Nov. 25, 1952 J. H. WILHELM 2,618,898

DOLL EYE ASSEMBLY

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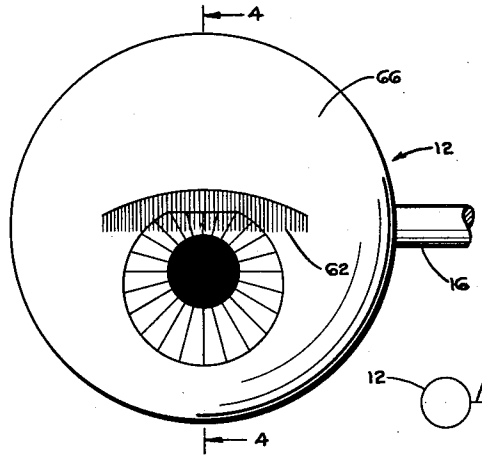


FIG. 2

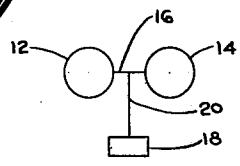


FIG. 1

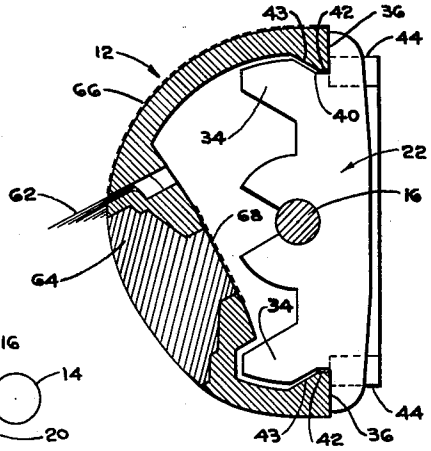


FIG. 4

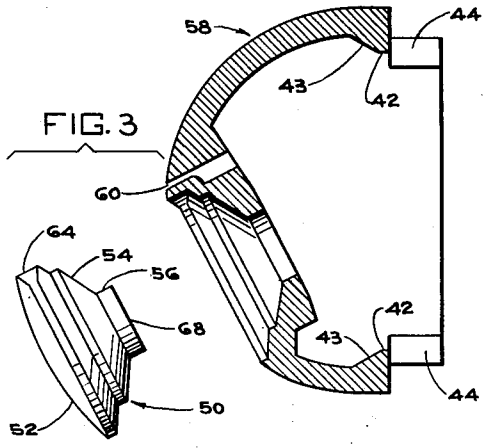


FIG. 3

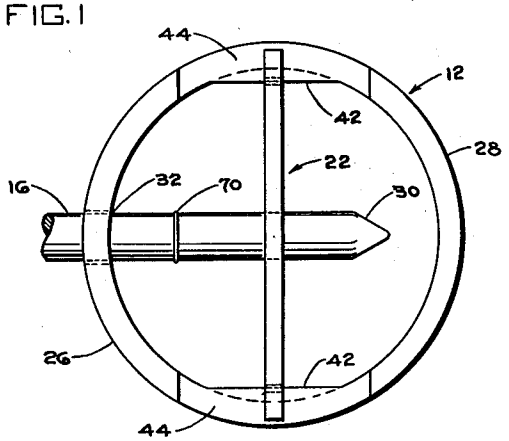
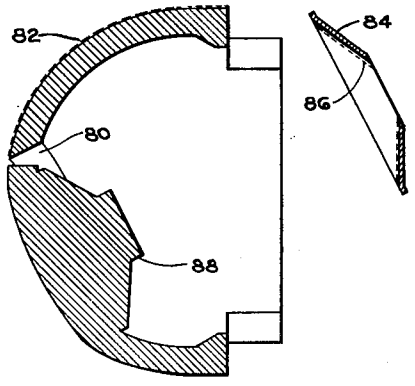


FIG. 5

FIG. 6



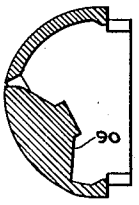


FIG. 7

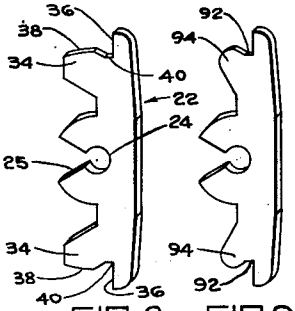


FIG. 8 FIG. 9

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DOLL EYE ASSEMBLY

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Application October 15, 1948, Serial No. 54,615

5 Claims. (Cl. 46—169)

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This invention relates to doll eyes, and more particularly to an assembly of a doll eye, cross-rod, and key.

