Nov. 2, 1965 R. G. SWAN 3,214,854

ANIMATED DEVICE

Filed Aug. 7, 1962

Fig. 1.

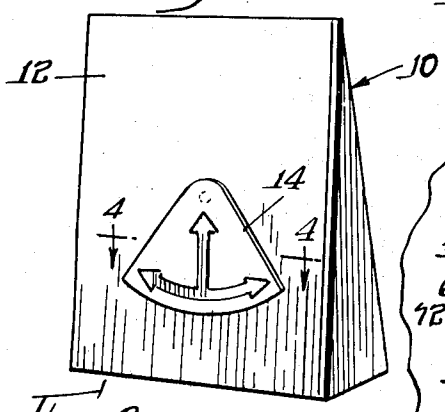


Fig. 2.

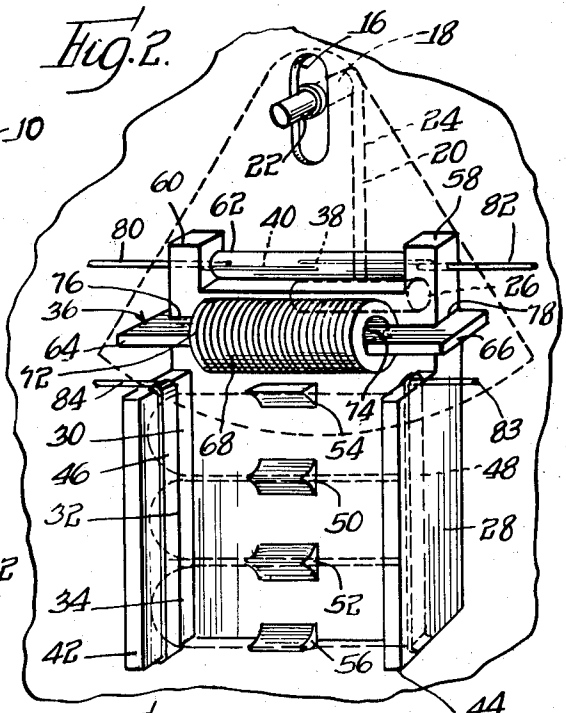


Fig. 3.

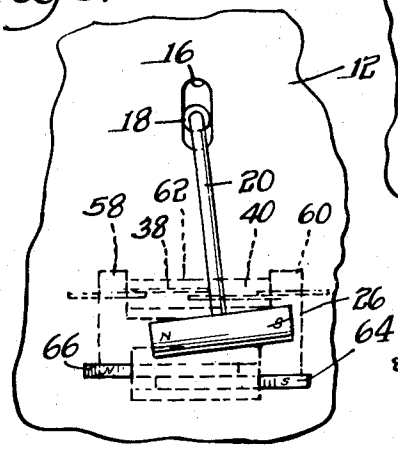


Fig. 4.

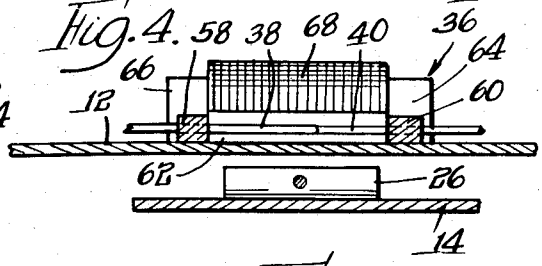


Fig. 6.

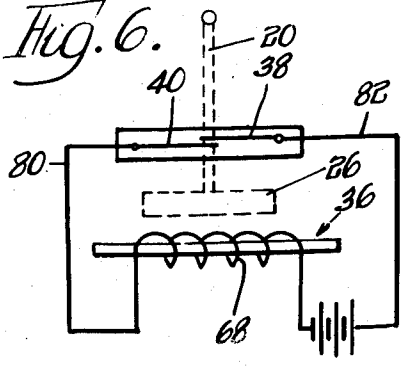
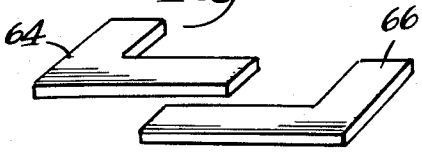


Fig. 5.



