

Sept. 10, 1968

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3,400,810

PACKAGE AND PACKAGING METHOD

Filed Sept. 28, 1966

3 Sheets-Sheet 1

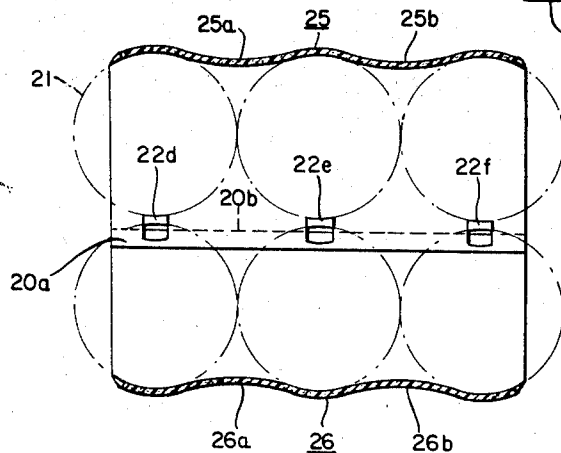
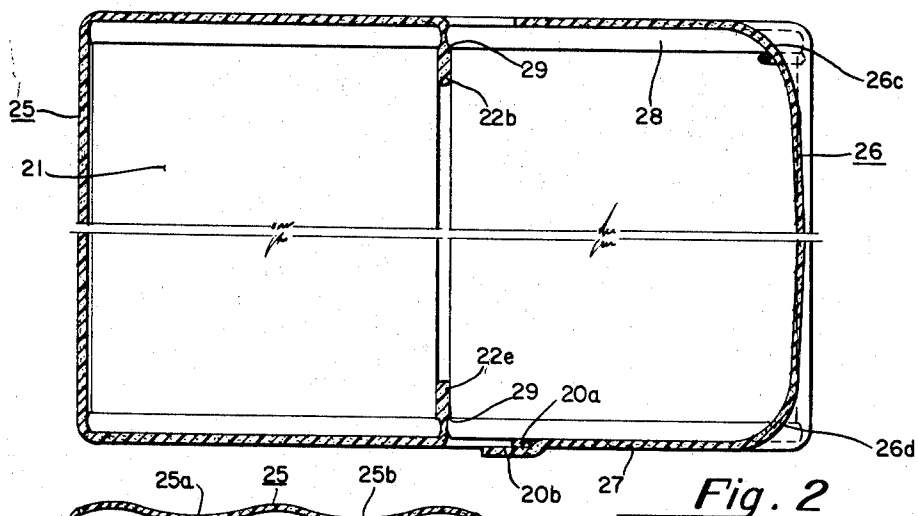
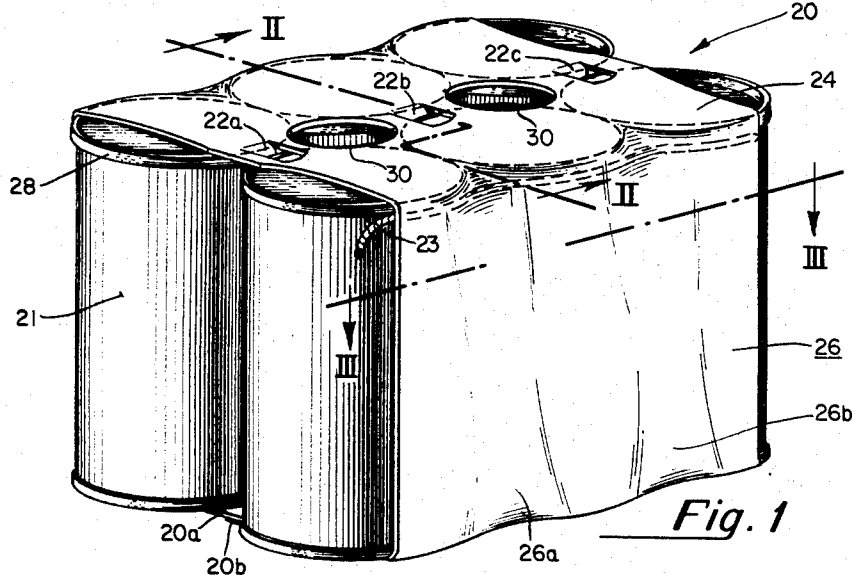


