May 16, 1967 W. R. HAIDER ETAL 3,319,870

PROTECTIVE SHEATH FOR ROLLED SHEET MATERIAL
AND PROCESS OF MANUFACTURE
Filed June 18, 1965

FIG. 1

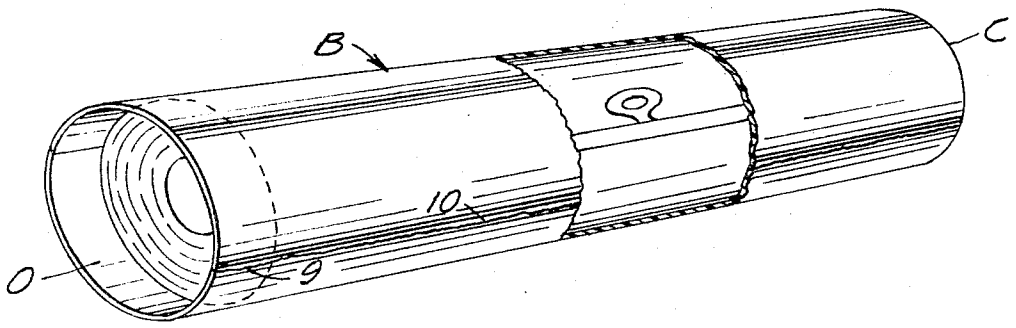


FIG. 2

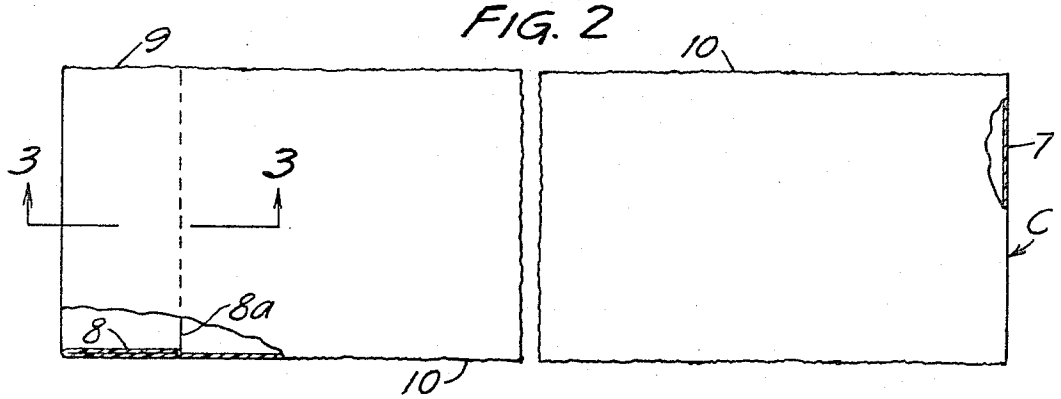


FIG. 3

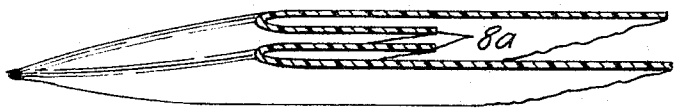


FIG. 4

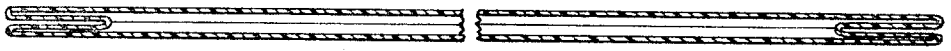
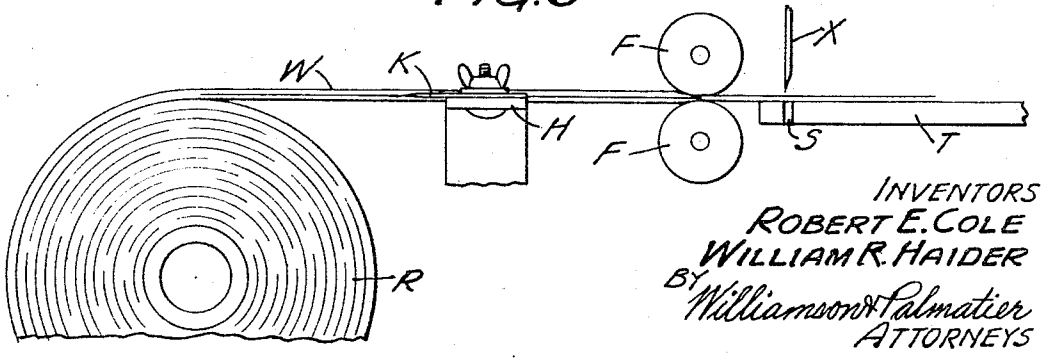