Doll eye assemblies have already been made in which the eye is self-adjustably movable from side to side (that is, axially of the cross-rod) yet is turned by the cross-rod. In a favorite construction for this purpose the eye has been turned with the cross-rod by means of a metal key which fits frictionally on the cross-rod and which bears against the back edge of the eye. Such a construction has proved successful with eye shells made of metal, but difficulty has arisen in attempting to employ the same kind of assembly when using an eye shell molded of a somewhat elastic material such as a molded thermoplastic. In the latter case the shell tends to escape from the key.

The primary object of the present invention is to overcome the foregoing difficulty; to improve doll eye assemblies, particularly when using a molded thermoplastic eye shell; and more specifically, to improve the keying of such an eye shell to a cross-rod by means of a metal key.

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

Fig. 1 schematically illustrates a doll eye assembly;

Fig. 2 is a front elevation of one end of the same;

Fig. 3 is a section taken in elevation through a two piece eye;

Fig. 4 is a section through the eye assembly taken approximately in the plane of the line 4—4 of Fig. 2;

Fig. 5 is a rear elevation of one end of the eye assembly;

Fig. 6 is a section similar to Fig. 3, but showing a one piece eye;

Fig. 7 is a similar section showing a modification;

Fig. 8 is a perspective view of a key forming a part of the invention; and

Fig. 9 shows a modified form of key.

Referring to the drawing, and more particularly to Fig. 1, the doll eye assembly comprises approximately hemispherical eyes 12 and 14 mounted at the ends of a shaft or cross-rod 16 to which an operating weight 18 is attached, as by means of a weight arm 20. Such assemblies

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are common in the doll art. They are oscillatably mounted within a doll head by means of a suitable hanger or bridge providing bearings which receive the cross-rod 16, the arrangement being such that when the doll is in erect position the weight 18 holds the eyes in open relation to the eye openings in the doll head, and when the doll is laid on its back the weight turns the eyes toward the bottom of the eye openings, a flesh colored portion of the shells then being exposed through the eye openings in simulation of sleep.

Referring now to Figs. 4 and 5 of the drawing, the eye 12 is received loosely on cross-rod 16, but is caused to rotate with the cross-rod by means of a metal key 22. This key is best shown in Fig. 8, from which it will be seen that it is stamped out of heavy gauge sheet metal, and has a hole 24 for the cross-rod. There is also a slot 25 leading to the hole 24 and making the latter slightly yieldable, so that the key will be received on the cross-rod with a frictional fit, thereby affording manual rotational adjustment between the key and the rod. The end portions of the key engage the rear edge of the eye and support the same, as well as cause the same to rotate with the cross-rod. The inner side wall 26 (Fig. 5) of the eye has a hole receiving the cross-rod 16, but the cross-rod may terminate short of the opposite side wall 28 of the eye, as is indicated at 30.

While the construction as so far described has proved to be convenient and satisfactory with an eye shell stamped and drawn from sheet metal, it has not proved satisfactory with eye shells molded of thermoplastic materials. Such eyes have been found to escape from the key. I have found that the cause of the difficulty arises from the somewhat flexible nature of the thin-walled thermoplastic shell. Thus the shell may turn forwardly about the side hole 32, the wall at the hole bending or yielding somewhat until the shell escapes from the forwardly extending fingers 34 (Figs. 4 and 8) of the key, whereupon the shell can turn downwardly or laterally of the cross-rod.

To overcome this difficulty, I matingly shape the shell 12 and the key 22 in an undercut relation such as to prevent the shell from moving transversely of the rod. More specifically, the key is not only stepped or shouldered at its ends to provide surfaces 36 which hold the eye against rearward movement, and surfaces 38 which hold the eye against downward or lateral movement, but I notch or recess the end portions of the key, as is indicated at 40 in Figs. 4 and 8, and at the same time matingly shape the eye, as is indicated

at 42, thus preventing the eye from moving forwardly relative to the rod. The portions 42 of the eye are preferably elongated to form guides, ways, or rails extending parallel to the cross-rod 16, as is best shown in Fig. 5. In such case the eye is free to move from side to side or axially of the cross-rod, for automatic adjustment of the spacing between the two eyes, in order to fit the eye openings in the particular doll head which receives the assembly.