Fig. 3

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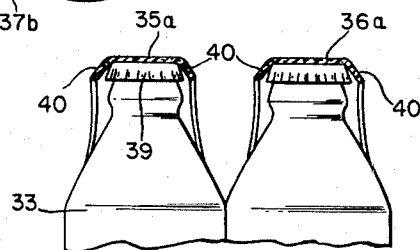
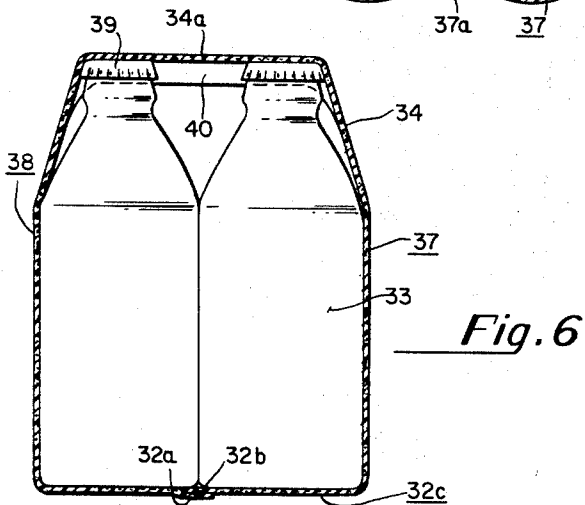
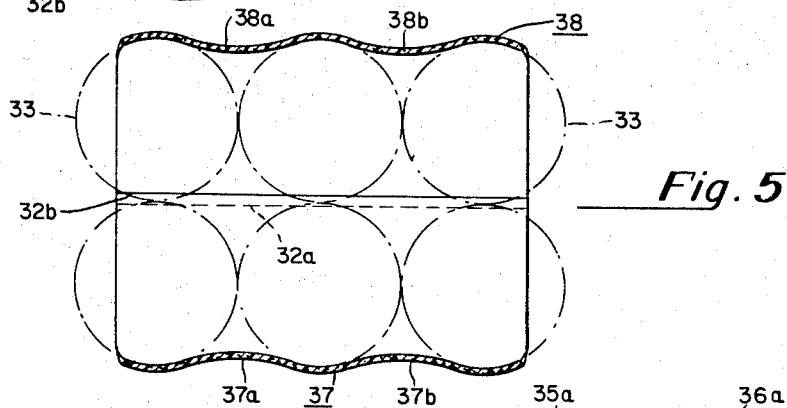
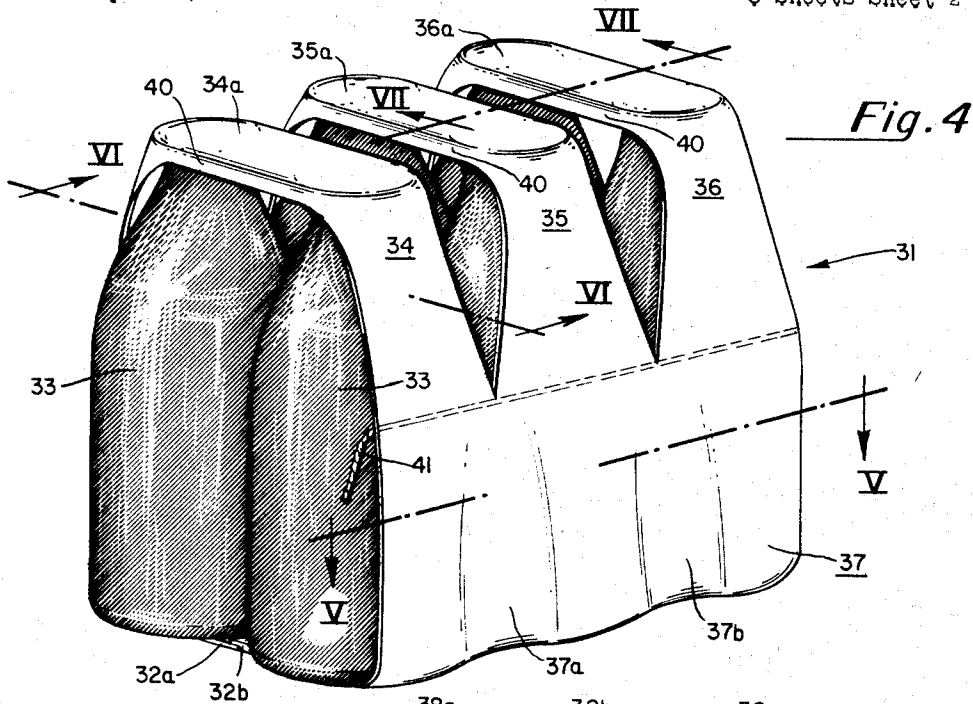
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PACKAGE AND PACKAGING METHOD

