Jan. 13, 1942. G. DE W. ROBINSON ET AL 2,270,142

ELECTRICALLY CONTROLLED FIGURE OR DOLL

Filed Dec. 21, 1938 2 Sheets-Sheet 1

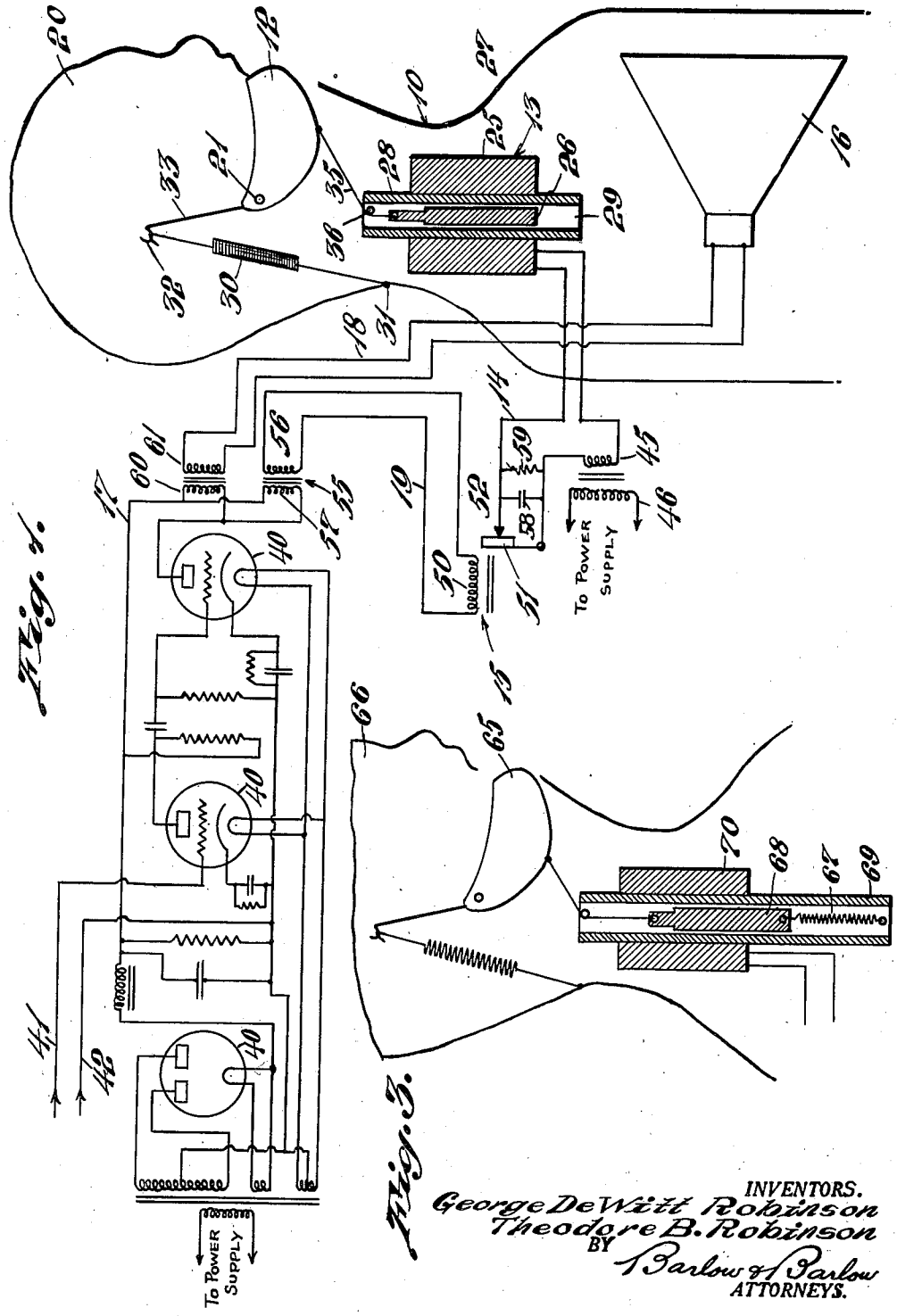


Fig. 1.

Fig. 3.

