This invention relates to toys, and more particularly to dolls' heads having movable eyes and to a movable eye system therefor.

Numerous systems and arrangements of movable eyes for dolls have been suggested and tried out at various times, but because of the numerous desiderata which must be met, only a few of these arrangements have proven practicable and successful in commercial practice. The most satisfactory movable eye systems comprise a movable eye set and an extensible or expansion bridge for supporting the eye set. The bridge is ordinarily provided with a pair of tang or prong plates slidably mounted on the bridge and so arranged that with the aid of a special tool they may be extended or expanded outwardly relative to the bridge, while the eyes are located in the eye sockets, thereby insuring correct location of the bridge and of the eyes within the doll's head.

The primary object of the present invention is to retain the advantages of such an eye system while simplifying and cheapening the cost of the structure of the bridge by dispensing with the use of sliding tang plates and the like. This object I fulfill by providing the bridge member with end prongs which are bendable outwardly in order to extend the bridge. The bridge member and the end prongs are preferably formed out of a single piece of sheet metal, thereby making economical manufacture readily possible.

One of the advantages of the expansion bridge heretofore used was the fact that it could be extended with the aid of a tool or fixture. This fixture made it possible to mount the eye system through the neck opening of the doll's head, for the bridge and eye set were supported at one end of the fixture while the doll's head was located with the eye sockets directly over the eyes, whereupon the fixture was actuated to expand the bridge and so to fix the same within the head. Accordingly, another object of my invention is to so design the expansion bridge, employing outwardly bendable end prongs as above described, as to facilitate extension of the bridge with the aid of a tool or fixture. For this purpose the end prongs are located outside of the sides of the intermediate portion or body of the bridge member. In preferred form I employ a pair of spaced end prongs at each end of the bridge, and the prongs in each pair are spaced apart a distance greater than the width of the intermediate portion of the bridge so that a fixture employing separable yokes surrounding the bridge is readily able, upon separation of the yokes, to bend the end prongs outwardly and embed the same in the material of the doll's head.

The tool or fixture for expanding the bridge may be simplified if only one of the yokes is made movable while the other is kept stationary. This, however, would tend to embed the prongs at one end further than those at the other end of the bridge. Also, even if both yokes are made oppositely and equally movable, incorrect final location of the bridge may be caused by reason of non-uniformity in the resistance of the material of the doll's head, or non-symmetry in the location of the inner walls receiving the prongs. Still another object of my invention is to overcome these difficulties, which I do through the provision of a locating or anchoring tang for preliminarily holding the bridge in proper location during the actuation of the tool for embedding the end prongs into the material of the doll's head.

The manufacture of dolls' eyes must tool-up for, manufacture, and have in stock a large number of sizes of movable eye systems in order to fit the correspondingly large number of sizes of dolls' heads used in the toy art. This requirement heretofore applied not only to the eye sets, including the crossbar and eyes mounted thereon, but also to the bridges for supporting the eye set within the doll's head. Another object of the present invention is to minimize this difficulty and to make it possible to fit a large range of dolls' heads with a single size of bridge. This object is fulfilled by providing the front wall of the doll's head with interior abutments spaced a predetermined distance apart which is uniform for all sizes of head. These
abutments receive the prongs of the bridge, and a single size of bridge is therefore sufficient.

The spacing between the eye sockets in a doll's head varies directly with the size of the head, and in each case is nearly as great as the width of the head. It would therefore be exceedingly difficult to provide uniformly spaced abutments at the sides of different sizes of doll's head. Accordingly, I provide the doll's head with top and bottom abutments, and use an upright expansion bridge for supporting the eye set in transverse relation to the bridge. With such an arrangement it is readily possible to retain a standardized uniform distance between the opposed faces of the abutments while varying the size of the head. Another advantage incidentally obtained by the use of an upright bridge is that less clearance is needed to insert the same through the neck opening of the doll's head when mounting the eye system in place.