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3 Sheets-Sheet 2



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PACKAGE AND PACKAGING METHOD

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3 Sheets-Sheet 3

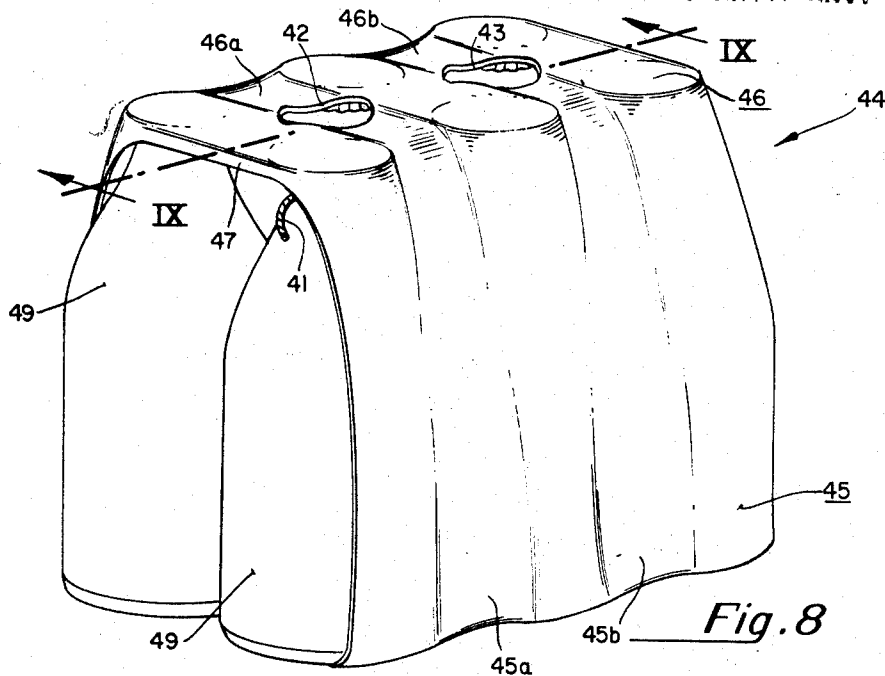


Fig. 8

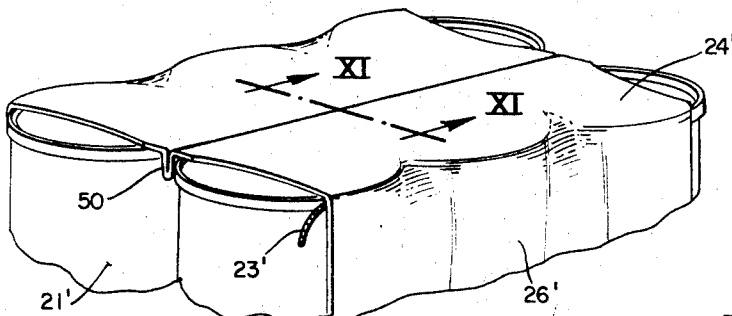


Fig. 10

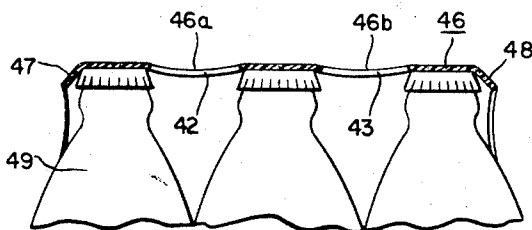


Fig. 9

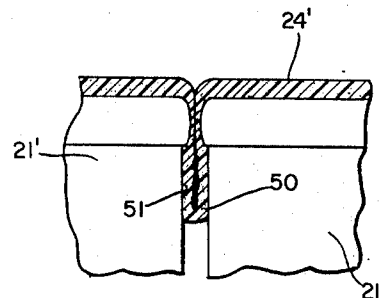


Fig. 11

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PACKAGE AND PACKAGING METHOD
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3 Claims. (Cl. 206—65)

This invention pertains to carriers and packages for articles such as cans, bottles, jars, etc.

The primary object of this invention is to provide a new package and a new packaging method substantially less expensive than heretofore used and, in particular, more economical than paperboard. The package of this invention also provides greater protection for containers than materials in current use and has many other desirable attributes, including resistance to moisture, strength, low weight and attractive appearance.

To achieve these objects and others which will become apparent, the invention utilizes an expandable cellular thermoplastic material that shrinks biaxially in one plane (i.e. longitudinally and laterally) and which also expands in thickness as the material is subjected to heat. Such material is hereinafter occasionally referred to by the coined term "Makotherm." Expandable polystyrene, also known as "foam" polystyrene, is an important type of Makothermic material and is used for purposes of the present disclosure.

In the drawings:

FIGURE 1 is a perspective view of a preferred embodiment of my invention used to form a package for cans;

FIGURE 2 is a vertical sectional view taken along lines II—II of FIGURE 1;

FIGURE 3 is a horizontal sectional view taken along the lines III—III of FIGURE 1, wherein the cans are shown in phantom lines;

FIGURE 4 is a perspective view of another embodiment of my invention used to form a package for bottles;

FIGURE 5 is a horizontal sectional view taken along lines V—V of FIGURE 4.

FIGURE 6 is a vertical sectional view taken along the lines VI—VI of FIGURE 4;

FIGURE 7 is a fragmentary view taken in vertical section along lines VII—VII of FIGURE 4;

FIGURE 8 is a perspective view of another embodiment of the invention comprising a package for bottles;

