

April 20, 1937.

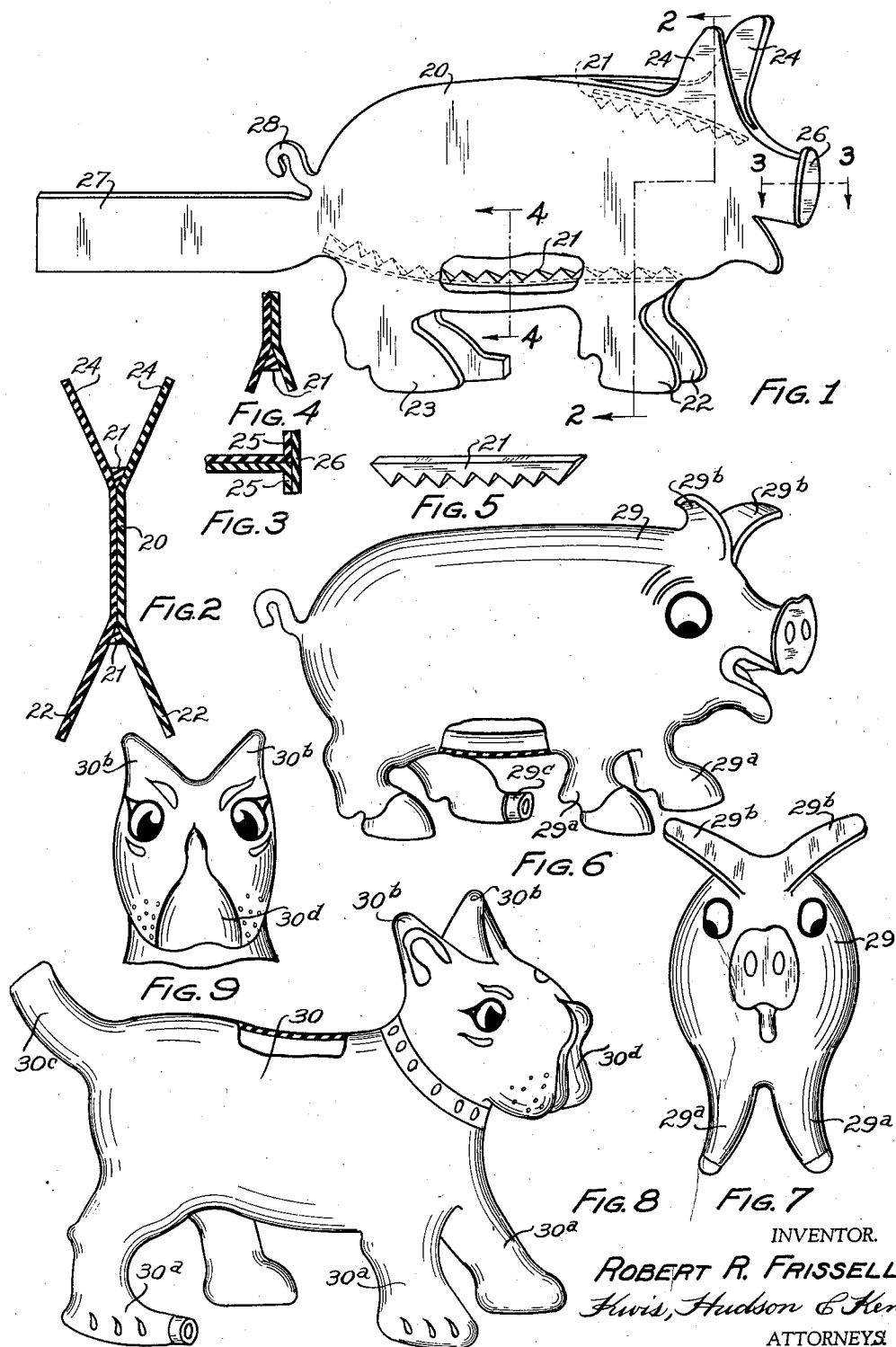
R. R. FRISSELL

2,077,752

FORM FOR MAKING INFLATABLE ARTICLES

Filed Feb. 28, 1936

3 Sheets-Sheet 1



April 20, 1937.

