Aug. 1, 1961 C. L. OTTO ET AL 2,994,327

ARTICLES OF REINFORCED FOAM MATERIAL

Filed April 26, 1955

Fig. 1.

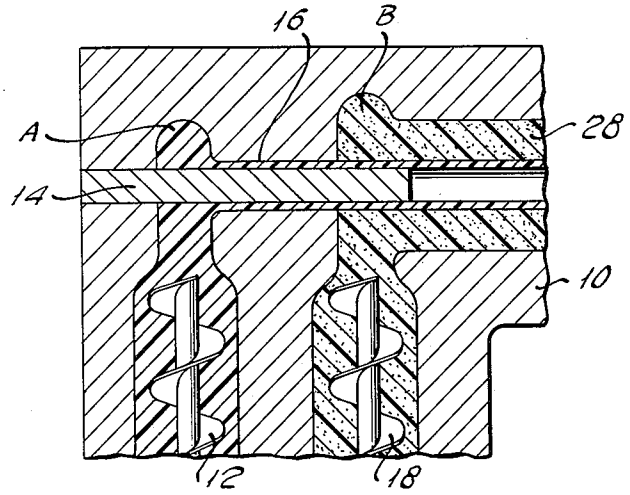


Fig. 2.

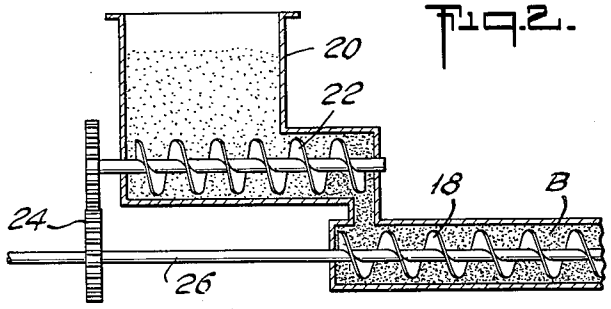
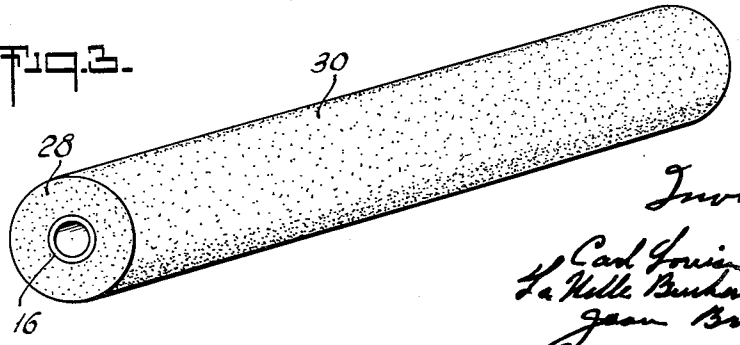


Fig. 3.



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ARTICLES OF REINFORCED FOAM MATERIAL

Carl Louis Otto, La Nelle Burnham Otto, and Joan Briton, New York, N.Y., assignors, by direct and mesne assignments, of ninety-two percent to Caronelle Inc., New York, N.Y., a corporation of New York, and eight percent to Charles C. Schwartz, New Rochelle, N.Y.

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6 Claims. (Cl. 132—39)

The present invention relates to articles of reinforced foam material and to the manufacture thereof, and has particular reference to such articles in which the foam material is of resiliently elastic nature, while the reinforcement is provided by stiffer material.

By way of example, but without limitation, articles to which the invention is particularly applicable are the core members, usually cylindrical, of hair curlers around which strands of hair to be curled are wound and then clamped in place by retaining members engaging the strands of hair and the core member.

For such articles to be satisfactory they must be light, elastically resilient, and should be porous to the extent required to afford the substantial degree of ventilation required to secure the relatively rapid drying of hair wound thereon that is desirable. Additionally, the articles, to have practical commercial acceptance and value, must be relatively very cheap.

From the standpoint of the above mentioned physical characteristics, foam material of various synthetic resins such as various vinyl derivatives and other polymers such as polyesters and polyurethane derived from isocyanate, also various forms of foam rubber both natural and synthetic, all of which materials may be generically termed plastic foam, satisfy the requirements, but such materials do not have the requisite physical strength in resistance to bending to provide the axial stiffness necessary for a satisfactory core member of a hair curler or similar devices requiring a certain minimum degree of longitudinal structural strength. Accordingly the present invention contemplates to provision of a new article of the character described comprised of an elongated circumferential continuous hollow body of resiliently elastic foam material longitudinally stiffened by a central hollow reinforcing element of other more dense and structurally stiffer material, preferably relatively light and non-frangible synthetic plastic material, which liner is advantageously in the form of a cylindrical tube but which may be in the form of a solid core. Preferably, both the body and the reinforcing element are tubular. For the intended purpose, numerous of the known synthetic thermoplastic materials may be employed, polyethylene being noted by way of example but without limitation, as a suitable material of that class.