FIGURE 9 is a fragmentary view taken along section lines IX—IX of FIGURE 8;

FIGURE 10 is a modification of the invention illustrated in FIGURES 1—3 comprising a package for cans;

FIGURE 11 is a fragmentary view taken in vertical section along lines XI—XI of FIGURE 10.

FIGURE 1 illustrates one preferred embodiment of the invention in the form of a package, generally identified as 20, which is utilized to contain cans 21 arranged in the familiar 2 x 3 alignment.

In order to form the package 20, an initially flat sheet of foam polystyrene is cut to proper size, the usual locking tabs 22a—22f are punched and an opening string or tape 23 is attached to the sheet by adhesives. All of this is accomplished by known converting machinery for paperboard which needs little modification for use in connection with this type of material. If desired, the sheet may be printed by similarly well-known means.

After the cutting, punching and printing operations are

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concluded, the sheet is wrapped about the cans 21 so that the tabs 21a—21c are inserted between the tops of the cans. At the same time the tabs 21d—21f are inserted between the bottom of the cans. The length of the sheet is such, preferably, that a slight overlap of the end portions 20a and 20b exists along the midline of the bottom of the cans. The overlapped portions are securely attached to each other by any suitable means, such as adhesive or staples. Thus, the package is formed with a top 24, sides 25, 26 and a bottom 27.

After the foregoing is accomplished, the package is subjected to heat. Preferably, wet heat is used in the form of steam, hot liquid spray or an immersion bath. For this type of package, for example, immersion in water at 212° F. for ten seconds has proved suitable to achieve the results which will now be described. Since a time-temperature relationship exists, higher temperatures and shorter times may be used or longer times at lower temperatures.

As the polystyrene is thus subjected to wet heat, several significant events occur. First, the physical characteristics of the plastic undergo a marked improvement as the material loses substantially all of its brittleness and gains flexibility, toughness and strength of the kind that is necessary in packages for this type of use.

