March 16, 1937. A. ABRAMS ET AL 2,074,313

INTERWOUND FILM MATERIAL

Filed March 19, 1936 2 Sheets-Sheet 1

Fig. 1.

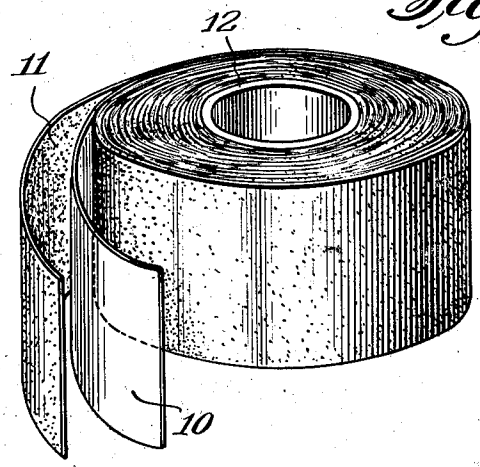


Fig. 3.

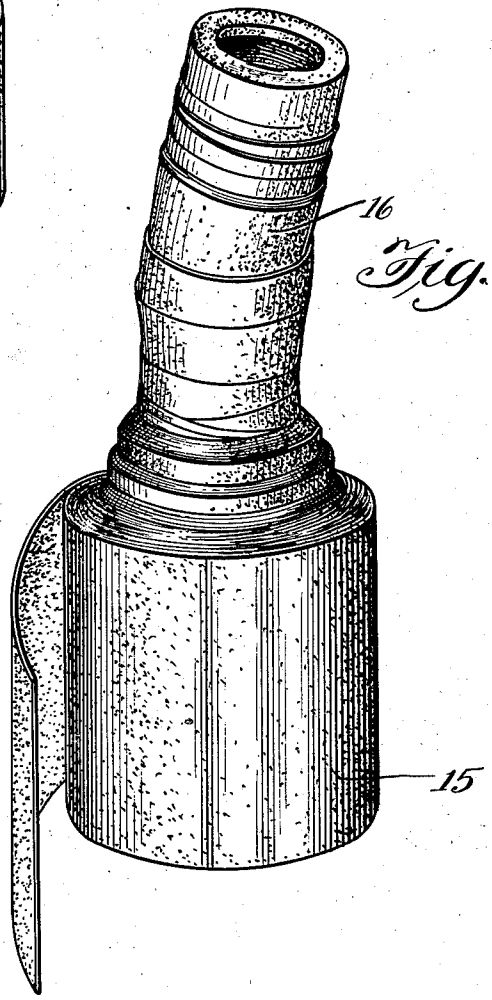
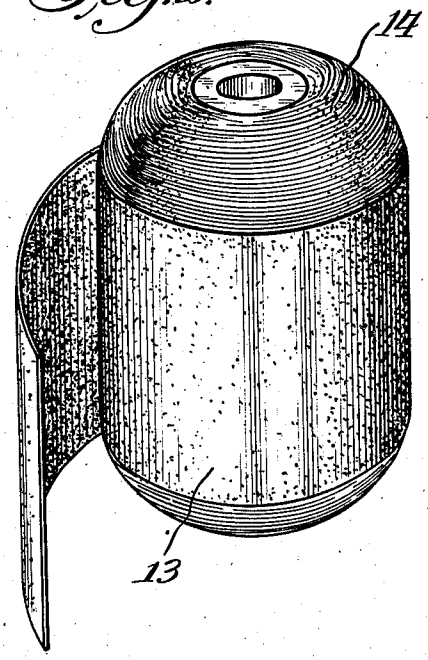


Fig. 2.



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Fig. 4.

