April 7, 1953 A. I. NELSON ET AL 2,633,651

AUTOMATON

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Fig. 1.

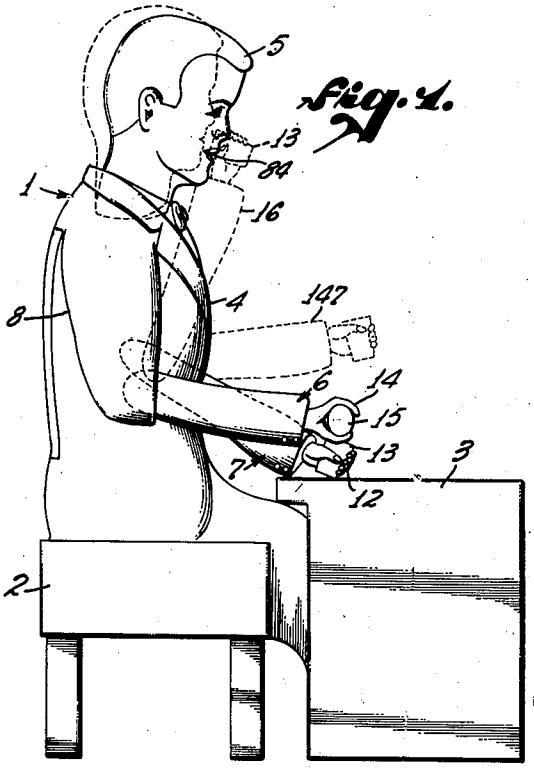


Fig. 2.

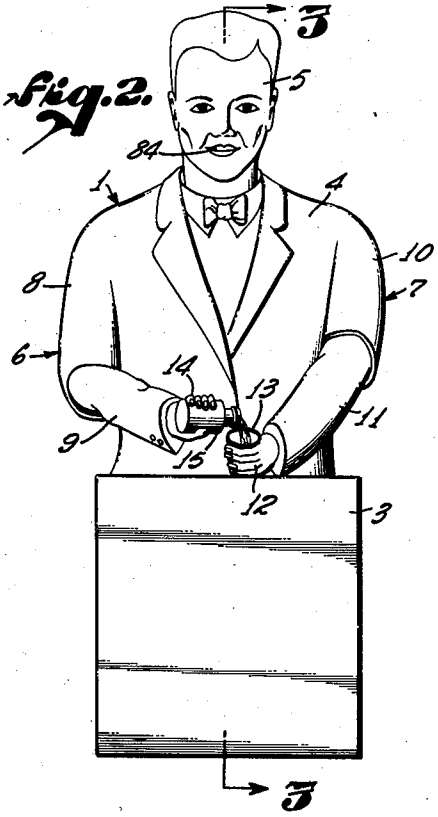
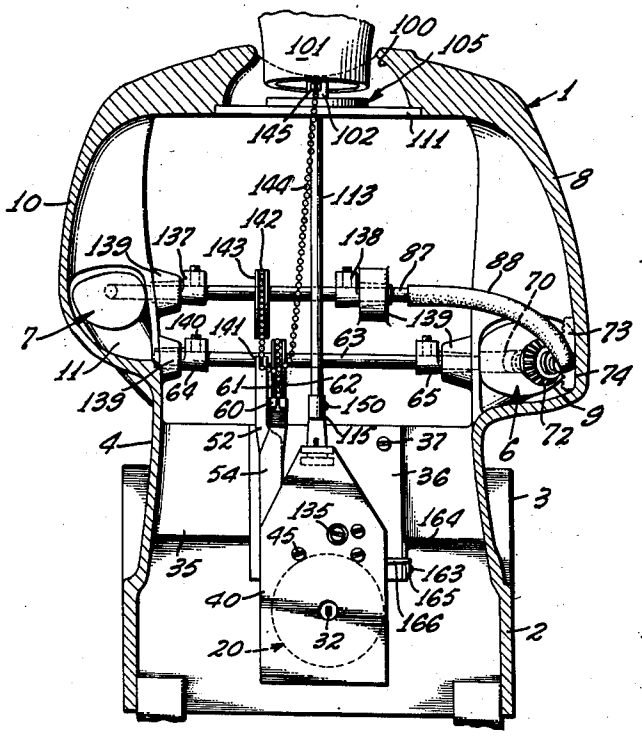


Fig. 4.