Secondly, the wet heat causes the polystyrene to shrink biaxially (i.e., along both its longitudinal and lateral axes) and to expand significantly in thickness. The shrinkage causes the material to contract tightly about the adjacent portions of the cans, as indicated in FIGURE 1. In the intervals between the cans the material draws inwardly toward the center of the package so that the sidewalls 25, 26 are concave in such areas, as best shown in FIGURE 3. Where the concave sidewall portions, numbered 25a, 25b, 26a, 26b, merge with the top 24 and bottom 27 of the package, curved shoulders, such as 26c and 26d, are formed.

As will be evident from an inspection of the drawings, especially FIGURE 2, the concave sidewall portions and the curved shoulders serve to securely hold the cans in place.

The third important effect of the wet heat treatment is the expansion of the polystyrene. This produces a thick-walled package having a significant cushioning capability. Indeed, in this respect alone the package is immeasurably superior to paperboard and like materials, including non-expandable plastics, which have been used previously. The importance of cushioning in shipping and handling is obvious.

Another very important effect of the heat treatment of the material is the expansion of the locking tabs 22a—22f below the lips or chimes 28 of the cans. As can be observed from FIGURE 2, the thickened portions of tabs 22b and 22e include shoulders 29 which lockingly engage the chimes 28 and thus prevent any significant movement of the cans in a vertical direction.

The thickened tabs 22 also serve to prevent lateral movement of the cans and to insulate adjacent cans from mechanical shock which may result during shipment, etc.

From the foregoing, it is apparent that both the shrink and expansion properties of this type of material have been utilized to form a package in a novel manner whereby shrinkage is used to form a tight contour wrapping about the top, bottom and outer sides of the articles, and expansion is utilized to provide members

between the inner sides of the articles which cooperate to maintain the articles in a desired orientation.

The embodiment shown in FIGURES 1-3 can be provided with the usual punched fingerholds 30 and, as previously indicated, with an opening string 23.

FIGURES 4-7 illustrate the invention in the form of a package 31 for bottles or other containers having tops of different diameters than their bottoms. The package 31 is formed from an initially flat blank of polystyrene which has been cut to a length sufficient to provide an overlap of the end portions 32a, 32b. In this case, which involves a package for bottles 33 arranged in the 2 x 3 pattern, two elongated, approximately tear-drop shaped portions are cut from the sheet so that, when the material is wrapped about the bottles, each adjacent pair of bottles is covered by a web. The webs are indicated by the numerals 34, 35 and 36.

When the material has been wrapped about the bottles 33 and the end portions 32a, 32b are secured to each other by adhesives, staples, etc., the package is subjected to an immersion bath at 212° F. for ten seconds.

The wet heat causes the material to shrink and, as a result, the lower sidewalls 37, 38 below the cut-out portions to contract about the round contours of the bottles, as best indicated in FIGURE 5. As in the case of the first embodiment, the portions 37a, 37b and 38a 38b of sidewalls 37 and 38 become concave as the material draws in toward the center of the package upon heating.

The webs 34, 35 and 36 are initially formed wider than the diameter of the bottle caps 39. Thus, when wet heat is applied, a downwardly depending locking lip 40 is created on each side of the tops 34a, 35a and 36a of the webs 34, 35 and 36.

Using the foregoing construction, bottles or other narrow-topped articles can be securely packaged. The bottles are firmly held in place as the contoured sidewalls 37, 38 prevent lateral movement, and longitudinal movement of the bottles, either singly or as a pair, is prevented by the locking lips 40 of the webs 34, 35 and 36.

The package is preferably formed with an opening string 41 which can be attached to the plastic as the sheet is cut.

The novel package just described has important advantages including thick cushioning sidewalls, bottom and top which result from the expansion of the material upon wet heating. The material has flexibility and strength. Indeed, one or more of the webs 34-36 can be used to carry the unit, thus rendering an additional handle unnecessary.

