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N. AGRISS ET AL
RESILIENT PACKING SHEET

3,018,015

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2 Sheets-Sheet 1

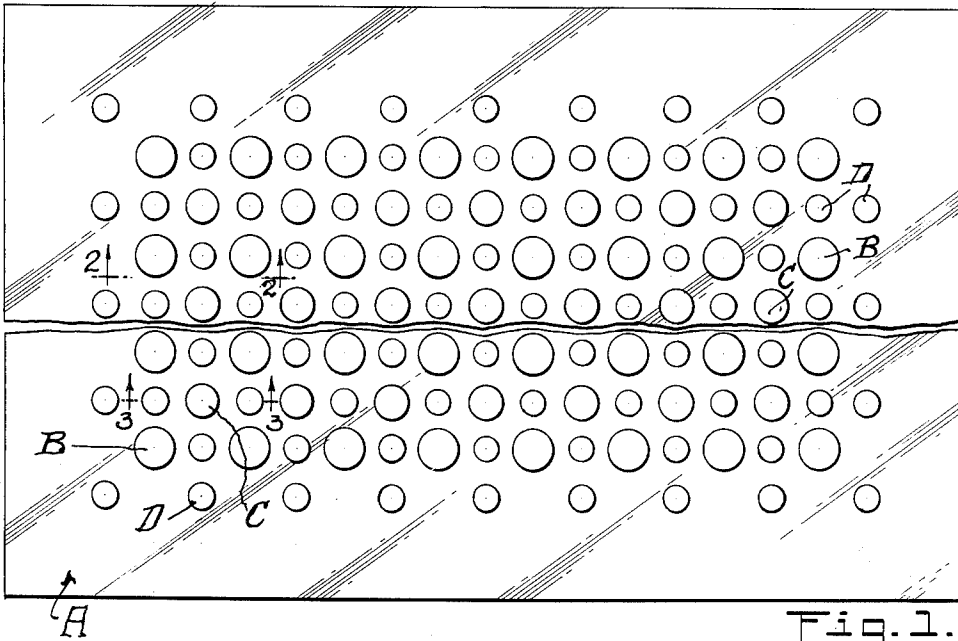


Fig. 1.

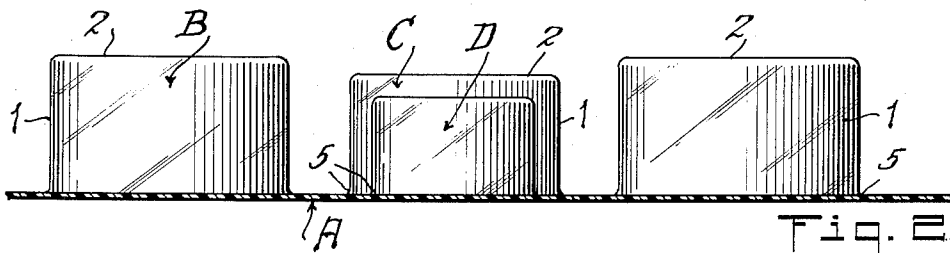


Fig. 2.

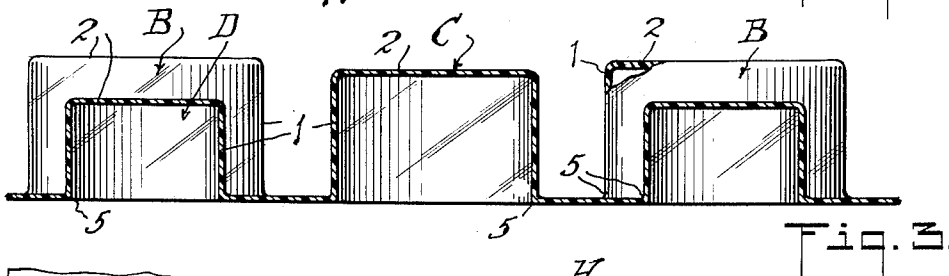


Fig. 3.