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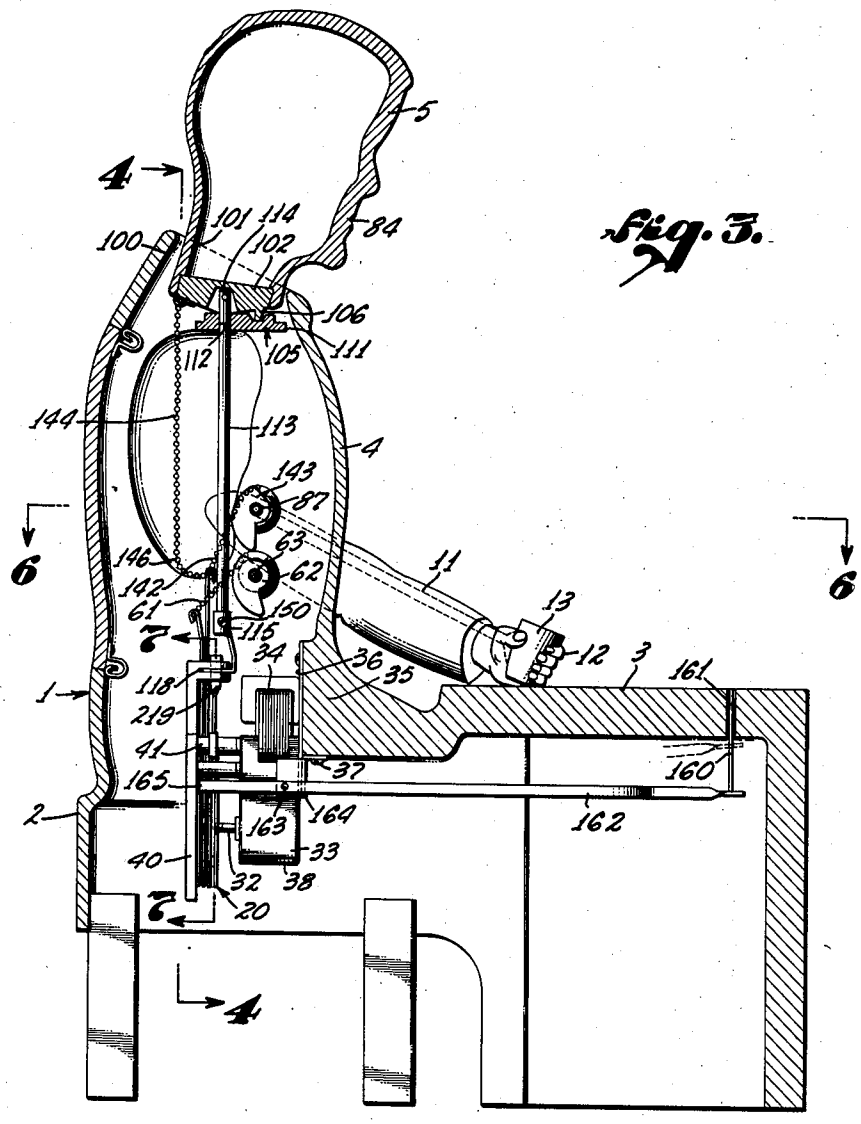


Fig. 3.

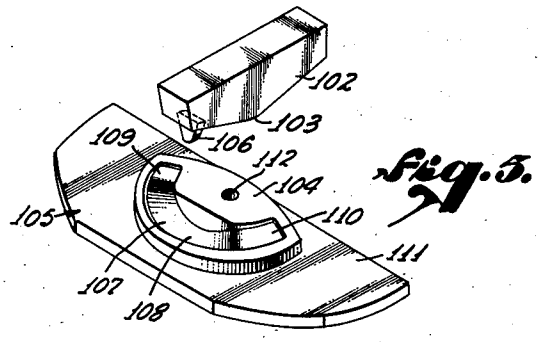


Fig. 5.

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Fig. 6.

