M. H. SHOENBERG.

AUTOMATON.

APPLICATION FILED FEB. 7, 1918.

1,292,105.

Patented Jan. 21, 1919.

2 SHEETS—SHEET 1.

FIG. 1.

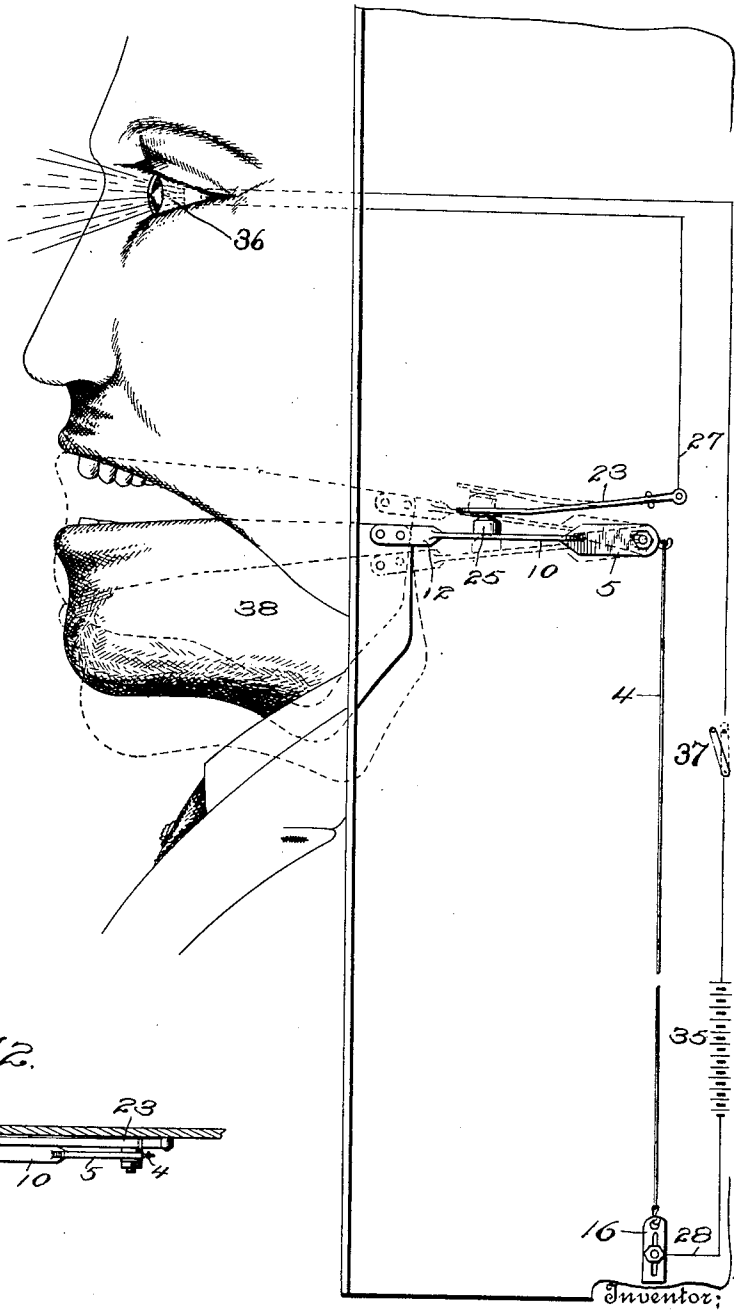

FIG. 2.

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Witnesses

R. S. Trogner.

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2 SHEETS—SHEET 2.

FIG. 3.

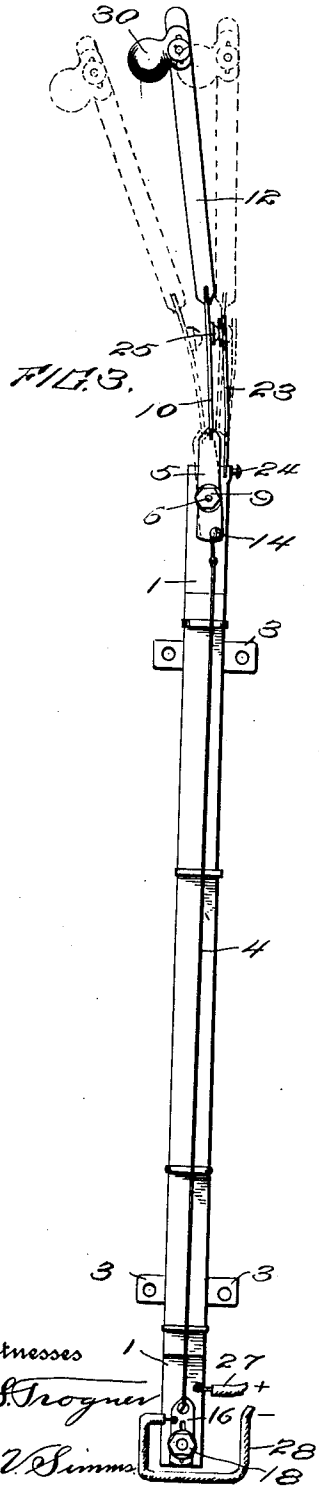

FIG. 4.

