

[54] ANIMATED PUPPET

666,207 2/1952 United Kingdom..... 46/126

[76] Inventor: **Robert Burkhart**, 9856 Shirley Lane, Beverly Hills, Calif. 90210

Primary Examiner—Louis G. Mancene  
Assistant Examiner—Robert F. Cutting

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[57] **ABSTRACT**

[52] U.S. Cl. .... 46/119; 46/126; 46/135; 46/166

This invention is an animated puppet skeleton with interchangeable segmented shell-like body parts. The head comprises a flexible rubber-like pullover mask which is attached at specific points to moveable parts of the skull so that independent jaw and lip motion and eye, eyelid and eyebrow motions are possible. Inflatable balloon-like structures attached to the body shell allow controlled change of body shape. The puppet body is supported by, and turns upon, a tube which extends from the control panel and terminates at a bearing between the legs of the puppet. All controls for the puppet enter through said tube. Complex puppet motions may be created by simple control motions by virtue of coordinated interconnections.

[51] Int. Cl.<sup>2</sup>..... A63H 7/00

[58] Field of Search..... 46/119, 126

[56] **References Cited**

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11 Claims, 16 Drawing Figures

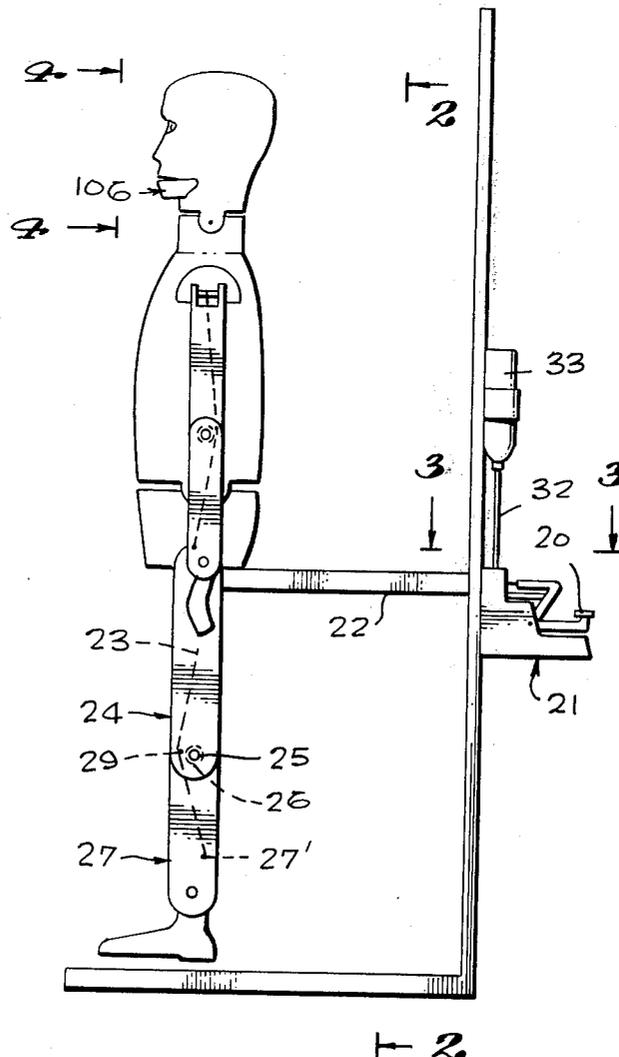


Fig. 1

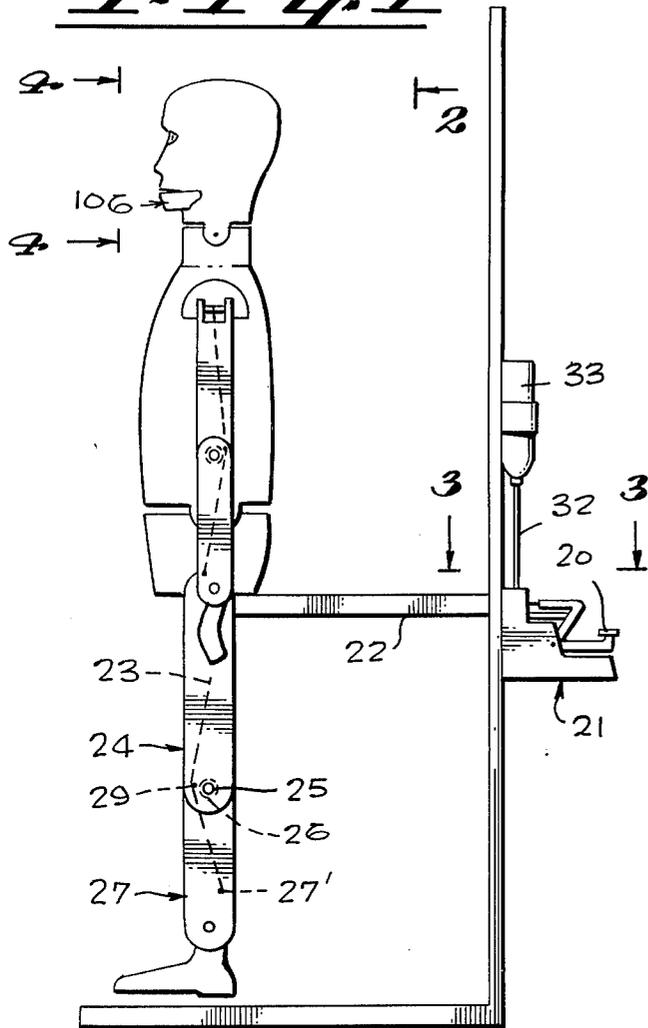
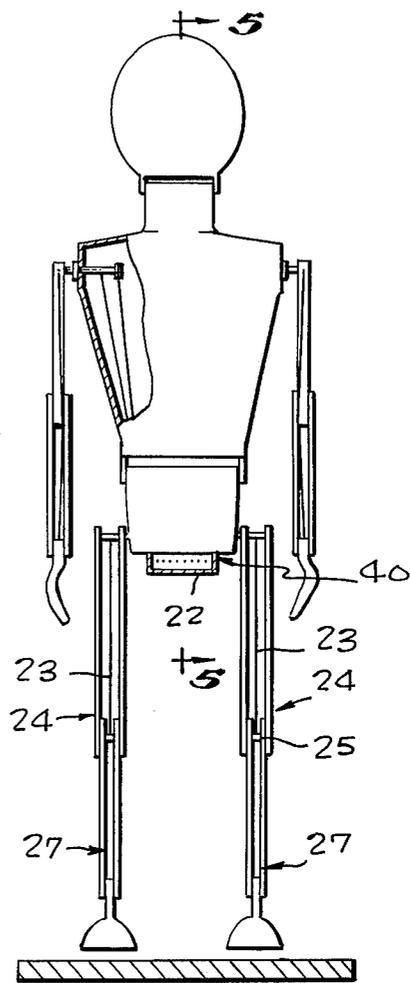


