June 2, 1936. W. W. McLAURIN 2,043,110

METHOD OF REENFORCING AND SEALING CARTONS AND MATERIALS THEREFOR

Filed April 18, 1931

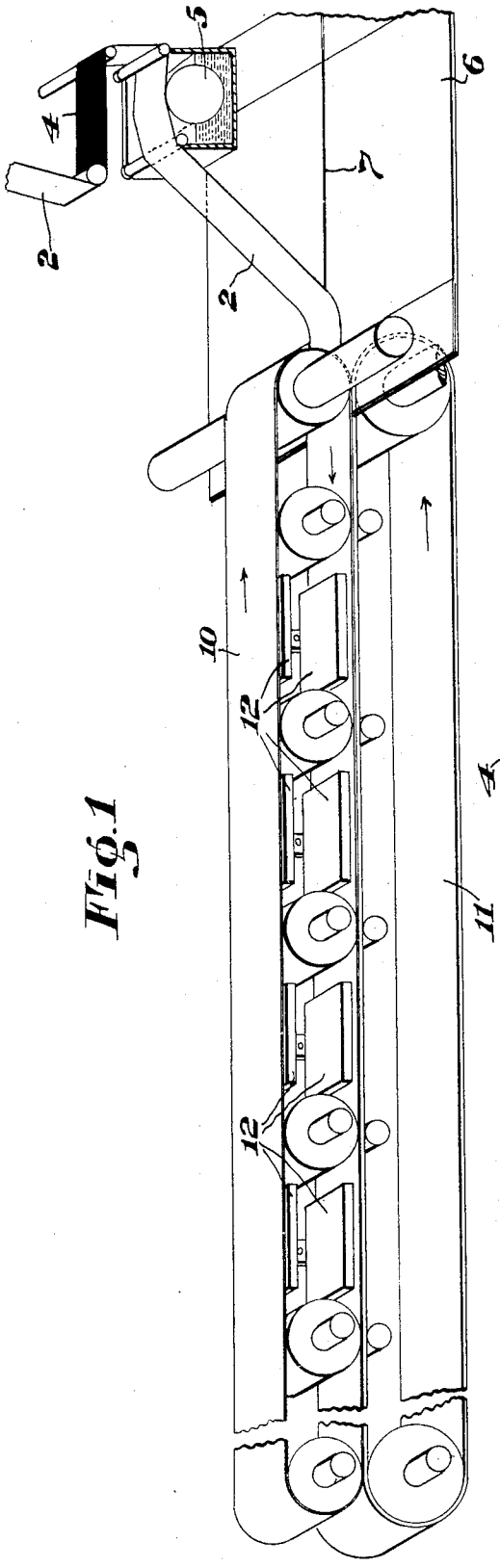


Fig. 1

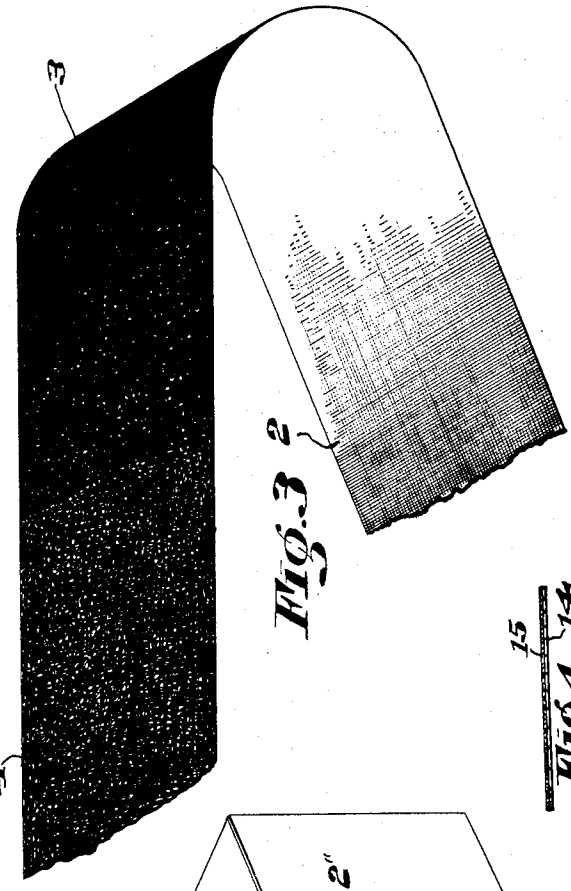


Fig. 3

Fig. 4

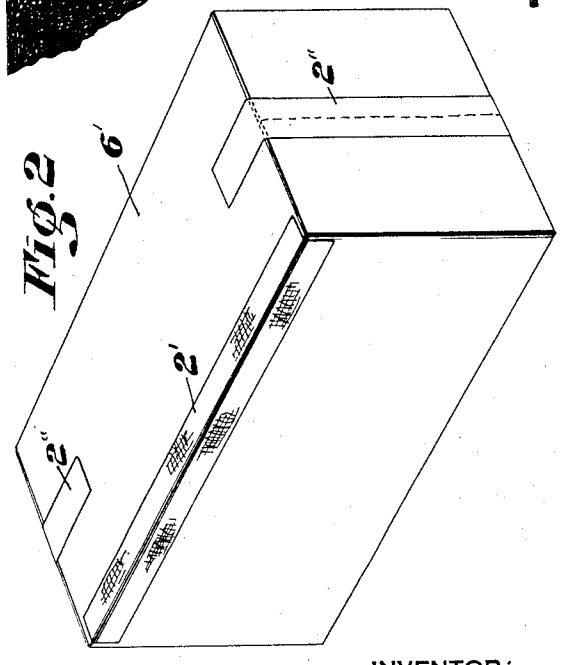


Fig. 2

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METHOD OF REENFORCING AND SEALING CARTONS AND MATERIALS THEREFOR

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Application April 18, 1931, Serial No. 531,052

6 Claims. (Cl. 91—68)

This invention relates to methods of uniting sheet materials to articles of work for various purposes, such as reenforcing, protecting, sealing, and the like, and to adhesively coated sheet materials adapted for these uses. While not limited thereto, the invention is especially concerned with the manufacture and sealing of cartons, boxes, and similar containers, and with reenforcing and sealing tapes adapted for use on such containers.

In the usual methods of making cartons, a carton blank is scored and folded and two side edges of the carton are brought into approximately abutting relationship where they later are secured together by a strip of reinforcing tape which is adhesively united to the margins adjacent to the abutting edges. This reenforcing operation is performed while the carton is in a flat or knocked down condition. In using the carton it is set up, filled, and closed by folding over the flaps in the proper order, and then is sealed by securing the carton flaps in their folded position by a sealing tape.

Both the sealing and reenforcing or stay tapes commonly used for these purposes are secured to the carton by a water soluble adhesive of some kind. If such cartons are subjected to a moist atmosphere for long periods of time, as for example, in ocean shipments through warm climates, the adhesives which unite the sealing and stay tapes to the carton are very likely to become softened to such an extent that they will let go.

