April 1, 1958 R. I. PRUPIS 2,828,581

MOVABLE DOLL EYE

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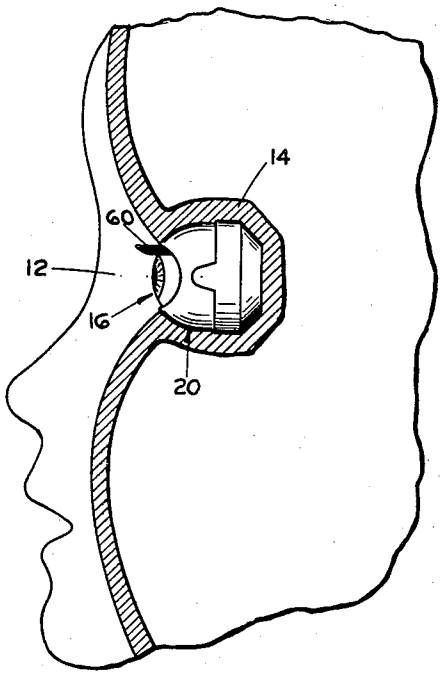


FIG. 1

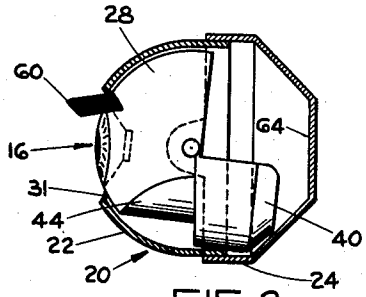


FIG. 2

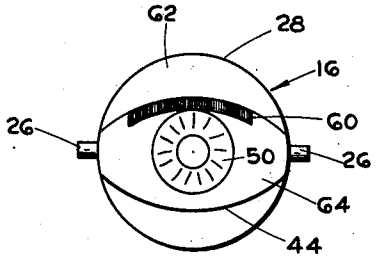


FIG. 3

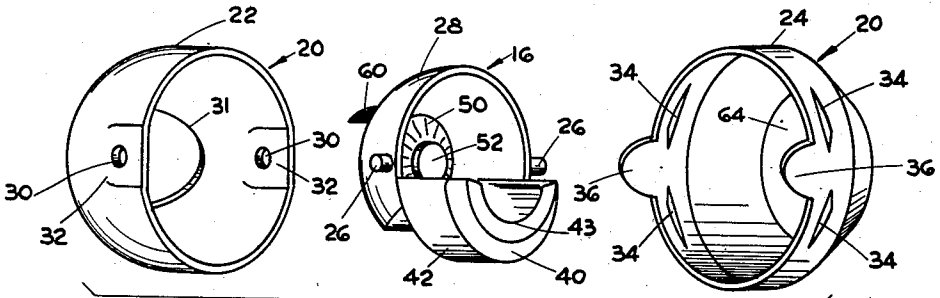


FIG. 4

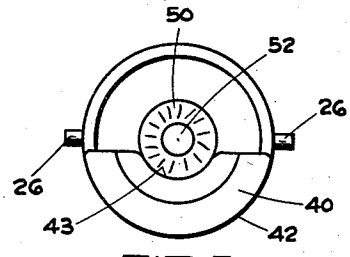


FIG. 5

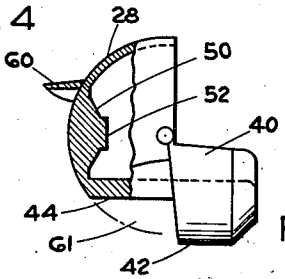


FIG. 6

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MOVABLE DOLL EYE

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4 Claims. (Cl. 46—169)

This invention relates to doll eyes, and more particularly to movable doll eyes of the individual unit type.

Modern doll heads are commonly made of flexible material, and this has led to the use of individual eye units. The movable eye with its actuating weight is pivotally housed within a protective housing to form an assembly which is inserted through the eye opening into a socket molded on the inside of the doll head. Unlike the eyesets used in rigid doll heads, there is no room to permit use of a weight arm between the eye and the weight, and the weight itself must be limited in dimension. Instead the weight extends rearwardly directly from the lower part of the eyeball.