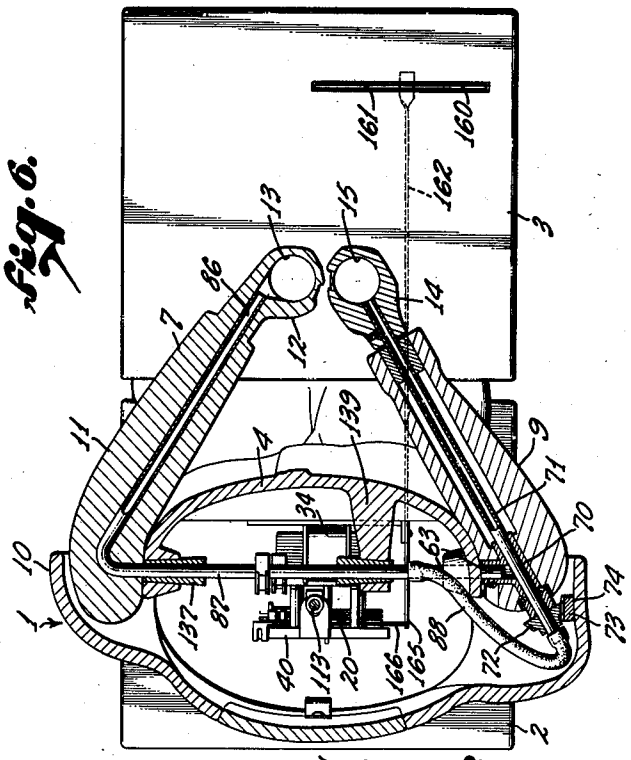


Fig. 7.

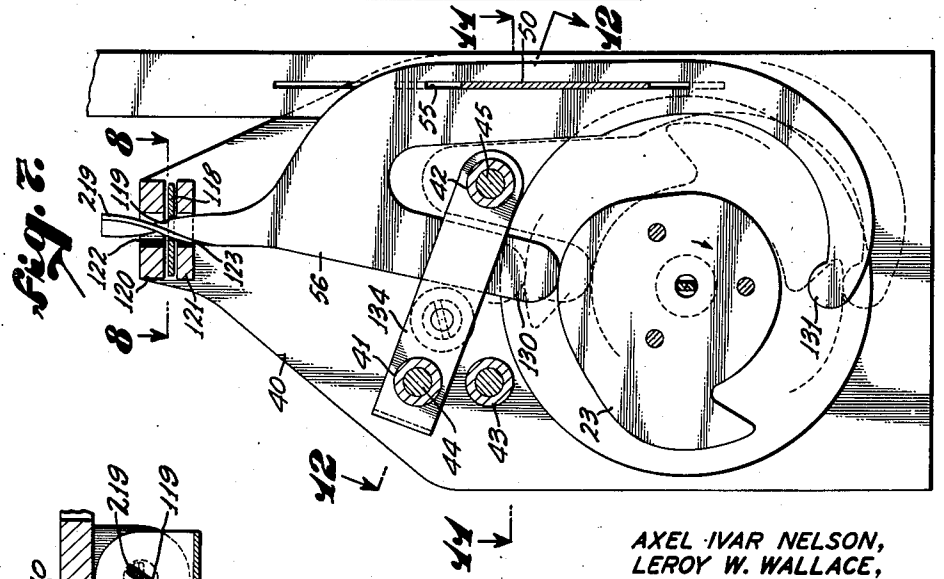
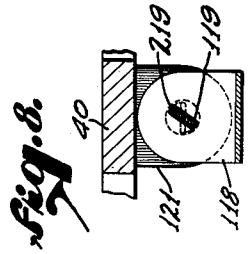


Fig. 8.



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Fig. 9.