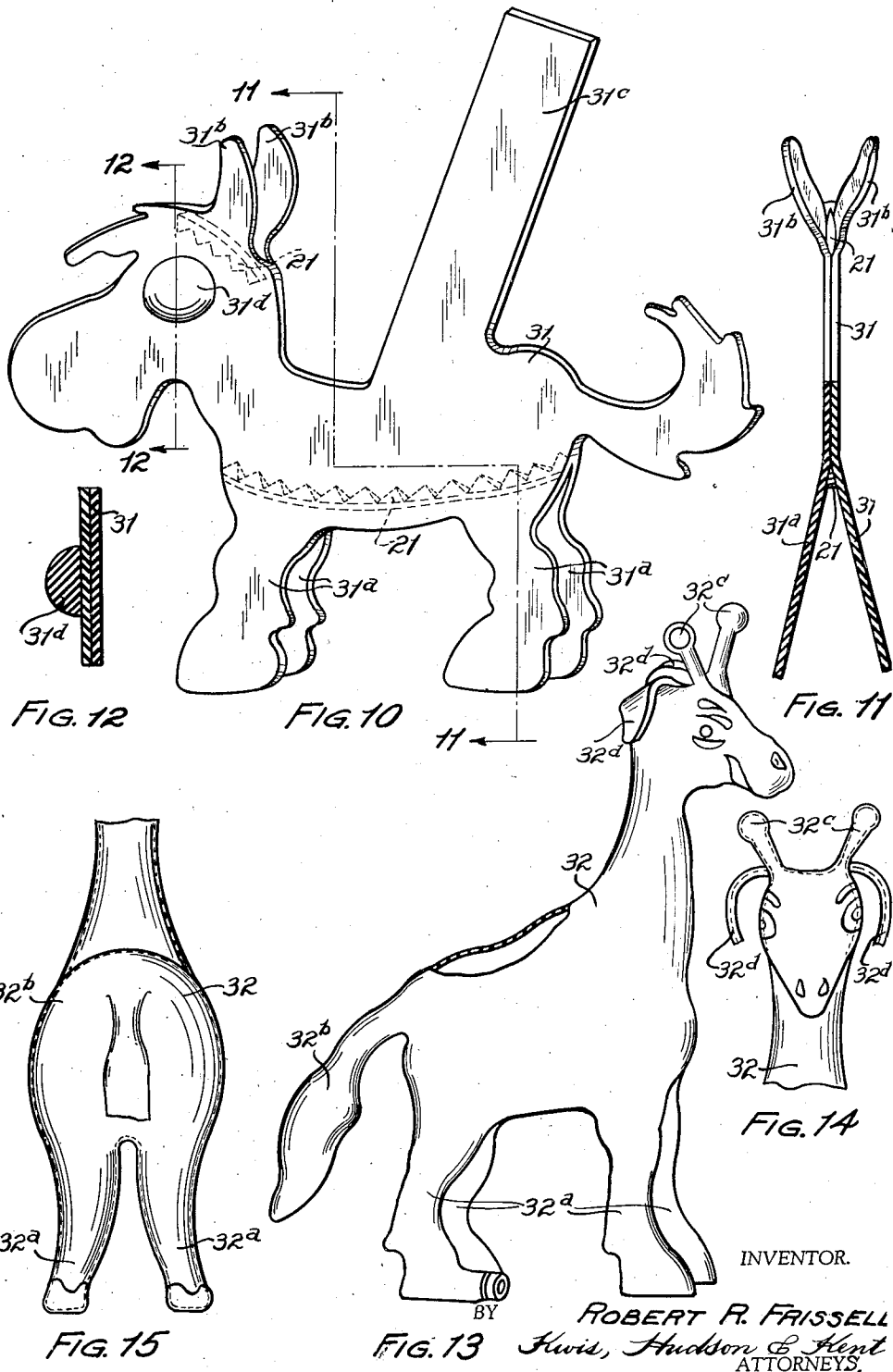
R. R. FRISSELL

2,077,752

FORM FOR MAKING INFLATABLE ARTICLES

Filed Feb. 28, 1936

3 Sheets-Sheet 2



April 20, 1937.