To the accomplishment of the foregoing and such other objects as will hereinafter appear, my invention consists in the movable eye supporting elements and their relation one to the other as hereinafter are more particularly described in the specification and sought to be defined in the claims. The specification is accompanied by the drawing in which:

Fig. 1 is a vertical section through a doll's head embodying my invention;

Fig. 2 is a section taken in a plane normal to that of Fig. 1 looking toward the front of the doll's head;

Fig. 3 illustrates the mounting of the eye system within the doll's head prior to extending the bridge;

Fig. 4 shows the bridge extended;

Fig. 5 is a section taken in the plane of the line 5—5 in Fig. 2 but is illustrative of a slightly modified form of bridge;

Fig. 6 is a detail of the modification shown in Fig. 5; and

Fig. 7 is a detail of still another modification of my invention.

Referring to the drawing it will be observed that in each case an eye set A is supported by a bridge B which is mounted in a doll's head C. The eye set A may be any one of a number of conventional types and need not be described in detail. In general, it will include a pair of eyes 2 mounted on a cross rod 4, to which there is affixed preferably by spot welding, a depending weight arm or weight wire 6 carrying a gravity operated weight 8 for moving the eyes between their opened and closed positions. In the modifications shown in Figs. 1–4, the weight wire 6 is bent around the cross rod 4 to form a motion limiting or stop member 10 which determines the position of the pupils of the eyes when open.

The extension or expansion bridge B includes an intermediate portion 12, which is preferably channeled, and outwardly bendable end prongs 14 and 16. The prongs 14 and 16 are best formed in pairs, as is most clearly evident in Fig. 2, and by reference to the same figure it will be observed that the prongs are located outside of the sides of the channeled portion 12, or, differently expressed, that the spacing between the prongs 14 or between the prongs 16 is greater than the width of the intermediate or channeled portion 12 of the bridge.

The sides of the channeled portion 12 of the bridge are provided with slots 18 for receiving the cross rod 4 of the eye set A. These slots permit movement of the eye set toward and from the eye sockets of the doll's head. Resilient means, preferably in the form of a hairpin spring 20, mounted in a slit 22, best shown in Fig. 5 of the bridge, urges the eye set forwardly in slots 18 toward the eye sockets of the doll's head in order to obtain a close fit between the eye set and the rims of the eye sockets without causing excessive friction therebetween. The hairpin type of spring disclosed is preferable because of its extreme simplicity and cheapness, and also because the depending legs of the hairpin spring are disposed at either side of the weight wire 6 and therefore serve to help locate the cross rod 4 transversely of the bridge.

The center portion of the bridge is cut away to form a longitudinal slot or opening 22 through which the weight wire 6 extends and in which it is oscillatable during movement of the weight 8. The material of slot 22 is only partially cut away, the remaining material being bent backwardly to form the motion limiting or stop member 24 against which the weight wire 6 contacts in order to determine the closed position of the eyes. This stop may be bent slightly, if necessary, in order to obtain the desired closed position of the eyes, after the eye set has been mounted within the doll's head.

The bridge B is preferably also provided with an additional prong 26 which may be called a locating or anchoring tang, the function of which is to retain the bridge in its initial location during the operation of embedding the end prongs 14 and 16 into the material of the doll's head. It should be noticed that the entire bridge member is formed out of a single sheet of metal, with the exception only, of the hairpin spring 20, so that economical manufacture of the bridge member is possible.

The doll's head C may be of conventional type, except that it is provided with interior abutments 30 formed on the front wall of the doll's head at a predetermined standard sized spacing for receiving the bridge B. By making this spacing uniform in amount re-
ardless of the size of the doll's head it is possible to employ a single size of bridge for different sizes of doll, which leads to further manufacturing economies inasmuch as it dispenses with a necessity of tooling up for manufacturing, and keeping in stock bridges of a large number of sizes. The abutments are preferably located above and below the eye openings, as shown, because the desirable standardized spacing therebetween could not very conveniently be obtained if side abutments and a horizontal bridge were employed instead of the top and bottom abutments with an upright bridge here shown.

The eye set and bridge are mounted in the doll's head with the aid of a tool, best shown in Fig. 3 of the drawing. This tool comprises a base 32, a fixed extension 34 mounted thereon through a pillar 36, and a movable extension 38 slidable in the pillar 36 under the actuation of a manually operable lever 40 pivoted to the base 32 at 42 and connected to the movable extension 38 through a pin 44 passing through a slot 46. A bearing screw 48 is mounted in the fixed extension 34 and passes through a slot 50 in the movable extension 38 so as to accurately guide the movement of extension 38.

