wrapped.

2. Apparatus for wrapping an article in a thermo-stretchable film which comprises a substantially air-tight compartment of suitable size to hold the article, the compartment having an opening therein with means for holding a film across it, the opening being of sufficient size to pass the article therethrough, means for heating the film and means for blowing air into the compartment.

3. Apparatus for packaging articles by the stretch-wrap method which comprises a column, means for fastening a thermo-stretchable film across the bottom of the column, valve means for separating the bottom section of the column from the remainder thereof and means for introducing compressed air into the bottom section.

4. Apparatus for packaging articles by the stretch-wrap method which comprises a compartment, means for clamping film across an open end of the compartment, means for introducing compressed air into the compartment, means for continuously supplying individual articles to the compartment and substantially air-tight valve means through which the articles are introduced into the compartment.

5. The method of wrapping a plurality of articles which comprises heating a thermo-stretchable film held taut across an open end of a compartment containing said articles, stretching the film by fluid pressure applied thereto, delivering one of the articles from the compartment to the film and wrapping it in the stretched film and then replacing the film with fresh film and repeating the operation.

6. The method of wrapping materials which comprises heating a thermo-stretchable film held taut across an open end of a compartment, applying air-pressure to the compartment to stretch the film and introducing the material to be wrapped into the compartment, and, by stretching the film, enclosing the material within it and twisting the material with its enclosing film with respect to the means holding the film in order to completely enclose the object within the film.

7. The method of wrapping individual objects by the stretch-wrap method which comprises heating film stretched across the end of a compartment and compressing the air within the compartment to stretch the heated film and while continually supplying objects to be wrapped to the compartment, introducing the objects individually into the compartment and enclosing them in the stretched film while stretching the film around them to conform it to their shape.

8. The method of wrapping articles which comprises delivering articles one at a time from one end of a series for wrapping and always maintaining a series of the articles by adding thereto at the other end of the series, holding a sheet of thermo-stretchable film at its perimeter, heating the film and stretching it by applying fluid pressure to one side thereof without changing the relative position of the means holding the perimeter of the film, delivering an article to the film, wrapping it in the stretched film and then replacing the film and repeating the stretching and wrapping operation while supplying the articles to be wrapped continuously from the aforesaid series of articles.

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