R. R. FRISSELL

2,077,752

FORM FOR MAKING INFLATABLE ARTICLES

Filed Feb. 28, 1936

3 Sheets-Sheet 3

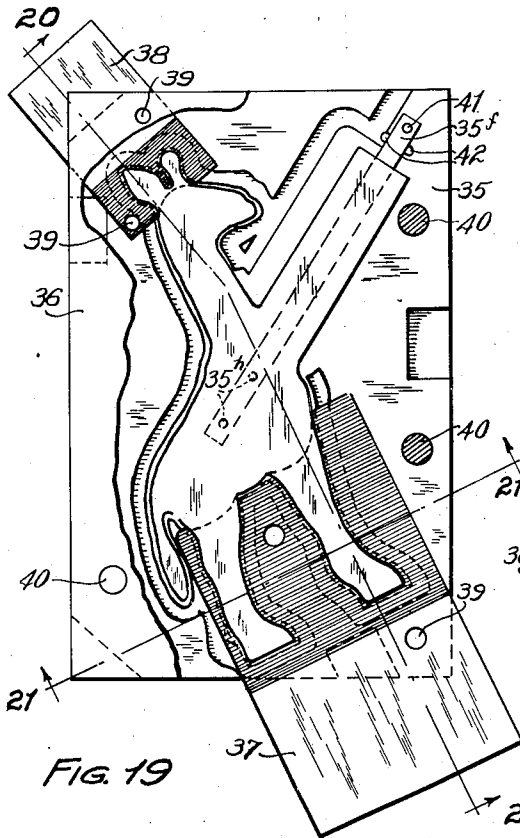


FIG. 19

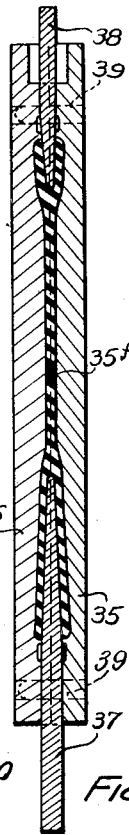


FIG. 20

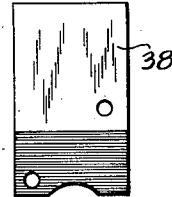


FIG. 23

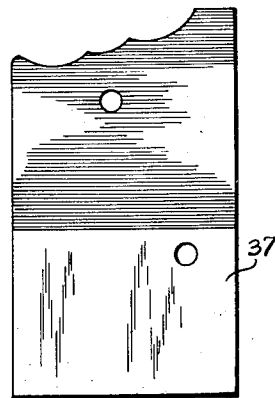


FIG. 22

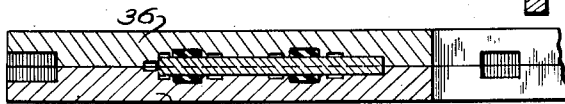


FIG. 21

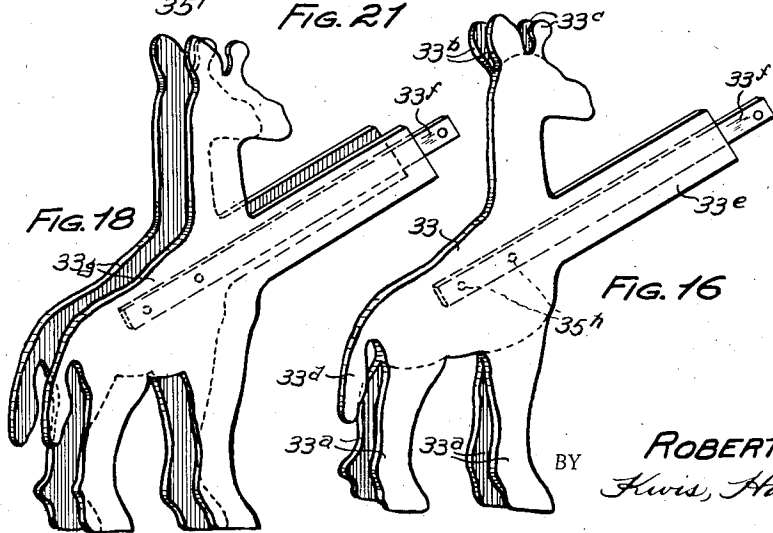


FIG. 18

FIG. 16

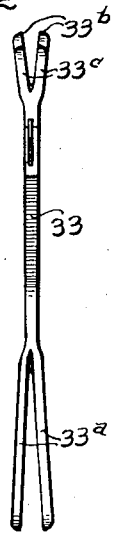


FIG. 17

INVENTOR.

ROBERT R. FRISSELL

Flwis, Hudson & Hunt
ATTORNEYS.

UNITED STATES PATENT OFFICE

2,077,752

FORM FOR MAKING INFLATABLE ARTICLES

Robert R. Frissell, Sandusky, Ohio, assignor to
The Barr Rubber Products Company, Sandusky,
Ohio, a corporation of Ohio

Application February 28, 1936, Serial No. 66,271

17 Claims. (Cl. 18—41)

This invention relates to forms for inflatable articles, such as rubber toys, especially those representing various forms of animals, and similar articles.

5 This application is a continuation in part of my prior application Serial No. 741,521, filed August 25, 1934 for Forms for inflatable articles.

The invention is an improvement over the forms illustrated and described in the applica-
10 tions filed in the name of John J. Lee, Serial No. 698,646, filed November 18, 1933, and Serial No. 736,921, filed July 25, 1934.

