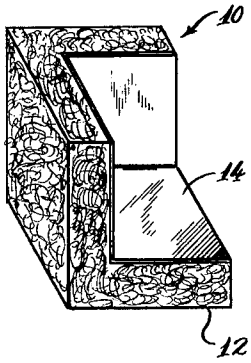
Aug. 25, 1964 C. R. LEWIS ETAL 3,145,837

SHOCK-ABSORBING DEVICE

Filed Dec. 31, 1962

Fig 1



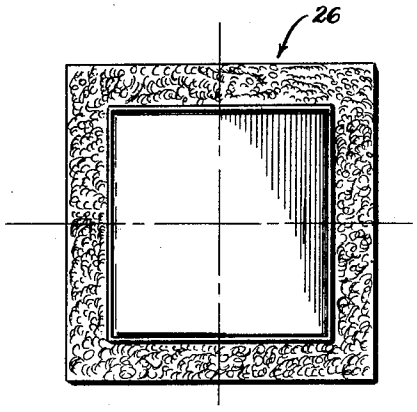
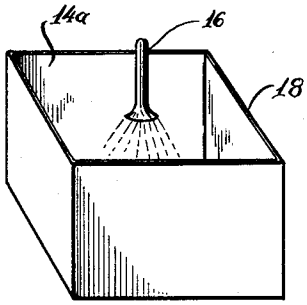


Fig 2

Fig 4



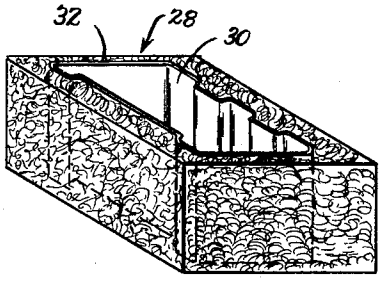
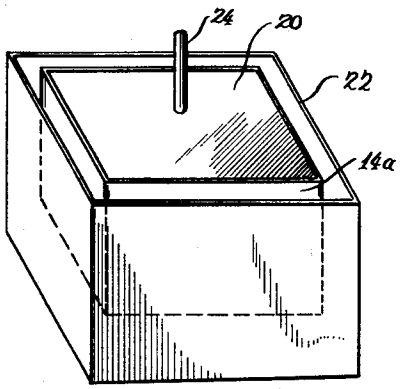


Fig 3

Fig 5



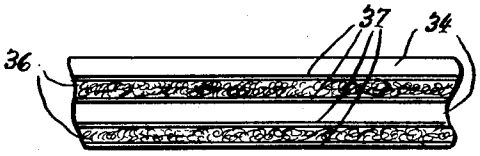


Fig 6

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SHOCK-ABSORBING DEVICE

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5 Claims. (Cl. 206—46)

This invention relates to a protective device, and more particularly to a shock-absorbing device adapted for use with articles having surfaces which are highly susceptible to abrasive action.

Many articles of manufacture must be transported long distances from the site of manufacture to the place of sale. By way of illustration, most furniture sold in the United States is manufactured in a rather localized area from which it must be distributed by truck, rail and other means of transportation to the purchasing public or sales outlets. Since the value of furniture is normally directly dependent upon its appearance, great care must be exercised during transport to prevent appearance-destroying damage from being inflicted on the moved articles.

Many articles of furniture, particularly those of generally rectangular configuration such as desks or the like, are shipped in crates or cartons together with heavy resilient corner pieces. The corner pieces function to space the surfaces of the article of furniture from the enveloping crate or carton thereby preventing contact therebetween which may damage the surface. The protective corner pieces are thick and resilient in character so as to absorb any sudden shock or bump which may be imparted to the crate during movement without damaging the article of furniture therein.

A composition which has been found particularly effective for functioning as a protective corner piece employs animal hair, such as hog hair and the hair of the mane or tail of a horse, which has been processed to impart a curl thereto. The curled hair is then coated with liquid latex or other rubbery material compatible with the hair. The latex is cured, binding the curled hair into an assemblage possessing the desired properties of deformability and shape recovery.