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United States Patent Office

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ANIMATED DEVICE

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Filed Aug. 7, 1962, Ser. No. 215,449

3 Claims. (Cl. 40—106.3)

This application is a continuation-in-part of my copending application, Serial No. 85,533, filed January 30, 1961, and entitled Animated Display Device, now abandoned.

This invention relates to an animated device and more particulraly to a display device which may be used as a greeting card in which the greeting card contains an animated portion.

Greeting cards generally have developed from a simple card bearing a prosaic message to cards which contain a great deal of art work and in some cases contain a spring or rubber band mechanized portion to animate a portion of the card for a single time, such as the opening of the card. It has been appreciated for some time that it would be desirable to provide a greeting card which would have an animated portion which animated portion would operate for a day or longer. It is, therefore, one of the principal objects of the hereindisclosed invention to provide an animated display device suitable for use as a greeting card in which the animated portion will operate for an extended period of time.

It is another object of the present invention to provide a greeting card having a small source of energy which operates an animated member of the greeting card.

It is a still further object of the hereindisclosed invention to provide a greeting card having an animated member which reciprocates over a substantial period of time and the energy for animating the animated member is carried on the greeting card.

It is a still further object of the hereindisclosed invention to provide an inexpensive animated device which operates over a substantial period of time.

It is also an object to provide a novel and improved animated device which utilizes a permanent magnet but requires no torque transmitting linkage between the permanent magnet and the animated element which is driven by said magnet.

It is a further object to provide an improved device of this character in which the support for the movable element can be located at any of various positions on the stationary member, and may be a pivotal or other type of flexible support.

It is another object to provide an improved device of this nature which is capable of oscillating, fluttering, or rotary motion.

It is also an object to provide an improved animated device having these characteristics, which inherently minimizes friction between the movable and stationary elements which might retard motion of the movable element.

It is a further object to provide an improved device of this type which is adapted for shipment assembled or separated into two subassemblies without danger of the batteries being discharged in transit, which may be quickly and easily assembled and which will automatically start operation upon assembly, thus eliminating the necessity of a separate on-off switch.

Other objects and uses of the instant invention will become readily apparent to those skilled in the art upon a perusal of the appended specification in light of the accompanying drawing in which:

FIGURE 1 is a perspective view of a greeting card embodying the present invention having an animated member mounted on its front portion;

FIGURE 2 is an enlarged perspective view of a portion of the back of the card shown in FIGURE 1;

FIGURE 3 is a front view of an enlarged portion of the card shown in FIGURE 1 but with the animated member removed;

FIGURE 4 is an enlarged cross-sectional view taken on line 4—4 of FIGURE 1;

FIGURE 5 is a perspective view of two poles of an electromagnet shown in FIGURE 2; and

FIGURE 6 is a circuit diagram showing the electrical connection of the various related parts and showing the position of a permanent magnet in relation to the electromagnet shown in FIGURE 2.

Referring now to the drawing, an animated greeting card **10** embodying the hereindisclosed invention generally includes a nonmagnetic flat base **12** with an animated member **14** mounted thereon, and means are provided for reciprocating the animated member **14** about a point to provide the required animation. The base contains a slot **16** which has mounted therein a bearing **18**. The bearing **18** has a support rod **20** rotatably mounted therein. The support rod **20** includes a stud **22** which is mounted in the aforementioned bearing **18** and a support arm **24** which is substantially perpendicular to the stud **22**. The arm **24** has fixed thereon the animated member **14** so that the animated member pivots about the bearing **18**. A permanent magnet **26** is fixed to the end of the arm **24** so that the magnet has the animated member **14** moving with it as it pivots about bearing **18**. As may be seen in the drawing, the permanent magnet is on the front side of the greeting card, no torque transmitting connection being necessary between the permanent magnet and movable member **14**.

