This invention relates to an improvement in inflatable articles, such as figure toys formed from rubber, flexible plastic film and/or sheeting, such as Koresol, Krone, Vinylibra and Balthaflex. This application is a continuation-in-part of co-pending application Serial No. 407,880, filed February 1, 1954, now abandoned. Figure toys are commonly made by seaming together two flatly positioned superposed sheets of such plastic sheeting along a closed line which outlines in two dimensions the figure to be produced. The seaming is economically and quickly done by feeding the sheets together dielectrically by the use of an outline die in a platens press, the die and platens of the press being in circuit with a source of high frequency electric current. This so-called dielectric welding process being well known, does not require specific description here.

As above pointed out such process produces a figure or shape which is two dimensional except for the thickness imparted to the figure upon separation of the two sheets upon inflation. Where projecting portions or elements, such as arms and legs are desired to extend in a third dimension it has been customary to form an opening in one of the sheets, form the extending arm or other projecting portion by seaming together in a separate operation two sheets to form the extending member with an opening at the desired point of juncture and seaming or otherwise securing the edges of the opening in the member to the edges of the body opening by a third seaming operation.

It is the principal object of the present invention to provide three dimensional inflatable articles, such as figure toys, which can be formed from two opposed sheets in a single seaming or welding operation.

In the accompanying drawings,

Fig. 1 is a front elevational view of a toy embodying the invention in uninflated condition;

Fig. 2 is a generally front elevational perspective view of the toy inflated in three dimensional form;

Fig. 3 is a rear view of the toy as shown in Fig. 2;

Fig. 4 is a view similar to Fig. 2 but showing an alternative form of means for releasably holding the toy in three dimensional form;

Fig. 5 is a similar view showing the toy permanently secured in three dimensional form when inflated;

Fig. 6 is a view showing a different form of toy inflated but not brought to final three dimensional form;

Fig. 7 is a generally side perspective view of the toy from Fig. 6 brought to complete three dimensional shape;

Fig. 8 is an elevational view of another form of toy embodying the invention in uninflated condition;

Fig. 9 is a generally perspective view of the toy of Fig. 8 inflated and in three dimensional form;

Fig. 10 is a detail view of an element of Fig. 9;

Fig. 11 is a view of a floating toy in uninflated condition;

Fig. 12 is a generally perspective view of the toy of Fig. 11 inflated and in three dimensional form;

Fig. 13 is a plan view of a portion of a toy element embodying the invention and indicating the manner in which the invention may be advantageously combined with other three dimensional structures.

Fig. 14 is a generally perspective view of an inflated toy incorporating the element of Fig. 13; and

Fig. 15 is a bottom view of the toy of Fig. 14 showing the manner of holding the inflated element of Fig. 13 in three dimensional form.

Referring to the drawings, Fig. 1 shows a toy comprising two sheets, 1 and 2, of synthetic flexible plastic sheeting welded together along their outside edges, as indicated at 3, to provide a head portion 4 with ears 5 extending therefrom, a body portion 6 from which the head and arms 7, legs 8 and a tail 9 extend in a common plane. In Fig. 1 the width of the seam or weld 3 is exaggerated for clearness, in practice a so-called ten-shear will be used, that is, the welding die is so formed that the surplus material outwardly of the weld will be substantially severed from the toy and the sealed edges so shaped as to form a relatively smooth surface when the article is inflated as in the other figures. Axially of the body portion 6 the sheets are seamed together along a closed line 10 forming an elongated area 11 or zone which in the form shown in Figs. 1 and 2 is not inflated. Extending from the opposite sides of the body portion of the sheets are flaps 12 having their edges seamed together by seams 13 which intersect the outlining body seam 3 at their ends so that the flaps 12 are not inflated. The flaps 12 are respectively provided with socket and post elements of a snap fastener as indicated at 14 and 15 respectively. An opening 16, extending through both sheets, is formed at the lower end of the uninflatable portion 11 adjacent the sealed edges of the sheet and opposite tail 9. One of the sheets 1 or 2 is preferably provided with an inflating valve as indicated at 17 in Fig. 3 in any suitable position. When the toy so constructed has been inflated through the valve 17 the arms 7 and sheet 8 are swung towards each other around the elongated axial zone 11 as a hinge, and the tail 9, preferably before inflation, is swung upwardly and thrust through the opening 16 after which the flaps 12 and 13 are secured together by the snap fastener elements 14 and 15, as shown in Fig. 2, the engaged flaps holding the body portion folded against the inflating pressure, which tends to return it to developed form, the arms and legs extending at an angle to the plane of the body portion and head 4, thus forming a three dimensional toy of which the unfolded structure of Fig. 1 is a two dimensional development. As will be apparent from an inspection of Fig. 1 the development is of greater width than would be a two dimensional figure toy by the width of the hinge zone and the width of this zone which bridges the space between the side portions in part at least controls the angularity of the body appendages with respect to each other when the toy is inflated and folded.