This difficulty has long been recognized and many attempts have been made to overcome it. For example, the reenforcing tapes have in some cases been secured by metallic fastenings to the carton, or have been dispensed with altogether and the sides of the carton secured together by metallic fastenings. Various kinds of "waterproof" or, more correctly, water-resistant adhesives have been used. For example, water glass is used to some extent in sealing cartons but is objectionable because of its extreme brittleness and the fact that it dries slowly. The most satisfactory of the water resistant adhesives for these purposes, considering the various requirements, including that of price, is asphalt, or a mixture in which asphalt is an important constituent. Tapes coated with such materials, while introduced some years ago, have never gone into use to any substantial extent. These adhesives must be softened sufficiently by heat to bond them to the carton, and while tapes coated with them can readily be applied by hand methods, it is extremely difficult to apply them in taping or sealing machines at speeds satisfactory to the trade. In addition, the nature of these adhesives is such that it introduces serious practical difficulties in the handling and cutting of the tapes in taping and sealing machines. It is still, therefore, almost the universal practice to use water soluble adhesives in applying sealing and reenforcing or stay tapes to the cartons.

The present invention deals particularly with these considerations. It aims to improve the methods of applying sheet materials to articles of work with water resistant adhesives and to devise improved sealing and reenforcing materials with a view to overcoming difficulties of the character above mentioned. It is a particular object of the invention so to improve these methods and materials as to permit the use of water resistant adhesives in the reenforcing and sealing of cartons at speeds comparable to those used in reenforcing and sealing cartons by existing methods.

