

June 16, 1953

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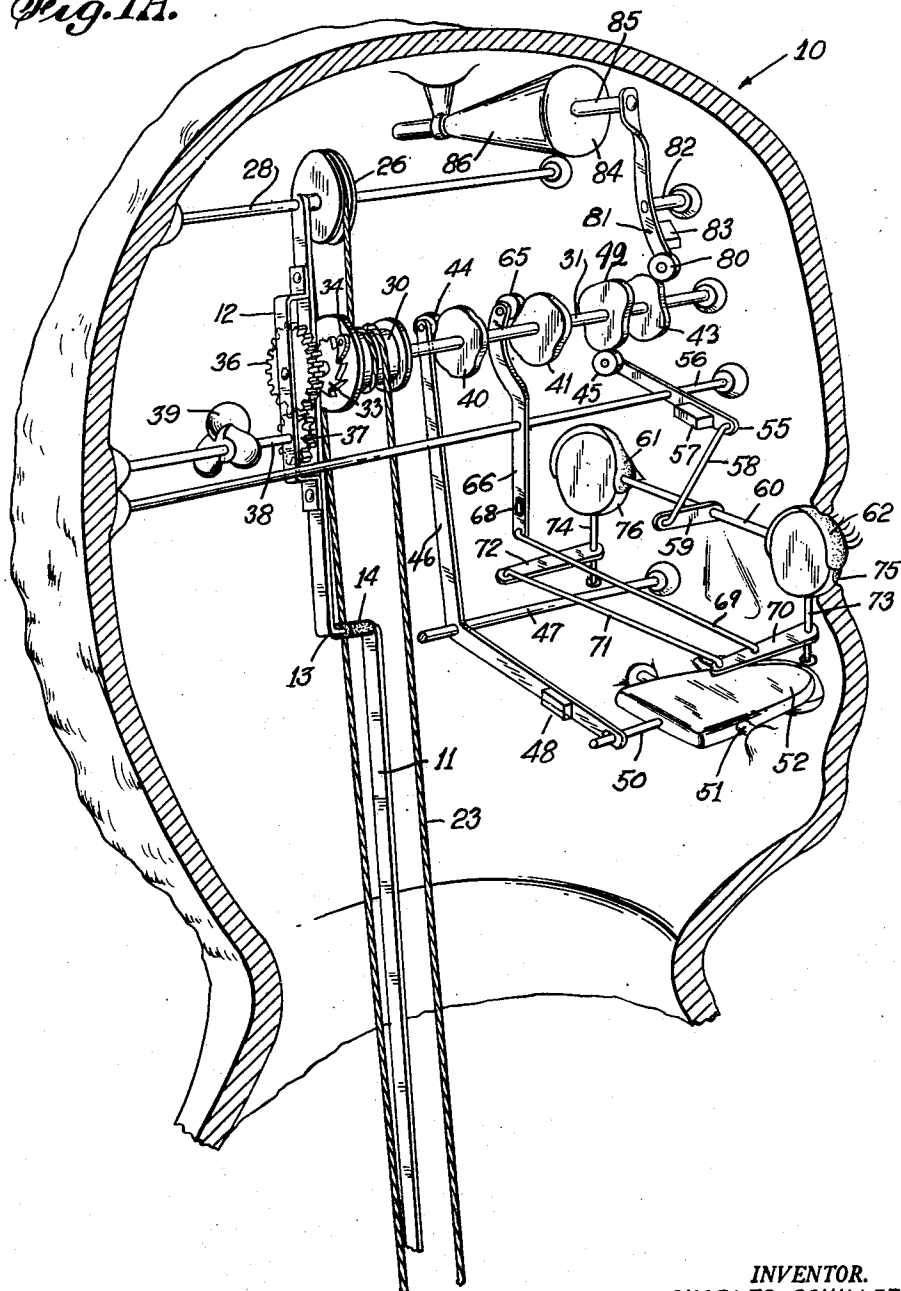
2,641,866

GRAVITY-ACTUATED MOVABLE DOLL

Filed Aug. 30, 1951

2 Sheets-Sheet 1

Fig. 1A.