One or both sheets may be printed with facial or other characteristics, as indicated at 19.

It will be understood that toys of any desired shape, or simulating animals or the human form, Fig. 5, may be made embodying the invention, by providing suitable body appendages on either side of a hinge formation, such as 11, extending along the axis about which the toy is to be folded to bring the extending member into a three dimensional, angular relationship to the body of the toy, and means for holding the toy in folded condition about the hinge. Preferably as shown the holding means comprises flaps formed integral with the toy body but if desired the holding means may take the form of a separate band formed of plastic sheeting or other suitable material as indicated at 18 in Fig. 4. Any other suitable means may be employed to hold the body fold-
ed, and the flap 12 and 13 may be permanently riveted together as indicated at 18 in Fig. 5. If desired, additional and separately formed extensions may be applied to openings in the body portion as shown in Fig. 6. Where sheets 20 and 21 are flatly welded together to provide four legs 22, a hinge 23 and opposed fastening flaps (one of which is shown at 24)—a separate head member 25 formed of two sheets as above described, being welded by a separate operation to the edges of an opening 26 formed in the body sheet 10.

When the toy is inflated, as shown in Fig. 6, and then folded about the hinge 23 to bring the legs toward each other, the flaps being secured together by the snap fastener as previously described, the toy of Fig. 6 assumes the three dimensional form shown in Fig. 7.

As previously stated the invention is applicable to a wide variety of forms, and a folding zone with fastening means may be variously applied to provide the desired three dimensional form to provide inflatable for beach use, water sports and the like. It will be understood that the inflatable hinge zone may be of any desired length and width to accommodate the desired degree and extend of folding, and while in the forms illustrated the hinge zone is formed by a weld line which encloses an area in which the sheets forming the toy are free of each other, the sheets may be welded together over the entire hinge zone, that is the inflatable hinge zone may take the form of a linear weld of suitable width.

The combination with the hinge and means for retaining the body portion of the inflatable folded thereabout, of an opening such as 16 through which an extending element is threaded to project the element at an angle to the body portion may be employed with reference to more than one projection and the opening may be formed in the body portion as well as in the hinge zone. Such an arrangement is shown in Figs. 8 and 9. In these latter figures the toy is shown as formed of two sheets of plastic sheeting 30 and 31 sealed together around their edges as 32 as previously described to form an inflatable toy having a body portion 33 with a head extension 34, a tail extension 35, leg extensions 36 and holding flaps 37 provided with snap fastener elements 38. An elongated hinge zone 39 is formed by a closed seal line 40 and zone 39 is provided with an opening 41 at the end adjacent tail extension 35. As so far described, the toy of Figs. 8 and 9 is a similar, except as to shape, to that shown in Figs. 1 and 2. In the construction of Figs. 8 and 9 the body portion is provided between the head projection 34 and the adjacent end of hinge zone 39 with an opening 42 sealed around its edges at 43.

Prior to inflation the head extension 34 and tail extension 35 are swung downwardly and upwardly respectively and thrust respectively through the openings 41 and 42 so that when the toy is inflated through suitable valve means (not shown) and the body portion is folded about hinge zone 39 and flaps 37 secured together by fasteners 38 the toy takes the three dimensional form shown in Fig. 9. Prior to inflation a separate decorative collar piece 45 formed of fabric or other suitable material and provided with an opening 46 may be positioned around the neck of the toy and if desired a bell 47 may be attached to the collar as by a cord 48.

For some purposes adequate third dimensional characteristics can be imparted by thrusting a projecting portion through a body opening alone as in the case of the floating soap dish illustrated in Figs. 11 and 12. As there shown two sheets of plastic sheeting 49 and 50 are sewed together around their edges as at 51 and along an oval seal line 52 to form an annular rim portion 53 and a head forming projection 55 and the annular rim portion is provided with an opening 56, sealed around its edges at 57, through which the projection 55 may be thrust to extend at an angle to the plane of the dish, as shown in Fig. 12, when the article is inflated.

