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Chase

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(54) **DYNAMIC EYE SIMULATION MECHANISM**

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A63H 3/38 (2006.01)

(52) **U.S. Cl.** **446/392**; 446/327; 446/330; 446/345; 446/348; 446/389

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See application file for complete search history.

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(57) **ABSTRACT**

A dynamic eye simulation mechanism in which an eye orb having a spherical surface has one area of that surface of a color simulating an eyelid and another area having a representation of an eye iris and surrounding sclera applied thereto wherein the orb is mounted for rotation relative to an eye aperture to simulate an eyelid closing and an eyelid blinking.

22 Claims, 6 Drawing Sheets

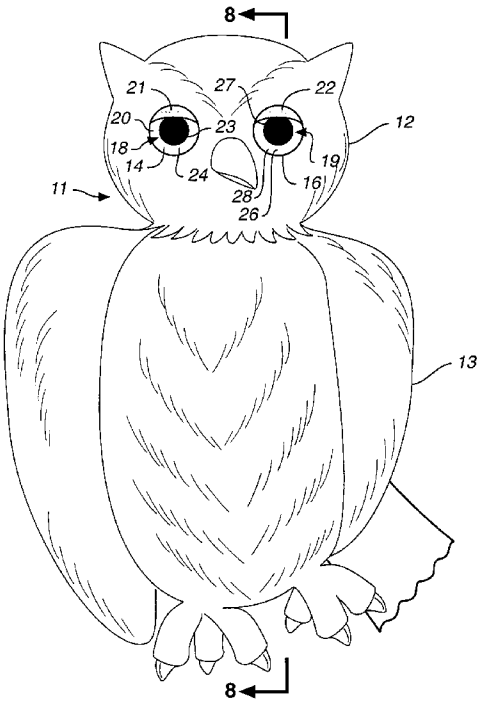


FIG._1B

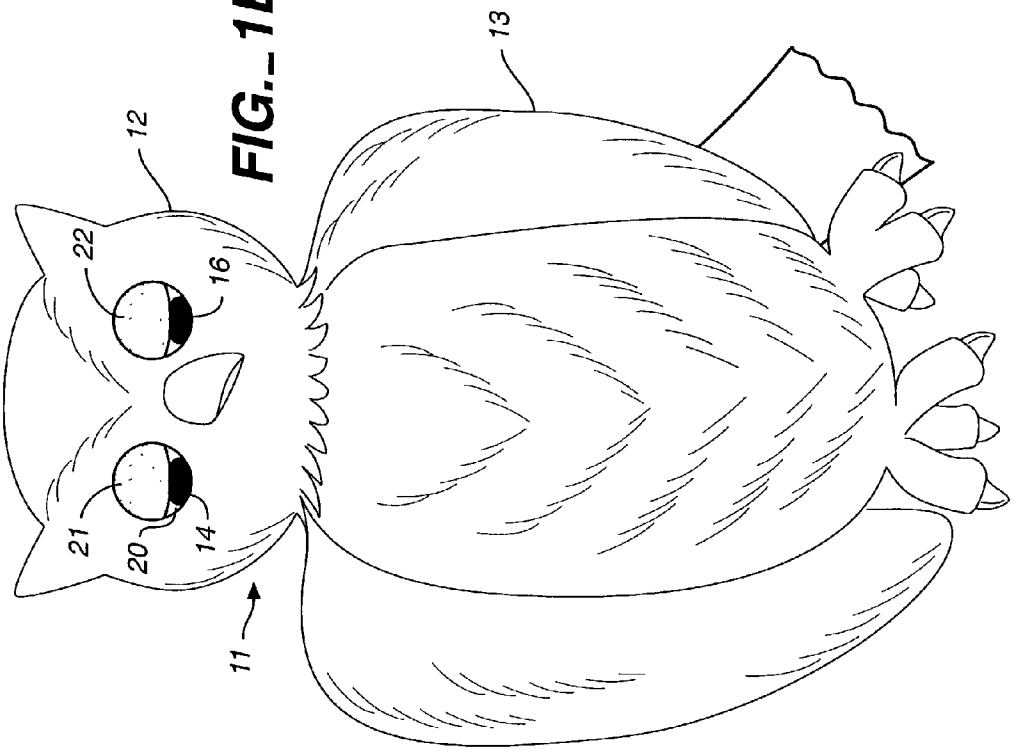
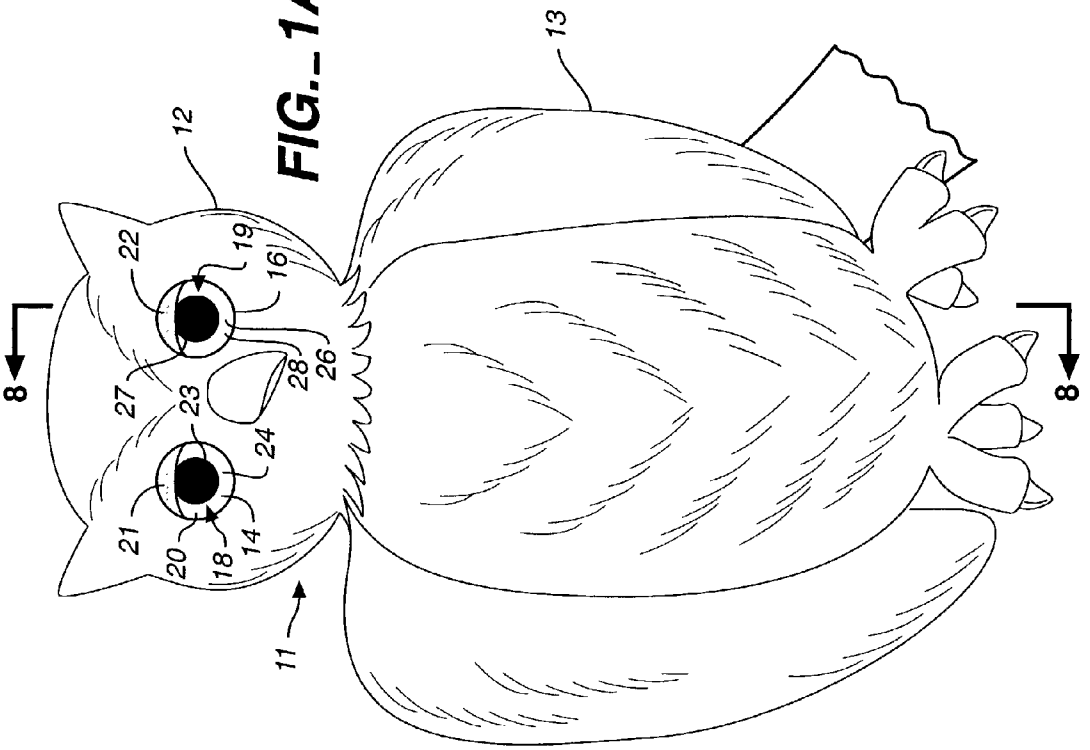