The rails 42 on the eye may be formed without complicating the mold for the eye, that is, without necessitating retractable cores. The material is sufficiently elastic to be ejected directly from the main core on the ejector half of the mold, the eye shell expanding outwardly enough for that purpose. It is for this reason that the forward face of the rail is preferably sloped, as shown at 43. The elasticity of the shell serves also to facilitate assembly of the eye with the key, for the two parts may be simply pushed together with a snap fit, the eye expanding slightly during the assembly operation. Of course, the parts may be similarly separated if subjected to an intentional separating force, but the parts will not separate so readily as to do so accidentally.

If desired, the top and bottom portions of the eye shell may be cut away or recessed forwardly, as is indicated at 44. This permits the vertical surfaces 36 of the key to be located at, or in this case close to, a plane passing through the cross-rod. It is obvious that the key would have to be wider and more cumbersome in construction if it were to engage the back edge of the shell without the recesses 44.

If desired, the cross-rod may itself be used to penetrate and form the opening 32 in the side wall of the eye. It will be seen in Fig. 5 that for this purpose the end 30 of the cross-rod may be pointed. Moreover, the cross-rod is preferably scored to raise some of the metal and thereby form a ridge or bead, as is indicated at 70, the said ridge being located in the region between the key 22 on one side, and the side wall 26 on the other. To assemble the parts the key and eye shell are placed in a suitable jig or fixture, and the cross-rod is moved axially in proper diametric relation to the eye shell, the end passing through the side wall 26 and into and through the hole in key 22. Thus the cross-rod forms a properly located hole in the eye shell, and the ridge 70 enlarges that hole to insure clearance for a free side to side movement of the shell relative to the cross-rod. This idea has already been used with metal eyes.

The present invention combines most advantageously with the above described method of perforating the shell. The reason for this is that in order to successfully perforate the shell in the described manner, without splitting or breaking the wall of the shell, the wall must be kept thin (which is anyway desirable in order to conserve material). With a thin wall the shell is sufficiently flexible at the hole 32 to permit escape of the shell from the key. This difficulty is in turn solved by use of the rails 42 combined with the undercut notches 40 previously described.

The particular eye here shown may be referred to as a two-piece eye, in that the eye is made of two main parts, one being a lens portion, and the other being an approximately hemispherical shell provided with a seat to receive the said lens portion. This relation is best shown in Fig. 3, in which the two parts are separated. The lens portion 50 conforms to the surface of a sphere at 52; is frusto-conical at 54; and has a rearwardly projecting stud at 56. The lens portion 50 is received in a mating seat in an eye shell 58. This may be slotted at 60 to receive an eye lash, indicated at 62 in Figs. 2 and 4. The lens may be flattened somewhat at the top edge adjacent the eye lash, as indicated at 64 in Figs. 3 and 4, this being already known in the art. When molding the eye in two pieces, as here shown, the lens portion 50 is preferably molded out of a transparent plastic, such as methyl methacrylate (commercial "Lucite"), while the shell portion 58 is preferably molded out of a white opaque plastic, which may be cellulose acetate or other suitable plastic.

The portion of the shell above the lash 62 is painted with a flesh colored paint, indicated at 66 in Fig. 2. The lower portion is white and simulates the eye ball of the eye. The frustro-conical portion of the lens may be tinted blue or brown, or other suitable color, for the iris of the eye. The inner end 68 of the stud 56 is colored black to simulate the pupil of the eye. With the construction here shown this is conveniently done after inserting the lens in the shell, the lens being secured in place by means of a suitable cement or solvent. The inside of the eye may be daubed with black paint without need to confine the same to the area of the stud, for only the circular area of the stud is exposed to the front of the eye, as will be clear from inspection of Fig. 4, the plastic of shell 12 being opaque.