Although the hair-latex composition above described possesses excellent properties of resiliency, the coarse hair which provides for remarkable form recovery, also possesses the disadvantage of being abrasive so as to damage the surfaces with which in contact.

It is an object, therefore, of this invention to provide a protective device for use in transporting articles which is both highly shock absorbing and non-abrasive, even for the most delicate of articles.

It is another object of this invention to provide a protective device which may be readily molded to completely envelope an article to be protected while affording the maximum protection of shock and abrasion resistance.

It is still another object of this invention to provide a protective device which may be "tailor-made" to satisfy the protection requirements of the articles to be protected.

The above and other objects of this invention will become more apparent from the following detailed discussion when read in the light of the accompanying drawing and appended claims.

In one embodiment of this invention a mixture of hog hair and horse hair is heat treated at an elevated temperature. Water is driven off from the hair mixture and a curl is imparted to the individual hairs. Liquid latex is sprayed onto the hairs and the latex-hair mixture packed into a mold, which may comprise a flat pan, in which a thin vinyl chloride sheet is placed over at least one mold-forming surface. The latex is cured for about five minutes at an elevated temperature. In the course of curing,

the vinyl chloride sheet is bonded to the adjacent surfaces of the hair-latex mass.

The molded latex-hair body, which is well known in the art, possesses excellent resiliency. By employing smooth plastic facings, the molded body may be employed for protecting delicate wood, metal or other surfaces against scratching, as well as shock. Thus, flat hair-latex rectangular bodies may have smooth facings disposed on opposed major surfaces and employed as spacers between sheets of delicate metals, such as titanium, which are highly susceptible to scratching and abrasion. The coarse hair providing the resiliency of the protective body is thus unable to harm the metal surfaces protected because of the smooth plastic sheets interposed therebetween.

For a more complete understanding of this invention, reference will now be made to the drawings wherein:

FIGURE 1 is a perspective view of a protective device made in accordance with the teachings of this invention;

FIG. 2 is a top plan view of a latex-coated-curled hair body having an inner plastic surface prior to division into four parts, each part having the appearance of the device of FIG. 1;

FIG. 3 is a perspective view of a modified protective device made in accordance with the teachings of this invention;

FIG. 4 is a perspective view of a spray device and mold which may be employed in the course of forming a plastic surface for one form of protective device;

FIG. 5 is a perspective view of a mold assembly which may be employed in the manufacture of the protective device of FIG. 1; and

FIG. 6 is a fragmentary side elevational view illustrating a sandwich arrangement of metal sheets having interposed therebetween protective elements made in accordance with the teachings of this invention.

Referring now more particularly to FIG. 1, a protective device **10** is therein illustrated comprising a main body **12** of curled hair coated with a rubbery material, such as pure latex. The curled hair may comprise animal hair, such as hog hair or horse hair, that is, the hair of a horse's tail or mane. A mixture of such hair may also be employed in the formation of device **10**.

Protective devices composed of rubberized hair are well known and the main body portion **12** of device **10** of FIG. 1 is formed in accordance with well known procedures. The body **12** may be composed of about 33⅓% by weight of a latex binder and 66⅔% hair. The hair in turn may be 70% by weight hog hair and 30% by weight of horse hair, which has been heat treated at, for instance, a temperature of about 240° F. for a sufficient period of time to drive off moisture in the hair and as a result thereof impart a permanent curl to each hair.

The hair which may be in rope form in the course of drying is afterwards subjected to an age cure which may be for a period of thirty days. Following the cure, the ropes in which the hair was originally dried are opened and combed to remove any snarls. The hair is then sprayed with liquid latex and packed into a mold of desired configuration.

The hair-latex composition is then cured at an elevated temperature, the specific temperature depending upon the particular rubbery binder which is used. As a result, a molded hair-latex body is formed. The resultant body possesses excellent properties of resiliency since the curled coarse hair members have many interstices therebetween and are bound together by the latex. The fibers may be readily deformed by the application of force thereto and upon removal of such force will return to their original configuration. The molded bodies of latex and hair possess excellent resiliency under extremely low

and extremely high temperature conditions and also possess excellent fire-resistant properties. The latter desirable properties render such bodies particularly suitable for a large variety of applications.

