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FIGURE MOVING ARTICLE

This invention relates to a figure moving article, and more particularly to a figure moving article which carries out bending motion upon detection of external stimulus such as light, sound, infrared rays or the like.

A conventional figure moving article generally takes an appearance of, for example, a flower or the like and is typically used for interior decoration. Such a conventional figure moving article is so constructed that when a sound sensor detects sound of a predetermined level or more such as the voice of a viewer talking to the article, hand clapping, background music or the like, a switch is turned on to drive a motor through a power supply. The so-actuated motor causes a core element serving as an actuation member to be rotated, resulting in a cover member which has an appearance in imitation of, for example, a flower, and in which the core element is loosely fitted, being moved in a meandering manner with the rotation of the core element.

Also, in the conventional figure moving article, the disappearance of sound (detected by the sensor) causes the driving of the motor to be immediately stopped.

A figure moving article according to the present invention includes an envelope formed of a flexible material; a bending structure received in the envelope and actuated to cause the envelope to carry out bending motion; a motor received in the envelope and operatively connected to the bending structure to actuate the bending structure; and a



drive circuit for driving said motor. The bending structure is operatively connected to the envelope so as to transmit the actuation of the bending structure to the envelope, resulting in the article exhibiting bending movement.

The figure moving article may include an envelope formed of a flexible material in a cylindrical shape ; a motor; a base by which the motor is mounted; a drive circuit electrically connected to the motor to drive the motor; a rotation member operatively connected to the motor so as to be rotated with the driving of the motor; an oscillation member supported above the base to be pivotally movable and operatively connected to the rotation member so as to be pivotally moved depending upon the rotation of the rotation member; an envelope support member arranged above the oscillation member in a manner to be movable in relation to the oscillation member and operably connected to the envelope to transmit the pivotal movement of the oscillation member thereto, to thereby cause the envelope to carry out bending motion; a sensor for detecting external stimulus; a sensor switch connected between the sensor and the drive circuit so as to be actuated depending upon the external stimulus detected by the sensor; and a posture detecting switch for detecting a predetermined position of the oscillation member. The posture detecting switch is connected to the sensor switch and drive circuit to cause the drive circuit to drive the motor, once the motor has started and even when the sensor detects no external stimulus, until the posture detecting switch detects the predetermined position of the oscillation member. Preferably, the predetermined stopped position is with the oscillation member in an upstanding position so that the envelope is not bent. The figure moving article also includes a spring interposed between the oscillation member and the support member so as to

exert elastic force in directions separating the oscillation member and support member from each other. The envelope receives the above-described respective components therein.

The figure moving article may further include a ball joint for operatively connecting the oscillation member and support member to each other.

The drive circuit for the figure moving article driven by a motor arranged therein, which motor includes a drive coil, includes a drive switch for supplying electric power from a power supply to the motor when the sensor switch is turned on; a short-circuit switch for short-circuiting the drive coil of the motor; the sensor for detecting external stimulus; the posture detecting switch for detecting a predetermined position of the figure moving article; and a selection circuit for turning on the drive switch to drive the motor when the sensor detects the external stimulus to turn on the sensor switch, and for turning off the drive switch and turning on the short-circuit switch to cause the drive coil of the motor to be discharged when the posture detecting switch detects the predetermined position of the figure moving article.

The figure moving article of the present invention may accomplish unique and unexpected movement upon detection of external stimulus and may remain stationary when it does not detect the stimulus.

The present invention may provide a figure moving article which is capable of permitting a figure to carry out bending motion, resulting in a viewer taking much interest and surprise.



The present invention may provide a figure moving article which is capable of returning to a posture which is not bent whenever the external stimulus is stopped.

The present invention may provide a figure moving article having a drive circuit which is capable of causing a motor to act as a brake to stop the motor with accuracy at a predetermined position of the article.

For a fuller understanding of the invention, reference is had to the following description taken in connection with the accompanying drawings in which like reference numerals designate like or corresponding part throughout, wherein:

FIGURE 1 is a vertical sectional view showing an embodiment of a figure moving article according to the present invention;

FIGURE 2 is an exploded perspective view showing a bending structure incorporated in the figure moving article shown in Fig.1;

FIGURES 3A to 3C each are a schematic perspective view showing the manner of bending movement of the figure moving article shown in Fig.1;

FIGURE 4 is a circuit diagram showing a drive circuit incorporated in the figure moving article shown in Fig.1;

FIGURE 5 is a perspective view of the figure moving article showing in Fig.1 to which accessories are attached;