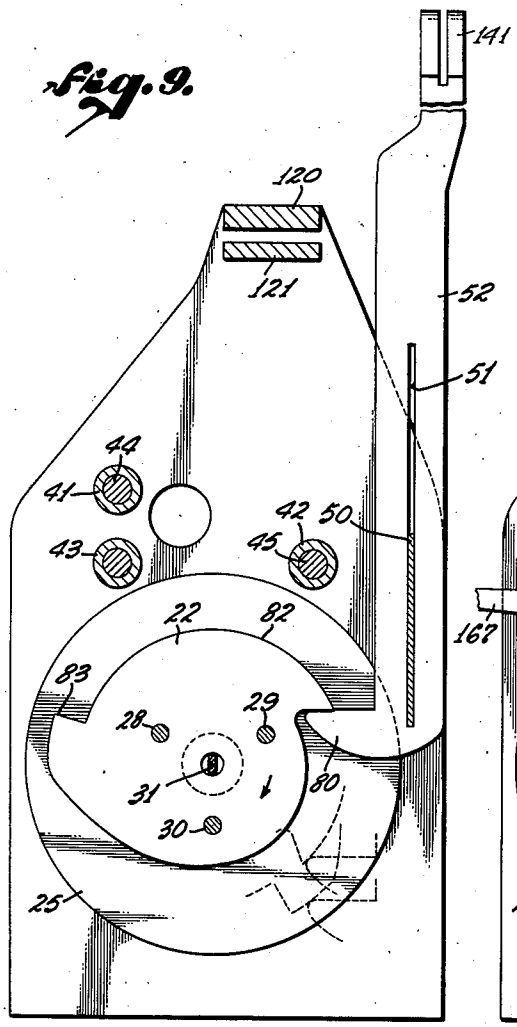
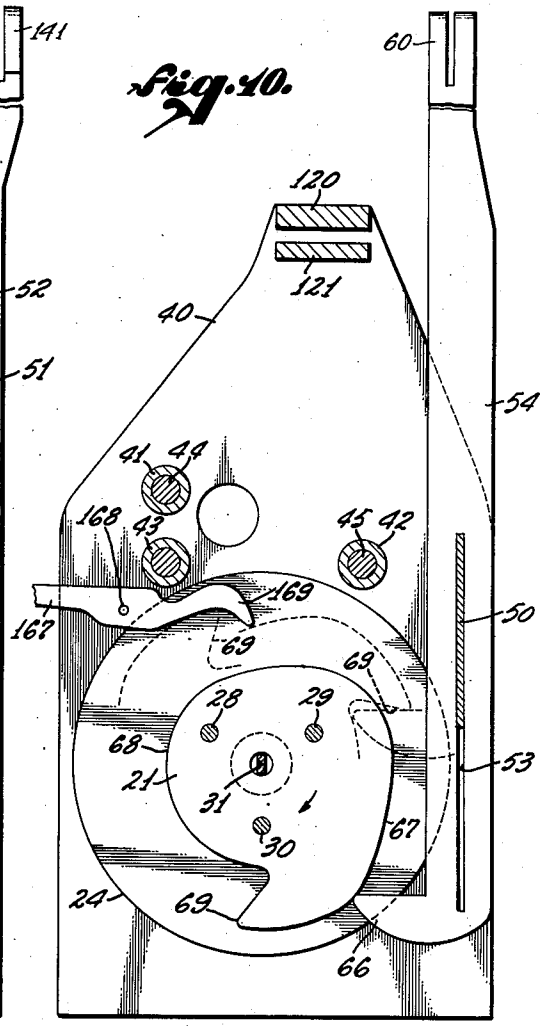


Fig. 10.



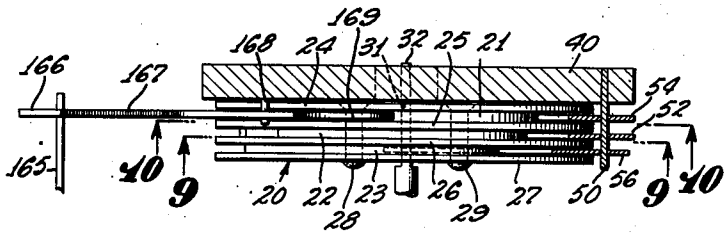


Fig. 11.

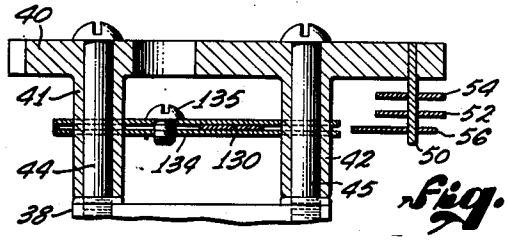


Fig. 12.

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Patented Apr. 7, 1953

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UNITED STATES PATENT OFFICE

2,633,651

AUTOMATON

Axel Ivar Nelson and Le Roy W. Wallace,
Los Angeles, Calif.

Application June 27, 1949, Serial No. 101,522

9 Claims. (Cl. 40—126)

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The invention relates to an automaton, namely, a self-moving machine which imitates certain motions of men.

In our Patent No. 2,528,968, granted November 7, 1950, for Automaton, we have described and claimed an automaton, particularly suitable for use as an advertising device and wherein a miniature man is provided with a movable head and with movable arms which are driven to simulate the act of cobbling a shoe.

An object of the present invention is to provide an automaton which will simulate the act of pouring a liquid from a bottle or the like held in one hand, into a glass or the like held in the other hand and to further simulate the lifting of the glass to drink the liquid therein, with the further provision of concealed means for transferring the liquid from the glass to the bottle so that the same liquid may be used for a repetition of the act of drinking.

A further object of the invention is to improve and simplify the mechanical features and, in particular, the cam assembly of the above mentioned co-pending application.

Further objects of the invention are to turn the head while simulating the act of drink, to tilt the head in consequence of its being turned, and to empty the contents of a bottle or other container by rotating the wrist in consequence of the arm being raised.