Such eyes have operated successfully when diecast out of metal. It is not possible to obtain a life-like eye with good depth and transparency at the iris, when using painted metal, and it has therefore been necessary to employ a composite eye made partly of plastics material and partly of metal. In one commercial form the eye and weight are diecast integrally, but a circular plastics lens is inserted at the front of the eye to simulate the iris and pupil portions. In another form the eye has been made of plastics material, and the weight and trunnions have been made of metal. In either case, there are problems attendant upon the assembly of the plastics and metal parts, in addition to the increased cost of making and assembling separate parts.

In the case of a rigid doll head, it has already been suggested to make an eye and weight arm and weight all out of a single piece of molded plastics material, but in such case there is no limit to the size of the weight and weight arm to produce sufficient turning moment for dependable operation. In the case of a flexible doll head it would be similarly convenient and economical to mold an individual eye and its weight integrally out of a plastics material, but the low specific gravity, the limited dimension of the weight, and the absence of a weight arm, cause the resulting operation to be undependable and unsatisfactory.

The primary object of the present invention is to generally improve individual doll eyes. A more particular object is to overcome the foregoing difficulty and to simplify the manufacture of such eyes by making the eye and weight out of a single integral body of plastics material, while at the same time insuring dependable operation of the eye. A further object is to provide such an eye which may be used in the same housing as now used, and which therefore may be used in the eye sockets of flexible doll heads as now made. Differently expressed, no change is required in the cores or plugs already standardized and used for molding the socket of the doll head.

To accomplish the foregoing general objects, and other more specific objects which will hereinafter appear, my invention resides in the doll eye elements and their relation one to another as are hereinafter more particularly described in the following specification. The specification is accompanied by a drawing in which:

Figure 1 is a fragmentary vertical section through one eye socket of a doll head;

Figure 2 is a vertical section through the housing of the eye assembly shown in Figure 1;

Figure 3 is a front elevation of the eye shown in Figure 2, with the housing removed;

Figure 4 is a perspective view showing the eye and the two separable parts of the housing in which the eye is received;

Figure 5 is a rear elevation of the eye; and

Figure 6 is a partially sectioned side elevation of the eye.

Referring to the drawing and more particularly to Figure 1, the doll head 12 has an eye socket 14 molded immediately behind an eye opening through which an eye 16 is exposed. The eye 16 is pivotally housed in a housing generally designated 20, which is snugly received in the socket 14. It will be understood that there are a pair of sockets 14 receiving a pair of eye assemblies of the type here described, and that each eye assembly is a complete or self contained operable unit.

Referring now to Figures 2 and 4 of the drawings, the housing 20 is made up of a pair of separable parts 22 and 24. In the present case these are forward and rear parts which separate on a vertical plane. The eye 16 is pivotally mounted, and in the present case has trunnions 26 which are disposed on the horizontal axis of the eyeball portion 28 of the eye, the latter being less than hemispherical in configuration. The forward part 22 of the housing has bearings 30 to receive the trunnions 26. It is also cut away to provide an eye opening 31 (Figure 4) which conforms generally to the eye opening in the doll head.

In the present case the housing 20 is made of sheet metal. The sides of the forward part 22 of the housing may be flattened slightly at the bearings 30, as shown at 32, to provide more room for reception of the trunnions 26. The trunnions may be inserted in the bearings by preliminarily squeezing the top and bottom of the housing toward one another, thereby spreading the flattened sides 32 apart somewhat.

Thereafter the part 24 of the housing may be slid over the rear edge of the part 22, as shown in Figure 2. The rear part 24 may be indented somewhat at spaced points 34 (Figure 4) thereby forming stops to limit the telescoping action of one part over the other, and the rear part 24 also may be provided with forwardly projecting ears 36 which come outside the ends of the trunnions. This prevents compression of the flexible material of the head against the ends of the trunnions, which would increase friction and restrain movement.