In the two Lee applications there are disclosed flat flexible forms which are used in the
15 production of inflatable toy rubber articles which are adapted to be inflated with very little distortion of the rubber. It is a feature of the forms and process disclosed in the above applications that the rubber toys are produced by a dipping
20 process so as to be seamless, even though the articles thus formed may have various leg, horn, arm, ear, and other appendages. When the dipped articles are vulcanized, stripped from the forms, and inflated, the appendages in part, such
25 as the tail, may be in the central plane of the article or disposed laterally thereof, such as the leg, ear, and horn appendages, the forms and processes being such that, notwithstanding the fact that the forms are generally flat and the
30 articles are produced by the dipping process, these various appendages will have, in the completed article, substantially their proper relationship with respect to the body portion, the invention
35 having especial utility in forming four-legged animals which will stand up or be self-supporting when inflated. The articles thus formed may be comparable in size and proportions to somewhat
40 similar articles which have been produced heretofore from two or more stamped or died pieces of rubber which had to be laboriously united at their edges so as to form not seamless but seamed articles.

In the Lee applications, the forms were pro-
45 duced either from paper or from rubber, but, in accordance with the Lee disclosures, the flexible lateral appendages, such as the legs, were formed by cementing to the body portion of the form separate flexible pieces which formed the
50 legs. With the Lee forms there were many limitations as to the shape, configuration, and effect produced on the finished rubber article, and, in some instances, certain of the appendages had to be applied after the article was dipped, vul-
55 canized, and stripped from the form, by forming

the appendages from separate pieces and pasting them on the article.

The principal object of the present invention is to provide certain improvements by which more
5 satisfactory rubber toy articles can be produced, which reduce the cost of the forms and therefore the cost of the finished articles, and which admit of a large variety of effects to be produced in the finished articles, as, for example, variable spac-
10 ing of leg or other lateral appendages.

Other objects will appear from the following detailed description.

The invention may be utilized in the forma-
15 tion of a great variety of different rubber articles, a few of which I have illustrated in the drawings, wherein:

Fig. 1 is a side view, slightly in perspective, of a form used in the production of an article which, when inflated, simulates a pig, a portion
20 being broken away and other parts being shown by dotted lines;

Fig. 2 is a cross-sectional view substantially along the irregular line 2—2 of Fig. 1;

Fig. 3 is a fragmentary sectional view substantially along the line 3—3 of Fig. 1;

Fig. 4 is a fragmentary sectional view substan-
25 tially along the line 4—4 of Fig. 1;

Fig. 5 is a view of a wedge-shaped serrated spacer that is used in producing this form and
30 others;

Fig. 6 is a side view, slightly in perspective, of the rubber pig which is produced from the form of Fig. 1 after the article has been decorated
35 somewhat, a portion being broken away;

Fig. 7 is a front view of the rubber toy shown in Fig. 6;

Fig. 8 is a side view of a toy which represents a dog, the same being produced from a form
40 made in accordance with the present invention;

Fig. 9 is a front view, looking at the head of the dog;

Fig. 10 shows a form used in producing a rubber article consisting of a caricatured horse;

Fig. 11 is a sectional view along the irregular
45 line 11—11 of Fig. 10;

Fig. 12 is a sectional view along the line 12—12 of Fig. 10;

Fig. 13 is a view of an article representing a giraffe produced from a form embodying the
50 present invention;

Fig. 14 is a view looking toward the head of the animal;

Fig. 15 is a view looking toward the rear with a portion of the tail broken away to show the
55 spacing of the rear legs;

Fig. 16 is a perspective view of an improved form made in accordance with the second embodiment of my invention briefly described above;

Fig. 17 is an edge view of the same looking toward the left of Fig. 16;

Fig. 18 is a perspective view of the two plastic blanks and the stiffener which are united by a molding operation in producing the form of Figs. 16 and 17;

Fig. 19 is a plan view of the mold used in producing the form of Figs. 16 and 17 with a portion of the upper mold member broken away;

Fig. 20 is a sectional view taken substantially along the line 20—20 of Fig. 19;

Fig. 21 is a sectional view taken substantially along the line 21—21 of Fig. 19; and

Figs. 22 and 23 are plan views of spacers constituting auxiliary mold members, these spacers being utilized with the mold of Fig. 19 to space apart and spread the lateral appendage forming portions of the plastic blanks.

In accordance with the present invention, the form is so made that the lateral appendages, though they extend in spaced apart relation from the body portion are integral therewith. According to one embodiment of the invention, the form is made from two similarly contoured flexible layers cemented or otherwise secured together with spacers or spreaders arranged between the two layers adjacent the points or parts where the lateral appendages extend from the body portion. With this form of the invention, the layers may be formed from a variety of flexible materials, plastic or non-plastic, but, if the latter, they are preferably cured or vulcanized before being made up into the form.