Hair-latex compositions similar to that above described have been used in the past as protective packing in the shipment of articles which are readily susceptible to damage and disfigurement. The furniture industry, for instance, has long been plagued with a shipping problem. More specifically, items of furniture in the course of shipment in a large number of cases are scratched, chipped or otherwise mutilated in transit, particularly at the corners. Such marring occurs when the crate or carton in which the furniture is packed is subjected to a sudden jolt resulting in the concentration of abrading forces in the corner portions of the carton so that the adjacent portions of the furniture are disfigured requiring refinishing by the retail dealer after the article of furniture has arrived at its destination. The same problem may reoccur upon shipment of the furniture from the dealer to the customer. Obviously the necessity of refinishing a piece of furniture adds greatly to the expense to the furniture dealer, requiring labor and expense which otherwise might have been avoided if the furniture could have been shipped without damage.

Protective device **10** of FIG. 1 comprises a corner piece which may be employed at the four corners of a rectangular item of furniture, such as a desk or chest, and has as its primary function the spacing of all surfaces of the item of furniture from an enveloping carton or crate in which the desk is confined. Although rubberized hair possesses excellent properties of resiliency, the coarse nature of the hair which makes this resiliency possible is such as to enable the hair to abrade a fine furniture finish and even the finish of delicate metals, such as titanium. Thus, the protective device itself has in the past damaged delicate surfaces which were to be protected.

In accordance with this invention a smooth plastic surface having a low coefficient of friction is placed over those surface portions of the rubberized hair protectors which engage the article to be protected from shock. An article possessing such a smooth facing, therefore, will possess not only properties of resiliency, but also insure the absence of any abrasion at the interface between the protector and the article surface contacting the same.

In FIG. 1 a smooth plastic sheet **14** is adhesively secured to the three innermost surfaces of the device **10** which would normally engage a corner portion of the article to be protected. Article **10** of FIG. 1 is given by way of illustration only. Quite obviously the rubberized hair body possessing the smooth plastic facing may be molded to closely conform with the surface configuration of any object to be protected thereby.

The article **10** of FIG. 1 may be formed in accordance with the following procedure. A viscous vinyl chloride-plasticizer composition may be sprayed about the interior periphery of an open container in the manner illustrated in FIG. 4, wherein spray **16** is illustrated as coating the periphery of the inner surface of container **18** with a spray resin-hardener composition. Following build-up of the desired thickness of the plastic film which may vary between about .01 to .02 of an inch in thickness, the coating is cured at an elevated temperature, 320° F. for a vinyl chloride composition, after which the solidified coating and mold assembly is plunged into a cold water bath. The film thickness will, of course, vary with the toughness thereof and the nature of the expected force to be applied thereto. A vinyl chloride film thickness of .01 to .02 inch has been found satisfactory for use with desks and similar size articles of furniture. As a result of such immersion the metal container **18** of FIG. 4 possessing a greater coefficient of expansion and contraction will shrink allowing coating **14***a*, which is formed on the inside thereof, to be readily stripped therefrom. Coating **14***a*, which is of bag-like configuration is then placed about the periphery of a form, such as form **20** of FIG. 5, which is in turn placed in desired relationship with a confining mold **22** by means of a supporting rod **24**. A latex-coated curled hair composition is then packed in the space defined by the plastic film **14***a* mounted on mold **20** and the inner periphery of mold **22**. The latex may then be cured at the desired curing temperature and as a result thereof, rubberized hair will be bound to the centrally disposed film **14***a* of box-like configuration.

Following curing of the latex, the two molds **20** and **22** which have been combined to form a mold space are stripped from the resulting film-rubberized hair body. The resulting body, such as box-like member **26** of FIG. 2 may then be cut along the intersecting axes also shown in FIG. 2, providing four protective devices as the device **10** illustrated in FIG. 1.