FIG._1A



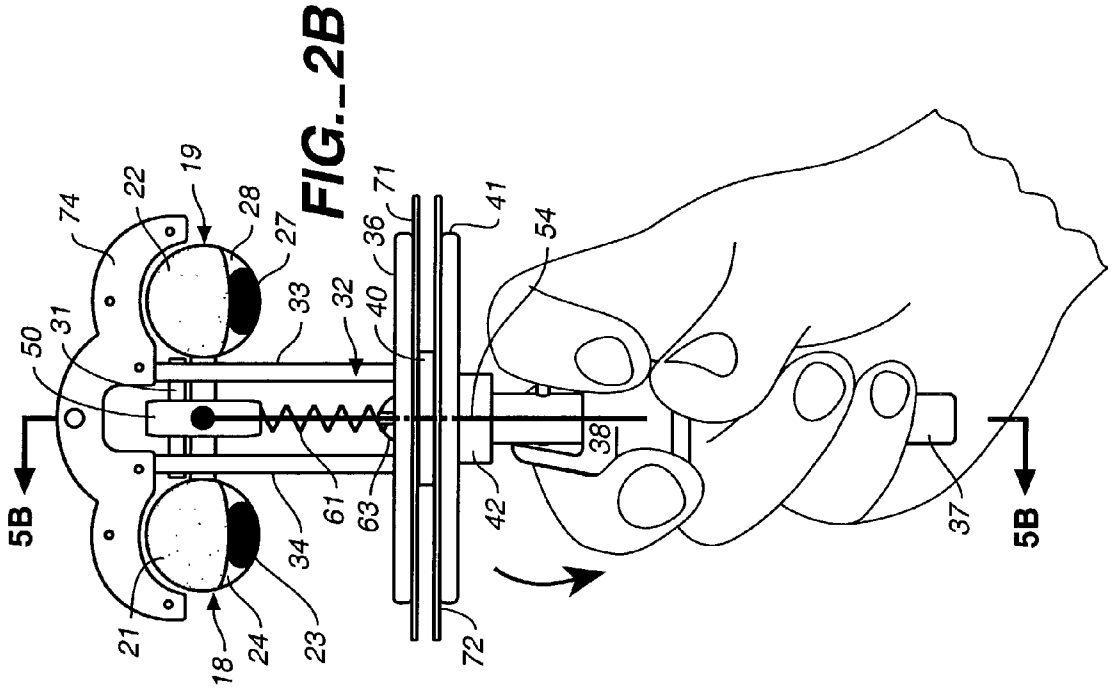
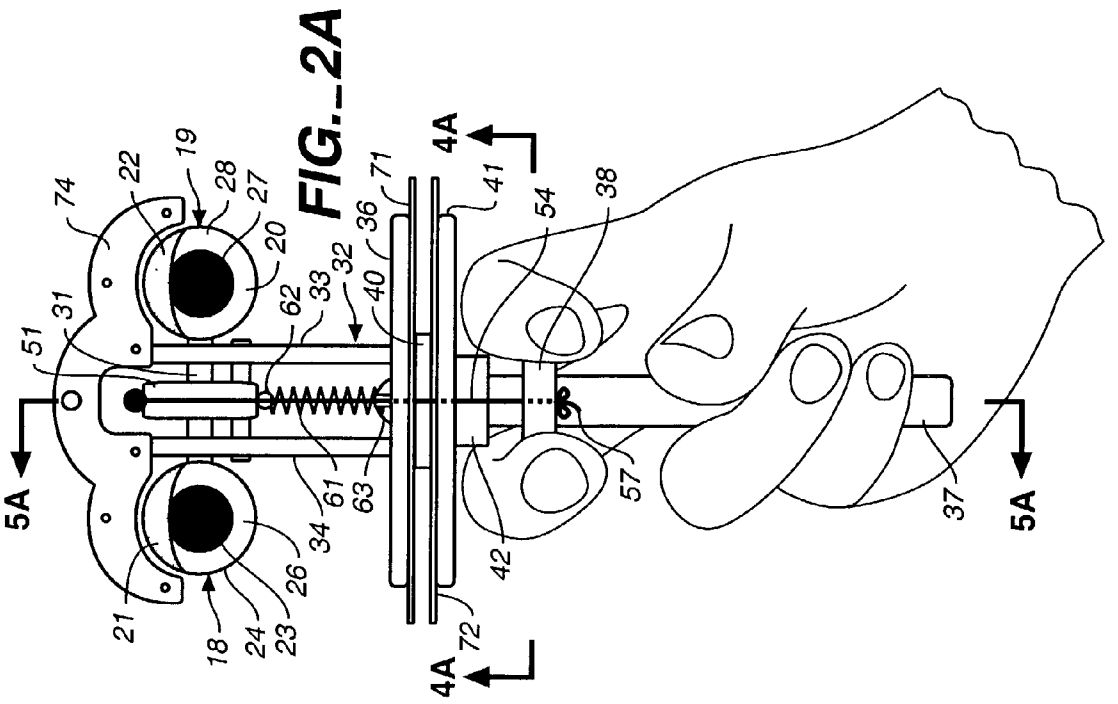

5B
5B
74
22
19
28
27
31
50
33
32
40
36
71
41
54
38
61
63
34
42
37
21
18
24
23
72

FIG._2B


5A
5A
4A
4A
74
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20
31
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62
33
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63
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FIG._2A