According to the second form of the invention, the flexible form, with its integral flexible appendages, is molded from plastic stock, such as rubber, although other materials may be utilized. In this case, the form is preferably, though not necessarily, made from two similarly contoured blanks of uncured plastic material and are molded into a unitary body and cured with all portions of the two blanks united except the lateral appendages which remain free and spread apart, as is desired.

The embodiment of the invention first referred to will now be taken up, reference being had to Sheets 1 and 2 of the drawings, including Figs. 1 to 15.

In Fig. 1, 20 represents a form which is thin, flexible, and flat except where the flat body portion is modified by parts, such as leg and ear appendages, disposed laterally from the plane of the body portion. The form here shown is employed in the production of a rubber article which represents a pig, the present invention being particularly useful in the production of toys having laterally disposed appendages such as four-legged animals which, when inflated, are designed to stand alone, unsupported, thus requiring inflatable leg portions with a suitable spread.

Largely for the purpose of facilitating the formation of the lateral appendages on the form 20, the form is preferably made from two layers which are secured together by cementing or otherwise. Any suitable flexible material may be employed in forming the layers of form 20, such for example as leather, rubber, or rubber and fabric, i. e., fabric coated or surfaced on one or both sides with a thin layer of rubber. Suitable paper stock might also be used, but I prefer to use materials more durable than paper, such as those mentioned above. At the present

time I am using fabric with rubber sheeting on both sides, but I do not wish to be confined to this particular material. In addition to the two layers referred to above, the form includes one or more spreaders 21 which are adapted to be inserted between the layers where the appendages are to be formed and where certain other effects are to be produced, to be referred to presently. Each spreader 21 is preferably formed of rubber and is wedge-shaped and serrated along one edge so as to give it flexibility and allow the spreader to be readily bent to conform to whatever curvature the particular toy being made requires, and also to admit of the spreader being curved so that one or more portions thereof can be inserted deeper between the layers than other portions.

In Fig. 1 the form has lateral appendages consisting of front and rear leg appendages 22 and 23 and ear appendages 24, the effect of the spreaders 21 where these appendages are to be formed being clearly illustrated in Fig. 2. It will be noted that the spreader used in making the appendages extends not only between the leg appendages but also along the whole lower part of the form, whereas the spreader between the ear appendages 24 is somewhat shorter. An important feature of this invention is the fact that the depth that the spreader is inserted between the two layers determines the spread and spacing of the appendages in the finished article, for the deeper the spreader or any portion of the spreader is inserted between the two layers of the form, the greater the amount of stock between the appendages that can be rounded out or spread when the article is inflated. It will be noted, particularly by reference to Figs. 1 and 4, that where the spreader extends along the lower part of the form between the front and rear leg appendages it is, in this instance, above the lower margins of the two layers of the form. This is for the purpose of providing additional stock which is rounded out when the completed article is inflated so as to give the inflated article the desired shape and cause the leg appendages to assume the desired position with respect to the body portion.

Another feature which is illustrative of the many modifications which can be made in the form to produce different effects, depending upon the articles produced, is embodied in the form which is utilized to produce the pig of Fig. 6. For example, to give the pig a fairly wide-spread snout, the ends of the two layers in the nose-forming portion of the form are spread laterally, as illustrated at 25 in Fig. 3, and to the laterally bent or spread ends 25 is cemented or otherwise secured a snout-forming piece 26 which is preferably a suitably shaped piece of rubber.

At some suitable part of the form there is provided an extension 27 (in this instance at the rear of the article beneath the tail appendage 28) by which the form is supported during the dipping process.

To prepare the form for the main dipping process by which the rubber article is produced thereon, the form is dipped into a suitable coagulant containing preferably a powder which, when the coagulant dries, will adhere to the form and permit the easy stripping of the rubber article from the form. To produce the rubber article, the form, while supported by the extension 27, is dipped into latex or other suitable solution containing rubber in dispersion. Generally one dipping will be sufficient, but it may be dipped repeatedly, depending upon the desired thickness

of the rubber. After the dipping operation, the rubber which adheres to the form is vulcanized, after which the article is stripped from the form, this being permitted notwithstanding the various appendages by reason of the fact that the form is flexible throughout and flat. In the dipping operation, a part of the extension 27 will be covered with rubber, and, after vulcanization, the protruding end or neck portion of the rubber which surrounds the extension 27 is cut off and the edges of the slit thus formed are cemented together.

To permit inflation of the resulting rubber article, which is designated 29 in Figs. 6 and 7, the end of one of the appendages, such as a leg appendage, is provided with an inflating valve 29c.