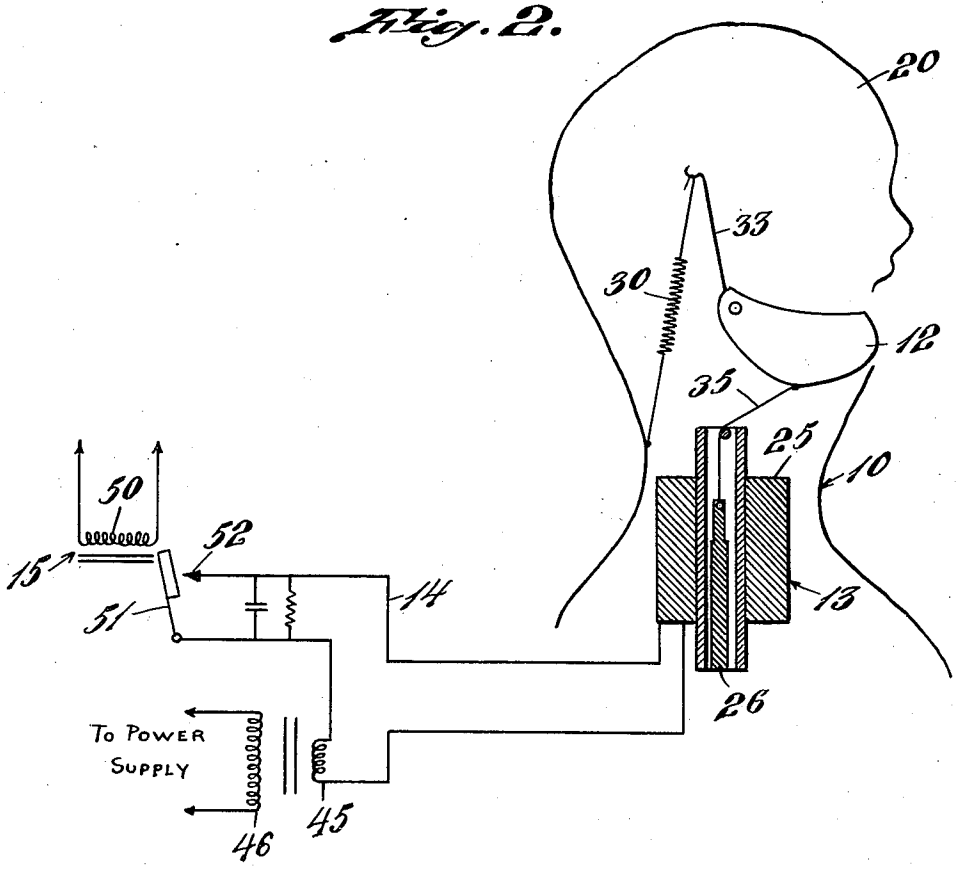
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Fig. 2.



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ELECTRICALLY CONTROLLED FIGURE OR DOLL

George De Witt Robinson and Theodore B. Robinson, Edgewood, R. I.

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6 Claims. (Cl. 46—118)

This invention relates to an animated toy figure or doll, and more particularly to an electrically controlled dummy having a movable part or parts, and has for one of its objects the controlling of the movements of the movable part so as to simulate life-like and natural movements of the same simultaneously with and appropriate to all speech or sounds emitted from a sound reproducing device.

Another object of the invention is to provide a device of this character having a movable mouth in which electrically operated means control the opening and closing of the mouth to simulate the natural opening and closing movements of a mouth appropriate to speech or sound as reproduced synchronously therewith by the sound reproducing device.

Another object of the invention is to provide a toy figure having a movable mouth part in which the control of the movement and range of opening of the mouth is effected electromagnetically.

Another object of the invention is to provide a toy figure having a movable mouth part in which electromagnetic mechanism is provided for controlling the movement and range of opening of the mouth in which the control mechanism will be responsive to changes in amplitude and/or intensity of a modulated or intermittent current for effecting the mouth movement synchronously with and appropriate to sound or speech emitted from a sound reproducing device.

Another object of the invention is to provide a talking doll or toy figure in which the mouth will be caused to move into its various degrees of partially open and closed positions by reason of the intermittent energizing and de-energizing of an electromagnet whereby the mouth movements will be controlled in synchronism with the variations in amplitude and/or intensity of a source of modulated electric currents.