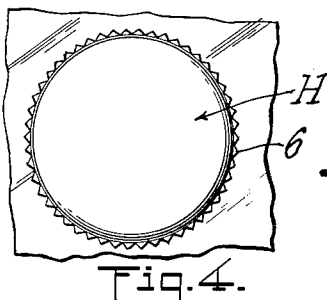


Fig. 4.

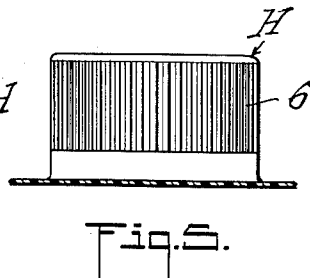


Fig. 5.

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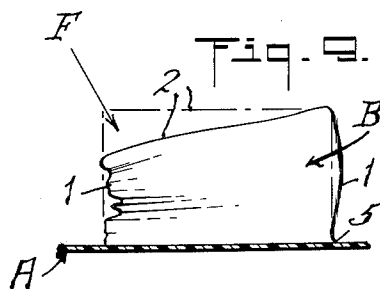
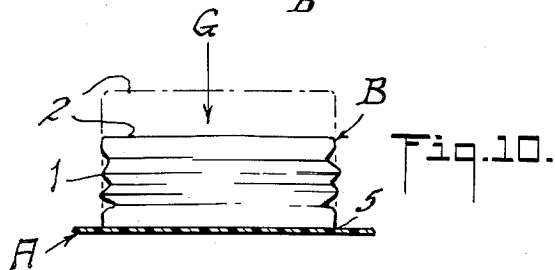
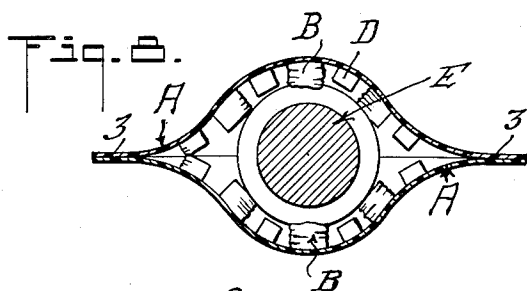
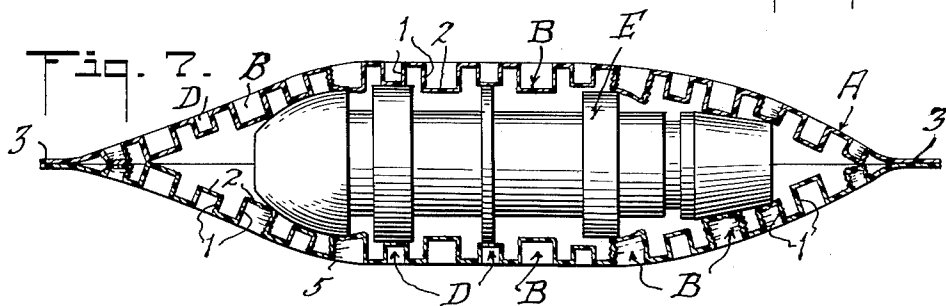
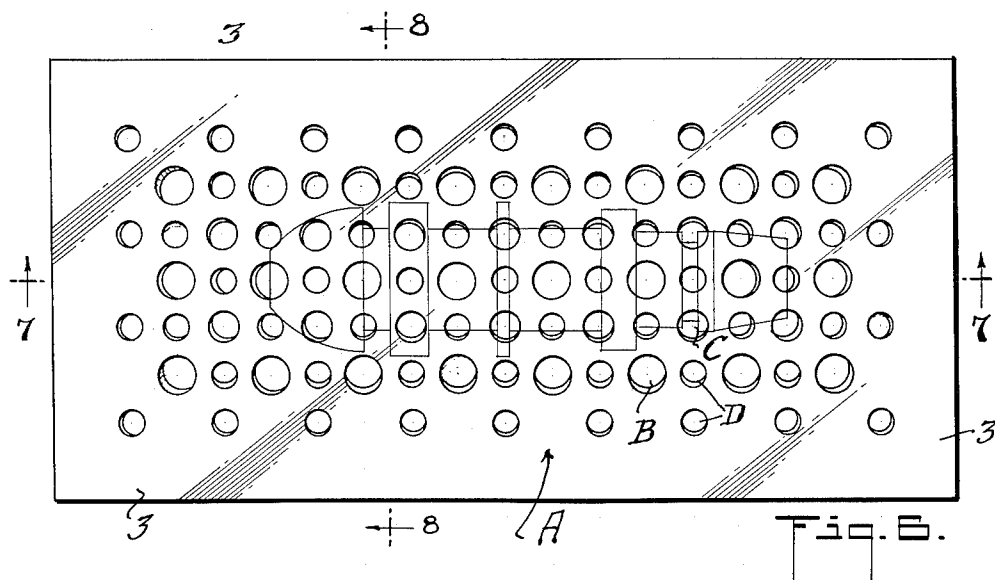
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RESILIENT PACKING SHEET