The nature of the invention will be readily understood from the following description when read in connection with the accompanying drawing, and the novel features will be particularly pointed out in the appended claims.

In the drawing,

Figure 1 is a perspective view, somewhat diagrammatic, illustrating an apparatus with which steps of the method devised by this invention may conveniently be practiced;

Fig. 2 is a perspective view illustrating one way in which a carton may be reenforced and sealed;

Fig. 3 is a perspective view of a portion of a reenforcing or sealing tape embodying features of this invention; and

Fig. 4 is a sectional view of another form of tape made in accordance with this invention.

According to the method of the present invention a temporary attachment of the sheet material to the carton or other article of work is first produced, and in connection with such attachment a water resistant adhesive is interposed between said material and the work. Subsequently this material is fused or softened in any convenient manner sufficiently to bond the material securely to the carton.

In the reenforcing and sealing of cartons the method is most conveniently practiced with the aid of a novel tape provided by this invention and one form of which is shown in Fig. 3. This tape comprises a backing strip 2 of suitable sheet material, such as fabric, paper, or a combination of fabric and paper. One side of this tape is coated with a water resistant adhesive 3. This adhesive preferably is substantially devoid of tackiness at

normal temperatures but is adapted to become tacky or sticky when heated to temperatures substantially above normal. It may consist of asphalt, or of a composition such as that disclosed in the Lord Patent No. 1,684,873. On this coating of water resistant adhesive is a superficial coating 4 of a water soluble adhesive which may be of any suitable nature, such as the common animal, vegetable, or fish glues. In Fig. 3 this coating is shown covering only a part of the adhesive coating 3, but usually the entire surface of the coating 3 will be covered by the coating 4.

Such a tape can be initially applied to the cartons in the ordinary taping and sealing machines. The tape usually is brought to these machines in rolls, and the machine is equipped with means for unwinding the tape, applying a suitable length to a carton, moistening the gummed surface of the tape on its way to the carton, and cutting the tape at the proper intervals. Some parts of such a mechanism are indicated diagrammatically in Fig. 1, the strip of tape unwound from the supply roll being shown at 2 and the gummed or adhesively coated surface of the tape being illustrated as running in contact with a moistening roll 5. This tape is shown with its forward end applied to the carton blank 6 where it covers the joint 7 at the meeting edges of the sides of the carton. A proper length of tape will be cut off to substantially cover this joint.

The initial attachment of the tape to the carton is produced through the action of the water soluble coating 4 of gum or adhesive. Subsequently the layer of asphalt 3 or other water resistant adhesive must be softened sufficiently to bond it securely to the carton. This result can be accomplished by hand or with the aid of a great variety of mechanisms. One convenient form of apparatus for performing this function is shown in Fig. 1. It consists of upper and lower endless metal belts 10 and 11, respectively, supported on suitable rolls with the lower reach of the upper belt running closely adjacent to but separated from the upper reach of the lower belt. The carton blank 6 is fed between these belts where it will be gripped and carried along by them with the upper belt 10 bearing upon the reenforcing strip 2 which has just been applied to the carton. Located closely adjacent to this upper belt 10 are several electric heaters 12 which serve to heat the belt to such a temperature that it will melt the adhesive 3 sufficiently to cause it to bond to the surface of the carton. In addition to softening the adhesive sufficiently to produce this result the belts also serve, due to the way in which they are supported, to press the sealing tape firmly into contact with the carton while the adhesive is melted. A very secure union thus is produced between the backing strip 2 of the tape and the surface of the carton. The conveying belts 10 and 11 should be made of such a length that a suitable time interval will be afforded to fuse the water resistant adhesive 3 securely to the carton. A substantial length of time is required for this purpose and this fact has been an important practical objection to the use of tapes coated with these adhesives in the commercial taping and sealing machines. The left-hand end, Fig. 1, of the conveyor belt 10 need not be heated, or may even be cooled so as to reduce the temperature of the adhesive 3 sufficiently to make it set or harden before the carton blank is discharged at the end of the conveyor. Or, the carton may be delivered to a second conveyor like the conveyor 10—11 but having unheated belts which will perform this same function.