Another object of the invention is the controlling of the movements of the movable mouth part of a toy figure or doll of the above character by electromagnetic means responsive to variations in amplitude and/or frequency of electric currents produced by a source of modulated or intermittent electric impulses or voltages of variable magnitude or intensity in which the lowering or dropping of the mouth is effected by means independent of the electric circuit.

Another object of the invention is the controlling of the mouth movement of a figure of the above type in such a manner that the action of gravity will cause movement of the mouth into any of its different opened positions.

Another object of the invention is to provide means effective to urge the mouth to a normally closed position in which the effect of such means will be altered or regulated by an electromagnetic mechanism actuated in synchronism with the changes in amplitude and/or intensity of a source of modulated or intermittent electric currents simultaneously impressed on the sound reproducing device whereby varying degrees of opening and closing movements of the mouth may be obtained synchronously with and appropriate to the speech or sounds projected by the sound reproducing device.

Another object of the invention is to provide an electrical system including a toy figure or doll having a movable mouth part, an electrically operated sound reproducing device, and electrically controlled means for regulating the opening and closing movements of the mouth in a smooth manner so that a natural and life-like movement of the mouth will be produced in synchronism and appropriate to all speech or sounds emitted by the sound reproducing device.

Another object of the invention is the provision of an electrical system involving a toy figure having a movable mouth part, an electrically operated sound reproducing device, and electromagnetic means for controlling the range of opening of the mouth in which the entire system may be of a portable character for full operation from a source of alternating or direct current.

With these and other objects in view, the invention consists of certain novel features of construction, as will be more fully described, and particularly pointed out in the appended claims.

In the accompanying drawings:

Fig. 1 is a diagrammatic representation of an electrical system embodying the present invention and showing in operating position therein a toy figure having a movable mouth part which is represented in a closed position, an electric circuit and apparatus for producing modulated electric currents, an electrically operated device for reproducing voice or sounds in response to the variations in said modulated electric currents, a relay circuit including a relay responsive to said modulated currents and shown in a closed circuit position, and a solenoid actuated by said relay or controlling the mouth movements of the toy figure.

Fig. 2 is a diagrammatic representation of a portion of the system shown in Fig. 1 showing only the toy figure thereof with its mouth in an open position, and also the open circuit position

of the relay when the solenoid for controlling the mouth movement is de-energized.

Fig. 3 is a diagrammatic view in side elevation of a modified arrangement of the solenoid device employed for controlling the motion and range of opening and closing movements of the mouth.

It is found to be of advantage in a proposed plan of advertising and sales promotion to employ an animated toy figure, such as a talking doll, to stimulate sales of commodities, services and ideas; and in order to obtain the advantages of expanding sales by the delivery of spoken sales messages through the medium of such means, the present invention contemplates the provision of an electrical system including therein a toy figure or doll of the type having a movable mouth part, such as, for example, a ventriloquial dummy, in which the mouth is opened and closed to simulate lifelike movements in synchronism and appropriate to all speech or sound emitted from a sound reproducing device, in which the opening and closing movements of the mouth are regulated by an electric control device which is operated by and in synchronism with the variations in amplitude and/or intensity of a source of modulated or intermittent electric currents; and for this purpose we utilize an electromagnetic mechanism which preferably comprises an electromagnet having a movable core armature connected to the movable mouth part, and there is provided an electrical relay for intermittently energizing and de-energizing the magnetic field of the electromagnet in response to variations in amplitude and/or intensity of said modulated or intermittent electric currents impressed on said relay device for actuating the same; and in order to attain this result the relay device is so arranged that it may be initially adjusted and set so as to be responsive only to electric currents in excess of a predetermined amplitude and/or intensity to cause movement of the movable armature of the relay into a position for regulating the flow of electric current to the electromagnet for controlling the mouth movement; and there is also provided means for mechanically urging the mouth into a closed position the effect of which means will be counteracted or modified by suitable movement of the movable core armature of the electromagnet when the field of the same is alternately energized or de-energized by operation of the relay; and the following is a more detailed description of the present embodiment of this invention, illustrating the preferred means by which these advantageous results may be accomplished:

With reference to the drawings, Figs. 1 and 2 show one embodiment of the invention, the arrangement therein illustrated being designed for full electric operation from a source of A. C. current, and comprising in its essential features a toy figure or doll 10 having a movable part 12, an electrically actuated control device 13 for regulating the mouth movements, a control circuit 14 containing an electric relay generally designated 15 for alternately energizing and de-energizing the electrically operated mouth controlling device 13, an electrically actuated voice reproducing device or loud speaker 16, an electric circuit 17 including apparatus for providing a source of electric currents or impulses of varying amplitude and/or intensity, and electric circuits 18 and 19 for simultaneously impressing upon the relay 15 and the loud speaker 16 the variations of electric currents or impulses supplied by the circuit 17 so as to cause movement of the mouth part 12 in synchronism with and appropriate to sounds or speech emitted from the loud speaker. It should be understood that the control device 13 is not limited particularly to A. C. operation, but that it may be made to operate from D. C. mains or by battery, and such operation is within the scope of the invention.

The toy figure or doll 10 may be of any desired type, such as a ventriloquial dummy, and it may have any desired form and size appropriate to provide a representation of a human, animal or an object, either of a natural or of a grotesque character having a movable part or parts, such as its mouth, arms, legs, ears, or eyes. As illustrated, the figure consists of the head 20 on which is pivotally mounted the movable mouth part 12 as at 21 for various degrees or distances of swinging movement relative to the head whereby the partial opening or range of opening desired to simulate the lifelike open and closed mouth movements of a natural person appropriate to the emitted speech is obtained.

The control device 13 comprises an electromagnet of the solenoid type having a field coil 25 and a movable core armature 26, the solenoid being shown as located in the body portion 27 of the toy figure in any desired position therein. If desired, the device 13 may be mounted exteriorly of the figure in any suitable position or location and connected by appropriate mechanism to actuate the mouth as will be apparent to one skilled in the art. The control device 13 serves to control all motion and ranges of speed and distance of the opening and closing movements of the mouth part 12, and this result is obtained by the intermittent energizing and de-energizing of the field coil 25, due to the interruption of electric currents in the relay circuit 14 synchronously with the changes in amplitude and/or intensity of the electric currents produced in the circuit 17, to raise and lower the armature 26, as will be hereinafter explained.

The field coil 25 is shown as having a central opening through which extends an elongated tubular guide sleeve 28. Housed within the bore 29 of the sleeve 28 is the movable core armature 26 of the solenoid for free up and down movement therein. The armature 26 is of a magnetic character and made of iron or steel, and it may have either a solid or a laminated construction as desired. It may be of any suitable size and shape, preferably cylindrical, in which form such as for example, iron or steel wire or rod may serve for the purpose. It will be understood, of course, that the armature is not to be limited specifically to a cylindrical shape since it is obvious that other geometric cross-sectional shapes may be employed with satisfactory results for such purposes.

As illustrated, the field coil 25 and the sleeve 28 are so positioned relative to the figure that the bore 29 of the sleeve 28 will extend in a generally vertical direction when the toy figure or doll is placed in an upright position. The sleeve 28 preferably should be formed of a suitable non-magnetic material, such as non-ferrous metals or of common electrical insulating materials such as hard rubber, Bakelite or fibrous insulating materials.

Disposed within the head 20 is a coiled spring 30 having one end attached to a portion of the figure as at 31, while the other end of the spring is fastened to a hook 32 terminating the free end of the wire 33 which is rigid or stiff to transmit

thrust and is fixedly carried by the movable mouth part 12 and extends obliquely upwardly from the same at a point adjacent the pivot 21 to provide sufficient leverage in this particular embodiment to actuate the mouth. The spring 30 preferably should be of sufficient strength to normally tend to urge the movable mouth part 12 into a closed mouth position.

To effect the various upward and downward movements of the movable jaw 12 in response to the changing positions of the armature 26 during the intermittent energizing and de-energizing of the field coil 25, the top portion of the armature 26 has suitable mechanical connection with the bottom portion of the movable mouth part 12, as by means of a flexible member 35, which may comprise a cord or cable composed of suitable textile material or wire having either a solid or a stranded construction. A pin 36 extends across the top end of the sleeve 28 to guide the flexible member 35 in its sliding movements thereover during dropping of the armature 26 and the mouth part 12, and also acts as a stop for preventing accidental dislodgement of the armature 26 from the bore of the sleeve 28 if the figure should be accidentally inverted or be laid down in a horizontal position.