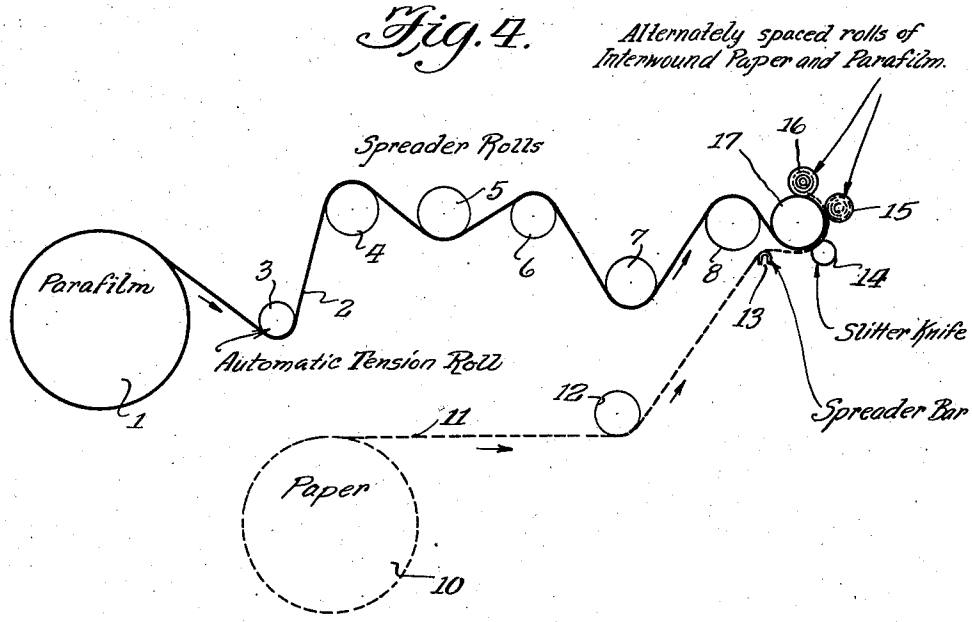
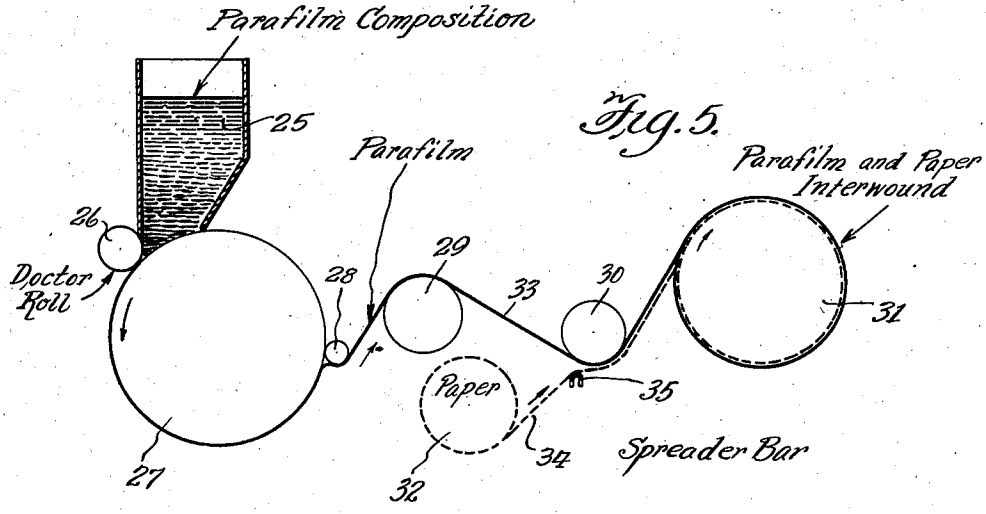


Fig. 5.



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INTERWOUND FILM MATERIAL

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Application March 19, 1936, Serial No. 69,731

8 Claims. (Cl. 154—2)

This invention relates to a roll of flexible sheet material interwound with fibrous sheet material. One of the objects of this invention is to provide a package of flexible thermoplastic, film material compactly wound in roll form which may be unwound without difficulty.

Another object of this invention is to provide a roll of flexible, pressure sealable sheet material which will retain its original form and which will not expand in width or otherwise deform when subjected to higher temperatures.

A further object of this invention is to provide an interwound package of wax-rubber sheet material which will retain its original configuration at temperatures above normal.