Fig. 2



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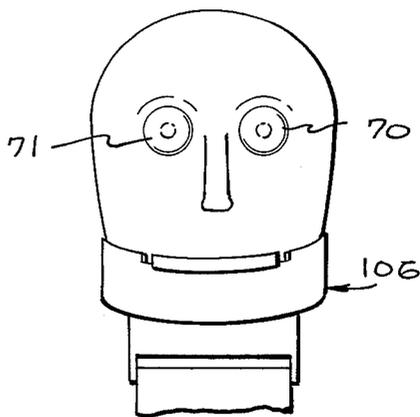
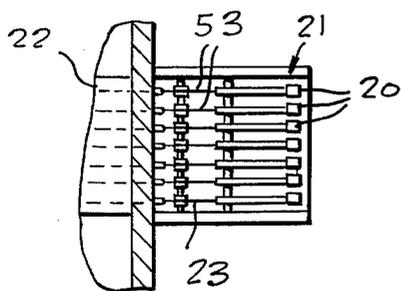


Fig. 3

Fig. 4

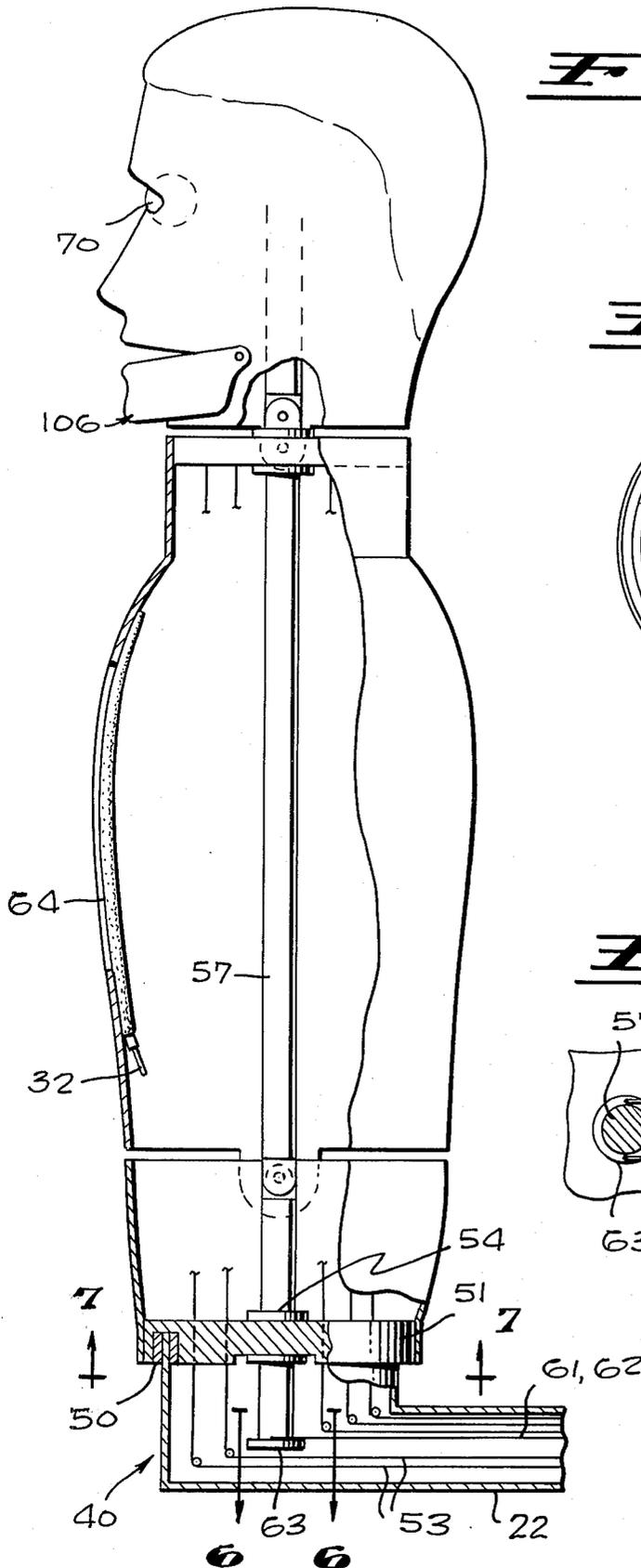


Fig. 5

Fig. 7