It is, of course, not essential to the present invention that the molded eye be formed of two pieces. It may be made of a lesser number or a greater number of parts. It may, for example, be made of three main parts as disclosed in U. S. Patent No. 2,425,510, issued August 12, 1947, to the assignee of the present application, in which the lens is made of a transparent plastic, the eye ball is made of a white plastic, and the remainder of the shell is made of a flesh colored plastic, the three parts being assembled together to complete the eye shell. On the other hand, the eye may be molded of a single piece of plastic, and such an eye is illustrated in Fig. 6 of the drawing. Here the entire eye is initially molded out of a transparent plastic. The portion above the eye lash slot 80 is painted with a flesh colored paint, as indicated at 82. A frusto-conical disc 84, preferably made of metal, is tinted blue or brown, or other suitable color, for the iris portion of the eye, this being indicated at 86. The disc is pressed over the stud 88 with a tight fit which not only holds the disc in place, but guards against leakage of paint when black paint is applied to the inside of the stud 88, the black being daubed on the end of the stud and some of the surrounding metal disc, but, of course, is not spread so freely as to run outside the metal disc. The inside of the eye is painted white, thus simulating the eye ball portion of the eye below the eyelid and outside the iris.

The disc 84 shown in Fig. 6 need not be made of metal, it being feasible to employ a stiff paper. In fact, it is not essential to use a disc at all, and in Fig. 7 an eye is shown which is similar to that shown in Fig. 6, except that the blue, brown, or other iris color is applied directly to the frusto-conical portion 90 of the lens area of the eye before the black and white paints are applied to the stud and to the inside of the eye shell, respectively. The outside of the shell above the lash is painted a flesh color, as previously described.

The forwardly projecting fingers 34 shown in

Fig. 8 are not essential to the invention, and in Fig. 9 I show a modification in which these fingers have been shortened or eliminated to leave only the undercut notches **92** which cooperate with the rails or beads **42** of the eye. A somewhat rounded or inclined approach surface **94** is preferably provided leading to the notches in order to facilitate pressing the key and eye shell into assembled relation, the parts coming together with a snap fit. It will be understood that in either form of key the height of the key forwardly of the rails or notches is reduced somewhat compared to the maximum or diametric dimension of the eye shell forwardly of the rails, in order not to inhibit the desired side to side movement of the shell on the cross-rod.

It is believed that the construction, method of assembly, and operation of my improved eye, as well as the advantages thereof, will be apparent from the foregoing detailed description. The shell may be molded out of a plastic, and the wall of the shell may be kept thin enough to be pierced by a pointed cross-rod without splitting the wall. The use of a thin wall also conserves material. However, a thin plastic shell is somewhat flexible, and may slip off the key, in contrast with a metal shell which would remain suitably supported on a similarly proportioned key. However, with the present invention the shell is held on the key, and the latter takes any stresses applied to the shell. The shell is held not only against rearward and lateral movement relative to the cross-rod, but also is held against forward movement by means of an undercut relation between the key and the shell. This relation is preferably made such as not to interfere with free side to side or axial movement of the shell on the cross-rod. The undercut is moderate enough in dimension relative to the elasticity of the shell so that it may be stripped from the mold without the use of complex retractible cores. This same elasticity facilitates assembly of the key and the eye shell, for the parts may be pushed together with a snap fit.

Concerning the plastics which may be used, where transparency is desired, as for the lens **50** or the one piece eye of Figs. 6 and 7, a suitable plastic compound may be selected from the group consisting of cellulosic derivatives, the polyesters and the polyacrylic acid derivatives, specific examples being cellulose acetate butyrate, polystyrene and methyl methacrylate, respectively. Where opacity is desired, as for the shell **53**, any one of the same compositions suitably compounded with a pigment may be used.

As to dimensions, in one particular case in which the eye was 0.720'' in diameter, the thickness of the wall of the shell was 0.035''. The undercut or rails were so dimensioned that the vertical spacing between the rails was 0.585''. The notches **40** of the key provided some clearance, the spacing between the same being 0.575''.

It will be understood that the specific dimensions given and the specific plastics mentioned are solely by way of exemplification, and not in limitation of the invention.

It will be apparent that while I have shown and described my invention in several preferred forms, changes may be made in the structures shown, without departing from the spirit of the invention, as sought to be defined in the following claims.

I claim:

1. A doll eye assembly comprising a generally hemispherical eye shell which is substantially fully open at the back, a rod for rotating said shell, said shell having a hole on one side receiving the rod in diametrical relation to the shell but said rod stopping short of the other side of the shell, a flat key mounted on said rod with its flat surface perpendicular to the rod and intermediate the sides of the shell for keying the shell to the rod, said key being so shaped with an undercut at the top and bottom, and said shell being so matingly shaped at the top and bottom in undercut relation as to prevent said shell from moving rearwardly or forwardly about said hole and relative to the rod while at the same time affording side-to-side adjustment of the shell relative to the rod, said shell being sufficiently elastic to be pressed into the mating undercut relation with the key.