FIGURE 6 is a fragmentary schematic view partly in section showing a modification of a reduction gear mechanism arranged between a motor and a bending structure in the figure moving article shown in Fig.1;

FIGURE 7 is a schematic diagrammatic view of the gear mechanism shown in Fig.6;

FIGURE 8 is an exploded perspective view showing another embodiment of a figure moving article according to the present invention;

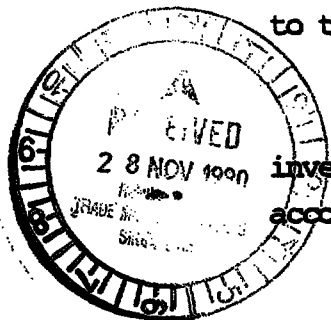
FIGURE 9 is a vertical sectional view of the figure moving article shown in Fig.8;

FIGURES 10A to 10C each are a schematic perspective view showing the manner of bending movement of the figure moving article shown in Fig.8;

FIGURE 11 is a circuit diagram showing another drive circuit suitable for use for a figure moving article according to the present invention;

FIGURE 12 is a wave form chart showing the operation of the drive circuit of Fig.11; and

FIGURE 13 is a circuit diagram showing a further drive circuit suitable for use for a figure moving article according to the present invention.



Now, a figure moving article according to the present invention will be described hereinafter with reference to the accompanying drawings.

Figs.1 to 3 illustrate an embodiment of a figure moving article according to the present invention.

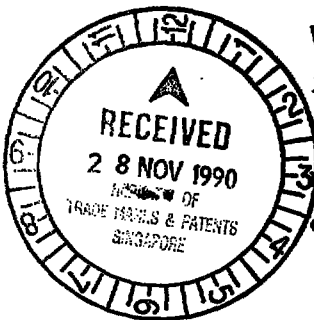
A figure moving article of the illustrated embodiment generally designated at reference numeral 20 includes a container 22 formed into a cylindrical shape. The container 22 is formed in imitation of a beer can. The container 22 includes a bottom 24, an envelope 26 which constitutes the peripheral side wall of the container, and a top 28. Within the envelope 26 is contained a receptacle 30 in which a power supply 32 such as a dry cell or the like is received. The receptacle 30 is placed on the bottom 24 so as to replaceably receive the power supply 32 therein. For this purpose, the bottom 24 is formed so that a part thereof may be openable. Also, on the bottom 24 are mounted a main switch 34 and a sound sensor 36, part of a drive circuit described hereinafter. The main switch 34 includes an operation lever 38 arranged in a manner to outwardly project through the bottom 24, through which the main switch 34 is operated for actuation of the figure moving article.

Also, within the envelope 26 is securely mounted a box-like casing 40, which is arranged on the receptacle 30. In the illustrated embodiment, the casing 40 may be considered to constitute a base. In the casing 40 are received a motor 42 and a reduction gear mechanism 44 including a spur gear, a reduction gear comprising a worm and a worm gear, and an over-load cutout friction clutch.

The gear mechanism 44 also includes an output shaft 46 arranged so as to extend upwardly through the top wall of the casing 40. On the portion of the output shaft 46 projecting from the casing 40 is mounted a cam 48 acting as a rotation

member, which is provided on the upper surface thereof with an eccentric drive pin 50 in a manner to upwardly extend therefrom. The casing 40 is provided on both sides of the upper portion of the side wall thereof with fixing pins 52 outwardly extending through the casing 40. Above the casing 40 is arranged an oscillation member 54, which includes a pair of leg portions 56 arranged so as to straddle the upper portion of the casing 40 and a connection portion 58 extending between the leg portions 56. The leg portions 56 each are formed at the lower portion thereof with a through-hole 60 through which each of the fixing pins 52 is loosely inserted, so that the oscillation member 54 may be pivotally moved about the fixing pins 52 with respect to the casing 40. The connection portion 58 is formed on the lower surface thereof with an elongated recess 62 so as to extend in the longitudinal direction thereof, in which the above-described eccentric drive pin 52 of the cam 48 is received.

In such arrangement of the cam 48 and oscillation member 54, the rotation of the cam 48 in a direction indicated at an arrow 64 in Fig.2 causes the oscillation member 54 to be pivotally moved about the fixing pins 52 in directions indicated at arrows 66. The oscillation member 54 is provided thereon with a cylindrical member 68. In the illustrated embodiment the cylindrical member 68 is formed integral with the oscillation member 54. The cylindrical member 68 is provided on the outer periphery of the upper portion thereof with an annular projection 70 laterally extending therefrom. Within the cylindrical member 68 is arranged a projection 72 in a manner to be substantially concentric with the cylindrical member 68 and extend in the axial direction of the member 68, which projection is formed with a blind hole 74 open at the upper surface of the cylindrical member 68 and



extending in the axial direction thereof.