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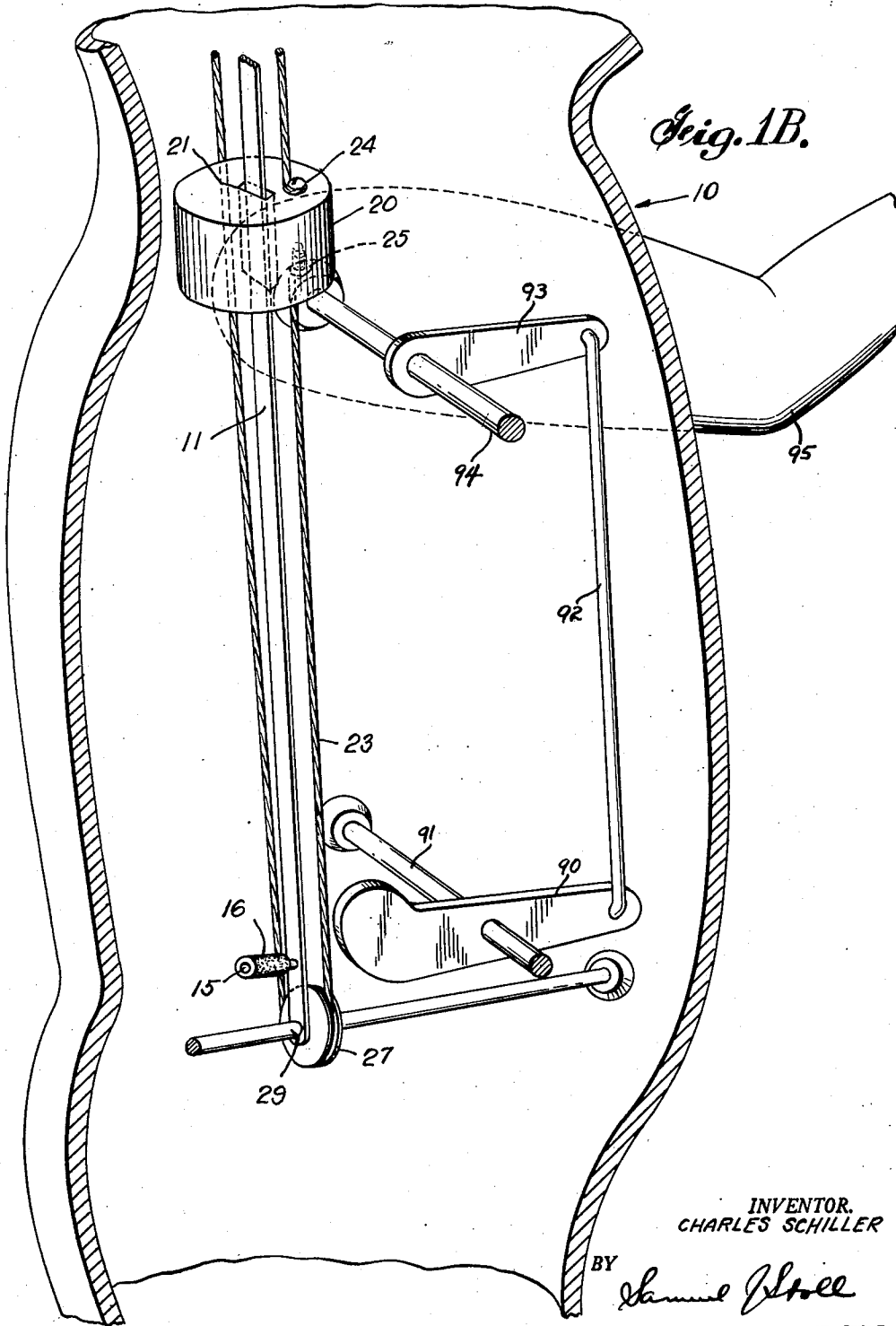
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2,641,866

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Filed Aug. 30, 1951

2 Sheets-Sheet 2



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2,641,866

GRAVITY-ACTUATED MOVABLE DOLL

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Application August 30, 1951, Serial No. 244,356

5 Claims. (Cl. 46—120)

1

This invention relates to a toy doll having movable parts, such as limbs, tongue, eyeballs and eyelids, and to a gravity actuated mechanism for moving said parts.

Toy dolls having movable parts and clock-spring motors to actuate said parts are well known to the prior art. In each case it is necessary to wind the motor manually, as by means of a key. In some toy dolls of this general character, a limb is connected to the clock-spring motor in such manner that turning the limb winds the motor. The duration of the action is extremely short in the case of every such doll. A single winding will put the mechanism in operation for a period measured in seconds and rarely if ever does the action continue for as long as a minute.