Considering now the back of the greeting card as shown in FIGURE 2, an energy and control means is mounted thereon. An insulating carrier **28** is fixed to the base **12** below the bearing **18**. The carrier **28** has mounting means thereon for three dry cells **30**, **32** and **34** and also supports an electromagnet **36** spaced above dry cell **30**. The carrier **28** also has a pair of resilient magnetizable contacts **38** and **40** mounted thereon. One of the contacts could be stationary within the principles of the invention. The carrier has a pair of integrally formed contact walls **42** and **44** which contain conductors **46** and **48** respectively. The dry cells **30**, **42** and **34** contact the conductors **46** and **48** in a conventional manner. The carrier has a plurality of guides formed integral therewith. A pair of guides **50** and **52** are interpositioned between dry cells **30** and **32** and dry cells **32** and **34** respectively to hold the dry cells. Guides **54** and **56** engage dry cells **30** and **34** respectively to fix the dry cells in position. The carrier also has a pair of ears **58** and **60**. The resilient magnetic contact **38** is fixed in ear **58** so that one end is free to move in a vertical direction. The other contact **40** is fixed in ear **60**, and contact **40**, being identical to contact **38**, is also free to move in a vertical direction. As may be seen in FIGURE 2, the contacts overlap each other for reasons which will become apparent hereinafter. In order to protect the contacts a glass case **62** may be mounted between ears **58** and **60** encasing the contacts **38** and **40**.

The aforementioned electromagnet **36** is generally U-shaped. It includes a pole **64** and a pole **66** which poles are perpendicular to base **12**. The poles both engage a coil **68**. The electromagnet **36** is made by first winding wire **72** on a circular paper core **74**. The poles **64** and **68** are slipped inside the coil **68** so that the ends of the poles overlap to make contact. The poles **64** and **66** also fit into slots **76** and **78** respectively of carrier **28** to hold the electromagnet in position.

The contact **40** is connected to a lead **80** which is connected to one end of wire **72** of coil **68**. The other

contact **38** is connected to a lead **82** which is connected to conductor **48**. The other conductor **46** is connected to a lead **84** connecting the conductor with the other end of wire **72** of coil **68**. Thus, the circuitry of the instant device is such as that shown in FIGURE 6. As may be seen in FIGURE 3, poles **64** and **66** of electromagnet **36** are positioned below the permanent magnet **26** when the permanent magnet is in its lowermost position. However, the contacts **38** and **40** are positioned above the permanent magnet **26** so that the permanent magnet affects the contacts **38** and **40**. Inasmuch as the permanent magnet is adjacent to the contacts and the contacts are magnetizable, the permanent magnet temporarily magnetizes the contacts so that the contacts engage each other. It is also readily apparent that when the permanent magnet is removed from the proximity of the contacts they are no longer magnetized and their resilience separates the contacts to disengage the contacts. The portions of the permanent magnet stroke during which the contacts are closed will vary depending upon the angular relation between the magnet axis and its stroke direction. However, the contacts will be closed at some portion of the permanent magnet stroke in the vicinity of the contacts.

Considering now the operation of the instant animated greeting card, it may be seen that the animated member **14** moves with the permanent magnet **26**. The permanent magnet has properties of a pendulum, as will be described hereinafter. When the permanent magnet is in the proximity of its lowermost position, it affects the contacts **38** and **40** to close the contacts. When the contacts are closed the dry cells are connected to the coil to energize the electromagnet **36**. The permanent magnet is then acted upon by the field created by the poles of the electromagnet to impel it in the direction of its movement. At this point, it should be mentioned that it may be necessary for an operator to move the animated member slightly in order to start the motion in the event that there should be a perfect balance between the opposite poles of the electromagnet and the poles of the permanent magnet. When the permanent magnet is displaced from its lowermost position and moves away a sufficient distance from the contacts **38** and **40**, the resultant flux intensity in the vicinity of the contacts is insufficient to hold them in their closed condition, and they will therefore open, the field of the electromagnet being insufficient to hold the contacts closed. Since the permanent magnet, acting as a pendulum, is displaced from its center position, it will swing back towards center. As it approaches center position, the contacts **38** and **40** are again magnetized and engage each other so that the electromagnet is energized. This again will cause the permanent magnet to be acted upon by a field created by the electromagnet to impel the permanent magnet in its new direction of movement. The movement will continue as before until contacts **38** and **40** are opened, and rocking of the permanent magnet will thus continue indefinitely until it is manually stopped or until the battery energy is depleted. As the permanent magnet swings about bearing **18**, the animated member **14** also reciprocates. It can be appreciated that, by increasing the potential of the electromagnet, enough force may be generated to put the permanent magnet into rotation rather than plain reciprocation.

Preferably, when permanent magnet **26** is in a centered position, its north and south poles will be adjacent the north and south poles of electromagnet **36**, as seen in FIGURE 3. Because of this relationship, there will be a repulsive force on magnet **26** tending to hold it away from the front of base **12** during operation, thus minimizing friction between the movable and stationary elements of the device. The length of magnet **26** relative to the lengths of contacts **38, 40** may of course be varied to suit requirements.