A further object of this invention is to provide a method for preventing the distortion of compactly wound rolls of thermoplastic films.

A further object of the invention is to produce a roll of thermoplastic sheet material which can be unwound evenly without distortion of the sheet during unwinding.

Further and other objects of the invention will be apparent from the annexed drawings and the following specification.

On the drawings:

Figure 1 is a perspective view of an interwound roll of film material.

Figure 2 is a perspective view of a roll of film deformed by the action of heat.

Figure 3 is a perspective view of another roll of film material illustrating the distorting action caused by high temperatures.

Figure 4 is a diagrammatic view illustrating an apparatus suitable for interwinding film material.

Figure 5 is a diagrammatic view of another apparatus suitable for interwinding film material.

In copending applications Serial No. 693,740 and Serial No. 40,765 we disclose a novel film material which is self-sustaining, flexible, waterproof and gasproof. Such film consists broadly of a thermoplastitc body substance and a smaller proportion of a binder substance. A specific example of such composition consists of a wax-rubber composition containing from at least 6 to 30% rubber. A film produced from such composition is thermoplastic, stretchable and self-sealing. We have found it convenient to supply this film material in the form of rolls of suitable widths.

Our film has the property of shortening in the length of its grain direction and stretching or expanding in width when heated above normal room temperature.

When our film is produced in continuous lengths the grain will normally run in the direction of the length of the film strips. Consequently when rolls of the film made from a wax-rubber composition using paraffin-wax of 130° F. m. p. are produced this change of dimensions causes considerable distortion of the wound roll particularly when it is subjected to temperatures above 90° F., thereby spoiling the original neat uniform and even contour of the roll. When higher melting point waxes are used the temperatures at which the rolls may be exposed without producing distortion are correspondingly higher.

The types of distortion which often occur are illustrated in Figures 2 and 3. As shown in Figure 2 a wound roll of our film becomes curved convexly and the ends 14 bulge outwardly when kept, say, at a temperature of 110° F. for 24 hours. This type of distortion usually occurs when the film is wound evenly. However, when an unevenly wound roll is kept at temperatures above 90° F. pronounced end distortion of the roll may occur as illustrated in Figure 3. This action appears to be caused by the contraction of the film in the direction of its length thereby producing a radial pressure which forces the film out laterally. It therefore appeared that the evenness of winding and perhaps the uniformity in thickness of the film across the width direction were factors to be controlled. If a roll is uniform in thickness but unevenly wound so that more pressure is exerted on one side than the other, there would be a greater tendency for the side where the greater pressure was exerted to expand so that the pushing out of the film would take place almost entirely from the one side. Moreover if greater heat is applied on one side of a roll than on the other side we have observed a greater tendency of the roll to expand on the warmer side than on the cooler side.

We have also found that the use of higher melting point waxes in our wax-rubber compositions has helped to reduce the tendency for cross-expansion of the wound film.

After many such attempts to prevent this expansion, without marked success, we found that it could be eliminated by interwinding a sheet of paper or other fibrous material. The function of the sheet material appears to be that of contacting the surface of our film sufficiently to prevent the film moving on the sheet material. It is our belief that the interwound paper produces a kind of frictional braking action, since the paper is a relatively inelastic material which will not deform or expand and frictionally engages the film moving thereover. When rolls of our film are interwound with paper or other suitable

fibrous material they can be subjected to temperatures as high as 110° F. for many hours without showing any distortion. Another advantage in interwinding paper or other fibrous sheet material with our film is that it prevents the film from sticking to itself thereby rendering it easy to unwind the rolled up film.

Furthermore the interwound paper can be suitably imprinted to give directions for use of the film and its many applications for binding and sealing purposes. We have found that generally a paper of comparatively low density or finish, in other words, a somewhat rough surfaced paper, is more likely to prevent expansion than one having a high finish or a smooth surface.

In general we prefer to use a sheet of at least 17 lb. (24 x 36—480) basis weight, both from the standpoint of economy and also because a sheet of lighter weight usually does not have sufficient strength to operate well on the winder. Where it is desirable merely to keep the film from sticking to itself but not to prevent cross expansion, we prefer to use a sheet of higher density such as super-calendered paper or glassine.