For further details of the invention, reference may be made to the drawings wherein Fig. 1 is a side view of an automaton according to the present invention, the full line showing the relative positions of the head and arms at one instant of pouring the liquid from a bottle into a glass, while the dotted lines represent the relative position of the parts in the drinking position.

Fig. 2 is a front view in elevation of the full line showing of Fig. 1.

Fig. 3 is an enlarged vertical sectional view on line 3—3 of Fig. 2 looking in the direction of the arrows.

Figs. 4, 6 and 7 are enlarged sectional views on lines of the corresponding number in Fig. 3.

Fig. 5 is a perspective view with parts broken away, of the cam device for causing tilt movement of the head in consequence of its rotation.

Figs. 8, 11 and 12 are sectional views on lines of the corresponding numbers in Fig. 7 looking in the direction of the arrows.

Figs. 9 and 10 are vertical sectional views on lines of the corresponding numbers in Fig. 11.

Referring in detail to the drawings, the

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automaton 1 is here illustrated as a man although it could very well be either a woman or a child. The automaton 1 is here illustrated as being seated on a chair or bench 2 at a table 3 although it could be standing or in some other position.

The automaton 1 is preferably made of papier-mache or the like and is provided with a relatively fixed hollow body 4, a movable hollow head 5, a right arm 6 and left arm 7. The right arm from the shoulder to the elbow as indicated at 8 is cast or molded integral with the body 4 while that portion of the right arm indicated at 9 from the elbow to and including the hand 14 is movable. The left arm portion indicated at 10 from the shoulder to a position above the elbow is cast integral with the body 4 while the remaining outer portion 11 of the left arm is movable. Fixed in the left hand 12 is a glass 13 and fixed in the right hand 14 is a bottle 15. The right hand 14 is rotatable at a position corresponding to the wrist in order to tilt the bottle 15 and transfer its liquid contents to the glass 13, when the right arm 9 is in an elevated position.

Means are provided for rotating the right hand 14 to tilt the bottle 15 from an upright position when resting on the table 3 to the tilt elevated position shown in Fig. 2 and in a reverse manner to rotate the bottle 15 from its tilted position to an upright position as the arm 9 is lowered. Means are also provided for raising the arm 11 from the table position shown in Fig. 2 to an elevated position shown at dotted lines 16 in Fig. 1 to a drinking position and, thereafter, to lower the arm 11 to the table position shown, and in proper sequence with the motion of the arm 9 and the head 5.

Means are also provided for transferring the liquid in the glass 13, through the arm 7, across the inside of the body 4 to the arm 9 and into the bottle 15 to restore the fluid therein so that the drinking cycle may be repeated indefinitely.

Means are also provided for moving the head 5 from one side to the other and for tilting the head forward and back to simulate the natural act of drinking.

The movements of the head 5 and arm 9, right hand 14 and arm 11 are coordinated by means of a cam assembly 20 comprising a right arm cam 21, a left arm cam 22 and a head cam 23, sandwiched between four metal disks 24 to 27. The cams 21 to 23 and the disks 24 to 27 are held in one unit by means of a plurality of rivets, three being indicated at 28, 29 and 30.

The cam assembly 20 has a non-circular aperture 31 in which fits the non-circular shaft 32

of a gear train 33 driven by an electric motor 34.

As shown in Fig. 3 the motor 34 and gear train 33 are supported from an angular boss 35 inside of the hollow body 4 by means of a bracket and screws indicated at 36 and 37. The gear train 33 has a casing 38.

Supported in spaced relation from the casing 38 is a base 40 having spacers 41, 42, 43 for bolts like 44 and 45, see Fig. 12. The cam assembly 20 is arranged between the base 40 and the motor 34 and its gear train 33 as shown in Fig. 3.

Laterally projecting from the base 40 is a cam follower guide or bearing 50 in the form of a flat metal strip which forms a slide bearing and a stop for the slot 51 in the left arm connecting rod 52, for the slot 53 in the right arm connecting rod 54 and for the slot 55 in the head connecting rod 56, see Figs. 9, 10 and 7. The connecting rods 52, 54, 56 are sheet metal stampings. The bearing 50 thus prevents undue lateral movement of the connecting rods 52, 54 and 56 while guiding them for reciprocating movement either under control of the weight of the part operated thereby or by their respective cams 22, 21 and 23. The connecting rods 52, 54 and 56 are prevented from undue movement lengthwise of the transverse guide 50, as each connecting rod extends between a pair of the disks 24, 25, 26, 27 in the cam assembly 20.