It will be noted particularly by reference to Fig. 7 that the legs 29a have sufficient spread so that the animal will stand unsupported. Likewise, it will be noted that in this instance the ears 29b are not inflated. It is possible, with my invention, to have on the animal ears which are inflated, and these will stand more or less erect, or ears which are not inflated and which will therefore be relatively flexible, depending upon the particular animal or thing that the article is to simulate and therefore upon the effect desired. If it is desired that any particular appendage be not inflated, the rubber article is turned inside out before the slit is cemented together where the extension 27 of the form initially protruded, and the ear or other appendage is sealed at its normally open end with cement. However, in other instances it is desirable that the ear appendages be inflated, as, for example, in the production of animals which normally have upstanding ears.

In Figs. 8 and 9 I have shown an article 30 produced with a form made in accordance with the present invention, which article simulates a dog. The dog has inflated spreading legs 30a, inflated spreading ears 30b, and an inflated tail 30c. It will be noted also that the dog has a blunt nose portion 30d. To produce this blunt nose effect, the two halves of the nose-forming portion of the form are separated by one of the spreaders 21, the same being inserted deeply enough to produce the effect desired when the article is inflated. In brief, a spreader of the type illustrated in Fig. 5 at 21 is used not only between the ear, horn, and leg forming appendages, but may be used also to form any blunt and slightly clevised portion. An expedient of this kind could be used in place of the snout-forming piece 26 on the form 20 of Fig. 1.

In Fig. 10 I have shown a form 31 from which is produced an article in representation of a caricatured horse, which form is made in accordance with the present invention. The form has spreading leg appendages 31a and spreading ear appendages 31b produced in the manner already explained. In this instance, the supporting extension 31c rises from the back-forming portion of the form and corresponds to the supporting extension 27 of Fig. 1. It will be understood that the extension may extend from almost any part of the form and will be provided on the form where most convenient. It will be understood also that after the form is dipped to produce the rubber article thereon, and after the vulcanizing step, the neck which extends partway along the extension will be cut off and the edges cemented together as before.

This form 31 illustrates another deviation or modification which may be incorporated in the form. For example, on one side of the head-forming portion of the form is cemented a substantially semi-circular piece of rubber 31d. This will form a rounded protuberance on the finished article, and, when properly decorated, will represent an eye. Of course, a similar protuberance may be formed on the opposite side of the head portion, but is illustrated on one side only since the caricatured horse which is produced on this form is made up, when the decorating is completed, to represent a horse winking one eye.

In Figs. 13, 14, and 15 I have shown a rubber article 32 produced from a form made in accordance with the present invention, this article representing a giraffe with spreading leg portions 32a, a tail portion 32b, spreading horns 32c, all of which appendages are designed to be inflated, and non-inflated ear appendages 32d.

I have produced numerous other articles with forms made in accordance with the present invention, as, for example, cows, rabbits, dinosaurs, elephants, etc., as well as various birds and fowl, in fact this form, with its lateral appendages formed in the manner explained to form appendages on the completed article adapted to be inflated or not can be used to produce a great variety of articles which are attractive and therefore salable, all of which articles are readily removable from the forms which therefore can be used repeatedly.

It will be seen that by varying the position of the spreader 21 between the parts which form lateral appendages or other parts which are to be spread, a great variety of different effects can be produced, depending upon the location and the depth to which the spreader is inserted between the two parts from which the form is made. Furthermore, by reason of the fact that the forms can be produced inexpensively, and since the completed article is produced by the dipping process, requiring only the sealing of one part where the extension protruded, unless certain of the lateral appendages, such as the ears, are intended to be "floppy" instead of distended, the completed articles can likewise be produced inexpensively, particularly when compared with somewhat similar articles of the non-seamless variety which require a great deal of hand work and are therefore relatively expensive and less attractive in appearance than the seamless article made with the form of my invention.

It is characteristic of the toy articles produced from the forms constituting the subject matter of this invention that they assume the desired form without any substantial distortion of the rubber when being inflated, as will be seen by comparison of the size of the toy article of Fig. 6 with the form of Fig. 1. It is only necessary that the articles be inflated to an extent such as to round or fill out the articles, and, since there is a low air pressure in the article, the likelihood of leakage is minimized.

On Sheet 3 of the drawings, including Figs. 16 to 23 I have disclosed a form made in accordance with the second embodiment of my invention referred to above and the preferred way of producing the same. In this instance the form is molded from plastic material, preferably rubber. While it may be feasible and I have contemplated producing the form from a batch of plastic material which in an appropriately formed mold would flow and take the desired shape, in the preferred way of carrying out the invention I

employ two similar blanks of uncured plastic stock, these blanks of course being shaped to the desired contour which is substantially that of the finished form, and then place these blanks in complementary mold members, the mold having provision for holding the lateral appendage-forming portions of the two blanks in spaced and spread relation so that the molding and curing operation the plastic material will fill the matching cavities and the portions of the two blanks will be united where they contact with each other, i. e., all portions except the lateral appendage-forming portions will become united into an integral homogeneous body but the lateral appendage-forming portions will be free of each other and spaced apart and in the desired divergent relation, the latter result being obtained by spacers which are in the form of auxiliary mold members employed in connection with the two main mold members.