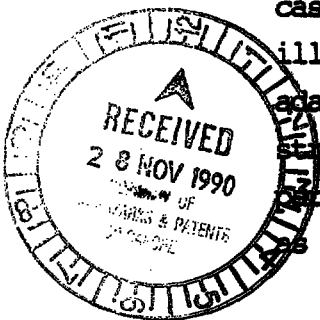
Further, within the envelope 26 is fittedly arranged a support member 76 in the form of a cover in a manner to be positioned between the top 28 and the oscillation member 54. The support member 76 is adapted to be engaged with the envelope 26 to support it and transmit the actuation of the support member 76 to the envelope as described below. In the illustrated embodiment, it is engaged with the periphery of the envelope and, for this purpose, it is formed into a circular shape of substantially the same diameter as the envelope 26. Thus, the support member 76 is engaged at the overall periphery thereof with the envelope which constitutes the side wall of the container 22. Between the support member 76 and the oscillation member 54 is interposed a coiled spring 78 in such a manner that a part thereof is received in the cylindrical member 68 and fitted on the projection 72, resulting in constantly urging the support member 76 and the oscillation member 54 in directions separating them from each other. The support member 76 is provided at the central portion of the lower surface thereof with a guide pin 80 downwardly extending therefrom so as to be inserted into the blind hole 74 of the projection 72. Also, the support member 76 is provided on the lower surface thereof with a plurality of elongated projections 82, which downwardly extend therefrom and which are annularly spaced from each other so as to surround the cylindrical member 68. The projections 82 each are formed at the distal end thereof with a claw 84 in a manner to inwardly project therefrom, which claw is adapted to be engaged with the annular projection 70 of the cylindrical member 68, so that the support member 76, constantly upwardly urged by the coiled spring 78, is prevented from being released or disengaged from the cylindrical member 68. Thus,

it will be noted that the support member 76 is arranged in a manner to be elastically movable with respect to the oscillation member 54 while holding the engagement with the oscillation member 54.

Thus, a bending structure is provided which is actuated by the motor and transmits the actuation of the bending structure to the envelope to cause it to carry out bending movement or motion.

For this purpose, the envelope 26 is formed of a flexible material such as a flexible plastic sheet. The envelope 26 is engagedly connected to the support member 76 by adhesion or bonding in a manner to somewhat compress the coiled spring 78, resulting in the figure moving article 20 of the illustrated embodiment normally exhibiting such an appearance as shown in Fig.1 because the envelope is under tension. In the illustrated embodiment, the upper end of the envelope 26 is inwardly turned so as to be positioned inside the support member 76 and the top 28 is securely put on.

The figure moving article 20 of the illustrated embodiment may include a posture detecting switch 86 which constitutes part of the drive circuit and is provided on the casing 40 for detecting a predetermined position of the figure moving article. In the illustrated embodiment, the posture detecting switch 86 is arranged on the outer surface of the casing 40 opposite the outer periphery of the cam 48. In the illustrated embodiment, the posture detecting switch 86 is adapted to detect the angle of inclination of the bending structure and therefore the figure moving article 20. More particularly, the posture detecting switch 86 is arranged so as to turn on when the article 20 is in the bent position



shown in Figs.3B and 3C (other than the erect position shown in Figs.1 and 3A) and turn off when it is in the erect position. Designated at reference numeral 88 is a circuit forming a part of the drive circuit.

Fig.4 shows the drive circuit for driving the motor 42, wherein the sensor switch 90 is adapted to be turned on depending upon the output of the sound sensor or microphone 36. The sensor switch 90 is connected in series to the circuit 88, power supply 32 and main switch 34.

Now, the manner of operation of the figure moving article of the illustrated embodiment constructed as described above will be described hereinafter with reference to Figs.1 to 5.