The doll eye unit comprises a less than hemispherical eyeball portion 28, and a weight portion 40 extending rearwardly of the rear edge of the lower part of the eyeball portion. It will be noted that the weight portion 40 is disposed substantially within a projected semi-cylindrical area extending rearwardly of the eyeball portion 28 in the direction of simulated sight. The outside surface 42 of the weight portion conforms generally to the diameter of the eyeball. The length of the weight portion is limited by the fact that it must oscillate within the housing 20, which in turn conforms to dimensions heretofore standardized when using a metal weight.

The dimension of the weight is limited in upward direction, as indicated by the curved top surface 43 corresponding to the lower edge of the lens 50, as is best shown in Figures 4 and 5. This clearance for access to the lens region is maintained for convenience in molding, and it is then possible to mold the eye between the halves of a simple two part mold, without using retractable cores or

the like. The mold halves separate in the direction of the fore-and-aft axis of the eye.

If the eye and weight were molded out of a plastics material with the eye constituting the usual full hemisphere, the gravitational force provided by the weight would be insufficient for dependable operation of the eye. I have found that the operation may be improved and made satisfactory by eliminating some of the plastics material of the eyeball itself, below the iris portion, as indicated at **44**. This part of the eye is concealed when the eye is in use in a doll head, as will be evident from inspection of Figure 2 of the drawing, which represents the worst case. The departure from hemispherical shape by elimination of the bottom part **61** is not visible through the eye opening.

I have found that in this way an amount of plastics material corresponding to about 10% of the total may be eliminated, and this removal of material forward of the trunnion axis corresponds to the addition of material behind the trunnion axis or to the weight **40**.

Referring now to Figures 4, 5 and 6 of the drawing, the eyeball is preferably molded with a frusto-conical iris portion **50** and a cylindrical pupil portion **52** inside the eyeball. The plastics material used is preferably a transparent material such as cellulose acetate butyrate or styrene. The inside of the iris portion **50** is preferably ridged or roughened to reflect light coming from the outside. The inside of the pupil portion **52** is preferably smooth and flat, so that it will remain transparent. The pupil then appears black without any need to coat it with black material, because the enclosed housing **20** prevents entry of light. As a precautionary matter the inside surface **64** of the back of the housing may be sprayed or otherwise painted with a black or dark coating to insure that the pupil will look black.

If desired, the eye may be provided with a simulated eyelash indicated at **60**. This may be made in either of two forms. In one form a rigid lash of plastics material is molded integrally with the eye, as is best shown in Figure 6. This is subsequently coated with a dark coating to better simulate an eyelash.

In another form, the lash may be flexible and made up of adjacent strands of hair. In such case, the hemispherical eyeshell is slit or slotted on an arcuate line over the iris, and the lash is inserted and cemented in place, in accordance with conventional practice. The lash is preferably curved to conform to the upper edge of the eye opening, so that it lies against that opening when the eye looks forward, as in Figures 1 and 2. The opening movement is also limited by contact of the weight **40** with the bottom of housing **20**.

Inasmuch as the one-piece eye and weight structure is molded of a plastics material which is preferably transparent, it is necessary to coat portions of the eye. More specifically, and referring to Figure 3, the part **62** above the lash **60** is flesh colored, while the part **64** below the lash **60** and around the iris **50**, is white. The iris **50** could be colored at the back, but a better looking eye is obtained by using a slightly tinted transparent plastic, it being tinted brown for a brown eye; blue for a blue eye; and left clear if it be desired to simulate a gray eye. The pupil portion **52** may be coated black, but is more simply and preferably left transparent, reliance then being had on the enclosed nature of the housing **20**.

The housing may itself be molded out of plastics material, and in such case the rear part of the housing is preferably made of a dark colored plastic. When the housing is made of sheet metal as here shown, the inside surface **64** may be darkened.