As will be observed from the above described construction, the armature 26 and the flexible member 35 will be in the positions shown in Fig. 1 when the field coil 25 is energized and the armature 26 is drawn upward into the sleeve. However, upon de-energization of the field coil 25, the weight of the armature 26 will cause it to drop, thus tensioning the flexible member 35 to apply sufficient force to the mouth part 12 to pull it down against the normal tension of the coiled spring 30. Hence, the opening or dropping movements of the movable mouth part 12 occur only when the field coil 25 is de-energized while the force that causes the jaw to drop is that supplied by the action of gravity.

The electric circuit 17 which is represented in Fig. 1 constitutes a suitable source of modulated electric currents, and as represented diagrammatically in Fig. 1, may comprise the output stage of an audio amplifier unit of any of the well known types commonly employed in radio or telephone circuits wherein there is incorporated as part of the amplifying circuit a number of electron tubes 40 which may comprise the common electron tubes having characteristics suitable for audio amplification and forming part of the amplifying circuit of the apparatus for magnifying the intensity of the electric impulses or voltages impressed on such tubes and received by the wires 41 and 42 of the input circuit of the amplifiers from a suitable varient sound or signal source, as from a microphone or from an electric phonograph pick-up unit or from the detector tube of a radio receiving set.

To control the flow of current through the field coil 25 of the magnet the relay device 15 is connected in series therewith by electric circuit 14 which receives its electric current from a suitable source which, when A. C. is used, may comprise the secondary windings 45 of a suitable power supply transformer having the primary winding 46 connected with a suitable source of alternating current (not shown). The relay 15 preferably is of a type which is quick acting and of high sensitivity. One form of relay which may be satisfactorily employed for this purpose and may be operated in the circuit disclosed and claimed is a sensitive relay of the single pole type in which the tension of the armature spring and the relative spacing of the contacts may be adjusted at will. In the present circuit, the relay 15 is set to respond only to the increases in amplitude and/or intensity of the modulated electric current above a predetermined initial value thereof to which the relay is preliminarily set. In the present instance, the relay 15 is adjusted to respond only to increased amplitudes and/or intensity of electrical impulses corresponding to increases in audible sound at the signal source of the circuit 17.

As diagrammatically represented in the drawings, the relay device comprises a magnet coil 50, a movable armature 51 which is normally urged by a spring (not shown) into closed circuit position to maintain positive electrical conducting connection with a fixed contact 52 of the relay device. The armature 51, the fixed contact 52, the secondary coil 45 of the power supply transformer and the field coil 25 of the mouth operating mechanism thus are all electrically connected in series by the circuit 14. The relay 15 may be suitably adjusted and set so that the armature 51 will respond only to voltages of a strength sufficient to overcome the initial biasing tension of the spring to which the armature 51 is adjusted. The armature 51 is attracted away from the fixed relay contact 52 when the magnet coil 50 of the relay is greatly energized by the increases in amplitude and/or intensity of the modulated current from the electric circuit 19. A coupling transformer generally designated 55 has its secondary coil 56 connected with the circuit 19 while the primary coil 57 of the transformer is electrically connected with the output circuit of the circuit 17 of the amplifier unit or other source of varient electric current employed. If desired, a condenser 58 and a resistor 59 may be incorporated in the relay circuit in parallel with the fixed contact 52 and the armature 51 so as to prevent excessive arcing when the relay circuit is interrupted during make and break contact of the relay armature 51 with the contact 52.

The loud speaker 16 is suitably concealed within the structure of the figure, preferably in its trunk, and may be of any well known types of construction as are commonly employed in radio receiving sets. If desired, the loud speaker 16 may be located at a point outside of the figure. A suitable coupling transformer, of known construction in the radio art, is provided having its primary coil 60 connected to the output stage of the circuit 17 while the secondary coil 61 of this transformer is connected to the operating mechanism of the loud speaker 16.