The figure moving article formed in imitation of a beer can is initially in an erect or normal, not bent, configuration as shown in Fig.3A, whenever the main switch 34 is turned on through the operation lever 38. After the main switch 34 is turned on when the sound sensor or microphone 36 detects sound of a predetermined level or more, such as hand clapping, music, voice talking to the article or the like, the sensor switch 90 turns on to cause electric power to be supplied from the power supply 32 to the drive circuit. This causes the motor 42 to be driven to rotate the rotation member or cam 48 through the gear mechanism 44, leading to rotation of the drive pin 50 in the recess 62, so that the oscillation member 54 may be pivotally moved about the support pins 52. This results in the figure moving article or beer can 20 being deformed in one direction from the erect position shown in Fig.3A to a bent position shown in Fig.3B or 3C, returned to the erect position shown in Fig.3A and then deformed in the

opposite direction to the bent position shown in Fig.3C or 3B. Such bending motion of the can 20 is continued while the sound is continuously detected.

If the position of the figure moving can 20 is erect when the detection of the sound is interrupted, the posture detecting switch 86 is kept turned off, so that the supply of electric power from the power supply 32 to the drive circuit is stopped, resulting in the movement of the can 20 being stopped. On the contrary, if the can 20 is in the bent position when the detection of the sound is interrupted, the posture detecting switch 86 is kept turned on until the oscillation member 54 is pivotally moved to the predetermined, not bent, position even though the sensor switch 90 is turned off, so that the can 20 is moved to the erect position shown in Fig.3A, at which the movement of the can is stopped. This results in the envelope 26 of the can 20 being left not bent and placed under tension to give a configuration or appearance natural to a beverage can.

In the figure moving article of the illustrated embodiment, reference numeral 92 designates accessories formed in imitation of glasses and headphones, which are detachably mounted on the outer periphery of the top 28 by means of holders 94, as shown in Fig.5.

Figs.6 and 7 show a modification of the gear mechanism 44 incorporated in the figure moving article 20 of the illustrated embodiment. A gear mechanism 44 shown in Figs.6 and 7 includes a pinion 96 mounted on an output shaft 98 of the motor 42, a first gear 100 mounted on a support shaft 102 and engaged with the pinion 96, a second gear 104 provided integral with and coaxial with the first gear 100, a third

gear 106 engaged with the second gear 104, a fourth gear 108 formed integral with the third gear 106, a fifth gear 110 engaged with the fourth gear 108, a sixth gear 112 provided integral with the fifth gear 110, a seventh gear 114 engaged with the sixth gear 112, a first bevel gear 116 rotated with the seventh gear 114, and a second bevel gear 118 mounted on an output shaft 46 of the gear mechanism 44. When the motor 42 is driven, the rotation of the motor 42 is transmitted through the so-constructed gear mechanism 44 to the output shaft 46 to rotate the cam 48, resulting in the drive pin 50 being eccentrically rotated. This results in the oscillation member 54 being pivotally moved, leading to actuation of the posture detecting switch 86.

The figure moving article of the illustrated embodiment is adapted to detect sound. Alternatively it could have a sensor for detecting external stimulus other than sound such as static electricity, light, pressure, infrared rays, smell, temperature or the like. For example, a pressure sensor may be used which is adapted to detect the weight of a person approaching the figure moving article. Also, the figure moving article of the embodiment is made so as to have an envelope in imitation of a beverage can, however, it may be formed in imitation of a doll, a bottle, a monstrous beast or the like.

As can be seen from the foregoing, the figure moving article of the illustrated embodiment is constructed so as to be kept stationary when the sensor does not detect external stimulus, resulting in exhibiting a stationary, non-bent configuration. When the article detects external stimulus, it carries out deformation or bending motion, to thereby cause a viewer to take much interest and surprise and an impression of

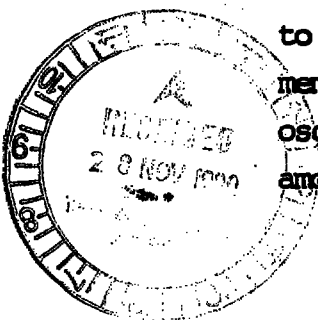
communication to be created between the viewer and the article. Also, the arrangement of the posture detecting switch in the article permits the article to assume a normal, not bent, configuration for the article whenever the article does not detect external stimulus, because it causes the article to be kept erect and the envelope elastically stretched.

Figs.8 to 10 show another embodiment of a figure moving article according to the present invention.

A figure moving article of the illustrated embodiment is constructed so as to more smoothly exhibit bending motion.

In the embodiment described above with reference to Figs.1 to 7, the support member is apt to apply excessive or immoderate force to the envelope which constitutes the side wall of the container, so that there is a possibility that the envelope is subject to an inelastic stretch, resulting in sagging, because it is made of a flexible material. Also, this may cause separation of the envelope from the support member or the breakage of the envelope. Also, the arrangement of the spring between the support member and the oscillation member often fails to sufficiently transmit the pivotal movement of the oscillation member to the support member.