FIG. 5



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3,319,870

PROTECTIVE SHEATH FOR ROLLED SHEET MATERIAL AND PROCESS OF MANUFACTURE

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This invention relates to protective coverings or sheaths for rolled sheet material such as calendars, pamphlets, music and the like, and to a simple and economical process of making the same.

More specifically, our invention provides for the production of very inexpensive, highly flexible tubular sleeves which can be efficiently produced from thin plastic material such as polyethylene, acetate, Mylar and the like, into which rather tightly rolled sheet material may be inserted and when released, will tension and distend the tubular sheath to form a protective package for shelf storage and sale in stores and for also if desired, constituting a mailing tube.

It is an object of our invention to provide a thin, highly flexible protective sheet of the type described having a substantially closed end and having its opposite end open for reception of rolled sheet material, and provided with an internal abutment medium preferably integrally formed from the same material which substantially prevents displacement or slidable drop-out of said rolled sheet from said sheath when the rolled sheets or other articles are fully encased within the sheath.

It is a more specific object to provide a highly flexible, thin protective sleeve or sheath of the type described, having formed in an open end thereof, an inturned cuff, preferably integrally formed from the sleeve material and which is connected with the adjacent portion of the sleeve along substantially the length of the cuff and at two opposed lines extending longitudinally of sleeve and cuff, thereby providing arcuate free abutment edges which, when the article is fully encased, are disposed just outwardly of the terminal edges of the article to prevent inadvertent removal or drop-out of the contained article.

A further object is the provision of a simple, economical and high capacity process for manufacturing, from one or two plies of thin, heat-sealable materials such as polyethylene, acetate, Mylar and other plastics, our new product of manufacture.

The foregoing and further objects and advantages of our invention will be more fully understood from the following description taken in connection with the accompanying drawings, in which:

FIG. 1 shows an embodiment of our protective sheath applied to rolled sheet material such as a calendar and fully encasing the same in operative position, portions of the tubular sheath being broken away to show a part of the contents;

FIG. 2 is a plan view of the embodiment of FIG. 1, with the sheath flattened out in position for packaging or shipping, the lower left hand portion of the sheath being broken away to show cross sectional portions thereof;

FIG. 3 is a cross sectional view taken on a greatly enlarged scale, illustrating the integral inturned abutment cuff as it is presented near the open end of the sheath;

FIG. 4 is a cross sectional view on a greatly enlarged scale, of readily available double gusseted, "lay-flat" plastic tubing, from which a multiplicity of our novel protective sleeves may be constructed, utilizing the herein disclosed process steps; and

FIG. 5 is a diagrammatical view showing the simple and economical processing of the specified material to produce, at high capacity, a multiplicity of the protective sheaths of this invention.

Referring now to the exemplification of the product of manufacture illustrated in FIGS. 1 to 3 inclusive of the drawings, it will be seen that we have provided a generally tubular, highly flexible body B having a closed rear end C and a forward open end O. This body is preferably but not necessarily constructed of thin, highly flexible plastic material such as polyethylene, acetate, Mylar and the like, which is capable of being heat-sealed, but it will be understood that other flexible materials may be used, all within the scope of this invention.