While in the forms shown in Figs. 1 to 9 inclusive the hinge zone is uninfatable in large articles it may be advantageous to provide an inflatable hinge zone as shown in Figs. 13, 14 and 15. In the latter figures the application of the invention to an inflatable rocking toy is illustrated. As there shown two sheets of plastic 58 and 59 are sealed together along their edges as at 60, the sheets being formed with projections flatly or non-infatable sealed together to form four spaced flaps 61 which are provided with grommets 62. Inwardly of the edge seal 60, the sheets are sealed together along an oval seal line 63 dividing the article into a central inflatable portion 64 and an annular inflatable portion 65. As shown, sheet 58 is provided with an opening 66 in the portion forming the upper wall of inflatable portion 65, and a separately formed head portion 67 (Fig. 14) is "cuff" sealed in a known manner as at 60, Fig. 14, to the sheet 58 along the dotted line 69, the opening 66 providing communication between the body portion 65 and the head portion 67, but alternatively a head could be formed as an appendage of the body as in Fig. 8. The portions 64 and 65 are provided with respective inflating valves of any suitable form as indicated at 70 and 71. Prior to or after the portions 64 and 65—67 have been inflated through their respective valves, the rear and aft pair of flaps 61 brought together and secured by passing the ends of a cord 74 through the flap grommets and knotting the ends, as shown at 72 in Figs. 14 and 15, thus folding and holding the sides of portion 65 into adjacency about the central portion 64 to provide generally arcuate supporting surfaces 73 about which the toy can be rocked by a young child sitting astride the toy. The cord 74 also holds the forward and rear pairs of flaps 61 in properly spaced relation. While Figs. 13, 14 and 15 depict a toy in the form of a duck it will be understood that by obvious changes in form and proportions only other animal or non-animal shapes, can be formed by the structural principles of the invention.

It will also be understood that any suitable valve means for inflating the toy may be employed in suitable instances the article may be expanded by a trapped inflation method by as the insertion of gas pressure forming material between the sheets prior to welding—the term "inflatable" here and in the claims being used broadly to include either mode of expansion of the article.

What is claimed is:

1. An inflatable toy comprising two sheets of flexible expansible material sealed together along their edges, said sealed edges defining a two dimensional development of a three dimensional figure including a body portion and at least one projecting body appendage, said sheets being sealed together inwardly of said sealed edges along a closed line of seal, the portions of said sheets between said sealed edges and said closed line forming an inflatable chamber isolated from the portion enclosed by said closed line, said last-named portion being positioned in part at least adjacent said sealed edge and opposite said projecting body appendage, said portion enclosed by said closed line being provided with an opening through which said appendage may be unfolded to extend from and be held at an angle to the body portion of the toy, and means for inflating said chamber.

2. An inflatable toy comprising two sheets of flexible expansible material sealed together along their edges, said sealed edges defining a two dimensional development of a three dimensional figure including a body portion and projecting body appendages including pairs of legs extending in opposed relation from opposite sides of the body portion and head and tail members respectively extending in opposed relation from opposite ends of the body portion, said sheets being sealed together along closed lines respectively forming enclosed portions iso-
lated by said closed lines of seal from the chamber formed between said sealed edges and said closed lines of seal, said enclosed portions being positioned in alignment on the major axis of the body portion, one of said enclosed portions being elongated to form a hinge zone about which the body portions and appendages lying on opposite sides thereof may be folded into juxtaposition, said enclosed portions being provided with respective openings through which the adjacent head and tail members may be respectively folded to extend and be held at an angle to the body portion, means to hold said body portion in folded position about said hinge zone and means for inflating said chamber.

3. An inflatable toy as in claim 2, the means for holding the body portion in folded position comprising opposed flaps extending from opposite sides of the body portion and means for connecting the ends of said flaps together.

4. An inflatable figure toy comprising two sheets of flexible expandable material sealed together along their edges, said sealed edges defining a two dimensional development of a three dimensional figure including a body portion and projecting body appendages including pairs of limbs extending in opposed relation from opposite sides of the body portion and a head extending from one end of the body portion, said sheets being sealed together inwardly of said sealed edges to form an elongated folding zone in alignment with the head and about which the so-formed development may be folded, the portions of said sheets between said sealed edges and said hinge zone forming an inflatable chamber, said hinge zone extending longitudinally and centrally of said body portion and being transversely dimensioned to position the body portions and limb appendages which are on opposite sides thereof at a predetermined angle to each other when said chamber is inflated and the development folded about said hinge zone to bring said body portions on opposite sides of said hinge zone into compressed contact and the toy into three dimensional form, means for inflating said chamber and means to retain the development in its so-folded position.

5. An inflatable figure toy comprising two sheets of flexible expandable material sealed together along their edges, said sealed edges defining a two dimensional development of a three dimensional figure including a body portion and projecting body appendages extending from opposite sides of the body portion and a head extending from one end of the body portion, said sheets being sealed together inwardly of said sealed edges to form an elongated folding zone in alignment with the head and about which the so-formed development may be folded, the portions of said sheets between said sealed edges and said hinge zone forming an inflatable chamber, said hinge zone extending longitudinally and centrally of said body portion and being transversely dimensioned to position the body portions and limb appendages which are on opposite sides thereof at a predetermined angle to each other when said chamber is inflated and the development folded about said hinge zone to bring said body portions on opposite sides of said hinge zone into compressed contact and the toy into three dimensional form, means for inflating said chamber and means to retain the development in its so-folded position.

References Cited in the file of this patent

UNITED STATES PATENTS
2,526,786 Whitney Oct. 24, 1950
2,589,155 Smith Mar. 11, 1952