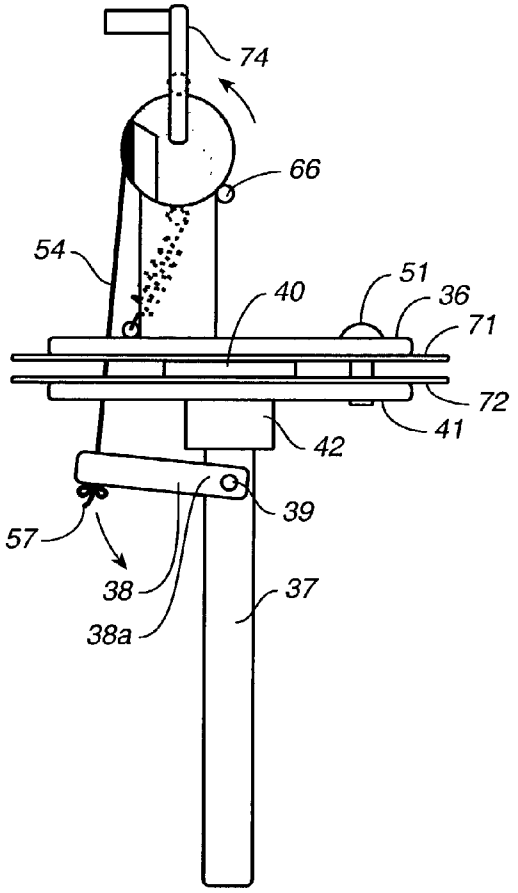


FIG._3A

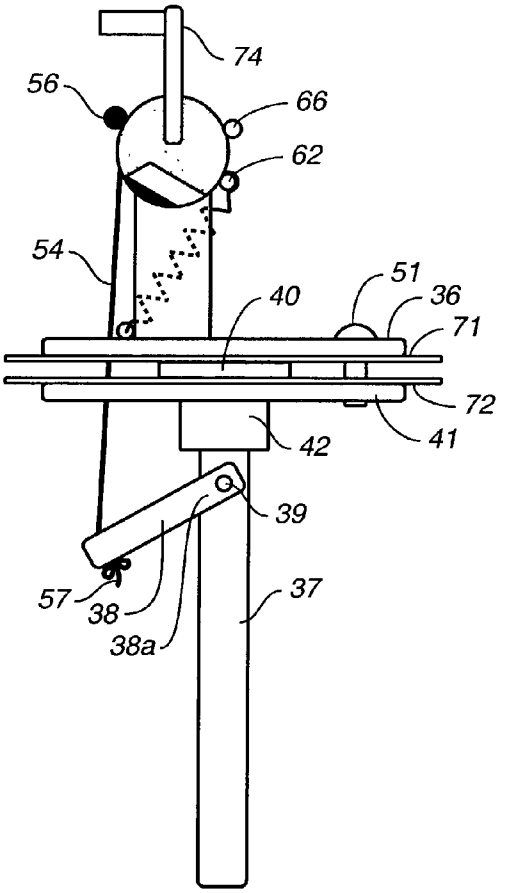


FIG._3B

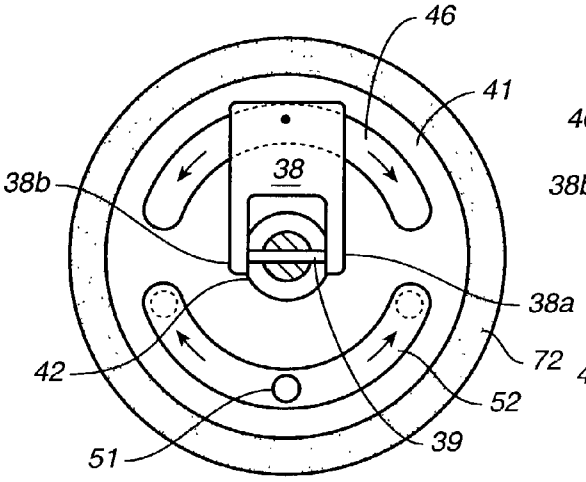


FIG._4A

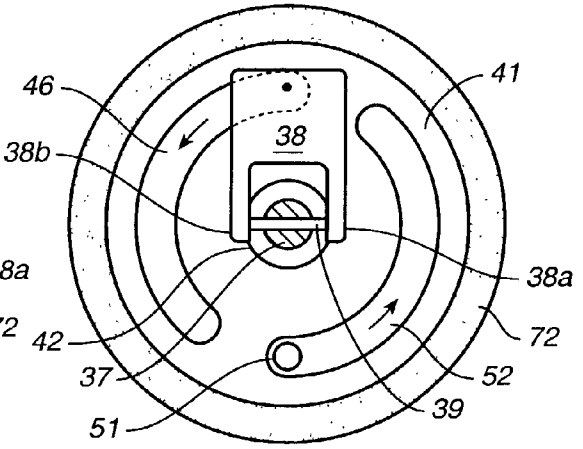