In the figure moving article shown in Figs.8 to 10, the connection between an oscillation member and a support member is improved to prevent unreasonable force from being applied to the envelope and ensure natural movement of the support member to satisfactorily transmit the pivotal movement of the oscillation member to the support member to increase the amount of movement of the figure.



The figure moving article of the illustrated embodiment is formed in imitation of a beverage can and comprises a bottom 24, an envelope 26 which constitutes a side wall of a container and a top 28. The envelope is made of a flexible material such as a flexible vinyl resin sheet. Within the envelope 26 are contained a casing 40 serving as a base, an oscillation member 54, a coiled spring 78 and a support member 76 of a substantially cylindrical shape, which may be arranged in substantially the same manner as those in the embodiment described above. Between the oscillation member 54 and the support member 76 is arranged a ball joint 120 for operatively connecting the two members to one another.

Within the envelope 26 is contained a receptacle 30 in which a power supply (not shown) such as a dry cell or the like is received. The receptacle 30 is placed on the bottom 24 so as to replaceably receive the power supply 32 therein. For this purpose, the envelope 26 is inwardly turned at the lower end thereof to form an inward flange 122 on which the receptacle 30 is placed and the bottom 24 is formed so that a part 124 thereof may be openable. The receptacle is fixed on the flange 122 by means of screws 126 inserted through the bottom 24. In the illustrated embodiment, the receptacle 30 may be formed integral with the casing 40.

On the casing 40 is mounted a sensor 36 which is adapted to detect external stimulus such as light, sound, infrared rays or the like to actuate a sensor switch (not shown) of a circuit arranged substantially in the casing 40. The sensor 36 is externally projected through a through-hole 128 when the casing 40 is positioned in the envelope 26. Also, in the casing 40 are arranged a motor (not shown) driven when electric power is supplied from the power supply through the

sensor switch thereto, a reduction gear mechanism (not shown) operatively connected to the motor and including an output shaft (not shown) on which a rotation member or cam 48 is mounted. Reference numeral 52 designates support pins outwardly projected through the casing 40. Such components may be constructed in substantially the same manner as those in the above-described embodiment. The rotation member or cam 48 includes an eccentric drive pin 50.

The oscillation member 54 includes a pair of leg portions 56 and a connection portion 58 interposed between the leg portions 56 so as to connect both together. On the connection portion 58 is arranged a cylindrical member 68 serving as a spring receiver. The connection portion 58 is formed on the lower surface thereof with an elongated recess 62 in a manner to be positioned in the cylindrical member 68. The leg portions 56 each are formed with a through-hole 60 through which the support pin 52 is fitted to support the oscillation member 54 on the casing 40 in a manner to be pivotally movable about the support pins 52. In the recess 62 is fitted the eccentric drive pin 50 of the cam 48, so that the rotation of the cam 48 causes the oscillation member 54 to be pivotally moved about the support pins 52.

The ball joint 120 comprises a ball 130 provided at one of the oscillation member 54 and connection member 76 and a ball socket 132 provided at the other of the above two members 54 and 76. In the illustrated embodiment, the ball 130 is arranged at the oscillation member 54 and the ball socket 132 is arranged at the support member 76. More particularly, the ball 130 is mounted on the distal end of a support pin 80 fixed at the proximal end thereof on the central portion of the bottom of the cylindrical member 68 so as to upwardly

extend therefrom and the ball socket 132 is mounted on the central portion of the lower surface of the support member 76. The ball socket 132 is formed on the upper surface thereof with a plurality of holding holes 134 and the support member 76 is formed with a plurality of through-holes 136 in a manner to positionally correspond to the holding holes 134. Reference numeral 138 designates a fixture which includes a flat support section 140, on the lower surface of which is a plurality of claws or clicks 142 which downwardly extend therefrom to be fixedly inserted through the holding holes 134 and through-holes 136, to thereby fix the ball socket 132 with respect to the support member 76.

Between the support member 76 and the oscillation member 54 is interposed the coiled spring 78 for constantly urging both these members 76 and 54 in directions separating them from each other. The coiled spring 78 is so arranged that its lower portion is received in the cylindrical member 68 and its upper portion is fitted on the ball socket 132.