It is readily apparent that alterations and variations may be made in the disclosed device by those skilled in the art without departing from the spirit and scope of the instant invention. It is to be expressly understood that the present invention is limited only by the appended claims.

What is claimed is:

1. A device of the character described comprising, in combination, a nonmagnetic substantially flat base positioned substantially upright, a bearing secured to said base, an arm pivotly mounted in said bearing and being pivotal about an axis substantially perpendicular to the plane of said base, a permanent magnet fixed to said arm for swinging relative to said base on one side of the base, a carrier mounted on the base on the side away from the permanent magnet, a flat resilient magnetic leaf contact having one end fixed relative to the carrier and the other end free for movement, said leaf contact in a plane substantially perpendicular to the plane of the base, a second flat resilient magnetic leaf contact having one end fixed relative to the carrier and the other end free being engageable with the free end of the first-mentioned leaf contact and being parallel to the first-mentioned leaf contact, said leaf contacts being positioned a distance from the bearing less than the distance from the permanent magnet to the bearing, an electromagnet mounted on said carrier substantially perpendicular to the plane of the base, said electromagnet being spaced a sufficient distance from the leaf contacts to produce no physical effect on said contacts, said electromagnet being spaced from the bearing a distance greater than the distance between the permanent magnet and the bearing, and a dry cell removably mounted in said carrier, one of said contacts being electrically connected to the electromagnet and the other of said contacts being electrically connected to the dry cell, said dry cell being electrically connected to the electromagnet, whereby the permanent magnet moving adjacent to the leaf contacts magnetizes said leaf contacts for engagement of the leaf contacts to complete a circuit from the dry cell to the electromagnet, thereby energizing the electromagnet to react with the permanent magnet to move the magnet demagnetizing the leaf contacts and de-energizing the electromagnet.

2. A device of the character described comprising a nonmagnetic substantially flat upright base, an arm mounted on one side of said base for pivotal movement about an axis perpendicular thereto, a permanent magnet fixed to said arm, the poles of said magnet being on a line perpendicular to said arm and parallel to said base, two normally separated but partially overlapping flat resilient magnetic leaf contacts in parallel relation, the outer ends of said contacts being fixed to said base, the contacts being parallel to said base and sufficiently close to the path of movement of said permanent magnet to be magnetized thereby during one portion of its movement when said line connecting the magnet poles is substantially parallel to said contacts, whereby the overlapping portions of said contacts will be brought into electrical conducting engagement, an electromagnet mounted on said base, said electromagnet having a coil with an axis parallel to said base and two poles extending perpendicular to said base, said poles being spaced a sufficient distance from said leaf contacts to produce no physical effect on said contacts but being sufficiently close to said one portion of the permanent magnet path to impel the permanent magnet to another portion of its path in response to energization of said electromagnet, an electrical power source, and means connecting said contacts, electromagnet and power source in an electrical series circuit, whereby engagement of said contacts will close said circuit and energize said electromagnet.

3. A device of the character described comprising a nonmagnetic substantially flat upright base, an arm

mounted on one side of said base for pivotal movement about an axis perpendicular thereto, a permanent magnet fixed to said arm, the poles of said magnet being on a line perpendicular to said arm and parallel to said base, two normally separated but partially overlapping flat resilient magnetic leaf contacts in parallel relation, said contacts and said permanent magnet being on opposite sides of said base, the outer ends of said contacts being fixed to said base, the contacts being parallel to said base and sufficiently close to the path of movement of said permanent magnet to be magnetized thereby during one portion of its movement when said line connecting the magnet poles is substantially parallel to said contacts, whereby the overlapping portions of said contacts will be brought into electrical conducting engagement, an electromagnet mounted on said base, said electromagnet having a coil with an axis parallel to said base and two poles extending perpendicular to said base, said poles being spaced a sufficient distance from said leaf contacts to produce no physical effect on said contacts but being sufficiently close to said one portion of the permanent magnet path to impel the permanent magnet to another portion of its path in

response to energization of said electromagnet, an electrical power source, and means connecting said contacts, electromagnet and power source in an electrical series circuit, whereby engagement of said contacts will close said circuit and energize said electromagnet.

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