The outer extremity of fixed extension 34 is made equal in width to the width of the channeled portion 12 of the bridge, and carries a pair of upwardly extending sides 52 which form a yoke surrounding one end of the channeled portion of the bridge. The sides are reduced in height in the region of the cross wire 4, as shown at 54, in order to clear the cross wire and to provide stops against which the cross wire rests during the operation of the tool. The movable extension 38 carries upwardly extending sides 56 the distance between which is about equal to the width of the channeled portion 12 of the bridge so that they form in effect a yoke surrounding the entire end of the bridge.

In operation, the eye set and bridge are placed on the tool. The neck opening of the doll's head is then passed over the end of the tool until the eye openings are located over the eyes 2. The head is then forced downwardly to embed the locating tang 26 in the rear face of one of the abutments 30 while the eyes are accurately located in the eye openings. The downward pressure of the doll's head on the eyes is taken by the reaction of the cross rod 4 against the side or stop members 54, and these are properly designed to support the cross rod at an intermediate point in the slots 18 so as to prevent the eye shells becoming permanently frictionally bound against the eye openings. Also, the bearing of tang 26 in the abutment 30, and the bearing of cross rod 4 against the sides 54 determine the location of the bridge with respect to the front wall of the doll's head.

The lever 40 is then pushed away from the doll's head so as to separate the projections or yokes 32 and 56, and this separation extends or expands the end prongs 14 and 16 of the bridge, thereby embedding the same in the opposed faces of the abutments 30, as is best shown in Fig. 4 of the drawing. The length of the upper edges of the stop members 54 is sufficiently great to continue to support the cross rod 4 while the prongs are embedded in the material of the doll's head.

It will be observed that the tool is considerably simplified by making only one of the members movable, and any disadvantage which might arise from this simplification is obviated by the use of the locating tang 26 which causes the bridge to retain its initial location with respect to the eye openings during the expansion of the bridge. This locating tang is also valuable because of the fact that the resistance of the material in one of the abutments may differ from that in the other, or the location of the abutments may be inaccurate and unsymmetrical.

In Figs. 5 and 6 a slightly modified form of bridge member is illustrated in which, in addition to utilizing the material from the upper portion of the slot 32 to form the stop 24, the material from the lower portion of the slot 22 is utilized to form a stop 60. With this arrangement the weight wire 6 may terminate at the cross rod 4 instead of being bent downwardly to form the stop 20, shown in Figs. 1-4. It will be evident that stop 24 determines the closed position of the eyes, while stop 60 determines the open position of the eyes. If necessary, these stops may be bent slightly, after the bridge is mounted in place, preferably by forcing the weight 8 in one direction or the other through the neck opening of the doll's head, in order to adjust the extreme positions as desired. The stops 24 and 60 are preferably appropriately bent so as to be somewhat resilient in order to cushion the movement of the weight and to avoid noise.

Figs. 4 and 7 illustrate a form of bridge which differs from that shown in the remaining figures by reason of the inclusion of a spacer lug 62 which is located between the prongs 16 in a manner similar to the location of the anchoring tang 26 between the prongs 14. The spacer lug 62 is intended to bear against the rear face of the abutment 30 and so to determine the spacing of the bridge from the front wall of the doll's head. By using this lug the stop members 54 on the tool may, if desired, be dispensed with. However, in order to be able to retain the stop members 54 in order to secure that the cross rod 4 may recede against the spring pressure after the doll's head is removed from the tool, and I find in practice that the spacer lug 62 may be dispensed with, with no apparent disadvantages.