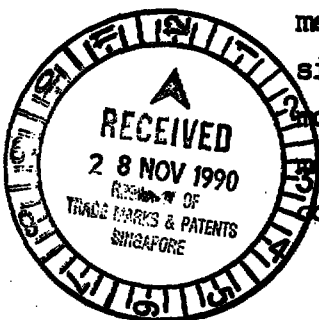
Thus, a bending structure is formed which serves to transmit the output of the motor therethrough to the envelope which constitutes the side wall of the container 22.

In the bending structure constructed as described above, the coiled spring 78 is received at the lower portion thereof in the cylindrical member 68 and then the ball 130 of the ball joint 120 is forcedly placed in the ball socket 132 mounted on the lower surface of the support member 76, to thereby connect the oscillation member 54 and support member 76 to each other and pressedly about the upper end of the coiled spring 78 against the lower surface of the support member 76.

The so-assembled bending structure is then inserted into the envelope while being integrally connected between the casing 40 and the support member 76. Then, the casing 40 is fixed with respect to the envelope 26. The envelope 26 is inwardly turned at the upper end thereof (as indicated at reference numeral 144) so that this upper end may securely enclose the upper end 145 of the annular support member 76. Thereafter, the top 28 is fitted in the support member 76, resulting in the envelope being connected to the support member 76 while being kept erect.

In the embodiment shown in Figs.8 and 9, the rotation member 48 comprises a cam as described above, and a micro switch 146 is arranged in proximity to the cam 48 and connected to the circuit in parallel with the sensor switch 90 connected to the sensor 36, resulting in a posture restoring mechanism being constructed which serves to drive the motor to restore the figure moving article to the normal erect position at a time when it is in a bent position even if it does not detect external stimulus.

In the figure moving article of Figs.8 and 9 constructed as described above, when the sensor detects external stimulus such a sound, light, infrared rays, smell, heat or the like, it actuates to turn on the sensor switch 90 to drive the motor 42. This results in the rotation member 48 being rotated, leading to pivotal movement of the oscillation member 54, which is transmitted through the ball joint 120 to the support member 76. This causes the envelope 26 which constitutes the side wall of the container 22 to repeatedly carry out bending motion, as shown in Figs.10A to 10C. During the bending motion, one side of the envelope 26 is repeatedly subject to contraction and expansion, whereas the other side is



repeatedly subject to expansion and contraction corresponding to the movement of the one side, respectively. Accordingly, the reaction of the contraction is repeatedly applied to the support member 76, however, the ball joint suitably pivotally moves, to thereby prevent excessive force from being applied to the envelope 26, so that the support member 76 may properly determine the range of movement in which it pivotally moves. This effectively prevents damage of the envelope 26 despite repeated bending movement.

Further, when the oscillation member 54 is returned to an erect position, the coiled spring 78 causes the support member 76 to be forcedly upwardly separated from the oscillation member 54, so that the figure moving article may be restored to the erect position with the envelope kept stretched.

The arrangement of the posture restoring mechanism comprising, in the illustrated embodiment, the rotation member 48 and micro switch 146 causes the driving of the motor to be continued until the figure moving article is restored to the erect position even when external stimulus is extinguished during the bending motion. Thus, a viewer would not expect the bending motion of the figure moving article when viewing the stationary article for the first time, thus the bending motion of the article in response to external stimulus causes the viewer to take much surprise.

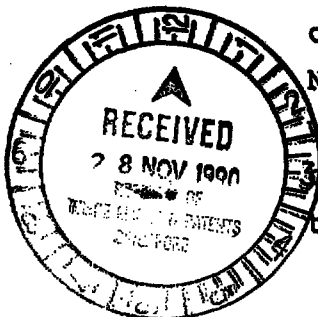
As can be seen from the foregoing, the figure moving article shown in Figs. 8 and 9 is so constructed that the ball joint 120 is interposedly arranged between the oscillation member 54 and the support member 76 and the spring 78 is likewise interposed between both of the above members to urge

the members in directions separating them from each other. Such construction permits the support member 76 to readily carry out positional variation and effectively prevents unreasonable or excessive force from being applied to the envelope with the pivotal movement of the oscillation member 54, so that the figure moving article may carry out smooth bending motion without causing any deterioration or damage of the envelope, or separation of the envelope from other parts of the container.

The remaining part of the embodiment of Figs.8 and 9 may be constructed in substantially the same manner as that shown in Figs. 1 to 7.

The drive circuit suitable for use in each of the above-described embodiments may be constructed as shown in Fig.11. A drive circuit generally indicated at reference numeral 148 in Fig.11 is adapted to cause a motor to also act as a brake when the movement of the motor is stopped due to disappearance of external stimulus, detected by a sensor, so that the figure moving article of the present invention may be stopped at a predetermined position and particularly a normal, not bent position, with accuracy.

