Feb. 9, 1943. R. R. FRISSELL 2,310,362

INDESTRUCTIBLE FORM FOR USE IN THE PRODUCTION OF INFLATABLE SEAMLESS ARTICLES

Filed Aug. 29, 1938 2 Sheets-Sheet 1

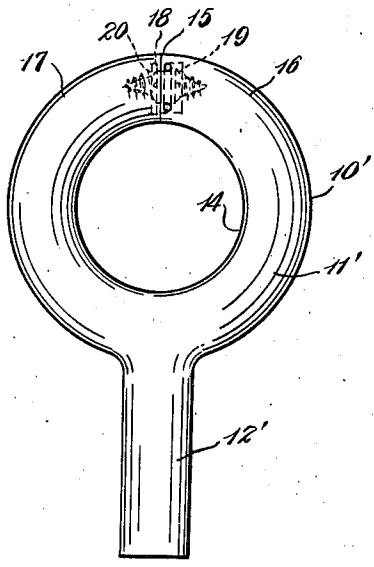


FIG. 1

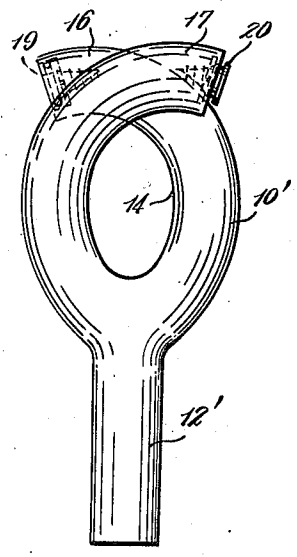


FIG. 3

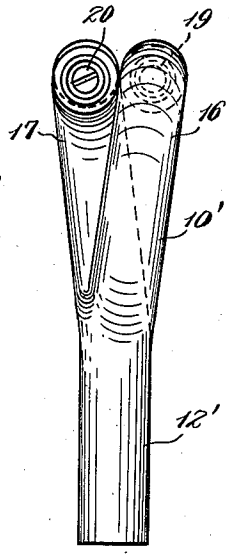


FIG. 4

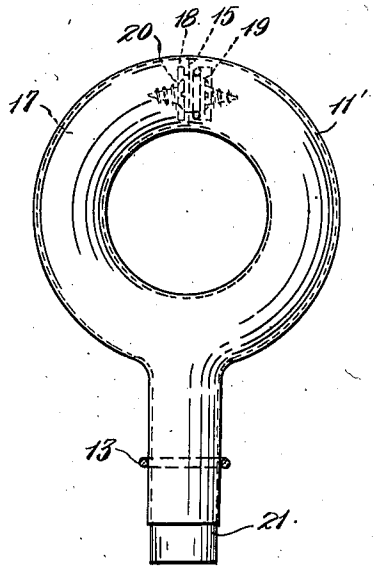


FIG. 2

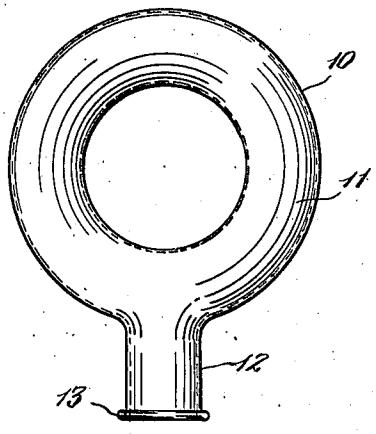


FIG. 5

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INDESTRUCTIBLE FORM FOR USE IN THE PRODUCTION OF INFLATABLE SEAMLESS ARTICLES