Several methods may be followed in preparing our interwound roll. According to one method, illustrated in Figure 4, our film alone is drawn through the winder until it reaches the slitter roll. The paper, 11, for interwinding is supplied from a jumbo roll 10 which meets the film sheet 2 at the slitter roll, the paper being brought on the outside of the film which in turn is next to the slitter roll. The film 2 is supplied from roll 1 and is led over an automatic tension roll 3, then over spreader rolls 4, 5, 6, and over guide rolls 7 and 8 to the supporting roll 17. The paper web 11 is led over guide 12, then over a spreader bar 13. The film and paper webs are superposed on roll 17 and are then slit simultaneously by a slitter knife 14 and from there on carried together and wound up into separate rolls such as 15 and 16. The type of rewinder which we find suitable is that made by the Cameron Machine Company and designated as No. 4 Camachine, model 7. In this winder compensation for thickness of film is made by having each small core driven independently of the others, through a friction applied on the core itself. In other words, if one side of the parent roll of our film is thicker than the other side, the roll slit from the thicker side would tend to be of greater diameter. Now if these were run on the ordinary drum type of winder greater pressure would be exerted on the thick roll than on the thin roll and as a result they would be wound with different degrees of hardness. By means of the special type of rewinder here mentioned this is compensated for and the rolls come off in about equal hardness of winding although one may be of greater diameter than the other.

We have found this method of interwinding paper to be suitable for all types of materials which will tend to contract in length and expand in width with increasing temperatures.

In printing our wax-rubber film and films of this type a much better printing impression can be produced when the film is backed with paper or other suitable sheet material when fed through the press than when the film is printed without such backing. This permits a more even handling on the printing press and also gives a certain degree of backing to the film so that the impressions made on it by the press are clearer and better.

We may also interwind the paper with the film at the time that the film is made on the forming machine. Then in case it is not necessary to trim the roll immediately, the entire wound roll can be fed directly to the printing press for printing, after which the trimming operation is performed.

This method is illustrated in Figure 5 where the film forming composition, such as a wax-rubber composition 25, is sheeted out on a chilled roll 27 by means of a heated doctor roll 26. The film 33 is stripped from the forming roll by a stripping roll 28 and is then led over guide roll 29 and around roll 30 where it meets the web of paper 34 which is supplied from roll 32. Web 34 passes over a spreader bar 35 and is superposed on the wax-rubber film at roll 30. The two sheets are then wound up on the roll 31.

It is to be understood that many changes and modifications may be made in the details of our invention and it is not intended to restrict the scope of the appended claims except as necessitated by the prior art.

We claim:

1. A roll of sheet material formed from a wax-rubber composition interwound with a fibrous sheet material to prevent deformation of the roll at temperatures above 90° F.

2. A roll of sheet material formed from a wax-rubber composition containing from at least 6 to 30% rubber interwound with a fibrous sheet material to prevent deformation of the roll at temperatures above 90° F.

3. A roll of sheet material formed from a wax-rubber composition containing from at least 6 to 30% rubber interwound with a paper of at least 17 lb. (24 x 36—480) basis weight having a slightly roughened surface.

4. A compactly wound roll comprising a flexible, self-sustaining, pressure sealable film interwound with a fibrous sheet material.

5. A roll of flexible strip material, having a tendency to contract in length and expand in width with increase in temperatures, interwound with a fibrous sheet material.

6. A method of preventing distortion of a roll of compactly wound thermoplastic flexible film at temperatures above 90° F. which consists in interwinding said film with a fibrous sheet material.

7. A method of preventing distortion at temperatures above 90° F. of a roll of compactly wound flexible film comprising wax and rubber which consists in interwinding said film with a fibrous sheet material.

8. A method of preventing lateral distortion of a compactly wound roll of a thermoplastic film which comprises interposing a suitable material between the convolutions of said roll to retard lateral expansion of the film with increase of temperature.

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