The manner of constructing and using, 
and the many advantages of my invention will, it is believed, be apparent from the foregoing description thereof. The eye set may be of any desired type. The bridge is exceedingly simple, being formed from a single sheet of metal, and yet is adapted for operation in a manner quite similar to the far more complex expansion bridges heretofore employed. The bridge is adapted to be mounted in place with the aid of a tool which is itself simple in construction, and yet which serves to support the eye set accurately in place during the mounting operation. By providing the doll's head with top and bottom abutments of uniform spacing, it is possible to fit different sizes of doll's head with only a single size of bridge. Either one or two motion limiting stops may be provided on the bridge, and these are formed from waste material and are adjustable. The bridge may be inserted through neck openings of relatively small diameter because it is in longitudinal relation with the axis of the neck opening.

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

I claim:

1. An expansion bridge for supporting a movable eye set comprising a channeled member and pairs of spaced end prongs all formed out of a single sheet of metal, the said end prongs being bendable outwardly and spaced at a width greater than that of the channeled member to facilitate expansion of the bridge.

2. A bridge for supporting a movable eye set comprising a channeled member and end prongs formed out of a single sheet of metal, the said end prongs being bendable outwardly in the direction of the channeled member, and being located outside of the sides of the channeled member so as to facilitate the application of bending pressure thereagainst, and means on said bridge for carrying the eye set.

3. A bridge for supporting a movable eye set comprising an intermediate member and bendable pairs of end prongs formed out of a single sheet of metal, the said end prongs being spaced at a width greater than that of the intermediate member, and the intermediate member being provided with means for receiving the cross rod of the eye set.

4. A bridge for supporting a movable eye set comprising a channeled member and bendable end prongs formed out of a single sheet of metal, the said end prongs being located at a width greater than that of the channeled member, the sides of the channeled member being provided with a pair of slots for receiving the cross rod of the eye set, and resilient means carried by said bridge for urging the eye set toward the eye sockets of the doll's head in which the bridge is mounted.

5. A bridge for supporting a movable eye set comprising an intermediate member, outwardly bendable prongs on the ends thereof, and a weight stop, all formed out of a single sheet of metal, and means on the intermediate member for carrying the eye set.

6. A bridge for supporting a movable eye set comprising an intermediate member, outwardly bendable end prongs pointed in the direction of the length of the intermediate member, and a fixed locating prong pointed in a direction perpendicular to that of the intermediate member, all formed out of a single sheet of metal, and means on the intermediate member for carrying the eye set.

7. An expansion bridge for supporting a movable eye set comprising an intermediate member, outwardly bendable end prongs, a locating tang, and a weight stop, the said end prongs being located at a width greater than that of the intermediate member to facilitate extension of the bridge, and means on the intermediate member for carrying the eye set.

8. An expansion bridge for supporting a movable eye set comprising a channeled member, outwardly bendable end prongs, a locating tang, and a weight stop, the said end prongs being located at a width greater than that of the channeled member to facilitate extension of the bridge, means for movably carrying the eye set, and resilient means urging the eye set toward the eye sockets of the doll's head in which the bridge is mounted.

9. An expansion bridge for transversely supporting a movable eye set comprising a channeled member, outwardly bendable pairs of spaced end prongs, a locating tang, and a weight stop, all formed out of a single sheet of metal, the said end prongs being located at a width greater than that of the channeled member to facilitate extension of the bridge, the sides of the channeled member being provided with a pair of slots for transversely receiving the cross rod of the eye set, and resilient means carried by said bridge for urging the eye set toward the eye sockets of the doll's head in which the bridge is mounted.

10. A movable eye system for dolls comprising an eye set including a pair of eyes, a cross rod and a depending weight, and a bridge for supporting said eye set including an intermediate member, and outwardly bendable prongs on the ends thereof, formed out of a single sheet of metal, the said end prongs being located outside of the sides of the intermediate member to facilitate extension of the bridge, and means on said intermediate member for receiving the cross rod of the eye set.

11. A movable eye system for dolls comprising an eye set including a pair of eyes, a
cross rod and a depending weight, and an upright bridge for supporting said eye set including an intermediate member, outwardly bendable pairs of spaced end prongs, and a locating tang, the said end prongs being located at a width greater than that of the intermediate member to facilitate extension of the bridge, and means for receiving the cross rod of the eye set in transverse relation to the intermediate member.