Filed Aug. 29, 1938 2 Sheets-Sheet 2

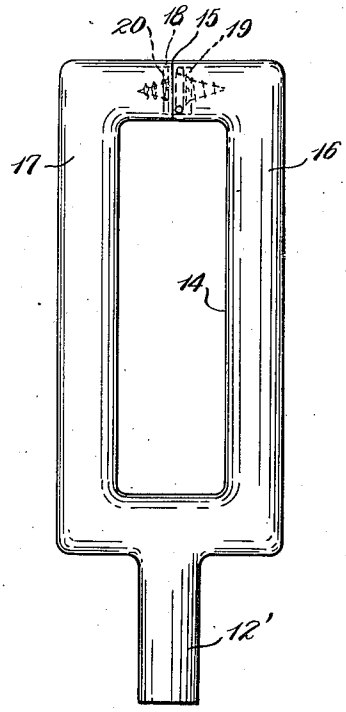


FIG. 6

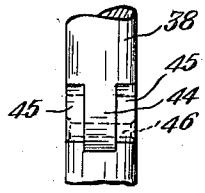


FIG. 10

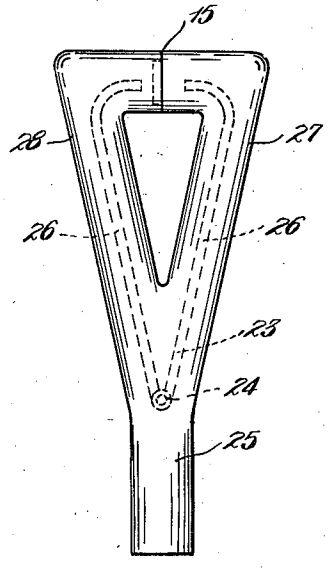


FIG. 7

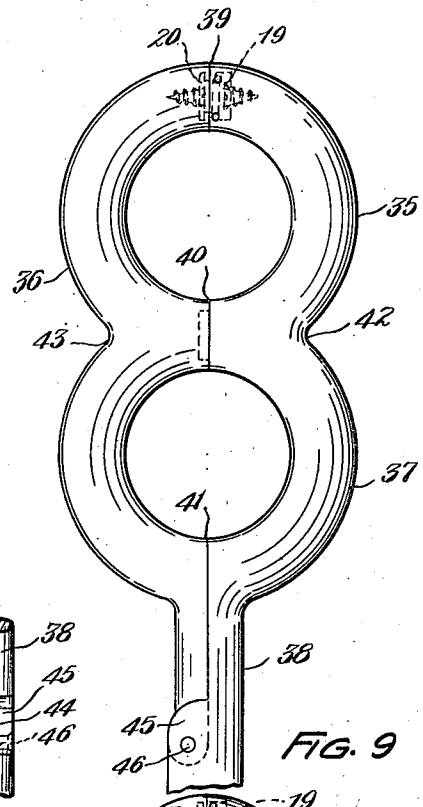


FIG. 9

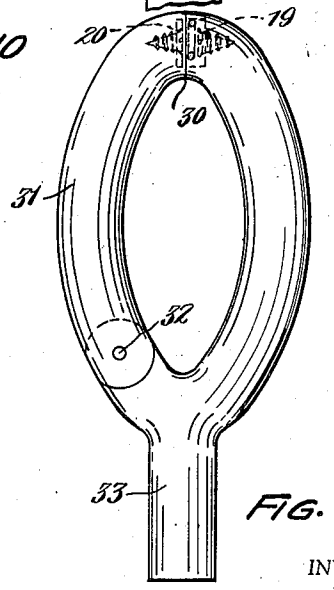


FIG. 8

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UNITED STATES PATENT OFFICE

2,310,362

INDESTRUCTIBLE FORM FOR USE IN THE PRODUCTION OF INFLATABLE SEAMLESS ARTICLES

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Application August 29, 1938, Serial No. 227,260

8 Claims. (Cl. 18—41)

This invention relates to forms for use in the production of inflatable seamless annular shaped articles such as toy balloons, life boats, swim toys, seat cushions, hospital cushions, life preservers, inner tubes and similar articles, and has for its primary object to provide a substantially indestructible form which may be repeatedly used in the production of like articles.

Another object of the present invention is to provide such a form of yieldable material having a separable portion to permit contraction of the form to thereby facilitate stripping of the article produced thereon.

Another object of the present invention is to provide such a form of inherently rigid material having a separable portion hingedly connected to thereby facilitate stripping of the article produced thereon.

Another object of the present invention is to provide the form with an extension by means of which the form may be supported during the application of the material forming the article and which extension preferably provides means upon the article by which the latter may be inflated, the extension preferably being located diametrically opposite to the separable portion of the form thereby facilitating stripping.

Another object of the present invention is to provide means for securing the separable portions of the form during the article producing operation to prevent appreciable marking appearing upon the finished articles.

With the objects above indicated and other objects hereinafter explained in view, my invention consists in the characteristics of the mold material employed and the structural features of the form.

Referring to the drawings:

Figure 1 is a front elevational view of a form embodying the present invention and showing one type of fastening means for the separable portions of the form.

Figure 2 is a front elevational view of the form as shown in Figure 1 but with a coating material applied thereto for producing the finished article.

Figure 3 is a front elevational view of the form shown in Figure 1 but with the separable portions disconnected and overlappingly contracted so as to facilitate the stripping of the article from the form as shown in Figure 2.

Figure 4 is a side elevational view of the form shown in Figure 3.

Figure 5 is a front elevational view of an article produced on the form shown in Figure 1 in an uninflated condition.

Figure 6 is a front elevational view of a form of different shape embodying the same invention.