In Figs. 16 and 17 I have shown at 33 the form last referred to, this form representing a giraffe, but of course it will be understood that a form in representation of any desired animal or other object, such as those described above and others, may be made by this process. This form is in effect a one-piece article homogeneous, substantially flat, and flexible. It has laterally divergent leg appendages 33a and ear and horn appendages 33b and 33c located laterally of the plane of the body, and it has a tail appendage 33d and a supporting extension 33e which are located in the plane of the body. Embedded in the supporting extension 33e and extending a suitable distance into the body portion is a metal strip 33f which stiffens the form and constitutes an important improvement in forms of this kind. In the process of making inflatable articles with forms of this kind, it is customary to place a large number of forms on the lower side of a support, the forms being attached thereto by the supporting extensions, and then to lower the support so as to simultaneously dip the forms into the rubber or other solution employed so as to provide on each form the coating which, after being cured, forms the inflatable article. After the coatings are produced on the forms, the support is elevated so as to lift the coated forms from the solution and allowed to stand for a brief interval until part of the excess solution drips therefrom. Then it is desirable that the support and the forms attached thereto be rocked through an arc of 180° more or less to prevent beads being formed at the lower extremities of the forms which last emerge from the solution so that the excess solution will be distributed over the forms. By providing a stiffener 33f in the supporting extension and allowing it to project into the body as illustrated, the dipped forms can be inverted and in fact swung back and forth through any desired arc by shifting the support to which the forms are attached without the forms bending over and contacting with each other. A similar stiffener may be employed in making up the forms shown on Sheets 1 and 2 of the drawings.

In Fig. 18 I have shown in perspective at 33g the two blanks from which the homogeneous flexible form of Figs. 16 and 17 is produced and in this same figure I have shown the stiffener 33f.

In producing the form 33 from the blanks of raw material, I prefer to employ a mold composed of lower and upper mold members 35 and 36, each having a cavity of the contour of the blanks and of substantially the same size or possibly slightly

larger. The two blanks are placed in the cavities of the two mold members and on one of the blanks is placed the metal strip 35f so it will be properly positioned in the completed article. Additionally, this mold includes auxiliary mold members consisting of spreaders 37 and 38 which during the molding or molding and curing operation keep the lateral appendages of the two blanks out of contact with each other and in spread or divergent relation. These spreaders fit into matching slots of the two mold members 35 and 36 and are held in place by suitable means such as dowel pins 39, the two main mold members also being held together with the cavities in registration by dowel pins 40 or equivalent means.

After the blanks are placed in the cavities of the two mold members, the spreaders are placed in position on one of the mold members so as to cover the lateral appendage-forming portions of the blank and then the other mold member is placed on top of it, and the mold members are pressed together so as to mold the article from the two blanks and in the curing operation the latter become united into a homogeneous flexible body. For convenience, portions of the two spreaders project outwardly beyond the main mold members and the portions which lie between the appendage-forming portions of the blanks are tapered so that the lateral appendages of the completed form will be spaced apart and divergent. In this manner inexpensive, satisfactory, flat flexible forms may be produced. It will be understood, of course, that in the molding and curing operation the stiffener is embedded and securely fastened in position. The outer end of the stiffener is provided with an opening which is fitted onto a pin 41, and this, in addition to guide pins 42 which may be provided on one of the mold members, properly positions the stiffener for the molding operation. In loading the mold, the metal stiffening strip 33f is properly positioned on the blank in the lower mold so that when the two mold members are placed together the stiffener will lie between the two blanks centrally and lengthwise of the supporting extensions, and in the molding and vulcanizing operation the rubber is molded around the strip and vulcanized thereto. If desired, the stiffener may be mechanically interlocked with the rubber in which it is embedded by any suitable means, as by providing lengthwise of the strip one or more openings 35h through which the rubber is squeezed in the molding operation.

Thus it will be seen that I produce, by two more or less separate and distinct methods, forms which are a distinct improvement over those illustrated in the Lee applications; first, in the respect that the lateral appendage-forming portions are integral with the body of the form, and in the second respect, that the supporting extensions and the adjacent portions of the form bodies are stiffened.

Additionally, the forms constructed as herein described are durable and can be used an indefinite number of times in the production of inflatable articles, whereas those formed of paper stock can be used only once. The present forms can be used repeatedly, due to the fact that they can be subjected to the necessary flexing and distortions in removing the form from the inflatable article produced thereon without breaking or otherwise injuring the form.