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2 Sheets-Sheet 2



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3,018,015

RESILIENT PACKING SHEET

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1 Claim. (Cl. 217—53)

This invention relates in general to the packing of fragile articles and particularly delicate instrument or machine parts. Resilient packing or cushioning sheets formed of fibrous material such as cardboard and paper pads are well known, but they are not satisfactory where the articles to be packed are covered with grease or are required to be protected against moisture and against dust, and generally it has been necessary to wrap such articles in a grease-proof, moisture-resistant and dust-proof wrapper before they can be placed in cartons or containers with the cushioning sheets.

A prime object of the invention is to provide a novel and improved grease-proof, moisture-resistant and dust-proof sheet to serve as a wrapper for such articles or as a resilient or cushioned lining for containers in which the fragile or delicate articles are packed and shipped.

A further object of the invention is to provide a packing sheet of this character which shall be formed of a synthetic plastic composition such as polyethylene or vinyl chloride and provided with a plurality of novel and improved resilient protuberances or bosses that project from either or both sides of the sheet.

A further object is to provide a packing sheet of this character which can be economically produced by vacuum forming or pressure forming methods or by die pressing of a thin sheet of the synthetic plastic composition.

Still another object is to provide a resilient plastic packing sheet having a plurality of equidistantly spaced integral upstanding hollow or cup-shaped protuberances or bosses provided with approximately cylindrical side walls.

Other objects, advantages and results of the invention will be brought out by the following description in conjunction with the accompanying drawings in which

FIGURE 1 is a top plan view of a cushioning or packing sheet embodying the invention with portions broken away;

FIGURE 2 is an enlarged vertical longitudinal sectional view approximately on the plane of the line 2—2 of FIGURE 1;

FIGURE 3 is a similar view on the plane of the line 3—3 of FIGURE 1;

FIGURE 4 is a top plan view of one of the protuberances or bosses embodying a modification of the invention;

FIGURE 5 is a side elevational view thereof;

FIGURE 6 is a plane view of an envelope formed of packing or cushioning sheets embodying the invention;

FIGURE 7 is a longitudinal vertical sectional view on the plane of the line 7—7 of FIGURE 6;

FIGURE 8 is a transverse vertical sectional view on the plane of the line 8—8 of FIGURE 6;

FIGURE 9 is an enlarged schematic side elevational view of one of the resilient protuberances or bosses showing one manner in which the boss or protuberance yieldingly resists a force applied obliquely thereto; and

FIGURE 10 is a similar view showing the action of the protuberance under a force applied thereto in a direction parallel to the axis or side walls of the protuberance.

Specifically describing the invention, the reference character A designates a thin sheet of a resilient synthetic plastic composition such as polyethylene or vinyl chloride and having a plurality of cup-shaped protuberances or bosses B, C and D projecting from one side of the sheet. The sheet with said bosses integrally formed therewith

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may be produced by any suitable method, such as by a well known vacuum forming process or by a well known pressure forming process or by die pressing a flat sheet of the plastic material.

The bosses or protuberances are shown as projecting from only one side of the sheet, but it will be understood that they may project from both sides of the sheet if desired.

Each protuberance or boss is hollow and has a side wall 1 projecting from the sheet, which is annular and preferably is approximately cylindrical or slightly tapered or frusto-conical and of about the same thickness as the main portion of the sheet. The protuberance opens at one end through one side of the sheet and has a wall 2 at its other end which desirably is disposed in a plane approximately perpendicular to the axis and side wall 1.