Figure 7 is a front elevational view of a form of still different shape embodying the same invention.

Figure 8 is a front elevational view of a modified form showing a hinged connection to facilitate stripping of the article produced thereon.

Figure 9 is a front elevational view of a modified form showing a hinged connection differently located to facilitate stripping of the article produced thereon.

Figure 10 is a fragmentary side elevational view of the form shown in Figure 9 and showing the detail of the hinge construction.

Inflatable seamless articles of annular shape have been heretofore produced but the form employed consisted of paper or similar material which was readily severable or tearable so as to permit stripping of the articles. Likewise, such type of form when once severed or torn could not be used again thus requiring a new form for every article. Such type of form and the article produced therefrom are clearly shown and described in the Lee Patents No. 2,053,371 and No. 2,053,372. With this type of form the size and characteristics of the inflatable articles produced were limited and the present invention makes possible the carrying forward of the original conception disclosed in the aforesaid patents to the extent that practically any size and shape of inflatable article may be produced.

In the drawings I have illustrated a number of forms of various shapes, each embodying the present invention and certain modifications thereof, and it should be understood therefore, that the invention is not to be so restricted inasmuch as other adaptations will be apparent to those skilled in the particular art.

In Figure 5 an inflatable seamless article **10** is shown in its normal or uninflated condition and comprises a hollow annular shaped body portion **11** provided with an outwardly projecting integral hollow stem **12** formed with the usual rolled bead **13**. This article **10** is made of suitable elastic material and is adapted to be inflated, by means of the stem **12**, to many times its normal size. It might be well to state here, that the term "annular" is used in its broadest sense without regard to size or contour, the only requirement being that the inflatable article have a transversely extending opening therethrough

inwardly of its marginal edge portion. This article 10 when inflated could be representative of the so called "Life Saver" mints if used as an advertising toy balloon, or could be made of somewhat stronger material and used as a life preserver or hospital seat cushion in which event the well known air valve could be embodied.

In producing the inflatable article shown in Figure 5, reference should be had to Figures 1 to 4 inclusive which illustrate the form employed and the method of producing and stripping the article therefrom. The form 10', more clearly shown in Figure 1, comprises an annular shaped body portion 11' providing an axial opening 14 extending transversely therethrough and entirely within the marginal edge portion of the body portion 11'. The annular body portion 11' is circular in cross section, as more clearly shown in Figure 4, and has an outwardly extending projection 12' preferably formed integral and by means of which the form may be supported during the article forming operation. The projection 12' is likewise, circular in cross section and is disposed in the plane of the body portion, the connecting portions being rounded to prevent marking on the article produced. Although the forms illustrated in Figures 1–4 are circular in cross section, forms of varied shapes in cross section may be used such as square, triangular, annular as various abstract designs. Of course, it is always advisable to round all corners and sharp edges on any form to facilitate the formation of a film consistent in thickness.

The form 10' may be made of any suitable material but preferably of molded rubber material suitably vulcanized to give it resilience and stability for a purpose to be later described. The annular body portion 11' of the form is severed transversely at 15, preferably diametrically opposite to the projection 12', to provide separable cooperating sections 16 and 17 and any suitable means may be employed for normally maintaining the severed ends in engagement during the article producing operation. A simple construction comprises a snap fastener 18 having the socket portion 19 secured within the severed end of the section 16 and the projecting portion 20 secured within the severed end of the section 17, the portions 19 and 20 being detachably connectable to normally maintain the severed ends of the sections 16 and 17 in tightly abutting engagement. No difficulty will be encountered in disengaging the snap fastener by reason of the inherent resilience of the material comprising the form.

In producing the inflatable article, the form shown in Figure 1 is treated with a suitable coagulant in any well known manner and then in a reverse position while being supported by the projection 12' is dipped into a tank containing liquid latex or any other suitable rubber dispersion, one or more times until a coating 21 of the desired thickness is obtained, the coating extending upwardly on the projection 12' to the point 21 as shown in Figure 2 for a purpose to be later described. If more than one dipping is required the deposit may be dried in any well known manner after each dipping and the form may be turned after each withdrawal to evenly distribute the rubber deposit. After the final dipping operation the rubber deposit forming the coating is cured in any well known manner and a bead 13 is formed upon the outer end of the hollow stem 12 either before or after curing as desired.