2. A doll eye assembly comprising a generally hemispherical eye shell which is substantially fully open at the back, a rod for rotating said shell, said shell having a hole on one side receiving the rod in diametrical relation to the shell but said rod stopping short of the other side of the shell, a flat key mounted on said rod with the flat surface perpendicular to the rod and intermediate the sides of the shell and extending from the top to the bottom of the shell for keying the shell to the rod, the end portions of said key being recessed, and the shell being provided at the top and bottom with integrally molded rails extending parallel to the rod and so mating with said recesses in undercut relation as to prevent said shell from moving rearwardly or forwardly about said hole and relative to the rod while at the same time affording side-to-side adjustment of the shell relative to the rod, thereby holding the shell in rotative relation to the rod, and said shell being sufficiently elastic to be pressed into the mating undercut relation with the key.

3. A doll eye assembly comprising a generally hemispherical eye shell which is substantially fully open at the back, a metal rod for rotating said shell, said shell having a hole on one side slidably receiving the rod in diametrical relation to the shell but said rod stopping short of the other side of the shell, the end of said rod being pointed and the body of said rod being circumferentially beaded at a point inside the wall of the shell, a flat metal key mounted on said rod with its flat surface perpendicular to the rod and intermediate the sides of the shell for keying the shell to the rod, said key fitting the rod frictionally in order to afford manual rotational adjustment between the key and rod, the end portions of said key being recessed, and the shell being provided at the top and bottom with integrally molded rails extending parallel to the rod and so mating with said recesses in undercut relation as to prevent said shell from moving rearwardly or forwardly about said hole and relative to the rod while at the same time affording side-to-side adjustment of the shell relative to the rod, thereby holding the shell in rotative relation to the rod, and said shell being sufficiently elastic to be pressed into the mating undercut relation with the key.

4. A doll eye assembly comprising a generally hemispherical eye shell which is substantially fully open at the back, a metal rod for rotating said shell, said shell having a hole on one side slidably receiving the rod in diametrical relation to the shell but said rod stopping short of the other side of the shell, a flat metal key mounted on said rod with its flat surface perpendicular to the rod and intermediate the sides to the shell

for keying the shell to the rod, said key receiving the rod being open at one side and of small enough dimension to fit the rod frictionally in order to afford manual rotational adjustment between the key and rod, said key being stepped at its ends to provide surfaces which prevent the shell from turning rearwardly or laterally about the hole and relative to the rod and which causes the shell to rotate with the rod, the ends of said key being additionally recessed, and the shell being provided at the top and bottom with integrally molded rails extending parallel to the rod and so mating with said recesses in undercut relation as to prevent said shell from moving forwardly about said hole relative to the rod while at the same time affording side-to-side adjustment of the shell relative to the rod, and said shell being sufficiently elastic to be pressed into the mating undercut relation with the key.

5. A doll eye assembly comprising a generally hemispherical eye shell which is substantially fully open at the back, a rod for rotating said shell, said shell having a hole on one side slidably receiving the rod in diametrical relation to the shell but said rod stopping short of the other side of the shell, the end of said rod being pointed and the body of said rod being circumferentially beaded at a point inside the wall of the shell, a flat key mounted on said rod with its flat surface perpendicular to the rod and intermediate the sides of the shell for keying the shell to the rod, said key receiving the rod being open at one side and of small enough dimension to fit the rod frictionally in order to afford manual rotational adjustment between the key and rod, said key being stepped at its ends to provide

generally upright surfaces which come behind the shell to prevent the shell from turning rearwardly and which cause the shell to rotate with the rod, and generally horizontal surfaces which come inside the shell at the top and bottom to prevent the shell from turning laterally about the hole and relative to the rod, said generally horizontal surfaces on said key being additionally recessed inwardly toward the rod, and the shell being provided at its inner periphery at the top and bottom portions thereof with integrally molded rails extending parallel to the rod and so mating with said recesses in undercut relation as to prevent said shell from moving forwardly about said hole relative to the rod while at the same time affording side-to-side adjustment of the shell relative to the rod, said shell being sufficiently elastic diametrically across the open back of the shell to be pressed into the aforesaid mating undercut relation with the key.

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