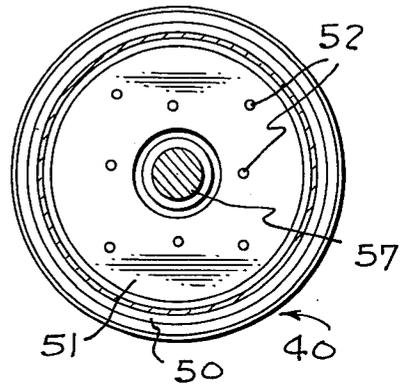
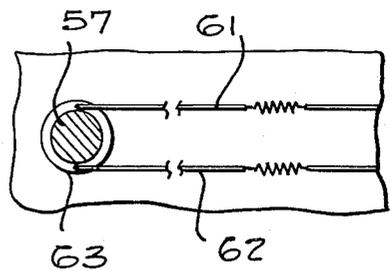


Fig. 6



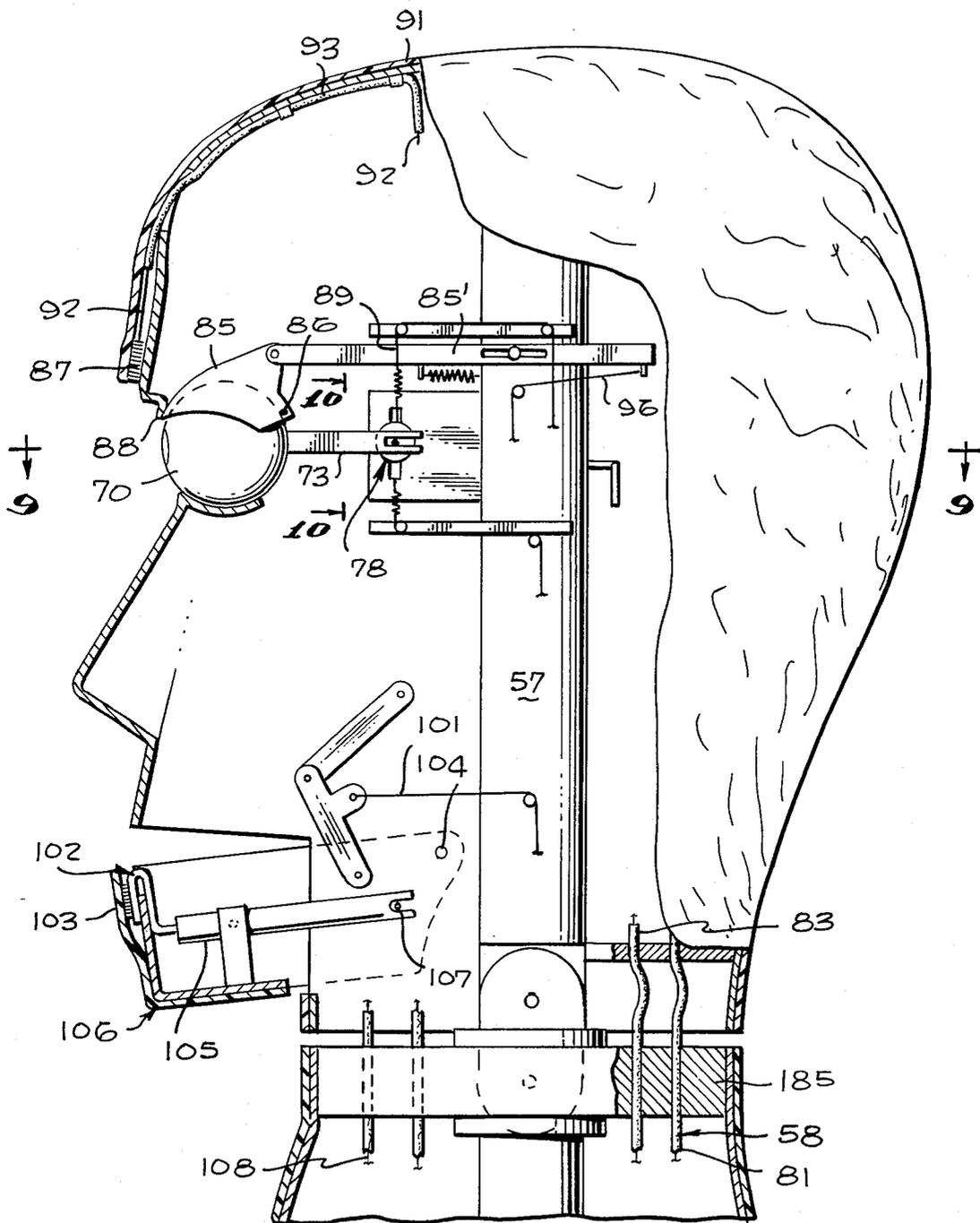
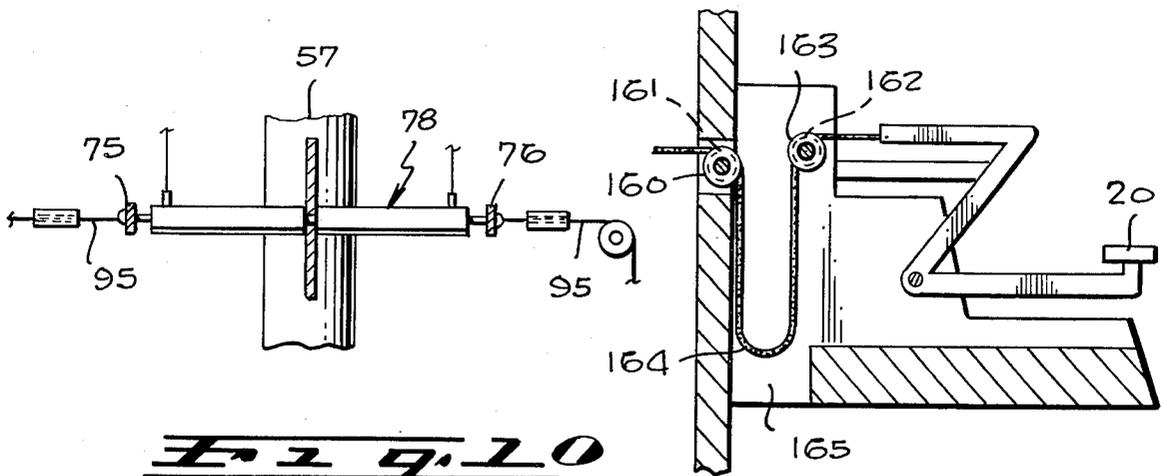
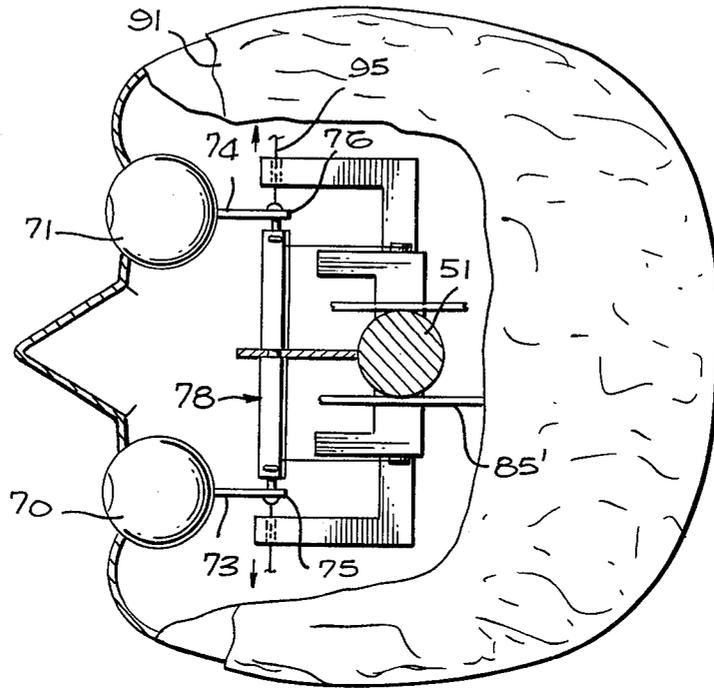