Another action-type of doll known to the prior art makes use of a pendulum to move some of its parts and particularly its eyelids. The pendulum may also be connected to a sound producing mechanism. When the doll is tilted in one direction, the pendulum acts upon the eyelids to cause them to cover the eyeballs in simulation of a sleeping condition. When the doll is tilted in the opposite direction, the pendulum acts upon the sound producing mechanism to produce a sound simulating a human voice. But here too the action produced by the swinging pendulum is of very short duration and indeed it lasts only as long as it takes the pendulum to swing from one position to another a total angular distance of approximately 90°, more or less. The action stops when the pendulum stops.

The principal object of the present invention is the provision of a toy doll having movable parts and a mechanism to move said parts for a relatively long period of time measured in minutes rather than in seconds. A toy doll made in accordance with the preferred form of the invention shown in the drawing is capable of continuous operation for a period of twenty minutes.

It is a corollary object of this invention to provide a prolonged action-type of doll of the character herein described, wherein the operating mechanism may be wound or loaded instantaneously, either to start the action or to prolong it.

The toy doll herein claimed utilizes a weight and the attraction of gravity upon said weight as the motive power of the actuating mechanism. When the doll is turned and held in one direction, the weight drops downwardly virtually instantaneously to charge the mechanism with potential kinetic energy. When the doll is turned in the opposite direction to its opposite position, the weight again tends to drop but the rate of its

2

descent is slowed and controlled by a governor. It may take as long as twenty minutes for the weight to reach its lowermost position and during this entire period of time it expends its energy performing the work of actuating the several movable parts of the doll.

In the preferred form of this invention the weight is slidably mounted on a fixed rod which extends substantially longitudinally of the doll's body and it may extend through the neck of the doll and into its head. The weight is connected to a rotatably mounted drum by means of a cable so that when the weight moves in one direction the drum rotates in one direction and when the weight moves in the opposite direction, the drum rotates in the opposite direction. The drum is connected by means of a clutch mechanism, more specifically a ratchet mechanism, to a shaft. During the loading operation, the drum rotates freely with respect to the shaft; during the work producing operation, the shaft turns with the drum. This latter movement of the drum and shaft is held to a slow speed by means of a governor to which the shaft is geared. A plurality of vanes mounted on a shaft, more specifically a fan or impeller, may be used as the governor.

The movable parts of the doll, particularly its eyelids, eyeballs and tongue are pivotally mounted for movement in the desired directions. Cams are provided on the shaft to which the drum is connected and these cams are connected by means of cam followers and suitable linkages to the pivotally mounted eyelids, eyeballs and tongue. When the shaft rotates slowly during the action phase of the cycle, the cams act upon the cam followers and through the linkages to impart movement to said pivotally mounted eyelids, eyeballs and tongue. The same mechanism may also be connected to the arms or legs or both to the arms and legs of the doll. Said mechanism may also be connected to a sound producing mechanism to produce sounds simulating the voice and cries of a human being.

A preferred form of this invention is shown in the accompanying drawing in which Figs. 1A and 1B should be held and read together, Fig. 1A above Fig. 1B. Both figures are vertical sections through a doll made in accordance with the present invention. Fig. 1A is a section through the head of the doll and Fig. 1B is a section through its torso. In both figures the operative mechanism herein described and claimed is shown somewhat diagrammatically, in perspective.

The doll 10 shown in the drawing is illustrative of the many dolls in which the mechanism of the

3

present invention may be installed. Bar 11 and bracket 12 constitute the framework which supports the mechanism of the invention. Bar 11 extends substantially longitudinally of the doll and it may reach from a point adjacent the top of the doll's head, referring to the cranial cavity, to a point adjacent the base of the spine. A portion 13 of bar 11 is bent at right angles to the bar to serve as a stop member for the weight herein-after mentioned and a rubber band 14 is mounted on said bent portion 13 to serve as a bumper with respect to said weight. A pin 15 is affixed to the lower end of bar 11 and a rubber tube 16 is mounted on said pin for the same purpose, namely, to serve as a bumper for the weight.

Weight 20 has a rectangular hole 21 formed therein to accommodate bar 11. It is by virtue of said hole that the weight is slidably mounted on said bar for longitudinal movement in either direction thereon. The range of movement of the weight is limited at one end by bumper 14 mounted on bent portion 13 of the bar and it is limited at the opposite end by bumper 16 mounted on pin 15. It will be noted that bar 11 is rectangular in cross-section, corresponding to the rectangular cross-sectional shape of hole 21 in said weight 20. Freedom of longitudinal movement of said weight on said bar is thereby provided for but rotary or angular movement of said weight on said bar is thereby prevented.