FIG._4B

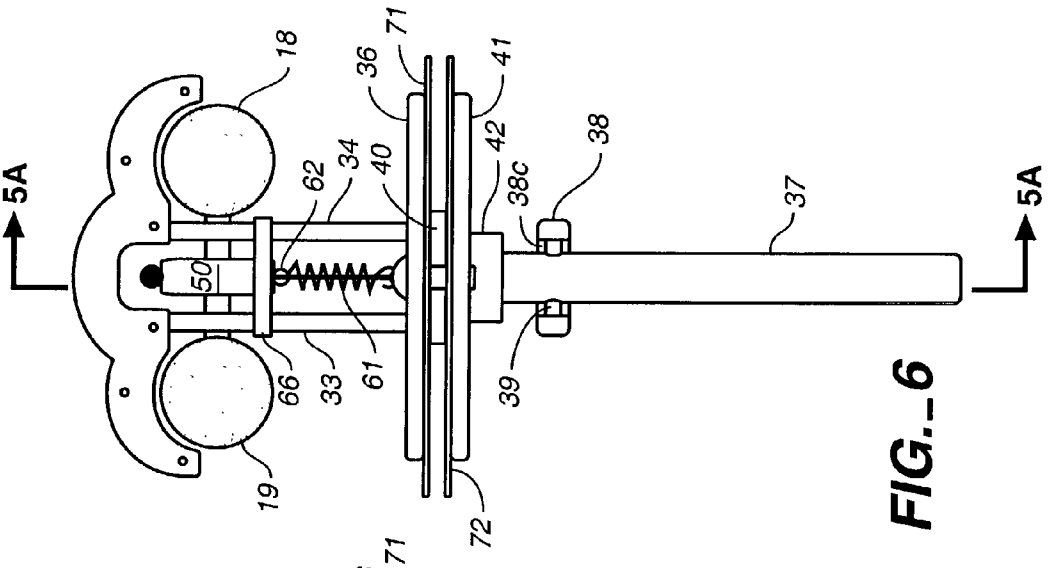


FIG._6

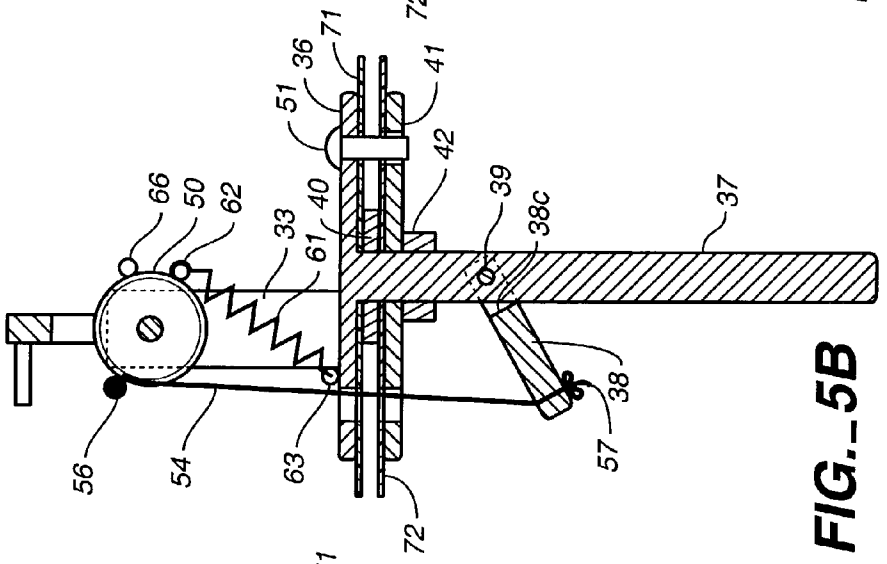


FIG._5B

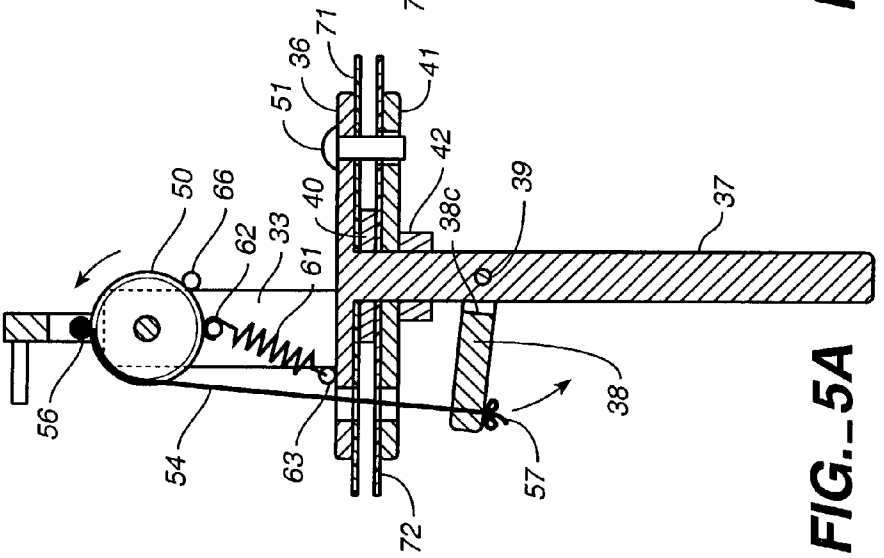
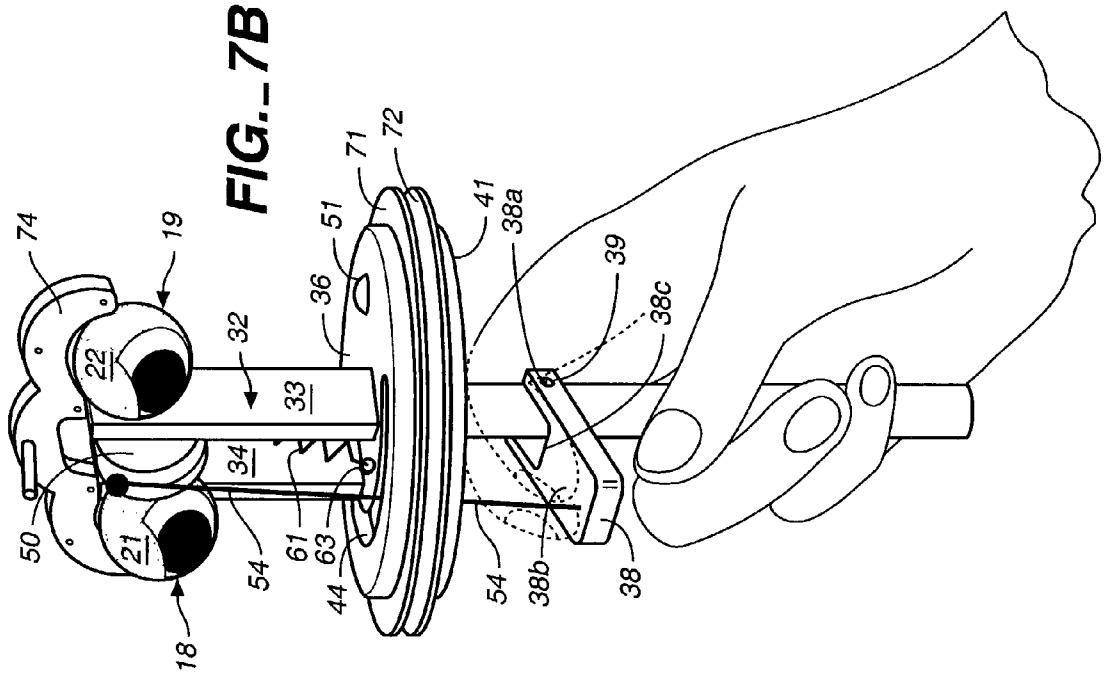