In the form as shown in FIG. 2, the entire sheath is constructed from an integral narrow strip of said flexible material having a fold 7 at the right hand end, as shown in FIG. 2, and having an inturned cuff 8 integrally formed with the body and folded back for a short distance such as one fourth to one inch in length, upon the interior of the body.

It is essential to our invention that opposing portions of the inturned cuff 8 be longitudinally secured to the adjacent overlying end portion of the body B, leaving the balance of the annular edge free and disconnected from the interior of the body to provide arcuate abutment flanges 8*a*.

In the embodiment illustrated in FIGS. 1 to 3 interconnection is made between the inturned sleeve 8 and the surrounding terminal portion of the body by heat-sealing along straight lines 9 on opposite sides of the sheath or sleeve. In fact, the two longitudinal edges of a flat folded strip as shown in FIG. 2, may be heat-sealed with the sleeves 8 first inturned along the entire longitudinal edges, including the sleeve attachment edges 9 and a continuing edge 10 at each side of the folded ply of material. This leaves a smooth fold at the open end of the protective sleeve and also, when the sleeve is distended by insertion of a cylindrical article such as a rolled calendar, drawings, photographs, etc., to leave the arcuately extending abutment or locking edges 8*a* free. The overall length of the completed sheath, as previously described, is sufficiently longer than the length of the rolled sheet material or other generally cylindrical article to be encased so that the outer end of the article is disposed slightly inward of the loose or free abutment edges 8*a* of the cuff. The rolled sheets or other article has a tendency to expand the circumference of the article when released within the sheath and thus, any tendency through gravity or other effect to cause the article to slide towards the open end of the sheath, causes the edges of the article to abut the loose edges 8*a* of the cuff, bending the same inwardly to form greater abutment facilities for preventing accidental withdrawal of the article.

It will be understood that our novel protective sheath may be utilized for containing many types of rolled sheet materials such as calendars, posters, pictures, drawings, catalogs and the like, affording a sheath for protecting the enclosed articles, and storing and selling such articles in stores, and also sufficing to constitute a mailing tube for such articles. The use is of course not limited to rolled sheet material, but if closely dimensioned to other cylindrical articles, can be successfully used therewith. However, there is a close combinative relationship between a rolled sheet material article which tends to expand when encased in the sleeve or tube and the novel structure of our protective sleeve which includes the inturned cuff being longitudinally secured to the surrounding body portion at two opposed sides longitudinally of the cuff. This combinative action assures that the expanding rolled sheet material, if there is a tendency to dislodge the same longitudinally from the sleeve, is resisted and stopped by the abutting free edges of the inturned cuff.

While obtainable materials from which our new product may be manufactured economically and at high capacity, may vary considerably, we prefer, for economy, to manufacture our protective sheaths, either from "lay-flat," thin plastic tubing, or "center fold" plastic tubing, supplied in a continuous web and usually capable of being supplied upon a roll. In FIG. 4 of the drawings, a cross sectional view broken away for foreshortening purposes, on greatly enlarged and somewhat exaggerated scale for thickness, illustrates an integral "lay-flat" plastic tubing of for instance, polyethylene of a thickness for example between one and one and two tenths mils, which in its manufacture and conventional formation, has gussets G formed in both longitudinal edges thereof. The double gusset formation enables this continuous web of plastic material to be helically wound upon a roll stock R illustrated in FIG. 5.

FIG. 5 is a diagrammatic end elevation illustrating the essential steps of our method as applied to the double gusseted material illustrated in FIG. 4. The supply roll R is suitably mounted on frictional trunnions which permit longitudinal pay-out of the overall web W. Web W is progressively payed out by a pair of cooperating feed rolls F which are progressively revolved in opposite directions and flatten the overall web as it passes therebetween.

Intermediate of the supply roll R and the feed rolls and at one longitudinal edge of the double gusseted web W, is mounted in a fixed position, a holder H which carries an inwardly projecting sharp or razor edge knife K of a sufficient length to sever the fold of one of the gussets leaving thereby in the pay-out of web W, cuffs on both the upper and lower runs of the gusseted tubing.