In operation, the electrical system being connected as shown and the wires 41 and 42 having connection with a source of modulated electric currents, the variant electric currents produced in the circuit 17 will be impressed simultaneously on the magnet 50 of the relay 15 and the electrical operating unit of the loud speaker 16 respectively. Consequently, when the field coil 25 is excited or energized by the electric currents flowing in the relay circuit 14 and derived from the secondary 45 of the supply transformer for the relay circuit, the armature 26 will be drawn into the sleeve 28 by the attraction of the magnetic field of the field coil 25 of the solenoid. However, when the intensity of power of the electric currents in the circuit 19 is of a degree high enough to produce a strong magnetic field in

the magnet coil 50 sufficient to attract the relay armature 51 toward the magnet and away from the fixed contact 52, the relay circuit 14 will then be opened, thus resulting in the de-energizing of the field coil 25 of the control device 13 followed by the immediate dropping of the armature 26 due to the action of gravity to cause tensioning of the flexible connector 35 and the pulling down of the mouth part 12 into an open position. The range or distance to which the mouth part 12 will drop by the pull incident to dropping of armature will, of course, be dependent upon the period of time that the field coil 25 is rendered inactive or "dead." Hence, any rapid alternate energizing and de-energizing of the field coil will result in partial opening movements of the mouth part 12 since the free pulling movement of the armature 26 will be suddenly arrested by the swift restoration of the magnetic field before the armature has dropped too great a distance toward the bottom end of the sleeve 28.

In Fig. 3 there is shown a modification of the electromagnetic control device for regulating the mouth movements in which the movable mouth part 65 is pivotally arranged on the head 66 of the figure and is moved into an open position, during de-energization of the solenoid, by means of a coiled spring 67 extending between the bottom end of the movable armature 68 and the bottom end portion of the guide sleeve 69 of the field coil 70 of the solenoid. With this arrangement the opening and closing movement of the mouth part 65 will be produced in response to the duration of excitation of the field coil 70 and will occur so that the device will operate in any position of the figure.

By means of the present invention we provide lifelike movements of the mouth (or any other part or parts). Furthermore, the movements of the movable part, such as the mouth, is smooth, not jerky, and can be controlled to give any desired effect under any operating conditions. This may be accomplished by (1) adjusting the spring tension of the spring 30 acting on the movable mouth 12; (2) adjusting the strength of the current to the field coil 25 of the solenoid; (3) adjusting the initial setting of the relay armature for the minimum voltage of the modulated currents for producing sufficient magnetism in the relay magnet to attract the armature of the relay into open circuit position; (4) by adjusting the volume control on the amplifier as desired to regulate the strength of the modulated currents in the output of the amplifier to the relay. Any or all of these adjustments can be readily and quickly made for modifying the operation of the device or for other special purposes.

It is to be understood that while the invention has been specifically described and illustrated in connection with a device for use in connection with advertising, that various other changes may be made in the combinations and structures referred to without departing from the scope of our invention, and also that numerous modifications and adaptations may be made in the application of it to particular conditions, but such changes and adaptations are to be considered as embodied in this specification and in the appended claims.

We claim:

1. In combination, a toy figure or doll having a movable lower jaw, a source of modulated electric currents, an electrically operated voice reproducing device responsive to said modulated electric currents, means tending to mechanically urge the movable jaw into a normally closed position, an electric circuit of fixed voltage, electromagnetic mechanism in said circuit comprising an electrical relay for interrupting flow of electric current in said circuit and a solenoid responsive to said relay and actuated by the electric currents in said circuit, said solenoid having a movable core armature connected to said movable jaw for moving the same into open position, said relay being normally biased to keep said circuit closed for exciting said solenoid to hold the movable armature thereof in a position where said mechanical jaw closing means will hold the jaw in a closed position, said relay being actuated by said modulated electric currents and normally unresponsive to variations in said modulated electric currents below a predetermined selected level of amplitude and/or intensity but responsive to all other increases in amplitude and/or intensity in excess of such predetermined level to modify or render ineffective the effect of said mechanical jaw closing means and thereby to control the operation of said solenoid to cause movements of said jaw in synchronism with and appropriate to all emitted speech or variant sounds, whereby the jaw will drop upon being subjected to a pull exerted thereon by the weight of the solenoid armature in falling when the solenoid is de-energized by interruption of flow of electricity in said electric circuit upon movement of the relay into an open circuit position.