FIG._5A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32
33
34
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61
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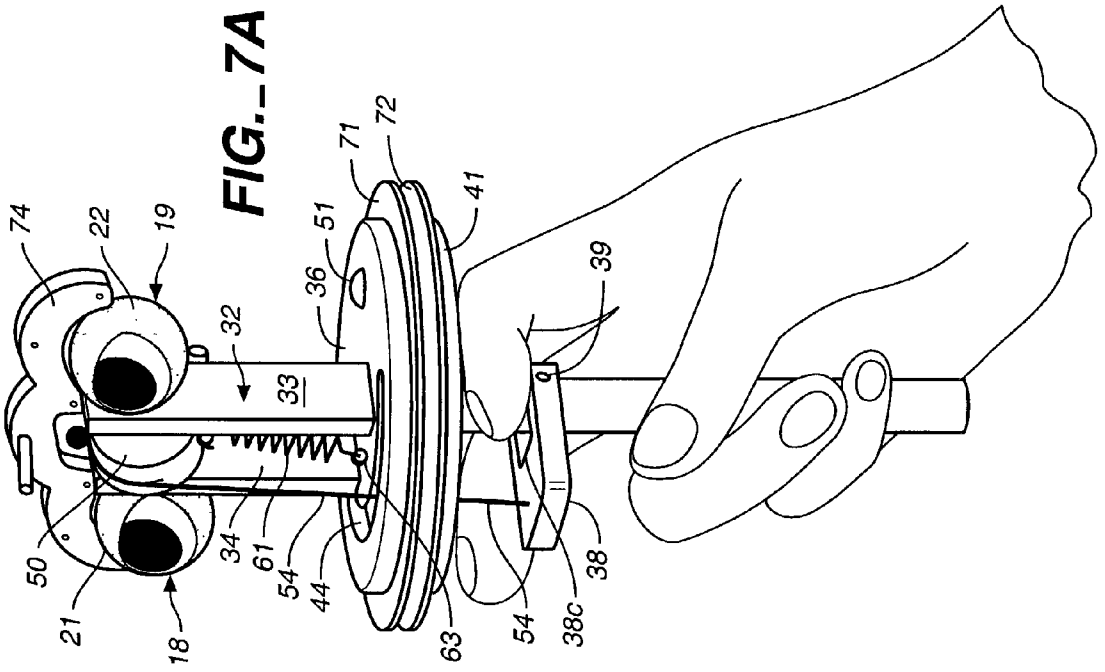
44
36
51
71
72
41
38a
39
38c
38b
38

FIG._7B


74
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19
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36
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71
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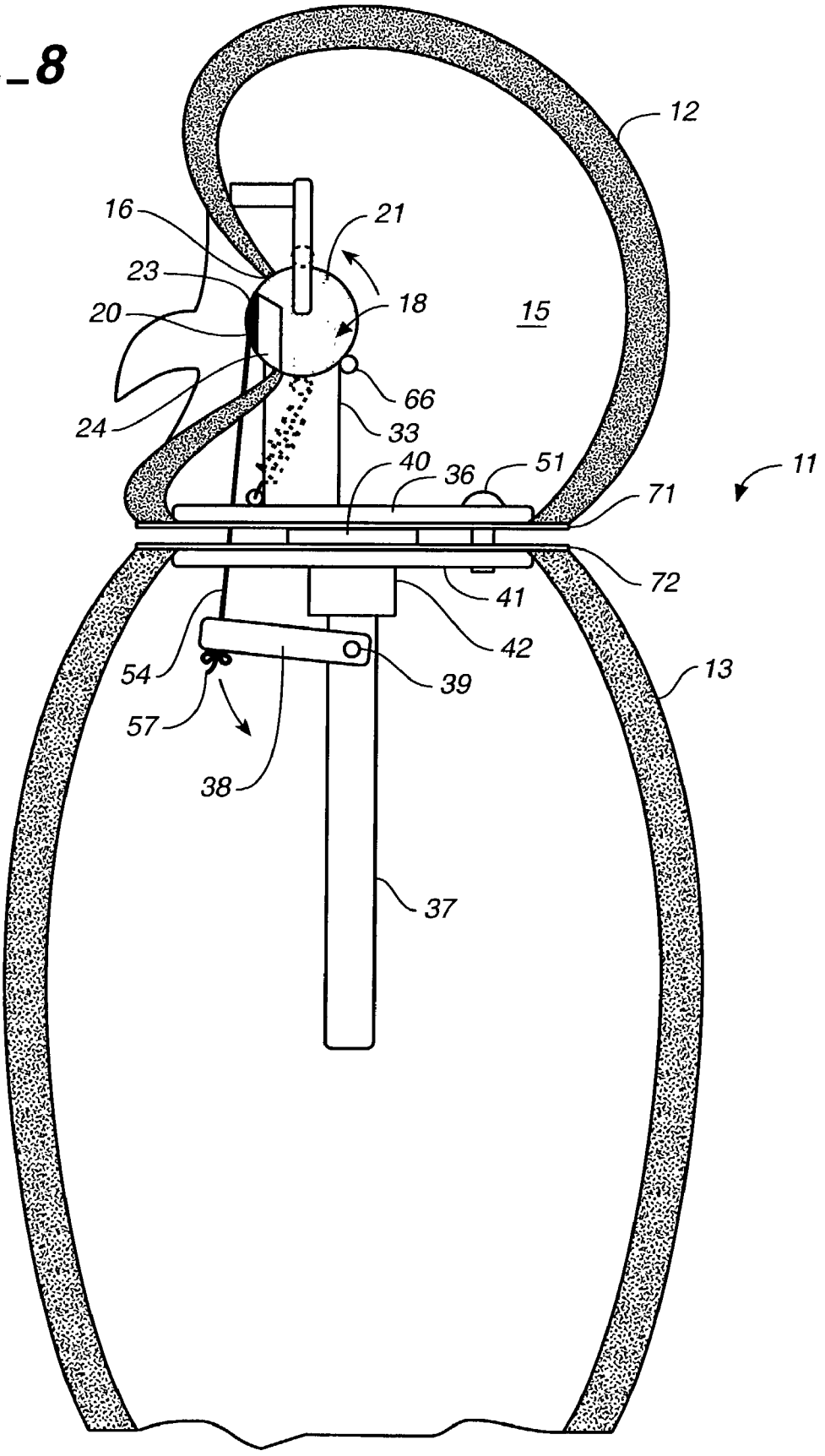
38c
63
54

FIG._7A

FIG._8



DYNAMIC EYE SIMULATION MECHANISM

BACKGROUND OF THE INVENTION

The present invention relates to a dynamic eye simulation mechanism and, in particular, to such mechanisms for use in connection with puppets, dolls and other toys representational of creatures having one or more eyes (hereafter referred to collectively as "puppets").