The next step is to strip the cured rubber article 10 from the form 10' which it obviously would be impossible to do if it were not for the type of form disclosed, because the coating entirely surrounds the annular body portion 11'. By making the body portion 11' separable at 15 however, the abutting ends, by disengaging the snap 18, may be separated and moved laterally relatively and then compressed in the manner shown in Figure 3 which materially reduces the width of the annular body portion to more nearly that of the diameter of the stem 12 and over which the stem must pass as the article is stripped from the form. The article may be stripped by two methods, first, injection of air by jet between film and form which aids the operator to pull the article from the form right side out, and second, rolling the article, starting with the neck, off of the form, resulting in a reversed or partially reversed condition. The article may then be turned right side out.

Figure 6 shows a form of different shape but embodying the same characteristics and advantages as those already described in connection with the form shown in Figures 1 to 4 inclusive.

Figure 7 shows a form of still different shape for producing inflatable annular articles of a different shape and further embodies a modification for normally maintaining the separable ends in engagement. Instead of the snap fastener as as shown in Figure 1, the adjacent abutting end portions are provided with cooperating tongue and groove to position the adjacent ends in alignment. Also a resilient member 23 is embedded within the material of the form during the molding operation and comprises a nucleus 24 adjacent the connecting portion of the projection 25 and angular extensions 26—26 disposed centrally of the separable sections 27—28, the outer ends being bent inwardly toward each other and terminating short of the separable ends. The extensions 26—26 of the resilient member 23 are under tension and tend to maintain the ends in closely abutting engagement but at the same time yieldable to permit separation of the ends and when once moved laterally relatively, the tension tends to move the separable portion in compact condition to facilitate stripping in the manner heretofore described.

In Figure 8 a still different form is illustrated wherein the annular body portion 29 is of elliptical shape and the form made of inherently rigid material such as wood, Tenite, aluminum, or other material. The body portion 29 is separable as at 30 and may be provided with a snap fastener or any other suitable fastening means which is readily disconnectible. Inasmuch as this form is made of non-yieldable material one section 31 is hingedly connected at 32 adjacent the connecting portion of the projection 33 in a manner to prevent its marking appearing upon the finished article. In this instance stripping is facilitated by moving the section 31 about its hinge pivot to separate the abutting ends and the form is made elliptical in shape so as to maintain the width of the form to a minimum.

Figures 9 and 10 illustrate a still differently shaped form but embodying the same invention in a general way. The form in this instance may be made of flexible or inherently rigid materials as desired but embodies a decided advantage in form production from the manufacturing standpoint. The form is indicated generally by the numeral 35 and comprises upper and lower annular portions 36 and 37 respectively, simulating a figure 8, and having at its lower end an out-

wardly projecting stem 38. The form is severed transversely at 39—40 and 41 in the plane of the axis of the stem 38 to provide separable cooperating sections 42 and 43, the section 43 at the outer end of the stem being suitably pivoted to the adjacent end of the stem of the section 42 in any desirable manner. In the present construction the stem portion of the section 43 has a depending tongue 44 while the stem portion of the section 42 has spaced ears 45 disposed upon opposite sides of the tongue 44. A pin 46 extends through aligned openings in the ears and tongue and has its outer ends upset to prevent disengagement but to permit free pivotal movement. This hinge construction may be so located as to be beyond the rubber coating applied to the form so as not to interfere with the bead rolling and even though the form is dipped beyond the hinge, that portion of the coating is waste and may be trimmed off. A snap should preferably be secured adjacent the severed portion 39 to secure the sections in close cooperative relation, thereby minimizing markings appearing upon the completed article. It should also be understood that all of the other forms shown herein may be formed in this manner if found more practicable.

While the forms illustrated in the drawings show the severed portion of the annular body portion diametrically opposite to the supporting projection it may be located at different points and the projection likewise may be omitted in some instances. Also it is within the province of the invention to provide a reinforcing means within the supporting projection if required.

While I have described the preferred embodiment of the invention it is to be understood that I am not to be limited thereto inasmuch as changes and modifications may be resorted to without departing from the spirit of the invention as defined in the appended claims.

What is claimed is:

1. A form for repeated use in producing, from latex or other dispersions of rubber, an inflatable seamless tubular walled opening encircling article of desired shape having an integral hollow stem by which the article may be inflated comprising an inherently resilient body portion having an opening and an encircling wall simulating that of the article to be produced, the wall of said body portion being severed to provide cooperating abutting ends; means detachably securing said ends in closely abutting relation to normally maintain the continuity of said wall, an extension projecting outwardly on said body portion and disposed on the side substantially opposite from said ends for producing the hollow inflating stem on the article, said extension being sufficiently long to afford support during the applying operation; said ends being relatively separable and movable laterally out of abutting relation whereby the article may be stripped from the form.