Fig. 8

**Fig. 9**



**Fig. 10**

**Fig. 11**

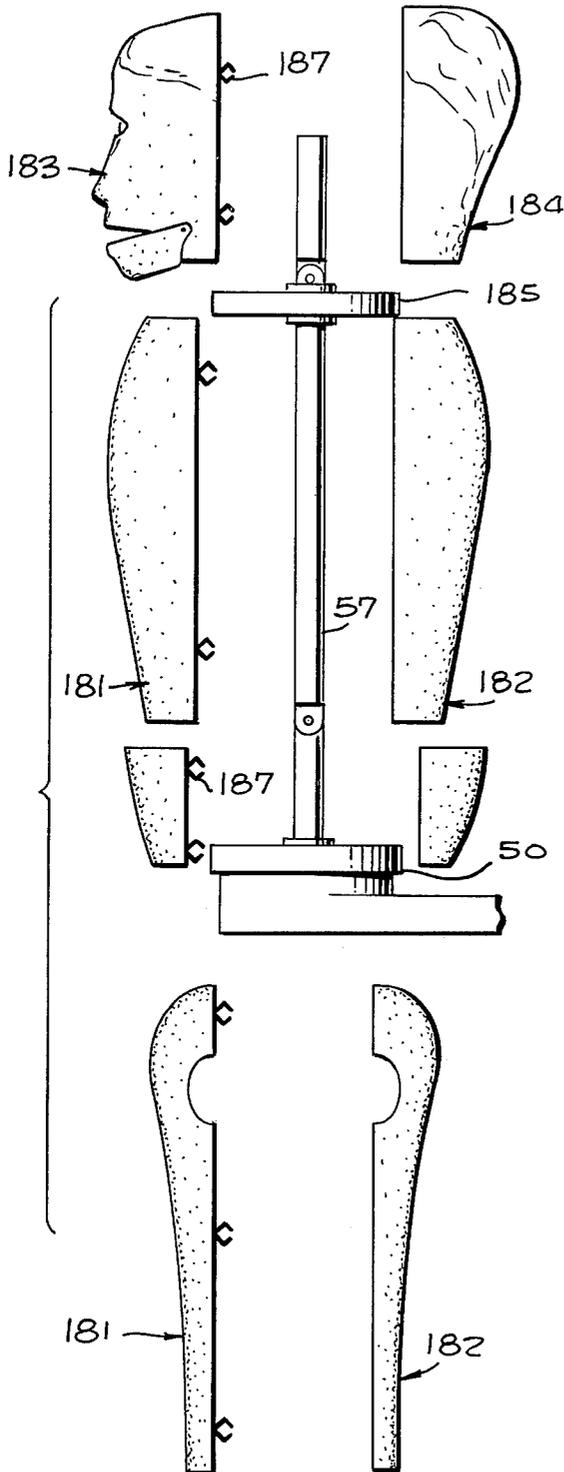


Fig. 12

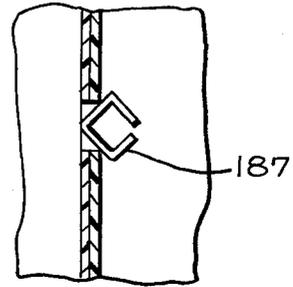


Fig. 13

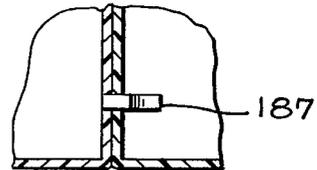


Fig. 14

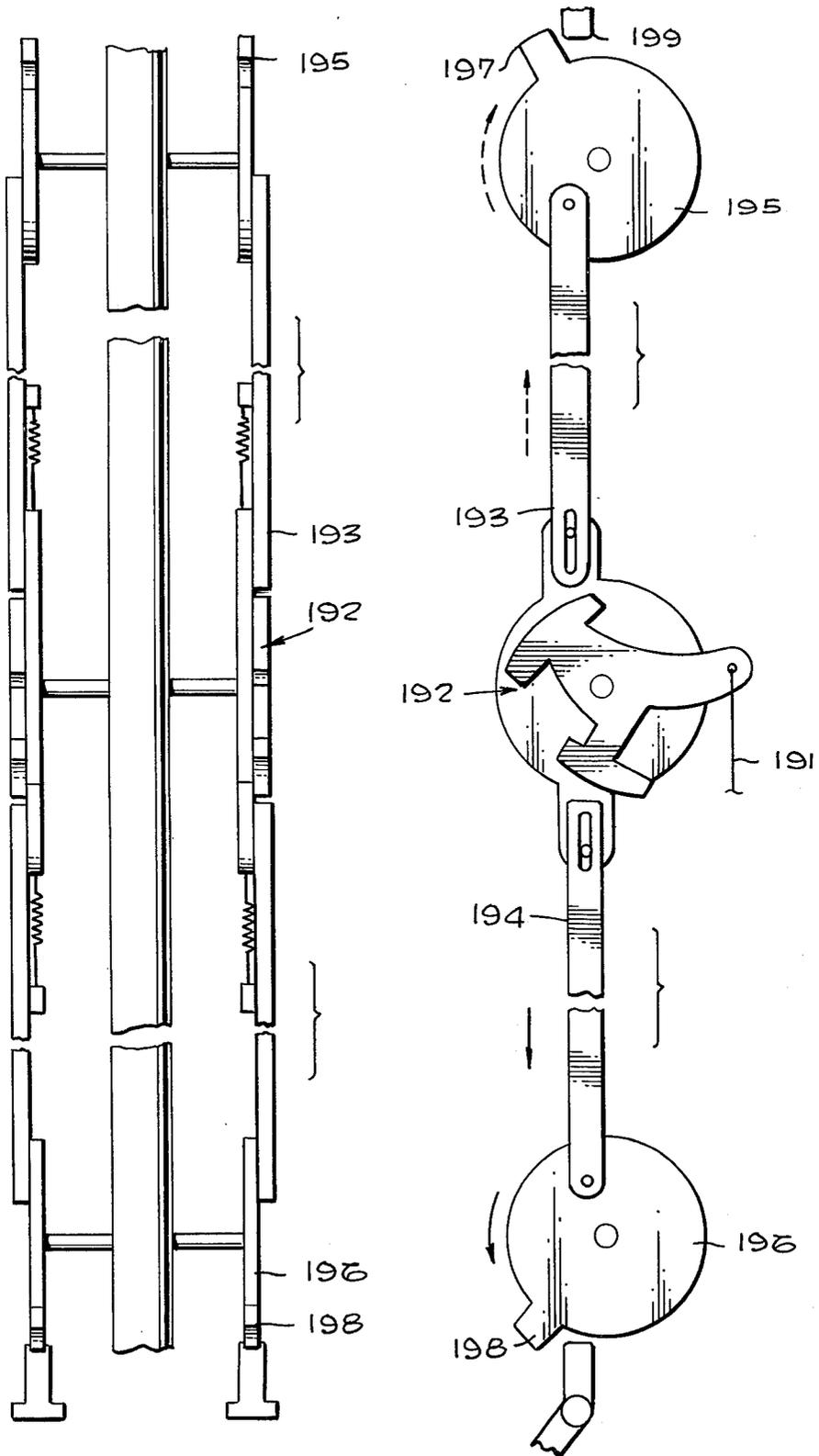


Fig. 15      Fig. 16

## ANIMATED PUPPET

## BACKGROUND OF THE INVENTION

The ancient art of puppetry has been improved only a modest amount by modern technology. These improvements have added very little to the entertainment value of puppets which, in many respects, rely on their awkward stylized movements for that entertainment value.

The medium of television has, however, created a much broader market for the skilled use of puppets. The electronic techniques now available for superimposing moving figures on independently moving backgrounds also provide new means of obscuring the mechanical support and control devices. This market has created a need for a variety of stylized puppets for use in producing large quantities of cartoon-like features. The puppet eliminates the need for drawing vast numbers of slightly different pictures for cell animation. A background is created separately. The puppet and background motions may be produced separately and superimposed electronically. What is needed is a mechanical puppet which can play many parts.