For this purpose, the drive circuit 148 includes a sound sensor or microphone 36 which is adapted to generate an output signal upon detection of sound of a predetermined level or more, which is then supplied through a sensor switch 90 comprising an NPN-type transistor to one terminal of a first NAND circuit 150. A selection circuit 152 which may be a well-known flip-flop circuit comprising two NAND circuits crossedly connected to each other, uses a signal supplied thereto from the first NAND circuit 150 as a start signal to



turn on a drive switch 154 and uses a signal supplied thereto from a second NAND circuit 156 (described hereinafter as a reset signal) to turn on a short-circuit switch 158. Thus, the flip-flop circuit 152 acts to selectively actuate the drive switch 154 and the short-circuit switch 158.

The second NAND circuit 156 is supplied thereto through a prohibition circuit 160 a signal generated from a posture detecting switch 86 actuated by the rotation member 48 rotated in synchronism with the motor 42 and adapted to close (to turn ON) when the figure moving article is in a predetermined position. The prohibition circuit 160 may be a well-known differentiating circuit comprising a capacitor 162 and a resistor 164, and when the posture detecting switch 86 turns on the output of the second NAND circuit 156 is reversed into a low level and maintained at a low level during a time T corresponding to a time constant of the prohibition circuit 160. Consequently, for such a period of time, the first NAND circuit's 150 output is maintained at a high level and acts to prohibit a reverse action of the flip-flop circuit 152, thus keeping the motor 42 stopped, even when the first NAND circuit 150 receives a sound signal from the transistor 90. Both the drive switch 154 and the short-circuit switch 158 each may comprise a PNP-type transistor, of which the bases are connected to respective output terminals of the two NAND circuits constituting the flip-flop circuit 152.

The collector and emitter of drive switch 154 are connected to a line for supplying electric power from the power supply 32 to the motor 42, so that when a signal is supplied from the flip-flop circuit 152 to the drive switch 154, the drive switch 154 drives the motor 42. The collector and emitter of the short-circuit switch 158 are connected to

both terminals of a capacitor 166 connected in parallel with a drive coil of the motor 42. Thus, when a signal is supplied from the flip-flop circuit 152 to the base of the short-circuit switch 158, it causes the drive coil of the motor 42 to be short-circuited to discharge the drive coil, resulting in braking of the motor 42.

Now, the manner of operation of the drive circuit constructed as described above will be described hereinafter with reference to Figs. 11 and 12.

When the sound sensor or microphone 36 detects sound of a predetermined level or more while the main switch is kept turned on and the posture detecting switch 86 does not change its "ON" or "OFF" stage (i.e. the second NAND circuit's 156 output is maintained at a high level), the first NAND circuit 150 causes the flip-flop circuit 152 to be actuated. The actuated flip-flop circuit 152 then actuates the drive switch 154, resulting in the motor 42 being driven. The driving of the motor 42 causes the rotation member 48 to be rotated to turn on the posture detecting switch 86. This indicates that the figure moving article of the present invention reaches a predetermined position such as an erect position, accordingly, it is required to stop the motor 42 at this time. When the posture detecting switch 86 is thus turned on, the differentiating circuit 160 causes the output of the second NAND circuit 156 to be reversed into a low level for a period of time corresponding to a time constant T. This causes the flip-flop circuit 152 by means of the first NAND circuit 150 to interrupt the actuation of the drive switch 154 to turn on the short-circuit switch 158. The turning-on of the short-circuit switch 158 causes the drive coil of the motor 42

to be discharged, so that the motor 42 is subject to braking, resulting in being stopped.

Thus, the motor 42 acts as a brake when the figure moving article reaches a predetermined position, so that it may stop the movement of the article at the predetermined position, even when there is a variation in moment of inertia of the figure moving article or even when load applied from the envelope of the figure moving article to the motor is varied due to a variation in flexibility of the envelope caused by a variation in ambient temperature.

The time constant T, which is the reverse time of the second NAND circuit 156, is set to be longer than time required for a decrease in terminal voltage of the motor 42 to zero, once the motor is stopped. During the reverse time of the second NAND circuit 156, the flip-flop circuit 152 keeps the motor 42 stopped even when the output of the sound sensor or microphone 36 is supplied to the first NAND circuit 150. Accordingly, the bending movement of the figure moving article is temporarily prevented at such an erect position as shown in Fig.3A or 10A although the sensor detects sound. The bending motion of the article exhibits satisfactory modulation, in that the article will always stop for a short period in the erect position even if the sensor is still detecting a stimulating signal.