FIG. 3 illustrates one-half of a protective device **28** having a central cavity **30** which is adapted to snugly receive a delicate instrument, such as a camera or the like. A mating portion (not illustrated) may be employed for purposes of completely enveloping such delicate instrument, thereby enabling the same to be transported through the mail without danger of abrasion or shock. In the protective device of FIG. 3 the surface of the rubberized hair body which defines cavity **30** is covered with a smooth protective film **32** insuring the absence of any abrasion between the rubberized hair of the body and the instrument resting therein.

The protective device of the type above described may be composed of layers of rubberized hair surfaced with smooth protecting films, such as vinyl chloride, and other thermoplastics such as acetates and butyrates which are compatible with the binder. In FIG. 6, sheets of titanium metal **34** are illustrated in stacked relationship with interposed sheets **36** of a rubberized hair body possessing opposed rectangular surfaces coated with a smooth plastic film **37**.

It is believed that the foregoing description has indicated the manner whereby protective devices composed of rubberized hair may be surfaced so as to retain their resilient properties and at the same time avoid abrading any delicate surface of an article which is to be protected.

As above pointed out, the specific configuration of the protective device will vary with the configuration of the article to be protected. The protective device may engage only a portion of the article or may completely envelope the article by receiving the same in an inner cavity. The rubberized hair compositions are well known in the art and may vary in composition to adapt itself to the particular application in which used. For instance, if a less resilient protective device is needed for use with a heavier article to be protected, more straight hair and more latex than normally employed will be used in such article. Thus, instead of approximately 33⅓% of a latex binder, approximately 50% may be employed.

Selection of the desired hair-latex compositions is believed to be well within the skill of the art and such compositions have been readily formed to meet specific applications in the past.

Although the foregoing description has merely referred to curled animal hair, fibers such as hemp, tula, and sisal which may be curled and which possess excellent properties of resiliency may be employed. It is intended that in the claims appended hereto, such materials be included within the scope of the term "fibers."

As above indicated, pure latex has been found to be an excellent binder for compositions of the type described. However, other synthetic and natural materials possessing the properties of latex and which are well known in the art may be substituted therefor. Although vinyl chloride is given by way of example as the smooth film surface for the rubberized hair bodies above described, other thermoplastic materials having similar properties of smoothness may be employed as surfacing for such bodies.

Without further elaboration, the foregoing will so fully explain the character of our invention that others may, by applying current knowledge, readily adapt the same for use under varying conditions of service, while retaining certain features which may properly be said to constitute the essential items of novelty involved, which items are intended to be defined and secured to us by the following claims.

We claim:

1. An assemblage comprising an article to be protected against shock, a container for said article, shock-absorbing means for preventing the imparting of shock to said article comprising a molded assemblage of curled, resilient, form-retaining fibers; said fibers being bound together by means of a resilient binder so as to be maintained in a substantially fixed relationship with a plurality of interstices therebetween whereby said fibers may be distorted by means of a distorting force and returning to their original configuration upon removal of said force, said shock-absorbing means being disposed between a portion of the container and a portion of the exterior surface of said article to be protected; said shock-absorbing means having a surface portion of predetermined configuration conforming with the engaged exterior surface portion of the article to be protected, and a protective, thermoplastic, smooth, non-abrasive surfacing disposed on said shock-absorbing surface portion of predetermined configuration for engaging said article to be protected; said thermoplastic surfacing being bound to said resilient, form-retaining fibes of said shock-absorbing means by said resilient binder.

2. The assemblage of claim 1 in which the fibers in said shock-absorbing means are sisal fibers.

3. The assemblage of claim 1 in which the fibers in said shock-absorbing means are tula fibers.

4. The assemblage of claim 1 in which the fibers in said shock-absorbing means are hemp fibers.

5. The assemblage of claim 1 in which the fibers in said shock-absorbing means are a mixture of curled hog hair and horse hair.

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