The most costly and difficult portion of the puppet is the mechanical support and control system. This invention proposes to create a skeleton puppet which can change bodies as well as clothes to suit the role. As a result, a wide variety of cartoon-like features can be produced with a few puppet mechanisms.

Earlier inventors have proposed methods of controlling puppets by internal control lines [(Caprino, British Patent No. 657,992 (1951) Wolf, U.S. Pat. No. 2,327,234 (1943) and Deaton, U.S. Pat. No. 2,466,214 (1949).] Others have proposed methods of supporting the puppet by a single support arm through which the control wires run, but which is kept continuously behind the puppet with respect to the viewing camera. [(Runanin, U.S. Pat. No. 3,390,481 (1968).] This latter feature is no longer critical because of the television camera's ability (with the aid of electronic selectors and gates) to obscure the image of the support and control devices and replace them by alternative backgrounds. In the interest of economics, the controls can be slightly more clumsy and obvious, without appearing in, and detracting from, the television picture projected.

The puppet must convey its message by action. For this reason some facial changes are desirable. This has been a major limitation of earlier puppets. This is one area in which modern technology has a great deal to offer. Very life-like head masks are now available for human actors. These rubber-like masks fit the face and convey the facial changes of the actor to his mask, by stretching. If the skeleton of the head and face of the puppet had greater ability for mechanical change, this same flexibility and adaptability could be conveyed to the puppet by placing a rubber-like mask over this skeleton of the head.

The skill required of a puppet operator has also limited the use of puppets. The original string supported and controlled puppet was suspended from crossed sticks with strings appropriately attached so that certain rhythmic motions of the control sticks could convey walking, arm swinging motion to the puppets. The use of internal control lines and keyboard controls with independent keys for each specific motion gives greater

versatility but eliminates this natural coordinated motion. The operator must provide his own coordination unless some internal coupling of motions is built into the puppet.

## SUMMARY OF THE INVENTION

This invention presents a relatively simple puppet skeleton with interchangeable bodies so that one mechanism can be used to play many roles in television productions. The mechanism is designed to be used with electronic methods of superimposing television images. The mechanism has a much more complex head skeleton for the purpose of exploiting the flexible rubberlike mask which can transmit facial motions while obscuring imperfections in the skeleton. Interlocking mechanisms are described which very simply produce coordinated, complex motions such as walking and arm swinging.

It is an object of this invention to create an animated puppet skeleton which can play many roles by interchanging bodies.

It is an object of this invention to create an animated puppet skeleton which can be assembled, tested and operated independent of its head, body and clothing.

It is an object of this invention to create an animated puppet with flexible rubber-like eyelids which open and close.

It is an object of this invention to create an animated puppet with flexible rubber-like eyebrows which may be raised and lowered.

It is an object of this invention to create a puppet with flexible rubber-like cheeks which allow the jaw to move up and down.

It is an object of this invention to create a puppet with flexible rubber-like lips which may be opened and closed independently of or in coordination with jaw motion.

It is an object of this invention to create an animated puppet with a torso which may be expanded, contracted and changed in shape by means of inflatable balloon-like structures.

It is an object of this invention to create an animated puppet which, by means of a simple control action, is caused to perform complex coordinated actions such as walking and arm swinging.

## DESCRIPTION OF THE DRAWINGS

The invention is illustrated in the following drawings: FIG. 1 is a side view of the puppet, its support and its controls.

FIG. 2 is a back view of the puppet taken on line 2 — 2 of FIG. 1, with cutaway showing skeleton and internal control lines.

FIG. 3 is a top view of the keyboard controls taken on line 3 — 3 of FIG. 1.

FIG. 4 is a front view of the head taken on line 4 — 4 of FIG. 1.

FIG. 5 is a side view taken on line 5 — 5 of FIG. 2, of the head and torso cutaway to show the support bearing and control lines.

FIG. 6 is a plan view taken on line 6 — 6 of FIG. 5 showing the control lines for turning the puppet on the support bearing.

FIG. 7 is a plan view of the support bearing taken on line 7 — 7 of FIG. 5.

FIG. 8 is a cutaway view of the head and internal mechanisms.

FIG. 9 is a partially sectioned plan view taken generally on line 9 — 9 of FIG. 8 showing the mechanism for moving the eyes.

FIG. 10 is a view taken on line 10 — 10 of FIG. 8 showing the device for converting control line motion to rolling motion of the eyes.

FIG. 11 shows a mechanism for regulating slack in the control lines.

FIG. 12 illustrates an exploded side view of the segmented shell of the torso and head.

FIGS. 13 and 14 show a side and plan view of the snaps for holding the segmented shells together and to the skeleton.

FIGS. 15 and 16 illustrate the mechanism for converting control line motion to synchronized arm and leg motion.

Motion of the puppet is controlled by control lines emanating from a keyboard 21, each control line being attached to and controlled by one key 20. All control lines enter the puppet through a guide tube 22. The leg consists of rigid elements 24 and 27 connected at a moveable knee joint by a spring loaded bearing 25. Attached to the bearing assembly is a coil spring 26 which forces the leg to a neutral, straight position. The control line 23 is guided through a pulley 29 attached to the leg above the knee joint and is then attached to the leg below the knee at 27' so that when the control line is pulled, the lower leg is pulled up, turning about the knee joint against the tension of the coil spring 26. Other control lines are similarly guided to the other rigid elements which make up the moving parts of the puppet skeleton.