A cable 23 is attached at one end to one side of weight 20 by means of a screw 24 or other suitable fastening means and said cable is attached at its opposite end to the opposite side of the weight by means of screw 25. The cable is looped around a pulley 26 at one end of bar 11 and it is looped around a second pulley 27 at the opposite end of said bar. These two pulleys are mounted for rotary movement, pulley 26 on shaft 28, and pulley 27 on shaft 29. The ends of these two shafts are supported by or journaled into annular bosses molded into the shell which comprises the head and torso of the doll. This is also true of all of the other shafts hereinafter mentioned. The cable is also looped several times around a drum 30. Drum 30 is mounted on a shaft 31 which is normal to the longitudinal axis of bar 11. This shaft is supported for rotary movement by that portion of bar 11 which lies above bent portion 13 and by bracket 12 above mentioned. The drum is freely rotatable on the shaft and it will be understood from the arrangement of parts thus far described that when the weight is moved in one direction along bar 11, the cable to which it is attached will cause the drum to rotate in a given direction, and when the weight is moved in the opposite direction along bar 11, the cable will cause the drum to rotate in the opposite direction.

Fixedly mounted on shaft 31 is a ratchet wheel 33 and pivotally mounted on drum 30 is a pawl 34. This pawl is situated for engagement with the ratchet wheel and it moves in a planetary path circumferentially of the ratchet wheel when the drum rotates in response to the longitudinal movement of the weight. When the drum rotates in one direction, the pawl will have no effect upon the position of the ratchet wheel but when the drum rotates in the opposite direction, the pawl will engage the teeth of the ratchet wheel and cause said ratchet wheel to rotate with the drum. Other clutches may substitute for the ratchet.

A train of speed increasing gears is connected to shaft 31 and illustrating this train of gears is gear wheel 36 fixed to shaft 31 and pinion 37 fixed to shaft 38. Shaft 38 is rotatably supported

4

by bar 11 and bracket 12. Also affixed to shaft 38 is a fan 39 which serves as the governor of the mechanism herein described and claimed. It will be understood from this arrangement of parts that when weight 20 moves in the direction of discharge of energy, shaft 31 is caused to rotate and to drive shaft 38 through gears 36 and 37. Shaft 38 will turn at a higher rate of speed than shaft 31 and the fan will rotate at a speed corresponding to the speed of shaft 38. The fan blades will beat the air and resistance to rotation of the fan and all of the rotating parts connected to the fan will thereby result, enabling the fan to serve as a governor.

Fixedly mounted on shaft 31 are cams 40, 41, 42 and 43 respectively. These cams actuate the movable parts of the doll through suitable cam followers and linkages. A cam follower 44 engages cam 40. Cam follower 44 is mounted on a rocker 46 which is supported by a pivot or shaft 47. The pivot is either fixed or journaled in the very structure which comprises the doll's head. This is also true of all of the other pivots or shafts to which the cam followers hereinafter mentioned are connected.

A weight 48 on rocker 46, tends to hold cam follower 44 in engagement with cam 40. Rocker 46 is connected to a rod 50 and said rod is attached to tongue 52 of the doll which is pivotally mounted on pivot 51. When shaft 31 is caused to rotate by the driving means above described, cam 40 will rotate with it and act upon cam follower 44 to cause the rocker to rock. Since the rocker is linked to rod 50, said rod will thereby be caused to oscillate and with it the tongue.

Cam follower 45 is mounted on a second rocker 55 and said rocker is supported by shaft 56. A weight 57 on rocker 55 tends to hold cam follower 45 in engagement with cam 42 and hence said rocker will be caused to rock on shaft 56 when said cam rotates with shaft 31. Rocker 55 is connected by means of a link 58 and what may be described as a crank or torque arm 59 to a shaft 60. This shaft is mounted for angular movement about its own longitudinal axis and it will be noted that said shaft 60 supports the eyelids 61 and 62 of the doll. Hence the rocking motion of rocker 55 will cause shaft 60 and eyelids 61 and 62 to oscillate.