One of the aspects of dynamic eye operation is the simulation of the action of an eyelid which can cover and uncover the optical components of an eye. The use of mechanical eyelids which cover and uncover an otherwise static eyeball (including an iris and sclera) have long been known and are most commonly found in connection with dolls, the eyelids of which cover the eyeball when the dolls are placed in a supine position.

A common failing of mechanical eyelids which cover and uncover a relatively static eyeball is that the rough handling children's toys inevitably experience frequently results in the eyelid mechanism becoming frozen somewhere between fully opened and fully closed, giving the doll an unnatural and unintended appearance.

Furthermore, prior art mechanisms for simulating eyelid action require that the entire doll be oriented horizontally or vertically in order to effectuate the eyelid action.

BRIEF DESCRIPTION OF THE INVENTION

In the present invention, a dynamic eye simulation mechanism provides a convincing illusion of eyelid action without requiring an eyelid mechanism separate from the eyeball itself, and which, further, does not require any particular orientation of the puppet to effectuate the illusion of eyelids opening or closing. In the present invention, the opening and closing of the eyelids is controllable by manual operation of a mechanism which selectively causes the eyes to appear to open and close (eyelids up or down).

In the present invention, dynamic eyelid operation is simulated by an eye orb having a generally spherical surface, with a first area of its surface colored to simulate an eyelid (eyelid area) and a second area of its surface having the representation of an eye iris and surrounding sclera applied thereto (eyeball area). Such an eye orb is disposed immediately adjacent to an eye aperture in the head of a puppet so that in one position of the eye orb, most of what is seen through the eye aperture is the eyeball area, while in another position of the eye orb, all that is seen through the eye aperture is the eyelid area. Between those two positions, the eye aperture can reveal portions of both the eyelid area and the eyeball area so that the eyelid can be made to appear in any position between fully opened and fully closed.

Unlike the prior art, in the present invention, the dynamic eye simulation mechanism includes an eyelid which is not separate from the orb which represents an eyeball, thus greatly simplifying the mechanism and eliminating the common sources of malfunction.

Accordingly, it is an object of the present invention to provide a dynamic eye simulation mechanism for use in connection with dolls and puppets which provides a simplified mechanism for simulating the operation of an eyelid.

It is a further object of the present invention to provide eyelid simulation mechanisms which do not require a mechanism for the eyelid separate from the eye orb which contains the eye pupil and surrounding sclera.

It is yet another object of the present invention to provide a dynamic eye simulation mechanism which is operable manually with the puppet in any orientation.

The invention possesses other objects and advantages, especially as concerns particular characteristics and features thereof which will be better understood from the following detailed description of the preferred embodiments when read in conjunction with the appended drawing figures.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1**A is a perspective view of an owl puppet having the dynamic eye simulation mechanism of the present invention, with the eye mechanism oriented to mostly reveal the eyeball surface;

FIG. **1**B is the same as FIG. **1**A, with the eye mechanism oriented to reveal mostly the eyelid surface;

FIG. **2**A is a front elevation view of the mechanism of the invention shown in conjunction with the hand of an operator;

FIG. **2**B is the same as FIG. **2**A, with the mechanism operated to rotate the eye orbs;

FIG. **3**A is a side elevation view of the invention;

FIG. **3**B is the same as FIG. **3**A, with the eye orbs rotated;

FIG. **4**A is a sectional view taken along the line **4**A—**4**A of FIG. **2**A;

FIG. **4**B is the same as FIG. **4**A, with the mechanism shown rotated to a mechanical stop;

FIG. **5**A is a sectional view taken along the lines **5**A—**5**A of FIG. **2**A;

FIG. **5**B is a sectional view taken through the line **5**B—**5**B of FIG. **2**B;

FIG. **6** is a rear view of the invention;

FIG. **7**A is a perspective view of the invention as shown in FIG. **2**A;

FIG. **7**B is a perspective view of the invention as shown in FIG. **2**B; and

FIG. **8** is a cross-sectional view of the invention in a puppet, taken along the line **8**—**8** of FIG. **1**.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to FIGS. **1**A, **1**B, **2**A, **2**B, **7**A, **7**B and **8**, a puppet **11**, in the form of an owl, includes a head member **12** having an interior space **15** and a body member **13** which are physically separate and able to move one relative to the other, as will be more fully described below. The owl puppet **11** is representational of any puppet of the kind in which a human hand can be inserted in order to effectuate certain manipulations that animate the puppet in one way or another. Thus, the outer form of the puppet and what it is intended to represent are not limiting to the invention.

The head member **12** includes a pair of eye apertures **14** and **16** through which eye orbs within the interior space **15** can be seen. While the outer form of the puppet **11** is limited only by the imagination, what is a constant as regards the present invention is the presence of one or more eye apertures, such as eye aperture **16**, through which an interior eye mechanism can be seen.

The head member **12** interior space **15** contains part of the dynamic eye simulation mechanism of the present invention, including eye orbs **18** and **19** which are aligned with, and visible through, eye apertures **14** and **16**, respectively.

In the preferred embodiment, eye orbs **18** and **19** are spheres, although the present invention retains its advan-

tages where the eye orbs **18** and **19** are not complete spheres, but have spherical surface areas.

A first eye orb surface area (eyelid area) **21** of the eye orb **18** has a generally uniform coloration and simulates an eyelid. Similarly, eye orb **19** has a first surface area (eyelid area) **22** which has a generally uniform coloration and simulates an eyelid. A second area (eyeball area) **20** of the eye orb **18** surface has applied to it a representation of an eye pupil **23** and a surrounding sclera **24** which is adjacent eyelid area **21**. In like fashion, the eye orb **19** has applied to a second and adjacent surface area (eyeball area) **26**, a representation of an eye pupil **27** and a surrounding sclera **28**.

Eye orbs **18** and **19** are non-rotatably affixed at either end of a shaft **31**, which is rotatably secured to a support structure **32** which includes spaced-apart uprights **33** and **34** secured to an upper platform **36**. Rotation of shaft **31** causes rotation of the eye orbs **18** and **19** so that the portion of the surface area of the eye orbs seen through the respective eye apertures **14** and **16** can be changed. FIGS. **1**A and **2**A illustrate the eye orbs **18** and **19** rotated to a position in which the eye eyeball areas **20** and **26** are aligned with and visible through the eye apertures **14** and **16**, respectively, with only a small portion of the eyelid areas **21** and **22** within the eye apertures **14** and **16**. FIGS. **1**B and **2**B illustrate the eye orbs **18** and **19** rotated so that the eyelid areas **21** and **22** occupy a location in the apertures **14** and **16** previously occupied by all or apart of the eyeball areas **20** and **26** and fill the majority of the apertures **14** and **16**, respectively. The mechanism described below which causes rotation of the shaft **31**, and, thus the eye orbs **18** and **19**, can create one of several different eye blinking effects.