As will be observed from the drawings, the invention contemplates the provision of a core member formed by a body of foam material of relatively large diameter, particularly as compared with the diameter of the internal reinforcing element, and said body provides what is in effect a soft pillow of foam material of bolster-like form upon which the hair is to be wound, the bolster-like body being highly compressible under the tension applied by winding the hair thereon, so that it may readily be manipulated by the user to wind coils of different diameter, depending upon the tension applied. Also, the high degree of compressibility of the body insures the maintenance of the desired tension on the hair that has been wound, even though after winding the hair, some slippage of the hair on the coil member may occur because of failure of the clip or other fastening means to hold the hair against any movement relative to the supporting body. Such advantageous functions can as a practical

matter be attained only when, as noted, the body of foam material is of relatively large diameter as compared with the central reinforcing element which is substantially incompressible.

Core members embodying the structure herein disclosed have been sold and used and are now being sold and used in commercial production quantities and it has been found that in order to secure the beneficial results that are presently to be obtained the outer diameter of the body of foam material should be at least twice that of the relatively stiff and incompressible reinforcing element, and preferably should be at least three or more times the diameter of the reinforcing element, so that the wall thickness of the foam pillow will be at least as great as the diameter of the reinforcing element, as illustrated in FIG. 3.

As previously noted, an important requirement for articles of the kind under consideration is low cost, and accordingly in another of its aspects the invention contemplates the production of such articles by methods and means resulting in a continuous compound extrusion process by virtue of which low costs are achieved through high rates of production with relatively simple apparatus and from substantially entire elimination of waste of the component materials.

For a better understanding of the nature of the invention and the manner in which it may advantageously be carried into effect, reference may best be had to the ensuing portion of this specification in which suitable apparatus and operation thereof for producing articles embodying the invention are described in conjunction with the accompanying drawings in which:

FIG. 1 is a fragmentary sectional view of extrusion apparatus for producing the desired article.

FIG. 2 is a fragmentary vertical sectional view of extrusion apparatus for producing the desired article and

FIG. 3 is a perspective view of a core member for a hair curler or the like formed by a length of the article as extruded from the apparatus shown in FIGS. 1 and 2.

Referring now more particularly to the figures, **10** indicates generally a compound extrusion apparatus embodying a first extruder indicated generally at A and a second extruder indicated generally at B. The specific forms of the extruders may be of any desired known type and by way of diagrammatic illustration, extruder A is shown as being provided with a feed screw **12** for feeding liner material such as polyethylene around the mandrel **14** so as to extrude an annular tube **16** of relatively thin wall section around the mandrel, the tube progressing into the chamber of the extruder B to which latter chamber foam material is fed by means of the feed screw **18**. By way of illustration, FIG. 2 shows foam material, produced in the foaming machine diagrammatically illustrated at **20** and fed by means of the feed screw **22** to the feed screw **18** of the extruder B. The feed screws advantageously may be synchronized by means of gears **24** connecting the drive shaft of the screw **22** with the power input shaft **26** constituting the drive shaft for the extruder B. The feed screws **12** and **18** may also be interconnected so that a common source of power may be utilized to drive the entire apparatus.

As will be evident from FIG. 1, the foam material will be extruded in the form of a sheath **28** around the liner **16** and with the foams of polymers such as those enumerated above, which have a relatively short setting time, further treatment following the discharge from extruder B is ordinarily not required. With some materials, a certain amount of curing following extrusion of the foam material may be required, but the specific procedures to be followed will be dictated by the particular material employed, such specific procedures being generally known in the art.

For making articles such as cores for hair curlers and similar articles, frictional contact between the foam material and the liner is sufficient to hold alone the components against relative axial displacement and for the purpose of making such articles the only step required after the extrusion is ordinarily to cut the extruded material to desired length to produce an article of the kind desired, such as the core for a hair curler indicated generally at **30** in FIG. 3.

As previously noted, the core member such as is shown in FIG. 3, may have an annular liner or a solid liner or core, and either form may advantageously be used in conjunction with retaining members of the kind embodied in the disclosure of U.S. application Serial No. 456,485, filed September 16, 1954, in the names of Carl L. Otto and La Nelle Burnham Otto, now U.S. Patent No. 2,842,-140 granted July 8, 1958.

While for purposes of disclosing the invention various examples have been given by way of illustration, it will be understood that the invention is not to be considered as limited to such examples, but is to be considered as embracing all products falling within the scope of the appended claims.

What is claimed:

1. A core member for a hair curler comprising an elongated circumferentially continuous hollow body of highly compressible elastically resilient foam material and a central hollow reinforcing element of elastically yieldable non-metallic material substantially stiffer than said foam material extending through said body, said reinforcing element being open at both of its ends, said element and said body being substantially coextensive longitudinally and the diameter of said body of foam material being at least a plurality of times the diameter of said reinforcing element, whereby to provide a soft pillow of foam material of bolster-like form the outer circumference of which may easily be materially reduced by the winding of a tress of hair thereon under desired tension to thereby permit coils of hair of different diameters to be formed on like core members as desired by the user in accordance with the tension under which the hair is wound and to insure maintenance of the desired tension of the hair while coiled on said member.

2. An article as defined in claim 1, in which both the body of foam material and the central reinforcing element are tubular in form, and the radial thickness of the wall of said body of foam material is at least as great as the outer diameter of said reinforcing element.

3. An article as defined in claim 1, in which said body of foam material consists of a synthetic polymeric resin.

4. An article as defined in claim 3, in which said central reinforcing element consists of a synthetic thermoplastic material.

5. An article as defined in claim 3, in which said body of foam material is of polyurethane.

6. An article as defined in claim 5, in which said central reinforcing element is of polyethylene.

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