The right arm connecting rod 54 at its upper end has a fork 60 for a ball chain 61 connected to a crank arm 62 fixed to a shaft 63 rotatably carried by bearings 64 and 65 at the opposite sides of the body 4. The bearings 64, 65 are similar to the bearings 137, 138 for shaft 87 and each bearing is held in place at the side of body 4 by plaster like 139 and each bearing has an oil wick like 140. The left arm connecting rod 52 has a similar fork 141 for a ball chain 142 connected to a crank arm 143 on shaft 87 to raise the left arm 11. Fork 141 also engages a ball chain 144 connected to a fork 145 on the rear end of the rocker bar 102. Chain 144 has slack 146 which is taken up when the left arm is elevated part way as shown in dotted lines at 147 in Fig. 1, so that the head 5 tilts back as the left arm continues to rise from mid-position 147 to a drinking position 16.

The lower end of the right arm connecting rod 54 terminates in a laterally extending cam follower 66, see Fig. 10, which is acted on by the surface of the cam 21. The cam assembly 20 is assumed to rotate in a clockwise direction as indicated by the arrows adjacent each cam. Cam 21 in rotating clockwise from the position shown, brings a portion 67 of the cam surface of decreasing radius to bear on the cam follower 66 with the result that cam follower 66 will rise due to the weight of the right arm which acts to rotate the shaft 63 in a direction to pull up on the chain 61. The cam 69 has an arm or rise having a laterally and forwardly extending face and cam follower 66 has a laterally and upwardly extending face, cam 69 being slideable off of cam follower 66 as the cam is rotated to bring cam follower 66 to its lowermost position. The cam surface 67 forms an obstruction of variable width between the guide 50 and the rise or arm of the cam follower 66, to delay the return stroke of the cam follower. The speed of movement of the right arm depends on the slope of the cam 21. For the portion 68 of cam 21 which is of constant radius, the right arm will remain in its lowest position resting on the table 3. When the abrupt increase in radius of the cam, as indicated at 69, acts on the follower 66, the right arm is elevated. This raising and lowering of the right arm 9 under action of the reciprocating follower 54 is also translated into rotation of the right hand 14 first in one direction and then the other, as the right arm 9, see Fig. 6, has a pivotal support as indicated at 70 on the side of the body 4 and the arm 9 carries a hollow shaft 71 having fixed thereto a mitre gear 72 having teeth which mesh with a rack 73 and secured to the inner right side of the body as indicated at 74. Fixed to the outer end of shaft 71 is the right hand 14 of the automaton. Hence, as the arm 9 is raised and lowered, the rack 73 causes the gear 72 to rotate and thereby rotate the hollow shaft 71 and the wrist and hand 14. The gear 72 is on the opposite side of the pivot 70 from the hand 14 and as arm 9 is elevated, the gear 72 is lowered which causes the gear 72 to rotate in a clockwise direction as seen from the front of the automaton, to tilt the bottle 15 from an upright position to a tilt position wherein the liquid contents in the bottle 15 will pour into the glass 13 held in the other hand 12. When the arm 9 descends, the gear 72 and rack 73 cause the hand 14 and bottle 15 to have a reverse movement from the tilted position shown in Fig. 2, to an upright position resting on the table 3.

The left arm connecting rod 52 has a cam follower portion 80 which follows the contour of the cam 22. The cam projection 81 lowers the follower 80 to raise the left arm 11 to an intermediate elevation where it remains during the constant radius portion 82 of the cam. The relative angular position of the three cams is shown in Figs. 7, 9 and 10 and it will be apparent that from about 2 o'clock back to about 10 o'clock the constant radius portion 82 of the left arm cam is holding the left arm at its intermediate elevated position while over the same interval on the right arm cam 21, the right arm is descending to rest the bottle 15 in an upright position on the table 3 where it remains during this interval. Further rotation of the cam assembly causes cam projection 83 to fully elevate the left arm 11 to bring the glass 13 close to the mouth 84, and as the glass 13 elevates to this position, the fluid in the glass 13 flows by gravity through the pipe 86 in the left arm 7, through hollow shaft 87 which pivotally supports the arm 7, through a flexible tube 88, to the hollow shaft 71, and back into the bottle 15. The liquid contents in the bottle 15 is then again poured into the glass 13, to return to the bottle 15 for repeated similar operation as long as the motor 34 is running.