By the present forms with their integral lateral

appendage-forming portions, superior inflatable articles can be produced by the dipping process, compared to those produced on forms wherein the appendage-forming portions of a form are made by cementing or otherwise attaching separate pieces to the body portion of the form, for it is found that when the appendage-forming portions of the form are separately applied to the flat body portion, a sufficiently smooth joint cannot be obtained to avoid the possibility of weaknesses occurring in those portions of the inflatable article which during the dipping process overlie the points of attachment of the appendage-forming portions with the body portion. With forms constructed as herein described, the inflatable articles produced thereon do not have points of weakness and the rubber or other material of which the inflatable articles are produced in the dipping process and subsequent curing process are of uniform thickness. The integral appendage-forming portions and the stiffened supporting extensions both contribute to the attainment of this desirable effect.

While I have shown two ways of producing my improved forms and the preferred constructions thereof, I do not desire to be confined to the precise details but aim in my claims to cover all modifications which do not involve a departure from the spirit and scope of the invention.

Having thus described my invention, I claim:

1. A form for use in producing inflatable articles by the dipping process comprising a flexible body having one or more extensions including a supporting extension in the central plane of the body and having integral appendage forming extensions free of each other and spaced apart laterally of the central plane of the body and a spreader for holding said extensions in spaced relation.

2. Means for forming inflatable articles by the dipping process comprising a substantially flat flexible form having integral flexible marginal portions free of each other and spaced apart laterally to form lateral appendages and a spreader for holding said extensions in spaced relation.

3. Means for forming inflatable articles by the dipping process comprising a substantially flat flexible form composed of two substantially similar preformed layers having main portions joined together and other portions spread to form lateral appendages and the like.

4. Means for forming inflatable articles by the dipping process comprising a substantially flat flexible form composed of two similar flat layers adhering to each other and other portions free of each other and spaced apart laterally to form appendages of different kinds.

5. A form for use in producing inflatable articles by the dipping process consisting of two substantially flat similarly contoured layers having main portions united together and relatively free appendage portions, and a spreader inserted between the layers adjacent the appendage portions.

6. A form for use in producing inflatable articles by the dipping process comprising a substantially flat flexible sheet with relatively free laterally spaced appendage forming portions, and a wedge-shaped spreader for holding said appendage portions apart.

7. A form for use in producing inflatable articles by the dipping process comprising a sub-

stantially flat flexible sheet with relatively free appendage forming portions, and a flexible spreader for holding said appendage portions apart.

8. A form for use in the production of inflatable rubber articles by the dipping process comprising a flexible body portion with relatively free lateral appendage forming portions, and a serrated flexible spreader between and adjacent the bases of said appendage forming portions.

9. A form for use in the production of inflatable rubber articles by the dipping process comprising two flexible layers adhering together with relatively free lateral appendage forming portions, and a wedge-shaped serrated flexible spreader between the layers adjacent the bases of the free portions.

10. A form for use in the production of inflatable rubber articles by the dipping process, said form being composed of two layers joined together inside their margins and one or more spreaders inserted between portions of the layers and at variable depths therein with free marginal portions of the layers extending outwardly beyond the spreader.

11. A form for use in producing inflatable articles by the dipping process, said form being flexible and being composed of two layers adhering together and one or more spreaders inserted between the two layers at or adjacent the margins thereof, the spreaders being flexible so that they may be curved if desired and so that one portion thereof may be inserted between the layers deeper than other portions with free marginal portions extending outwardly different distances beyond the spreader.

12. A form for use in producing inflatable articles by the dipping process, said form being composed of two layers joined together inside their margins, and a spreader inserted between marginal portions of the layers so as to spread them apart, said marginal portions projecting freely outwardly beyond the spreader.

13. Means for forming inflatable articles by the dipping process comprising a flexible form made from molded and cured plastic material with a supporting extension and with integral free flexible lateral appendage-forming portions located laterally of the central plane of the form.

14. A form for use in the production of inflatable articles by the dipping process consisting of a flexible body portion formed from molded plastic material and provided with a supporting extension and with integral flexible appendages spaced apart and in divergent relation laterally of the central plane of the form.

15. A form for use in the production of inflatable articles made by the dipping process comprising a substantially flat body formed from flexible material, said body being provided with a relatively stiff supporting extension.

16. A form for use in the production of inflatable articles made by the dipping process comprising a flexible body provided with a supporting extension, the latter having a stiffener embodied therein.

17. A form for use in the production of inflatable articles made by the dipping process comprising a flexible body provided with a supporting extension, the latter having a stiffener embedded therein and extending into the body portion of the form.

ROBERT R. FRISSELL.