12. A movable eye system for dolls comprising an eye set including a pair of eyes, a cross rod and a depending weight, and an upright bridge for supporting said eye set including a channeled member, outwardly bendable pairs of spaced end prongs, a locating tang, all formed out of a single sheet of metal, the said end prongs being located at a width greater than that of the channeled member to facilitate extension of the bridge, the sides of the channeled member being provided with a pair of slots receiving the cross rod of the eye set in transverse relation to the channeled member, and resilient means carried by said bridge for urging the eye set toward the eye sockets of the doll's head in which the eye system is mounted.

13. A movable eye system for dolls comprising an eye set including a pair of eyes, a cross rod and a depending weight, and an upright bridge for supporting said eye set including a channeled member, outwardly bendable pairs of spaced end prongs, a locating tang, and a weight stop, the said end prongs being located at a width greater than that of the channeled member to facilitate extension of the bridge, the sides of the channeled member being provided with a pair of slots receiving the cross rod of the eye set in transverse relation to the channeled member, and resilient means carried by said bridge for urging the eye set toward the eye sockets of the doll's head in which the eye system is mounted.

14. A doll's head having eye sockets formed in the front wall thereof and having interior abutments formed on the front wall of the doll's head at a predetermined spacing for receiving an eye set supporting bridge, an eye set including a pair of eyes, a cross rod and a depending weight, and an expansion bridge supporting said eye set including an intermediate member, and outwardly bendable prongs on the ends thereof embedded in the opposed faces of the abutments, the said end prongs being located outside of the sides of the intermediate member to facilitate extension of the bridge, and means on said intermediate member for receiving the cross rod of the eye set.

15. A doll's head having eye sockets formed in the front wall thereof and having interior abutments formed on the front wall of the doll's head at a predetermined spacing for receiving an eye set supporting bridge, an eye set including a pair of eyes, a cross rod and a depending weight, and an upright extension bridge supporting said eye set including an intermediate member, and outwardly bendable prongs on the ends thereof embedded in the opposed faces of the abutments, the said end prongs being located outside of the sides of the intermediate member to facilitate extension of the bridge, the intermediate member being provided with means for receiving the cross rod of the eye set.

16. A doll's head having eye sockets formed in the front wall thereof and having top and bottom interior abutments formed on the front wall of the doll's head at a predetermined spacing for receiving an eye set supporting bridge, an eye set including a pair of eyes, a cross rod and a depending weight, and an upright extension bridge supporting said eye set including an intermediate member, and outwardly bendable prongs on the ends thereof embedded in the opposed faces of the abutments, the said end prongs being located outside of the sides of the intermediate member to facilitate extension of the bridge, the intermediate member being provided with means for receiving the cross rod of the eye set.

17. A doll's head having eye sockets formed in the front wall thereof and having top and bottom interior abutments formed on the front wall of the doll's head at a predetermined spacing for receiving an eye set supporting bridge, an eye set including a pair of eyes, a cross rod and a depending weight, and an upright extension bridge supporting said eye set including a channeled member, outwardly bendable end prongs, a locating tang, and a weight stop, all formed out of a single sheet of metal, the said end prongs being located at a width greater than that of the channeled member and being embedded in the opposed faces of the abutments, the locating tang being embedded in the rear face of one of the abutments, the sides of the channeled member being provided with a pair of slots receiving the cross rod of the eye set, and resilient means carried by said bridge urging the eye set toward the eye sockets of the doll's head.

18. A doll's head having eye sockets formed in the front wall thereof and having top and bottom interior abutments formed on the front wall of the doll's head at a predetermined spacing for receiving an eye set supporting bridge, an eye set including a pair of eyes, a cross rod and a depending weight, and an upright extension bridge supporting said eye set including a channeled member, outwardly bendable end prongs, a locating tang, and a weight stop, all formed out of a single sheet of metal, the said end prongs being located at a width greater than that of the channeled member and being embedded in the opposed faces of the abutments, the locating tang being embedded in the rear face of one of the abutments, the sides of the channeled member being provided with a pair of slots receiving the cross rod of the eye set.
in transverse relation to the channeled member, and resilient means carried by said bridge urging the eye set toward the eye sockets of the doll's head.


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