2. In combination, a toy figure or doll having a movable lower jaw, a source of modulated electric currents, an electrically operated voice reproducing device responsive to said modulated electric currents, a coil spring tending to urge the movable jaw into a normally closed position, an electric circuit of fixed voltage, electromagnetic mechanism in said circuit comprising an electrical relay for interrupting flow of electric currents in said circuit, and a solenoid responsive to said relay and actuated by the electric currents in said circuit, said solenoid having a movable core armature connected to said movable jaw for moving the same into an open position, said solenoid being energized wholly by the electric currents of fixed voltage flowing in said circuit and interrupted by the breaking action of said relay due to the variations in amplitude and/or intensity of said modulated electric currents operating said relay, said relay being actuated by said modulated electric currents and normally unresponsive to variations in said modulated electric currents below a predetermined selected level of amplitude and/or intensity but responsive to all increases in amplitude and/or intensity in excess of said predetermined level to modify or render ineffective the effect of said spring in urging the jaw into closed position, and thereby to control the operation of said solenoid to cause movements of said lower jaw in synchronism with and appropriate to all emitted speech or variant sounds.

3. In combination with a toy figure or doll having a movable lower jaw, means operatively connected to said movable jaw normally tending to pull said jaw in one direction, an electric circuit including a source of modulated electric currents, gravity-actuated means connected to said jaw and capable of applying sufficient force thereto to completely overcome the pull of the first-mentioned means for producing movement of the movable jaw in the opposite direction for its complete distance of travel when the doll is positioned for gravity to actuate said gravity-actuated means, and electrically-controlled means

energized by said modulated electric currents to create a magnetic field opposing the action of said gravity-actuated means on the movable jaw to cause it to assume instantaneous positions corresponding proportionately at any instant of time to the degree of amplitude of the modulated electric currents yet providing a floating action of the movable jaw due to the action of gravity whereby all movements of said jaw will have uniform acceleration for either complete or partial distance of travel, all of said means being so coordinated together as to produce a complete mechanical duplication of all external vocal movements associated with and accompanying the production of definite vocal sounds.

4. In combination with a toy figure or doll having a movable lower jaw, a spring operatively connected to said movable jaw normally tending to pull said jaw into closed position, means including an armature opposing the action of said spring and arranged to normally move the jaw to its completely open position, an electric circuit including a source of modulatel electric currents, electrically controlled means responsive to said modulated electric currents for producing a movement of the movable jaw corresponding proportionately at any instant of time to the degree of amplitude of the modulated electric currents, said electric controlled means being arranged to create a magnetic field of varying strength to partially or completely nullify the action of said armature-included means normally holding the movable jaw in open position and to provide a floating action of the movable jaw, the arrangement of parts being such that all movements of said jaw will have uniform acceleration for either complete or partial distance of travel, all of said means being so coordinated together as to produce a complete mechanical duplication of all external vocal movements associated with and accompanying the production of definite vocal sounds.

5. In a toy figure or doll having a movable jaw part, of spring means normally tending to move the jaw into a closed position, a stiff lever member affixed at one end to said lower jaw near its pivot and extending obliquely upwardly therefrom, said spring being fixed at one end with the other end connected to said lever, a solenoid having a field coil and a movable core armature therein, flexible means connecting said armature to the movable jaw, and a source of modulated electric currents, said solenoid being alternately energized and de-energized in response to the variations in said modulated electric currents above a predetermined selected minimum level of amplitude and/or intensity for varying or rendering ineffective the effect of said mechanical jaw-closing spring to cause the jaw part to drop and open its complete or partial distance produced by the action of gravity due to the weight of the movable armature in falling freely when de-energization of the field coil of the solenoid occurs to apply a pull on the jaw to partially or completely overcome the action of said spring, the distance to which the jaw drops being determined by the changes in strength of the magnetic field created by the field coil corresponding to the varations in the modulated electric currents.

6. In a toy figure or doll having a movable lower jaw part, the combination of a spring normally tending to urge the jaw into a closed position, a movable armature connected to said jaw part arranged to transmit a pull thereto to oppose the action of said spring when the doll is positioned for gravity to act upon said armature to cause such action, said armature being formed of magnetic material of sufficient weight to open the jaw its complete distance by acting thereon with greater force than the normal pull of said spring when said armature is allowed to fall freely under the influence of gravity, and an electrically controlled means to create a magnetic field which, when said means is energized by a modulated electric current, will be of sufficient strength to lift and support said armature and will cause it to assume various instantaneous positions corresponding proportionately to the degree of amplitude of the modulated electric currents at any instant whereby the jaw will partake of opening and closing movements simulating all external vocal movements associated with and accompanying the production of definite vocal sounds causing the modulation of said electric currents.

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