While all of the protuberances may be of the same size, in many cases it is desirable to provide a plurality of series of protuberances with the protuberances of each series differing in height and diameter from the protuberances of the other series. As shown on the drawings, the series of protuberances B are of larger diameter and of greater height than the protuberances of the series C, and the protuberances of the series C are of greater diameter and of greater height than the protuberances of the series D.

The sheet may be used individually as a wrapper for a fragile, sensitive or delicate article, or a plurality of the sheets may be sealed together at certain of their margins to provide an envelope-like container for an article, or a sheet may be folded upon itself and have certain of its edges sealed together to provide a container.

FIGURE 1 shows a sheet that may be of any desired length, width and thickness, depending upon the size of the article to be packed, and in use, the sheet may be simply snugly wrapped around the article and secured in any suitable manner as by taping or tying or adhesive.

FIGURE 6 shows two sheets disposed in superposed relation to each other with their edges secured together in any suitable manner, such as thermoplastically or adhesively, as indicated at 3 to provide an envelope-like container for an article such as an instrument part E. The sheets may be arranged with the end walls 2 of the protuberances in contact with the article as shown in FIGURES 6 through 8, or if desired, the article may be wrapped with the protuberances or bosses projecting outwardly or away from the article.

Preferably the protuberances or bosses of each series will be equidistantly spaced from each other and the protuberances of the several series will be uniformly distributed on the sheet in alternately spaced relation as shown, for example, in FIGURE 1, and in use, the several series of protuberances may contact with different portions of the surface of an article having an irregular contour or having projections of different heights on its outer surface; and the bosses or protuberances of the different series provide different degrees of resiliency.

As shown in FIGURES 9 and 10, the protuberances may yield independently of each other and in different directions under forces applied thereto from different angles. For example, a force generally designated by the arrow F in FIGURE 9 applied to the end wall of the protuberance at an angle or obliquely to the axis and side wall of the protuberance will compress or partially collapse the protuberance in both a direction approximately parallel to the axis of the protuberance and in a direction transverse of said axis, and the protuberance will also bodily move laterally about the juncture of the side wall with the sheet. When a force G as shown in FIGURE 10 is applied uniformly to the end wall of the protuberance in a direction parallel to the axis of the protuber-

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ance, the side walls of the protuberance will be compressed or partially collapsed uniformly with the end wall of the protuberance disposed approximately perpendicular to the protuberance axis.

The approximately cylindrical walls provide a maximum of yielding resistance to forces applied to the protuberance consistent with the thickness of the sheet and the protuberance walls, and the protuberances are highly and individually sensitive to pressure applied thereto because the side walls of the protuberances are free to move in all directions about the zones of juncture 5 between said side walls and the sheet.

If desired, the side walls of the protuberance H may be reinforced by providing corrugations 6 therein as shown in FIGURES 4 and 5 and manifestly the shape of the side walls may be otherwise varied so long as they retain the characteristics of resiliency possessed by the cylindrical side walls that are shown in the drawings.

While we have shown and described the now preferred embodiment of the invention, it will be understood by those skilled in the art that many modifications and changes can be made in the material of which the sheet is formed, in the size, number and relationship of the protuberances and in the manner of enclosing or wrapping the fragile articles, all within the spirit and scope of the invention.

What we claim is:

Packing material comprising a single, thin, flexible, foldable sheet of material of substantially uniform thickness throughout having inherent resiliency and a plurality of hollow integral protuberances projecting from the sheet each including a cylindrical side wall of approximately the same thickness as the sheet joined at one

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end to one side of the sheet and having at its other end an integral flat wall approximately parallel to and above the general plane of said side of the sheet in a plane approximately perpendicular to said side wall, the protuberance being open at its other end, providing for resilient yielding of said side wall bodily under its inherent resiliency laterally about the juncture of said wall with the sheet and also bellows-fashion in a direction parallel and in directions oblique to its axis, there being a plurality of series of protuberances with the cylindrical walls of the protuberances of each series different in height and in diameter from the other protuberances and in alternately spaced relation thereto.

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