Progressive feed-out of the web W through the feed rolls F flattens the upper and lower runs of the originally tubular web and progresses this web step-by-step for in each step, a predetermined width of the material to be cut into our product, which may vary from an inch and a half to four inches in width.

A "hot" cutter and heat-sealing knife X synchronized with the progressive travel of the web W, is mounted for vertical reciprocating movement. The temperature of this knife in well known manner, is held constant to the desired extent to produce a fusion temperature on the particular plastic material to be cut. Cutting edge of this knife progressively severs strips across the entire width of the web W and simultaneously fuses the plastic material at both sides of the cut, which necessarily includes the fusion and heat-sealing of longitudinal zone or line portions of the cuffs 8*a* which have been previously formed by slitting the gusset fold at one longitudinal edge of the web. The said cutting and heat-sealing is preferably carried out on a rigid table or support T which has an appropriate vertical slot S formed therein to receive the depending knife edge of the hot knife X. The finished strips, heat sealed along the transverse longitudinal edges of the web by two consecutive cutting actions of knife X, may be dropped successively or otherwise collected after finishing of the product.

From the foregoing, it will be seen that our improved article of manufacture or product may be made very economically and in high volume in a continuous cycle of operation with, as essential steps, the formation of preferably integral cuffs from two plies of a tubular or two-ply stock of highly flexible, preferably heat-sealable material, and then the employment of a step of uniting the longitudinal edges of transversely cut sections of the web while simultaneously securing longitudinal zones or lines of said cuff portions to the surrounding end of the flattened tube formed.

If center fold or two-ply plastic flexible webs are utilized, either supplied in elongated sheets or a continuous

web on a supply roll, the web or sheet may be payed out and during the travel thereof, folding means being provided between the plies of inturning cuffs or flanges of proper width against the inner plies of the two runs or plies. Thereafter, through feed or compression rolls, the two plies may be brought into close contact and successively cut and simultaneously heat-sealed along transverse edges of the webs to effect the results previously described, with reference to the lay-flat, double gusseted plastic tubing.

It will of course be understood that various changes may be made in the form, details and arrangements of parts of the product, all within the scope of our invention.

What is claimed is:

1. A protective sheath in combination with a cylindrical article such as rolled sheet material.

said sheath comprising a tubular body constructed of highly flexible material having a closed gusset end an an opposite open receiving end,

an abutment and retaining cuff completely encircling and disposed internally of said open end and constructed integrally from the material of said body and having free circumferential edges disposed inwardly a short distance from said open end,

the length of said body being greater than the length of the article to be enclosed to an extent where the outer end of said article extends at least very slightly inwardly of said free circumferential edges,

and means for securing narrow longitudinal zones of said cuff to the surrounding portions of said body,

said zones being spaced apart to leave free inward abutment edges to restrain outward longitudinal displacement of the article encased within said sheath.

2. The process of manufacturing a multiplicity of protective sheaths from highly flexible plastic sheet material, capable of heat-sealing, which consists in

providing an elongated wide, integral web of the plastic material of tubular but flattened form having integral gussets at the longitudinal edges thereof,

transversely severing the inward medial portion of one of said gussets to leave at said edge of said material an inturned flange at both the upper and lower leaves (runs) of said material, with free, flexible, marginal edges for subsequent abutment purposes,

progressively paying out the said gusseted web so cut,

and transversely cutting narrow strips of said web with a hot, sealing knife medium to simultaneously heat seal the cut edges of said doubled web and heat seal longitudinal lines or zones of said cuffs with the exterior doubled body while separating off strips transversely of said web to provide a tubular or sleeve-like product having a substantially closed end and having an open opposite end for receiving substantially cylindrical articles and with said open end having an inturned cuff secured at longitudinal opposing zones to the exterior of said body and having free edges extending between said zones for abutment with the end of an article encased within said body.

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