It is believed that the method of constructing and using my improved doll eye, as well as the advantages thereof, will be apparent from the foregoing detailed description. Many complete eye members may be molded in a single shot by injection molding. The resulting eyes include the eye shell, the aris portion with its serrated rear surface, the pupil portion with its transparent rear surface, the weight, and even the trunnions and the lash. The weight, although limited in dimension downwardly, upwardly and rearwardly, and therefore comparatively light, is made adequate for dependable operation by eliminating a substantial part of the eye shell in a region forward of the trunnion. The resulting eye may be used in the already standardized housings and eye sockets.

A large part of the eyeball portion conforms to the surface of a sphere, and may be described as being less than hemispherical. It is provided with a rearwardly extending weight portion, the outside of which has a radius about an axis in the direction of simulated sight, which radius is substantially the radius of the eyeball portion. It may be slightly more, as indicated in Fig. 6 by the change from the broken line at **61** to the weight portion at **42**, but this increase cannot be more than a little because otherwise the eye movement in opening direction would be unduly limited. In practice the eye should open far enough for the lash to reach the top of the eye opening.

Indeed if the indentations **34** shown in Fig. 4 of the drawing are made quite deep, it becomes desirable to form channels or grooves along the outside of the weight, extending in the direction of the axis of simulated sight, so that the opening movement of the eye will not be prematurely stopped by reason of the weight engaging the indentations **34**.

The broken line at **61** in Fig. 6 indicates the usual hemispherical configuration of the eyeball portion, and in the present case the lower part is stepped back or eliminated relative to the surface of a sphere, this being indicated by the change from broken line **61** to the solid line **44**.

The motion of the eye may be limited by the eyelash itself when the eyelash is molded out of plastic as shown in Fig. 6. However, the space limitations in an eye of the present type result in a weight of such dimension that it moves about as far as possible, and thus the weight may act also as a motion limiting means, particularly when using a soft lash made up of flexible strands of hair. Thus in Fig. 2 it will be seen that the opening movement of the eye is limited by the weight just as the lash reaches the top of the eye opening.

It will be apparent that while I have shown and described my invention in a preferred form, changes may be made in the structure disclosed, without departing from the scope of the invention, as sought to be defined in the following claims. In the claims the reference to sockets of standard dimension means the dimension heretofore used for eyes having a metal instead of a plastics weight, so that the same cores or so-called "plugs" may be used by the doll manufacturer when molding the flexible doll head.

I claim:

1. A sleeping individual doll eye, comprising a single integrally molded body of transparent plastics material, said body comprising a less than hemispherical eyeball having an iris portion and a pupil portion inside the eyeball, a weight portion disposed substantially within a projected semi-cylindrical area extending rearwardly from the rear edge of the lower part of the eyeball in the direction of simulated sight, the outside of said weight portion having a radius about an axis in the direction of simulated sight which radius substantially corresponds to the radius of the eyeball, and the inside surface of said weight portion being shaped to clear an imaginary cylinder extending rearwardly in the direction of simulated sight from the iris and pupil portions so that the entire piece may be molded in a two-part mold separating in the direction of the line of sight, the bottom of said eyeball portion which is concealed when the eye is in use in a doll's head being stepped back relative to the surface of a

sphere below the iris portion and forwardly of the weight portion, the rear edge of said stepped back portion being integral with the forward end of said weight portion and defining thereat a line of juncture extending peripherally of said stepped back portion and approximately below the pivot axis of the eye when the line of sight is horizontal, the elimination of a part of said eyeball forward of said pivot axis being equivalent to the addition of material to the weight portion rearward of said pivot axis to thereby provide dependability of movement of the eye.