A very similar arrangement can also be used in connection with carton sealing machines for applying tape to the flaps of the carton to seal the carton. Usually, however, the backing for a sealing tape consists simply of a strong paper.

In Fig. 2 a carton which has been set up, filled and sealed is shown at 6'. The reenforcing tape applied in the mechanism shown in Fig. 1 is illustrated in Fig. 2 at 2' and the sealing tapes are shown at 2''.

I have demonstrated in practice that tapes of the character above described can be applied to cartons substantially as fast by this method as by the methods commonly used for applying tapes coated with a water soluble adhesive. In addition, the thorough heating of the tape in the conveyor belts is of advantage in drying out the water used in making the initial temporary bond between the tape and the carton so that when the cartons come out of the machine the reenforcing tape is thoroughly dried. This overcomes a disadvantage frequently experienced in using prior methods and in which the tapes come out of the sealing machine somewhat moist. The carton flaps frequently are under considerable pressure at this time, and if the adhesive on the tape is still wet some slip frequently occurs between the tape and one or both of the carton flaps so that the carton will not be sealed tightly. In some cases the flaps even fly open. In either event hand taping usually is resorted to later to overcome this difficulty.

In making the tape shown in Fig. 3 the asphalt or other water resistant adhesive may be applied either in a melted condition or, more preferably, in the form of an emulsion. Emulsified asphalts are readily obtainable on the market and the adhesive composition disclosed in the patent above designated can also be emulsified. These emulsions can be applied to the tape in the usual gumming machines and the necessity for installing an asphalt plant thus can be obviated.

If a cloth tape is used, it is preferable to fill one side of the cloth with clay, talc or other suitable fillers in the manner disclosed in the MacLaurin Patent No. 1,759,124, the other side of the cloth to which the adhesive is to be applied being left unfilled. This filler is useful in preventing the adhesive from sweating through the fabric when it is applied to the carton. A similar result can also be obtained by combining a strip of paper with the fabric and then applying the asphalt or other water resistant adhesive to the surface of the paper. When this process is followed it is preferable to use a water resistant adhesive in performing the combining operation, although this is not absolutely necessary for all uses.

Instead of applying a superficial coating 4 of water soluble adhesive to the underlying coat of water resistant adhesive, as in the arrangement above described, the two adhesives can be mixed and applied in a single coat. This is very easily accomplished if the water resistant adhesive is used in the form of an emulsion. Any of the common glues of animal origin, such as the ordinary fish or animal glues, or a mixture of them, can be mixed with the emulsion and this mixture applied to the tape in a common gumming machine. I have obtained entirely satisfactory results with a mixture of 75% of water resistant adhesive with 25% of glue of the character above mentioned. A smaller percentage of glue can, however, be used. A tape coated

with this adhesive is shown in Fig. 4, the backing sheet of paper, cloth, or the like, being indicated at 14 and the coating of adhesive at 15. This tape can be handled in the ordinary taping and sealing machines in the same manner as the tape shown in Fig. 3. In addition, it has the advantage of requiring a single coating operation only to apply the adhesive. For most purposes I consider this form of tape preferable to that previously described.

It is also contemplated that instead of using the more common water soluble adhesives for the outer coating 4 on the inner coating 3 of the adhesive, this outer coating may consist of an egg or blood albumen, or some equivalent substance which will give an initial tackiness sufficient to fasten the tape to the carton or other article of work and which will itself be rendered water resistant by the subsequent heating step required to soften the coating of water resistant adhesive sufficiently to cause it to bond to the carton. This has the advantage of substantially eliminating water soluble constituents from the final adhesive composition which is relied upon to bond the tape to the carton. At the same time it is open to the disadvantage of being more expensive and somewhat slower acting than the forms of the invention previously described.

Tapes embodying this invention have the advantage not only of being highly resistant to the action of moisture and water, but, in addition, they are not likely to mold or to undergo the disintegration to which water soluble adhesives frequently are subject when exposed to severe conditions. For these reasons they are particularly useful in connection with the packing of foods which must be stored in refrigerators or cold storage plants and they are useful in boxes of the set-up type as well as in cartons.