FIGURES 8 and 9 illustrate a modification of the bottle package just described. In this case a single sheet of foam polystyrene is cut of such length that the end portions (not shown) will overlap at the bottom to facilitate their joinder, and an opening tab or string 41 is attached to the material. At the same time fingerholds 42, 43 are cut. However, in contrast to the first embodiment, the material between the tops of the bottles is not removed. As a result, when the package, generally indicated as 44, is immersed in a hot bath at the temperature and for the time previously mentioned, those portions of the material which are not in contact with the bottles draw inwardly toward the center of the unit and take on a concave shape. In FIGURE 8, which shows one sidewall 45 and the top 46 of the package, the concave portions of the sidewall are numbered 45a, 45b and the concave portions of the top are numbered 46a, 46b. The other sidewall (not shown) has similar concave portions which merge into portions 46a and 46b.

The material is intentionally cut somewhat wider than dimension across the tops of the bottles. The extra material thus provided forms a downwardly depending lip 47 and a similar lip 48 at the other edge of the top 46 of the package.

The action of the contractive force exerted by the sides, 75

top and bottom as they tightly grip the contours of the bottles 49 cooperates with the locking action of the lips 47 and 48, which prevent longitudinal movement of the bottles. As a result, the bottles are firmly contained in the package 44 and the unit is suitable for shipping, handling and commercial sale.

FIGURES 10 and 11 illustrate a modification of the embodiment of the invention shown in FIGURES 1-3 wherein the individual punched locking tabs 22a-22c are replaced by a single tab 50 formed by doubling the material upon itself and cementing the folds together by a suitable adhesive 51. The tab 50 extends substantially the full length of the package. A similarly constructed tab (not shown) can be used at the bottom of the package in lieu of the individual tabs 22d-22f. The other features of the package are the same on the embodiment shown in FIGURES 1-3 and primed numbers indicate such common features.

The embodiments of the invention described have been successfully produced using foam polystyrene sheet about .040 inch thick and a density of about seven pounds per cubic foot.

Various modifications of the invention are possible. For example, the blank can be cut to provide elongated "ears" or extensions of the sidewalls which, when the sheet is initially wrapped about the articles, protrude beyond the ends of the package. Upon the application of wet heat, these "ears" will, of their own accord, curve toward the center of the package and conform to the contours of the articles. Thus, the package can be provided with ends. In addition, instead of removing the material from the tear-drop portions, each end thereof is permitted to remain connected to the sidewalls, the material is cut in half, and the resulting flaps can be pushed between the container to provide further insulation and separation.

It is to be clearly understood that the terms and expressions used herein are employed as terms of description, and not of limitation, and that there is no intention in using such terms and expressions to exclude any equivalents of the packages or methods described. It is also to be clearly understood that what is specifically shown and described herein represents a preferred embodiment only of the invention, and that various changes and equivalents may be resorted to without departing from the principles of the invention or the scope of the claims hereof. Accordingly, it is intended to claim the present invention broadly, as well as specifically, as indicated in the appended claims.

Having thus described my invention, I claim:

1. A method of forming a package about one or more articles comprising the steps of:

(a) wrapping a sheet of shrinkable expanded cellular thermoplastic material about the article,

(b) securing one end portion of the sheet to its other end portion,

(c) heating the sheet by immersing the package in a bath of liquid at approximately 212° F. for about ten seconds until the material thereof shrinks firmly about said articles.

2. A method of forming a package about one or more articles comprising the steps of:

(a) wrapping a sheet of foam polystyrene around the top, bottom and at least two opposing sides of the article,

(b) securing one end portion of the sheet to its other end portion,

(c) immersing the articles with the sheet so wrapped there-around in a bath of hot liquid at approximately 212° F. for about ten seconds.

3. A package for two or more cans or like articles having substantially flat tops and bottoms comprising a sheet consisting essentially of shrinkable expanded cellular thermoplastic material shrunk about said articles to form:

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- (a) a bottom having upstanding locking tabs protruding in between adjacent cans,
(b) a top having downwardly depending locking tabs protruding in between adjacent cans, and
(c) at least a pair of opposing sidewalls connecting said top and bottom, said sidewalls having portions immediately adjacent the sides of said cans which conform substantially to the shape thereof and concave portions intermediate said contour-conforming portions.

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