Although the eyelid area **21** is on the same sphere (or part of a sphere) as the eyeball area **20** and moves therewith (as opposed to separately therefrom), the effect of the rotation of eye orb **18**, as seen through aperture **14**, is the illusion of an eyelid closing or opening over an eyeball **23** and sclera **24**. The same is true of eyelid area **22** on orb **19**.

In the preferred embodiment, the surface of the eye orbs **18** and **19** onto which the eye pupil and surrounding sclera are applied (eyeball areas) occupy less than a full hemisphere of the eye orb so that less than 180 degrees of rotation of shaft **31** is required to produce a full eyelid closure effect, as best seen in FIGS. **7**A and **7**B. It will be obvious to those skilled in the art that the precise representation of an eye pupil and sclera may vary, as can the relative proportions of the eyelid area **21** and the eyeball area **20**, without departing from the invention.

Referring to FIGS. **2**A, **2**B, **3**A, **3**B, **4**A, **4**B, **5**A, **5**B and **6**, the upper platform **36** is attached to a depending handle **37**, to which is attached an actuator **38**. As best seen with reference to FIGS. **7**A and **7**B, the actuator **38** has a pair of spaced-apart members **38***a* and **38***b* which are disposed on either side of handle **37** and rotatably connected thereto by a connecting pin **39**. The actuator **38** can rotate about pin **39** and thereby change its angular position relative to handle **37**. Actuator members **38***a* and **38***b* are joined at the back **38***c* of actuator **38**. As best seen in FIGS. **5**A and **5**B, when actuator **38** is rotated away from platform **36** (counterclockwise), its movement in that direction is limited by the engagement of the actuator back portion **38***c* with the handle **37** (see FIG. **5**B).

A lower platform **41** is rotatably attached to handle **37** immediately below and generally parallel to upper platform **36**. Lower platform **41** is held in place by a collar **42**, which is secured to handle **37** and spaced from upper platform **36** by spacer **40** secured to handle **37**. An arcuate aperture **44** is formed in upper platform **36** spanning approximately 170 degrees. A similar arcuate aperture **46** is formed in lower platform **41**. Where the two apertures **44** and **46** overlap, there is an opening that extends through the upper platform **36** and lower platform **41**.

A limit pin **51** secured in upper platform **36** depends into a second arcuate aperture **52** in lower platform **41** and limits the rotation of platform **41** relative to platform **36**, as shown in FIG. **4**B. The second aperture **52** in platform **41** is a mirror image of the arcuate aperture **46** in the same platform, but on the opposite side of the collar **42**. When platform **41** rotates relative to platform **36** (and handle **37**), the extent of the rotation is limited by the engagement of pin **51** with one of the ends of arcuate slot **52**, as illustrated by dashed lines **51***a* and **51***b* in FIG. **4**A. FIG. **4**B illustrates rotation of platform **36** relative to platform **41** as far as limit pin **51** will permit.

A drive wheel **50** is non-rotatably secured to shaft **31** between the uprights **33** and **34** of support **32**. Rotation of drive wheel **50** causes rotation of shaft **31**, which causes the eye orbs **18** and **19** to change positions within apertures **14** and **16**. An actuator string **54** is affixed at one of its ends **56** to the periphery of drive wheel **50**, and at its other end **57**, to the actuator **38**. The string passes through the slot **44** in platform **36** and slot **46** in platform **41**. As best seen in FIG. **4**B, string **54** changes its position in slot **46** of platform **41** as platform **41** is rotated relative to platform **37**.

A spring **61** is attached at one of its ends **62** to the periphery of drive wheel **50** opposite the end **56** of string **54**, and the other end **63** of spring **61** is secured to the platform **36** between the uprights **33** and **34**.

As best seen in FIGS. **5**A and **5**B, the spring **61** provides a force that acts to rotate the drive wheel **50** in a clockwise direction. When no counter force is applied, the end **62** of the spring **61** (and the point of the drive wheel **50** where spring **61** is attached) will be driven to a location between the uprights **33** and **34**. When the spring **61** has rotated the drive wheel **50** to the position where the end **62** of spring **61** is between the uprights **33** and **34**, the end **56** of actuator string **54** is also located between the uprights **33** and **34**, but at a position approximately 180 degrees from the end **62** of spring **61** (the string end **56** is at the top when the spring end **62** is at the bottom).

The length of actuator string **54** is selected so that when the end of the string **56** is located between the uprights **33** and **34**, as best seen in FIG. **5**A, the actuator **38** is essentially perpendicular to handle **37**. When the actuator **38** is rotated away from the drive wheel **50**, as best seen in FIG. **5**B, drive wheel **50** is rotated in a counterclockwise direction, rotating the eye orbs **18** and **19** and, at the same time, extending the spring **61**. As previously mentioned, the back member **38***c* of actuator **38** engages handle **37** and thereby limits the extent to which drive wheel **50** can be rotated by pulling on actuator string **54** and, in the preferred embodiment, that rotation is approximately 90 degrees. The limitation of rotation of drive wheel **50** by engagement of actuator **38** back member **38***c* also prevents undue stress being applied to string **54**, which could cause it to break or become separated from drive wheel **50**.

FIGS. **7**A and **7**B illustrate how the handle **37** can be grasped by a hand with two fingers over the actuator **38**, which, when drawn away from the drive wheel **50**, causes the eye orbs **18** and **19** to rotate approximately 90 degrees and change the appearance of the eye, as best illustrated in FIGS. **1**A and **1**B. The spring **61** being extended by the rotation of the drive wheel **50** provides a force urging the drive wheel **50** in a clockwise direction. The operator, by

simply relieving the pressure on the actuator **38**, permits the drive wheel **50** to rotate counterclockwise and "open the eyes."