The right arm cam 21 is a duplicate of the head cam 23, but reversed in position, as it is convenient to use the same cam for both items. The right arm can drop no farther than the table permits it to drop and it is of no consequence that a portion of the surface of the right arm cam 21 is inactive, namely, approximately from 7 o'clock forward to 5 o'clock.

During the time that the right arm 9 and the left arm 11 are moving in timed relation with each other, the head 5 is turning substantially about a vertical axis and also tilting back and forth in timed relation with the movement of the arms 9 to 11 to simulate the act of drinking. In fact, before arranging the mechanical movements described herein, a study was made of the motions made by an average person in pouring a drink into a glass and drinking the contents thereof and the cycle of movements herein provided very closely simulates the actual move-

ments that an average person would make for this purpose.

The top of the body 4 has an enlarged hollow neck 100 in which is loosely mounted the neck 101 of the head 5. The bottom of the neck 101 has fixed therein a rocking bar 102, see Figs. 3 and 5. The bar 102 has a downwardly extending peak 103 which rests on the flat portion 104 of the cam 105, to serve as a rocking or tilting support. The bar 102 has a downwardly extending cam follower lug 106 which is held down by the weight of the head 5, and guided by a cam groove 107 having a deep vertical portion 108 and shallower end portions 109 and 110. The cam 105 is cast integral with a horizontal base 111 which is suitably cemented or otherwise fixed in the base of the neck 100, see Fig. 4. Cam 105 has a vertical bearing aperture 112 for an oscillating shaft 113 which projects therethrough, its upper end having a pivotal connection 114 with the rocking bar 102. The lower end of shaft 113 carries a socket 115 having a horizontally extending plate 118, see Figs. 7 and 8 having a slot 119 in which slidingly fits the corresponding screw or cam portion 219 at the upper end of the head connecting rod 56. The connecting rod 56 and the other connecting rods 52 and 54 are made of sheet metal and the cam portion 219 can be formed by twisting the sheet metal about 120 degrees to the left as shown in Fig. 7. The plate 118 thus is caused to rotate, to thereby rotate shaft 113 and the head 5, as the connecting rod 56 reciprocates under action of the cam 23. The plate 118 oscillates, that is, turns in first one direction then the other and is supported between spaced horizontal bearings 120 and 121 cast integral with the base 40. The bearings 120 and 121 have apertures 122 and 123 to loosely guide the cam 219 for vertical movement. As shown in Fig. 3, the socket 115 is connected to shaft 113 by a screw 150 to permit adjustment of the turning movement of the head 5 so that it can be adjusted to look straight forward when in drinking position.

The head 5 is positively tilted both down and up by the cam 23, that is to say, the head is not permitted to drop by gravity, as it would drop too fast in an unnatural manner. For this purpose, the connecting rod 56 has a downwardly extending follower portion 130 which is acted on by the cam 23 to tilt the head 5 down and the connecting rod 56 has a diametrically opposite and upwardly extending follower portion 131 which is acted on by cam 23 to tilt the head 5 back. The weight of the head 5 is prevented from actuating the connecting rod 56, as it is provided with a friction drag in the form of a U-shaped metal strip 134, see Fig. 12, which is carried by the spacing lugs 41 and 42 and which embraces and clamps the cam follower 130 under action of an adjustable screw 135.

When the head 5 is looking straight ahead, the plate 118 is intermediate the length of the cam twist 219 so that the head 5 is turned to the right or to the left as the cam twist 219 is lowered or raised respectively by the cam 23. After the liquid has run out of glass 13 to simulate completion of the drinking, slack 146 is restored in the chain 144 and rotation of shaft 113 causes the head 5 to tilt up and down due to a cam follower 106 riding in the cam groove 107.

An advertising sign 160 is slidably mounted in a slot 161 in the table 3. The sign 160 is raised and lowered by one end of a lever 162 pivotally supported as indicated at 163 on a bracket 164.

The inner end 165 of the lever 162, see Fig. 11, is actuated by and extends underneath the outer end 166 of a lever 167 pivotaly supported on the base 40 as indicated at 168 and having an inner cam follower end 169 actuated by the cam projection 69 on the right arm cam 21. When cam follower 169 is raised the lever 166 moves the lever 165 down to raise the sign 160. After cam projection 69 has moved beyond the follower 169, the sign 160 drops by gravity.

The extent and relative movements of operation of the arms 9 and 11 can be adjusted by adjusting the length of the chains 142 and 144 as caught by their respective hooks, and by adjusting the position of the socket 115 on the shaft 113. As illustrated, and in the preferred form, the parts perform the following operation. As the cam assembly 20 rotates about one-quarter turn, the left arm 11 is raised and holds in partially elevated position, the head 5 turns to the left and the right arm 9 sets the bottle 15 down upright.