In the drive circuit of Fig.11, a sound sensor is used as a sensor 36. However, a sensor which detects external stimulus other than sound such as light, infrared rays, temperature, pressure, static electricity, smell, smoke or the like may be suitably used for this purpose.

The drive circuit may be constructed in such a manner as shown in Fig.13. A posture detecting switch 86 is adapted to be turned off when the figure moving article is in an erect position. When a sensor or microphone 36 detects sound of a predetermined level or more while a main switch 34 is kept closed, the figure moving article is in an erect position and the posture detecting switch is open; a transistor Q_3 is turned on to drive a motor 42, resulting in the figure moving article carrying out bending motion. The article continues the motion so long as the sound is detected. When the figure moving article is in a bent position even if the sensor 36 does not detect sound, the posture detecting switch 86 is kept turned on, so that the figure moving article continues the bending motion until it reaches the erect position. When the figure moving article reaches the erect position, the posture detecting switch 86 is turned off to interrupt the bending movement of the article.

C L A I M S

1. A figure moving article comprising an envelope formed of a flexible material, the envelope containing the following components of the figure moving article therein:

- i) a motor;
- ii) a drive circuit electrically connected to the motor to drive the motor; and

iii) a bending structure, which comprises:

- a base by which the motor is mounted;
- a rotation member operatively connected to the motor so as to be rotated on actuation of the motor;

- an oscillation member supported on the base so as to be pivotally moveable with respect to the base and operatively connected to the rotation member so as to be pivotally moved on rotation of the rotation member;

- an envelope support member arranged above the oscillation member in a manner to be moveable in relation to the oscillation member and operably connected to the envelope to transmit the pivotal movement of the oscillation member to the envelope, to thereby cause the envelope to carry out bending motion; and

- elastic means interposed between the oscillation member and the support member so as to exert elastic force in directions separating the oscillation member from the support member;

- the drive circuit comprising:

- a sensor for detecting external stimulus; and

- a sensor switch connected between the sensor and the motor so as to be actuated depending on the external stimulus detected by the sensor.

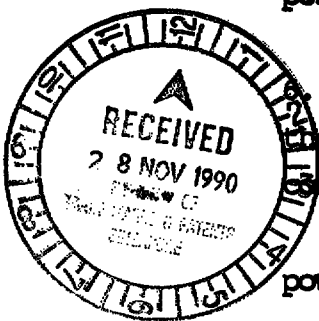


2. A figure moving article according to claim 1, wherein the rotation member is a cam which has an eccentric drive pin extending outwardly from the surface of the cam, and wherein the oscillation member is formed with an elongated recess extending in the longitudinal direction thereof in which the eccentric pin is received, so that rotation of the cam causes movement of the eccentric drive pin in the elongated recess with resulting pivotal movement of the oscillation member.

3. A figure moving article according to claim 1 or 2, wherein the elastic means comprises a spring.

4. A figure moving article according to any one of the above claims, wherein the oscillation member and the support member are operatively connected through a ball joint.

5. A figure moving article according to any one of the above claims, wherein the drive circuit further comprises a posture detecting switch for detecting a predetermined position of the oscillation member, the posture detecting switch being connected to the sensor switch and motor to cause the drive circuit to drive the motor once the motor has started and even when the sensor detects no external stimulus until the posture detecting switch detects the predetermined position of the oscillation member.



A figure moving article according to claim 5, wherein the motor includes a drive coil and the drive circuit further comprises:

a drive switch for supplying electrical power from a power supply to the motor when the sensor switch is on;



a short-circuit switch for short-circuiting the drive coil of the motor; and

a selection circuit for turning on the drive switch to drive the motor when the sensor detects the external stimulus and for turning off the drive switch and turning on the short-circuit switch to cause the drive coil of the motor to be discharged when the posture detecting switch detects the predetermined position of the oscillation member.

7. A figure moving article according to claim 6, wherein the drive circuit further comprises a prohibition circuit for prohibiting the selection circuit from selecting the sensor switch for a predetermined period of time after the short circuit switch is turned on.

8. A figure moving article according to any one of the above claims wherein the envelope is cylindrical.

9. A figure moving article according to claim 8 made in imitation of a beverage can.

10. A figure moving article according to any one of the above wherein the motor is operatively connected to the rotation member through a gear mechanism.

11. A figure moving article substantially as hereinbefore described with reference to the accompanying drawings.