Referring, in particular, to FIGS. **5**A, **5**B and **6**, drive wheel **50** has attached thereto a limiting crossbar **66**, which has a length greater than the distance between the upright support members **33** and **34**. The location of limiting crossbar **66** between the end **56** of string **54** and the end **62** of spring **61** determines the amount of eye area of eye orbs **18** and **19** that will be seen through the eye apertures **14** and **16** in the head member **12** when no pressure is put on the actuator **38**. The spring **62** rotates the drive wheel **50** in a clockwise direction (when pressure is withdrawn from actuator **38**) until limiting crossbar **66** engages the support members **33** and **34**, which prevent further rotation. Thus, the location of crossbar **66** on drive wheel **50** determines the amount, if any, of eyelid areas **21** and **22** and eyeball areas **20** and **26**, which are seen through their respective apertures when no pressure is applied to the actuator **38**.

Referring to FIG. **8**, the head member **12** is secured to upper platform **36** by an upper attachment member **71**, while the body portion **13** is attached to the lower platform member **41** by a lower attachment member **72**. Being so attached and so separated, the head member **12** is free to rotate relative to the body member **13** while the handle **37** is being grasped by an operator, thus, giving further animation to the puppet. A yolk **74** which is attached to upright support members **33** and **34** and which spans the eye orbs **18** and **19** serves as an attachment means for the head member **12** to maintain the apertures **14** and **16** therein in alignment with the eye orbs **18** and **19**.

Of course, various changes, modifications and alterations in the teachings of the present invention may be contemplated by those skilled in the art without departing from the intended spirit and scope thereof. As such, it is intended that the present invention only be limited by the terms of the appended claims.

What is claimed is:

1. A dynamic eye simulation mechanism for use in a puppet having a head portion and a body portion, comprising:

an eye orb having a generally spherical surface;

a first area of said eye orb generally spherical surface having a color simulating an eyelid which, at any given point in time, occupies a location in space;

a second area of said eye orb generally spherical surface having a representation of an eye iris and surrounding sclera which, at any given point in time, occupies a location in space;

means rotating said eye orb whereby the location in space occupied by at least a portion of one of said first and second areas is, after rotation, occupied by at least a portion of the other of said first and second areas and wherein said means for rotating said eye orb includes a shaft affixed to and extending outwardly from said orb;

means for rotating said shaft and thereby said orb;

a first platform to which said eye orb is mounted;

a second platform spaced apart from and generally parallel to said first platform.

2. The eye simulation mechanism of claim **1** where said eye orb is a sphere.

3. The eye simulation mechanism of claim **2** wherein said second area occupies less than a hemisphere of said eye orb.

4. The eye simulation mechanism of claim **1** wherein said means for rotating said eye orb further includes means for limiting said shaft rotation to less than 180 degrees.

5. The eye simulation mechanism of claim **1** wherein said means for rotating said eye orb further includes a spring which is extended when said shaft is rotated in one direction, creating a force urging rotation of said shaft in a direction opposite to said one direction.

6. The eye simulation mechanism of claim **1**, further comprising:

a handle affixed to said first platform and extending through and beyond said second platform wherein rotation of said handle causes said first platform to rotate relative to said second platform.

7. The eye simulation mechanism of claim **6**, further comprising:

rotation limit means limiting the rotation of said first platform relative to said second platform.

8. The eye simulation mechanism of claim **6** further comprising:

an actuator movable in two directions affixed to said handle on a portion thereof which extends beyond said second platform and;

connecting means attached to said actuator and said shaft whereby movement of said actuator in one direction rotates said shaft.

9. The eye simulation mechanism of claim **8** wherein said actuator is limited in its movement in the one direction.

10. The eye simulation mechanism of claim **8** wherein said connecting means extends through both said first and said second platforms.

11. A dynamic eye simulation mechanism, comprising:

a rotatable eye orb having a generally spherical surface;

a first area of the eye orb generally spherical surface having a color simulating an eyelid;

a second area of the eye orb generally spherical surface having a representation of an eye iris and surrounding sclera;

a first platform to which said eye orb is mounted;

a second platform spaced apart from said first platform and rotatable relative thereto;

a handle non-rotationally affixed to said first platform and extending through and beyond said second platform wherein said second platform is rotatably affixed to said handle.

12. The eye simulation mechanism of claim **1** wherein the head portion contains said eye orb and is connected to said first platform for movement therewith, and wherein the body portion is connected to said second platform.

13. The eye simulation mechanism of claim **6** wherein the head portion contains said eye orb and is connected to said first platform for movement therewith, and wherein the body portion contains said handle and is connected to said second platform whereby the head portion can be made to move relative to the body portion by rotation of said handle.

14. The eye simulation mechanism of claim **10** wherein said connecting means is a string.

15. A dynamic eye simulation mechanism for use in a puppet having a head portion and a body portion, comprising:

an eye orb having a generally spherical surface;

a shaft affixed to and extending outwardly from said orb whereby when said shaft rotates, said orb rotates;

a first platform on which said eye orb is mounted;

a handle attached to said first platform whereby the platform is supported by a hand grasping said handle; and

a hand-operated actuator attached to said handle and operably connected to said shaft whereby operation of said actuator causes rotation of said shaft and said orb

whereby said orb can be caused to rotate by the same hand that grasps said handle.

16. The dynamic eye simulation mechanism of claim **15** wherein said eye orb is disposed within the head portion and the head portion is attached to said first platform.

17. The dynamic eye simulation mechanism of claim **15** further comprising;

a drive wheel affixed to said shaft for rotation therewith; and wherein said actuator included is a lever mounted on said handle and operably connected to said drive wheel whereby movement of said lever causes said drive wheel to rotate, which causes said shaft and said orb to rotate.

18. The dynamic eye simulation mechanism of claim **17** further comprising;

a spring attached to said drive wheel and applying a force of rotation on said drive wheel in opposition to the direction of rotation of said drive wheel in response to said lever movement.

19. The dynamic eye simulation mechanism of claim **17** further comprising;

a stop member that limits the distance said lever can move.

20. The dynamic eye simulation mechanism of claim **18** further comprising;

a stop member that interacts with said drive wheel and limits the rotation of said drive wheel by said spring.

21. The dynamic eye simulation mechanism of claim **15** further comprising;

a second platform spaced apart from and generally parallel to said first platform wherein said handle extends from said first platform through said second platform and beyond.

22. The eye simulation mechanism of claim **21** wherein the head portion contains said eye orb and is connected to said first platform for movement therewith, and wherein the body portion contains said handle and is connected to said second platform whereby the head portion can move relative to the body portion by rotation of said handle.

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