For the next quarter revolution the head 5 turns to the front and tilts back while the left arm 11 raises more to the drinking position and then the head tilts forward and the left arm starts to lower.

For the third quarter turn, the head 5 turns to the right, the left hand 12 sets the glass 13 down on the table 3, and the advertising sign 160 is raised.

For the fourth quarter turn the head turns and lowers to the front, the right arm 9 raises and turns the bottle 15 and pours the liquid into glass 13 and turns the bottle 15 half back, and sign 160 drops, to complete the cycle.

Various modifications may be made in the invention without departing from the spirit of the following claims. For example, the mechanism illustrated herein may be applied to some other type of figure. For example, instead of the figure representing a human being, it could very well represent an animal such as an elephant or otherwise and in that case the movement which is here illustrated as applied to the arms, would in that case be applied to the forelegs of the animal. Also the hands 12 and 14 may be molded to form holders for the glass and bottle which are removable and suitably cemented or fastened in the hands.

We claim:

1. An automaton comprising a hollow body having an upper arm integral therewith, a forearm therefor, means supporting said forearm for pivotal movement about an axis extending crosswise through said body, a hand and wrist portion at the outer end of said forearm, a shaft supporting said hand and wrist portion for oscillation about an axis lengthwise of said forearm, said shaft extending at its inner end into said body and having a gear fixed thereon, a cooperating rack fixed to said body, and means for operating said forearm about said first axis to raise and lower said forearm and thereby operate said gear to turn said hand and wrist portion.

2. An automaton according to claim 1 wherein said shaft comprises a conduit having an outer end at the hand of said hand and wrist portion, said body having another movable arm having a cooperating conduit, and means for operating said other movable arm.

3. An automaton having a component part having a rocking shaft, a motor and gear train unit having a horizontal slow speed shaft, a vertical base spaced from and adjacent said motor and gear train unit, a cam on said slow speed

shaft, said cam having a laterally and forwardly extending face, a reciprocating cam follower therefor having a cooperating upwardly extending face, said component part acting to urge said cam follower upwardly, a flexible link connecting said rocking shaft and said cam folower, a vertical slot in said cam follower, a guide laterally extending from said base through said slot, said cam having a cam portion of varying radius serving as a variable obstruction for said cam follower to control the upward movement of said cam follower by said component part.

4. An automaton having a head having a neck, a cooperating body in which said neck rotatably fits, a vertical shaft having a horizontal pivotal connection with said head for turning said head and permitting tilting thereof, a cam and cooperating cam follower, one thereof being fixed to said neck and the other thereof being fixed to said body, said cam having a cam surface of varying height concentric with said shaft, said cam follower co-acting with said cam surface to raise and lower said head when said shaft is turned, and means for turning said shaft.

5. An automaton having a head having a neck, a cooperating body in which said neck rotatably fits, a rocking bar fixed to said neck, said bar extending from the back towards the front of said neck and having a downwardly facing convex portion and having a central downwardly facing socket and having a forward end having a downwardly extending cam follower, a base fixed to said body portion, said base having a bearing for said shaft and having an upwardly facing cam surface of variable height concentric with said shaft, the upper end of said shaft extending in said socket and having a horizontal pivotal connection with said bar, said head being overbalanced to maintain said cam follower in contact with said cam surface, said base having a surface supporting said bar for rocking movement.

6. An automaton according to claim 5 comprising independent means connected to the rear of said bar for operating said head about said pivotal connection.

7. An automaton comprising a head having a neck having a downwardly facing cam follower fixed in said neck, a cooperating body having a cam fixed thereto, said cam having a cooperating upwardly facing cam surface, a shaft for rotating said head, and means for operating said shaft to cause said head to nod under action of said cam and cam follower.

8. An automaton comprising a head having a vertical shaft, means supporting said shaft for rocking movement on a vertical axis, a motor and gear train unit having a horizontal slow speed shaft, a cam on said slow speed shaft, a rectilinear reciprocating cam follower therefor, a screw portion on said cam follower, said vertical shaft having a laterally extending plate having a slot in which said screw portion slideably fits, and a bearing in said base rotatably supporting said plate.

9. An automaton according to claim 8, said cam follower having opposed operating portions at opposite sides of said cam, said head tending to operate said cam follower, and a friction drag on said cam follower preventing said head from operating said follower except under control of said cam.

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LE ROY W. WALLACE.

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