On the end of the guide tube 22 is a bearing attached to the puppet at the crotch 40 between the legs. The entire weight of the puppet is supported on this bearing. The control tube bends upward 40, is enlarged and the end of the tube is covered by a circular plate 51 which is supported on the guide tube by a bearing 50. There are holes 52 in the plate through which the control lines 53 are guided into the interior of the puppet. The upper torso of the puppet is supported on a central rod 57 which is supported on and rigidly attached to the plate 51 at its center 54. The lower torso, hips and legs are supported at the outer periphery of the plate 51. The puppet is made to turn on the bearing by pulling one or the other of control lines 61 and 62 which attach to the bottom 63 of the control support rod 57.

The control lines 53 which enter the puppet from the guide tube 22 are guided to the elements they control by means of guides 58 such as that at the neck. In certain areas, motion of one part, such as the head, may cause a lengthening or shortening of the path of the control lines to other parts such as the eyes or lips causing undesired motion of those parts. This can be offset by one of two methods. First, the control lines in the region where the path length change can occur are replaced by flexible wires enclosed in a flexible tube which bends but does not stretch, such as commonly used for accelerator cables in automobiles. This is illustrated in FIG. 8. The ends 81 and 83 of the flexible tube 82 are attached to two points that move with respect to one another, one end 81 in the shoulder area, the other 83 in the head. Because the line fits tightly in the tube, no slack is added or removed from the line by head motion although slack exists in the flexible tube. The second method allows slack to be added or removed from the line. The slack is kept in a reservoir near the keyboard controls (FIG. 11) by means of guide pulleys 160

and 163 which are driven by coil springs 161 and 162 so as to draw any slack into the reservoir. The tensions on the springs are not great enough to move the parts controlled by the lines, but are strong enough to draw any slack 164 into the reservoir 165.

FIGS. 8, 9 and 10 illustrate mechanisms for producing motion of the eyes. The eyes 70 and 71 rest in sockets in which they are free to turn. From the back of each eye protrudes a rod 73 and 74, the opposite ends of which 75 or 76 are attached by universal joints to a central rod 78. This central rod 78 can be moved from side to side or raised and lowered causing the ends of the rods 75 and 76 from the eyes to be moved in unison from side to side or up and down, rolling the eyes 70 and 71. The central rod 78 may be raised by means of the control line 89 or moved to the side by the control line 95.

In FIG. 8, the eyelid 85 may be closed by pulling control line 96, which drives rod 85' toward the eyelid causing the eyelid to turn about the hinge shaft 86.

The head is covered by a flexible rubber-like pullover mask shown in cutaway form FIG. 8. This flexible mask 91 attaches to the eyelid 85 at the edge 88 so that it folds and stretches as the eyelid is opened or closed.

The mask is also attached beneath the eyebrow by means of gripping fabrics such as Velcro to a small plate 87 which can slide up on the skull when pulled by means of control line 92 which is guided to the plate 87 by means of a guide tube 93. This permits the eyebrows to be raised.

The mask is also attached at the lips 103 to a mechanical lip 102. The mechanical lip 102 is supported on the rod 105 supported by the hinge shaft 107 so that it may be moved independently of the jaw 106 by means of control line 108. The jaw 106 is supported by a hinge shaft 104 and may be moved by the control line 101.

FIGS. 12, 13 and 14 illustrate the interchangeable puppet body consisting of segmented shells 181 and 182 and head of similar structure 183 and 184. The segmented body is attached to the central support rod 57 at the disc like control line guide 185 and at the plate 50 on the support bearing 51. The segmented parts are held to one another and the central skeleton support system by means of fasteners 187.

FIGS. 15 and 16 illustrate the mechanism to convert a single control line pulling motion to a synchronized arm swinging - stepping motion. When the control line 191 is pulled, the eccentric 192 rotates pushing one rod 193 upward and the other rod 194 downward. The upper rod turns an eccentric 195 in the shoulder. The lower rod turns an eccentric 196 in the hip. The eccentric 195 has a protrusion 197 which moves against a lever 199 attached to the arm, causing it to swing. When this mechanism is not active, that protrusion moves back allowing the arm to move freely when controlled independently. Similarly the eccentric 196 has a protrusion 198 which moves against a lever on the end of the leg causing it to be raised in a steplike motion. The device is located along the central support rod in the torso with the eccentric 192 at the waist. A second such device lies along the other side of the central support rod for simultaneously controlling the other arm and leg.

FIG. 5 illustrates a torso which can be changed in shape instantaneously. An inflatable balloon-like sack 64 is attached to the torso. The sack may be inflated by compressed gas from the storage bottle 33 of FIG. 1

through the connecting tube 32.

#### DESCRIPTION OF PREFERRED EMBODIMENT

Although the inventions described and claimed herein could be achieved by various mechanical means, the preferred embodiment is that illustrated in FIGS. 1 through 16 wherein the rigid support elements of the skeleton are made of light metal or reinforced plastics, the segmented shells of the body and head are made of plastic, the head mask is latex with and without imbedded hair and the control lines are nylon cord.