A cam follower 65 rides on cam 41 and it will be seen that said cam follower is supported by a third rocker 66. This rocker is mounted on shaft 56 and a weight 68 on said rocker tends to maintain cam follower 65 in engagement with cam 41. Rocker 66 is connected by means of link 69 to a pivotally mounted bar 70 and said bar is connected by means of link 71 to a parallel pivotally mounted bar 72. Pivots or shafts 73 and 74 respectively support bars 70 and 72 and they also support eyeballs 75 and 76 of the doll. Oscillatory movement of rocker 66 will produce a corresponding oscillatory movement of bars 70 and 72 and of eyeballs 75 and 76.

A fourth cam follower 80 engages cam 43 and it will be seen that said cam follower is carried by a rocker 81. This rocker is mounted on pivot 82 and a weight 83 on said rocker acts to hold cam follower 80 in engagement with cam 43. Rocker 81 is attached to a diaphragm 84 by means of a link 85. This diaphragm forms part of a sound producing mechanism 86 of conventional design. When rocker 81 rocks by reason of the engagement of cam follower 80 with cam 43, the diaphragm 84 will produce currents of air which will cause the reed in said sound producing mechanism

nism to vibrate and sound will thereby be produced.

A lever or rocker 90 mounted on shaft 91 projects into the path of weight 20 and when the weight engages said lever it causes the lever to tilt on its said shaft. A link 92 connects lever 90 to a crank arm 93 which is connected to a shaft 94. Secured to shaft 94 are the arms of the doll, only one of which, left arm 95, is shown. When lever 90 tilts in response to the action of weight 20 thereon, shaft 94 will be caused to turn on its longitudinal axis and the doll's arms will pivot upwardly.

The foregoing is illustrative of the broad principles of the invention and it will be understood that variations and modifications may be incorporated therein within the wide scope and broad spirit of the invention.

I claim:

1. A toy doll of the character described having movable parts and a mechanism for moving said movable parts, said mechanism comprising a weight mounted in said doll for longitudinal movement therein in either direction, a cable connected to said weight, a rotatably mounted drum connected to said cable, whereby movement of the weight in one direction causes the drum to rotate in one direction and movement of the weight in the opposite direction causes the drum to rotate in the opposite direction, a rotatably mounted shaft, a clutch connecting said drum to said shaft to cause rotation of said shaft when the drum rotates in one direction, said drum having no influence upon said shaft through said clutch when the drum rotates in the opposite direction, a plurality of cams fixed to said shaft, a plurality of cam followers mounted for engagement with said cams, and linkages connecting said cam followers to said movable parts of the doll.

2. A toy doll of the character described, having movable parts and a mechanism for moving said movable parts, said mechanism comprising a weight slidably mounted in said doll for longitudinal movement therein both upwardly and downwardly, a cable connected at one end to the lower end of the weight and connected at its opposite end to the upper end of the weight, a pulley situated at the lower end of travel of the weight, a drum rotatably mounted at the upper end of travel of the weight, said cable being looped around both the pulley and the drum in such manner that movement of the weight in down-

ward direction causes the drum to rotate in one direction and movement of the weight in upward direction causes the drum to rotate in the opposite direction, a rotatably mounted shaft, a clutch connecting said drum to said shaft to cause rotation of the shaft when the drum rotates in its first mentioned direction of rotation, said clutch being adapted to slip with respect to the shaft when the drum rotates in the opposite direction, a plurality of cams fixed to said shaft, a plurality of cam followers mounted for engagement with said cams and linkages connecting said cam followers to said movable parts of the doll, said shaft being connected to a plurality of speed increasing gears and said speed increasing gears being connected to a fan which beats the air in the doll when the shaft rotates to act as a governor with respect to the speed of rotation of the shaft.

3. A toy doll in accordance with claim 2, wherein the clutch which connects the drum to the shaft comprises a pawl mounted on said drum and a ratchet wheel fixed to said shaft, said pawl being oriented to engage the ratchet wheel and turn the same when the drum rotates in one direction and to slip along the ratchet wheel when the drum rotates in the opposite direction.

4. A toy doll in accordance with claim 2, wherein the cam followers are each mounted on one end of a rocker and the opposite end of the rocker is linked to a movable part of the doll.

5. A toy doll in accordance with claim 2, wherein each of the movable parts of the doll is mounted for pivotal movement on said doll and a rocker is provided which is linked at one end to each said pivotally mounted part of the doll and which supports at its opposite end the cam follower which actuates said pivotally mounted part of the doll.

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