The method provided by this invention makes it practical for the first time, so far as I am aware, to use tapes coated with water resistant meltable adhesives in reenforcing, staying and sealing machines at speeds satisfactory to the trade.

The invention also is valuable even when the water soluble adhesive is to be relied upon exclusively in securing the tape or other sheet material to an article of work to which it is to be applied. This is particularly true of that form of tape in which a coating of asphaltum or other water resistant material is first applied to the sheet material and a coating of water soluble adhesive later is applied to the surface of the first coating. The intermediate coating of water resistant material is valuable entirely apart from its adhesive properties in protecting the water soluble adhesive from the action of moisture when the latter adhesive is relied upon solely to secure the tape to the work. For this purpose it is not absolutely essential that the intermediate coating of water resistant material be of an adhesive nature, but water resistant coatings of the character above mentioned are entirely satisfactory for this purpose and they have the advantage of being readily applied, very inexpensive, having that degree of pliability which is desirable, and forming a strong union with both the sheet material and the water soluble adhesive. Such a tape can be applied to cartons in the ordinary taping and sealing machines, without the use of heat, and forms a far more reliable seal, stay or reenforcement than do the ordinary reenforcing and sealing tapes which are coated simply with water soluble adhesives and do not have the protection for these adhesives which the asphalt coating affords. These tapes are suitable, therefore, for use on packages which must be stored in cold storage plants, or which are going into warm climates where there is a considerable degree of humidity, or which are to be subjected to the action of moisture due to other conditions.

While I have herein shown and described preferred embodiments of my invention, it will be evident that the invention may be embodied in other forms without departing from the spirit or scope thereof. It will also be understood that while I have explained the process or method provided by this invention in connection with certain apparatus, the use of this apparatus is not essential to the successful practice of the method or process, but that the method can be practiced by hand or with the aid of a great variety of mechanisms.

Having thus described my invention, what I desire to claim as new is:

1. An adhesive tape of the character described comprising a strip of sheet material and a normally dry coating of water resistant adhesive on one face of said strip, said coating including a high percentage of asphalt and a sufficient proportion of water soluble glue of animal origin to produce, when moistened, an initial bond between said strip and the article to which the tape is to be applied.

2. An adhesive tape of the character described comprising a strip of sheet material and a coating of water resistant asphaltic adhesive on one face of said strip, and a normally dry, superficial coating of water soluble adhesive on the surface of said coating of water resistant adhesive and serving when moistened to produce an initial bond between said coated strip and an article to which the strip is applied.

3. An adhesive tape of the character described comprising a strip of sheet material and a coating of water resistant adhesive on one face of said strip, said adhesive including a high percentage of asphalt and being hard and substantially devoid of tackiness at normal temperatures but adapted to become sticky when heated to temperatures substantially above normal, and a sufficient proportion of a dry, water soluble glue of animal origin carried by said coating to produce, when moistened, an initial bond between said water resistant adhesive and an article to which the tape is to be applied.

4. An adhesive tape of the character described comprising a strip of sheet material and a normally dry coating of adhesive on one face of said strip, said coating including substantial proportions of a water soluble glue of an animal origin and an asphalt, said coating being substantially devoid of tackiness at normal temperatures but is adapted to become sticky when heated to temperatures substantially above normal, said glue being present in a proportion sufficient, when moistened, to render the coating tacky.

5. An adhesive tape of the character described comprising a strip of sheet material, and a normally dry coating of water soluble adhesive bonded to said strip by a water resistant adhesive coating of an asphaltic nature interposed between said water soluble coating and said strip, said water soluble adhesive serving when moistened to produce an initial bond between said coated strip and an article to which the strip is applied.

6. An adhesive tape of the character described comprising a strip of sheet material and a normally dry coating of water resistant adhesive on one face of said strip, said adhesive being hard

and substantially devoid of tackiness at normal temperatures but adapted to become sticky when heated to temperatures substantially above normal, and a sufficient proportion of water soluble adhesive carried directly by said coating to produce, when moistened, an initial bond between said water resistant adhesive and an article to which the tape is to be applied, said water soluble adhesive being adapted to be rendered highly resistant to the action of water when subjected to said temperatures.

WILLIAM W. McLAURIN.