2. A sleeping individual doll eye, comprising a single integrally molded body of transparent plastics material, said body comprising a less than hemispherical eyeball having a frusto-conical iris portion and a pupil portion inside the eyeball, said pupil portion having a smooth non-reflective back surface and said iris portion having a serrated back surface which reflects incident light, trunnions projecting outwardly of said eyeball and defining the pivot axis of the eye, a weight portion disposed substantially within a projected semi-cylindrical area extending rearwardly from the rear edge of the lower part of the eyeball in the direction of simulated sight, the outside of said weight portion having a radius about an axis in the direction of simulated sight which radius substantially corresponds to the radius of the eyeball, and the inside surface of said weight portion being shaped to clear an imaginary cylinder extending rearwardly in the direction of simulated sight from the iris and pupil portions so that the entire piece may be molded in a two-part mold separating in the direction of the line of sight, the bottom of said eyeball portion which is concealed when the eye is in use in a doll's head being stepped back relative to the surface of a sphere below the iris portion and forwardly of the weight portion, the rear edge of said stepped back portion being integral with the forward end of said weight portion and defining thereat a line of juncture extending peripherally of said stepped back portion and approximately below the pivot axis of the eye when the line of sight is horizontal, the elimination of a part of said eyeball forward of said pivot axis being equivalent to the addition of material to the weight portion rearward of said pivot axis to thereby provide dependability of movement of the eye.

3. A sleeping individual doll eye, comprising a single integrally molded body of transparent plastics material, said body comprising a less than hemispherical eyeball having a frusto-conical iris portion and a pupil portion inside the eyeball, said pupil portion having a smooth non-reflective back surface and said iris portion having a serrated back surface which reflects incident light, trunnions projecting outwardly of said eyeball and defining the pivot axis of the eye, a weight portion disposed substantially within a projected semi-cylindrical area extending rearwardly from the rear edge of the lower part of the eyeball in the direction of simulated sight, the outside of said weight portion having a radius about an axis in the direction of simulated sight which radius substantially corresponds to the radius of the eyeball, and the inside surface of said weight portion being shaped to clear an imaginary cylinder extending rearwardly in the direction of simulated sight from the iris and pupil portions so that the entire piece may be molded in a two-part mold separating in the direction of the line of sight, the bottom of said eyeball portion which is concealed when the eye is in use in a doll's head being stepped back relative to the surface of a sphere below the iris portion and forwardly of the weight portion, the rear edge of said stepped back portion being integral with the forward end of said weight portion and defining thereat a line of juncture extending peripherally of said stepped back portion and approximately below the pivot axis of the eye when the line of sight is horizontal, the elimination of a part of said eyeball forward of said pivot axis being equivalent to the addition of material to the weight portion rearward of said pivot axis to thereby provide dependability of movement of the eye, and a simulated lash projecting from said eyeball above said iris portion, the eyeball above said lash being flesh colored to simulate an eyelid and the eyeball below said lash outside the iris portion being white.

4. A doll eye assembly for use in a flexible doll head having eye openings and eye sockets molded in back of said eye openings, said assembly comprising an eye formed of a single integrally molded body of transparent plastics material, said body comprising a less than hemispherical eyeball, a weight portion disposed substantially within a projected semi-cylindrical area extending rearwardly from the rear edge of the lower part of the eyeball in the direction of simulated sight, the outside of said weight portion having a radius about an axis in the direction of simulated sight which radius substantially corresponds to the radius of the eyeball, and the inside surface of said weight portion being shaped to clear an imaginary cylinder extending rearwardly in the direction of simulated sight from the iris and pupil portions so that the entire piece may be molded in a two-part mold separating in the direction of the line of sight, the bottom of said eyeball portion which is concealed when the eye is in use in a doll's head being stepped back relative to the surface of a sphere below the iris portion and forwardly of the weight portion, the rear edge of said stepped back portion being integral with the forward end of said weight portion and defining thereat a line of juncture extending peripherally of said stepped back portion and approximately below the pivot axis of the eye when the line of sight is horizontal, the elimination of a part of said eyeball forward of said pivot axis being equivalent to the addition of material to the weight portion rearward of said pivot axis to thereby provide dependability of movement of the eye, and a housing in which said eye is pivotally mounted, said housing being made of two separate parts to facilitate assembly of the eye inside the housing and having means to pivot the eye at the axis of the eye, said housing having an eye opening at the front and being closed at the rear, the weight portion of said eye being limited in dimension to afford sleeping movement of the eye within the housing, and the latter being dimensioned to be received in doll head eye sockets of standard dimension.

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