What is claimed is:

1. An animated puppet comprising:
  - a. A skeleton of rigid elements connected at movable joints,
  - b. control lines, at least one said control line connected to each pair of said rigid elements at each said joint, such that one said rigid element of said pair is forced to move around said joint with respect to the other member of said pair when said control line is pulled,
  - c. springlike devices, at least one said springlike device attached to each said pair of rigid elements connected by a joint near said joint, such that one said rigid element of said pair is forced by said springlike device to a predetermined neutral position with respect to the other element of said pair when said control line is relaxed,
  - d. pulleys, spacers and tubes attached to said skeleton by means of which each said control line is guided from said joint, which said control line controls, to the operator, such that the operator may pull each said control line independently,
  - e. interchangeable, segmented shells of lightweight material, such that said segmented shells can be attached to said skeleton to give said puppet an external shape corresponding to the body of the character to be depicted by said puppet.
2. The animated puppet claimed in claim 1 in combination with a keyboard of keys each of said control lines being attached to one of said keys such that each said control line is pulled independently by depressing the corresponding key.
3. An animated puppet comprising the animated puppet claimed in claim 1 wherein said control lines exit from said skeleton and said segmented shells downward through a port between the rigid elements corresponding to the legs of said puppet, a tube through which said control lines are guided from said port to said operator, a bearing attached between said port and said tube such that said skeleton and segmented shells are supported by said tube so as to be able to turn on said bearing, and a control line attached to said port so that said skeleton and said segmented shells turn on said bearing when said control line is pulled.
4. The animated puppet skeleton claimed in claim 1 wherein said guides for said control lines and said means by which said control lines are guided include sections of incompressible, flexible tubing whose inside diameter is comparable to the outside diameter of said control line, through each of said sections of tubing one of said control lines passes, the ends of each said section of tubing being affixed to elements of said skeleton connecting the rigid elements and joint controlled by said control line to said external control means.
5. An animated puppet comprising the animated puppet skeleton claimed in claim 1 wherein some of said rigid elements correspond to supports for head, eyes,

eyelids, jaws and lips in combination with interchangeable segmented shells of light weight material attachable to said rigid elements corresponding to the head, eyes, eyelids, jaw and lips of said puppet skeleton, each said segmented shell having the shape appropriate to the head, eyes, eyelids, jaw and lips of the character to be represented by said puppet.

6. An animated puppet comprising:
  - a. The animated puppet claimed in claim 1 wherein two of said rigid elements, with the portions of said segmented shell attached thereto, correspond to a skull and a jaw joined at a moveable joint, and
  - b. an interchangeable rubber-like head and face mask having flexible regions corresponding to cheeks which stretch and allow the mouth of said mask to open when said mask is placed over said head and jaw and said jaw is moved downward with respect to said skull.
7. An animated puppet comprising:
  - a. The animated puppet claimed in claim 1 wherein two of said rigid elements, with the portions of said segmented shell attached thereto, correspond to a jaw and an upper lip formed at a moveable joint, and
  - b. an interchangeable rubber-like head and face mask having flexible regions corresponding to lips which stretch and contract to allow the mouth of said mask to close and open when said mask is placed over said jaw and lip and said lip is moved down and up with respect to said jaw.
8. An animated puppet comprising:
  - a. The animated puppet claimed in claim 1 wherein two of said rigid elements, with the portions of said segmented shell attached thereto, correspond to a skull and an eyelid joined at a moveable joint, and
  - b. a flexible sheet of rubber-like material attached to said skull and said eyelid so that said flexible sheet wrinkles and contracts when said eyelid opens and stretches to cover said eyelid when it closes.
9. An animated puppet comprising:
  - a. The animated puppet claimed in claim 1 wherein two of said rigid elements with the portions of said segmented shell attached thereto, correspond to an eyebrow and a skull joined at a moveable joint such that said eyebrow can move up and down on said skull and
  - b. a flexible, interchangeable rubber-like head and face mask with imbedded hair for each eyebrow, the region of said imbedded hair for one eyebrow attaching to said rigid element corresponding to said eyebrow so that said mask stretches or contracts and wrinkles to accommodate motion of said rigid element.
10. An animated puppet comprising the animated puppet claimed in claim 1 and pulley-like rollers, mounted on fixed supports external to said skeleton and said segmented shells near said operator, each of said control lines being turned around at least one separate said roller, each of said rollers being supported on a shaft and a tensioned spring-like device which rotates each said roller individually so as to draw any slack in said control lines out of said skeleton and said segmented shells, the tension in each said springlike device being less than that required to pull the rigid element controlled by each said control line away from its said neutral position.
11. An animated puppet comprising:
  - a. The animated puppet claimed in claim 1,

- b. a first eccentric internal to said puppet near the waist of said puppet to which one of said control lines is attached such that said first eccentric is rotated when said control line is pulled,
- c. a first rod directed upward within said puppet, the lower end of said first rod being attached to said first eccentric such that said first rod is pushed upward when said first eccentric is rotated,
- d. a second eccentric within said puppet near the shoulder of said puppet to which the upper end of said first rod is attached such that said second eccentric is rotated when said first rod is pushed upward,
- e. a first lever attached to the outer periphery of said second eccentric,
- f. a second lever attached to one of said rigid elements of said puppet corresponding to an arm of said puppet such that said arm swings when second lever is pushed, said second lever being located so that it is pushed by said first lever on said second eccentric when said second eccentric is rotated,

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- and such that said first and second lever do not contact when said second eccentric is not rotated,
- g. a second rod directed downward within said puppet, the upper end of said second rod being attached to said first eccentric such that said second rod is pushed downward when said first eccentric is rotated,
- h. a third eccentric within said puppet near the hip of said puppet to which the lower end of said second rod is attached such that said third eccentric is rotated when said second rod is pushed downward,
- i. a third lever attached to the outer periphery of said third eccentric,
- j. a fourth lever attached to one of said rigid elements of said puppet corresponding to a leg of said puppet such that said leg is lifted when said fourth lever is pushed, said fourth lever being located so that it is pushed by said third lever on said third eccentric when said third eccentric is rotated, and such that said third and fourth levers do not contact when said third eccentric is not rotated.

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