2. A form for repeated use in producing, from latex or other dispersions of rubber, an inflatable seamless tubular walled opening encircling article of desired shape having an integral hollow stem by which the article may be inflated comprising a body portion having an opening and an encircling wall simulating that of the article to be produced, the wall of said body portion being severed to provide cooperating abutting ends; means detachably securing said ends in closely abutting relation to normally maintain the continuity of said wall; an extension projecting outwardly on said body portion and disposed on the side substantially opposite from said ends for producing the hollow inflating stem on the article, said extension being sufficiently long to afford support during the applying operation; said ends being relatively separable and movable out of abutting relation whereby the article may be stripped from the form.

3. A form for repeated use in producing, from latex or other dispersions of rubber, an inflatable seamless tubular walled opening encircling article of desired shape having an integral hollow stem by which the article may be inflated comprising an inherently resilient body portion having an opening and an encircling wall simulating that of the article to be produced, the wall of said body portion being severed to provide cooperating abutting ends; a snap fastener having cooperating portions secured to the respective ends for detachably securing the latter in closely abutting relation to normally maintain the continuity of said wall; an extension projecting outwardly on said body portion and disposed on the side substantially opposite from said ends for producing the hollow inflating stem on the article, said extension being sufficiently long to afford support during the applying operation; said ends being relatively separable and movable laterally out of abutting relation whereby the article may be stripped from the form.

4. A form for repeated use in producing, from latex or other dispersions of rubber, an inflatable seamless tubular walled opening encircling article of desired shape having an integral hollow stem by which the article may be inflated comprising a body portion having an opening and an encircling wall simulating that of the article to be produced, the wall of said body portion being severed to provide cooperating abutting ends; a snap fastener having cooperating portions secured to the respective ends for detachably securing the latter in closely abutting relation to normally maintain the continuity of said wall; an extension projecting outwardly on said body portion and disposed on the side substantially opposite from said ends for producing the hollow inflating stem on the article, said extension being sufficiently long to afford support during the applying operation; said ends being relatively separable and movable out of abutting relation whereby the article may be stripped from the form.

5. A form for repeated use in producing, from latex or other dispersions of rubber, an inflatable seamless tubular walled opening encircling article of desired shape having an integral hollow stem by which the article may be inflated comprising an inherently resilient body portion having an opening and an encircling wall simulating that of the article to be produced, the wall of said body portion being severed to provide cooperating abutting ends; means detachably securing said ends in closely abutting relation to normally maintain the continuity of said wall; an extension projecting outwardly on said body portion and disposed on the side substantially opposite from said ends for producing the hollow inflating stem on the article, said extension being sufficiently long to afford support during the applying operation; said ends being relatively separable and movable laterally out of abutting relation and then contractible whereby the article may be stripped from the form.

6. A form for repeated use in producing, from latex or other dispersions of rubber, an inflatable

seamless tubular walled opening encircling article of desired shape having an integral hollow stem by which the article may be inflated comprising an inherently resilient body portion having an opening and an encircling wall simulating that of the article to be produced, the wall of said body portion being severed to provide cooperating abutting ends normally maintaining the continuity of the wall, an extension projecting outwardly on said body portion and disposed on the side substantially opposite from said ends for producing the hollow inflating stem on the article, said extension being sufficiently long to afford support during the applying operation; said ends being relatively separable and movable laterally out of abutting relation whereby the article may be stripped from the form.

7. A form for repeated use in producing, from latex or other dispersions of rubber, an inflatable seamless tubular walled opening encircling article of desired shape having an integral hollow stem by which the article may be inflated comprising a body portion having an opening and an encircling wall simulating that of the article to be produced, the wall of said body portion being severed to provide cooperating abutting ends; means in said body portion for normally urging said ends into abutting engagement to maintain the continuity of said wall; an extension projecting outwardly on said body portion and disposed on the side substantially opposite from said ends for producing the hollow inflating stem on the article, said extension being sufficiently long to afford support during the applying operation; said ends being relatively separable and movable out of abutting relation whereby the article may be stripped from the form.

8. A form for repeated use in producing, from latex or other dispersions of rubber, an inflatable seamless tubular walled opening encircling article of desired shape having an integral hollow stem by which the article may be inflated comprising a body portion having an opening and an encircling wall simulating that of the article to be produced, the wall of said body portion being in sections relatively spaced apart to provide two pairs of cooperating abutting ends one pair of which is pivotally connected together; means detachably securing the other pair of ends in closely abutting relation to normally main the continuity of said wall; an extension projecting outwardly on said body portion and disposed on the side substantially opposite from said other pair of ends for producing the hollow inflating stem on the article, said extension being sufficiently long to afford support during the applying operation; said detachable ends being adapted for separation and movement out of abutting relation to afford stripping of the article from the form.

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