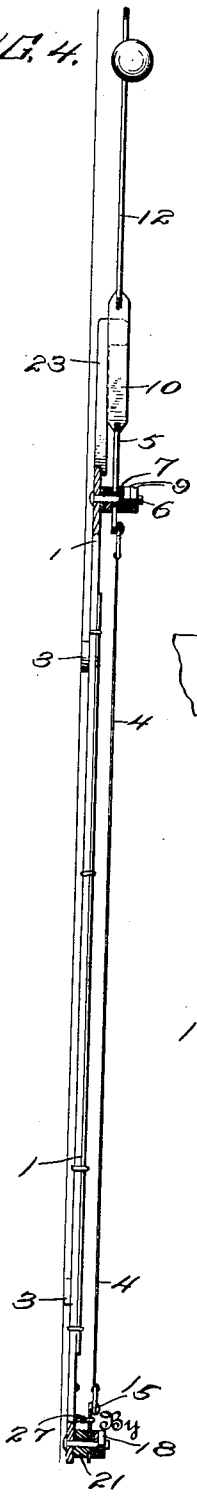

FIG. 5.

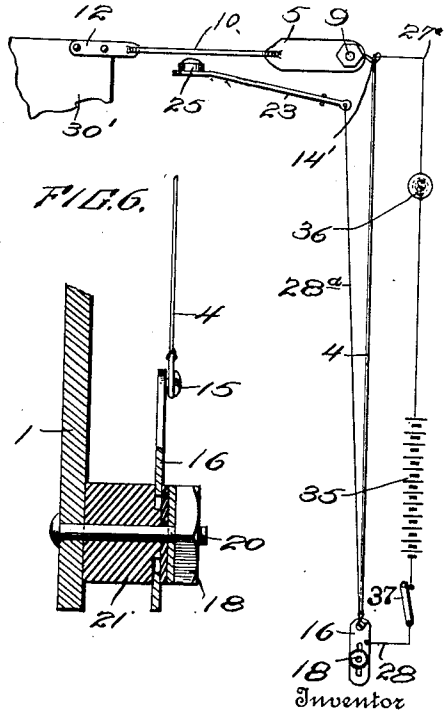

FIG. 6.

Witnesses

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UNITED STATES PATENT OFFICE.

MILTON H. SHOENBERG, OF SAN FRANCISCO, CALIFORNIA.

AUTOMATON.

1,292,105. Specification of Letters Patent. Patented Jan. 21, 1919.

Application filed February 7, 1918. Serial No. 215,870.

To all whom it may concern:

Be it known that I, MILTON H. SHOENBERG, a citizen of the United States, residing at San Francisco, in the county of San Francisco and State of California, have invented certain new and useful Improvements in Automatons, of which the following is a specification.

This invention relates to automatically operated mechanism for actuating automatons and may be used for operating automatic toys, and other devices.

The object of my invention is to provide a motor mechanism adapted to be connected to an electric circuit to actuate automatic devices such as toys, automatons and motion figures adapted to be used for advertising purposes, fans, signals, etc., the motive power being applied through the instrumentality of the expansion and contraction of a wire under the influence of an electric current. One of the purposes of my invention is to provide an arrangement which will enhance the effect of the initial movements imparted by the expansion of the heated wire. Other objects will appear from the following description, in connection with the accompanying drawings, in which—

Figure 1, is a side elevation of an automaton embodying my invention; Fig. 2 is a top plan view of the motor mechanism; Figs. 3 and 4 are front and side elevations of another form of my hot wire mechanism; Fig. 5 is a modification showing a shunt arrangement of the circuits in which the electric circuit is not interrupted as in the other figures; and Fig. 6, is an enlarged detail section of the bottom suspension of the expansion wire shown in Fig. 4.

Referring first to the mechanism illustrated in Figs. 3 and 4, the motor device is preferably mounted upon a rigid iron or other metal bar 1, which forms a part of the electric circuit, and may be fastened to any suitable support by means of lugs 3, or in any other suitable manner. The vibrator which forms the connecting link between the expansion wire 4 and the movable mechanism of the automaton or other device to be actuated, comprises a lever 5, pivoted upon a bolt 6, carried upon the upper end of the bar 1, but insulated therefrom by means of an insulating bushing 7, and held in position by the nuts 9. The outer end of the lever 5 carries a leaf spring 10, which may be flexed in the plane in which the lever moves, while the outer end of the spring carries the bar or link 12, which communicates motion to the automaton or other device.

The thermo-expansive wire 4, which is made of metal having a high resistance and preferably having a large coefficient of expansion, is fastened at the top to a lug or screw 14, on the lever 5, and which is located upon one side of the median line through the pivot bolt. The lower end of the wire 4 is attached to a screw 15, carried by a plate 16, which may be adjusted longitudinally by means of a slot and nut 18, upon the bolt 20 passing through the lower end of the bar 1, to vary the tension upon the wire 4. The plate 16 is insulated from the bar by the bushing 21.

A spring plate 23, soldered to the upper end of the bar 1, or secured in a notch by a set screw 24, or in any other suitable manner, normally presses yieldingly upon a carbon button 25 or other contact carried by the spring 10, in the manner illustrated in Fig. 3. The bar 1 and plate 16, are connected respectively to the conductors 27, 28 which are connected to any suitable current-regulating and switch devices.

Normally the parts are held in the position indicated by the full lines in Fig. 3, by the tension of the wire 4. When the electric current is supplied to the mechanism through the leads the current passes from the lead 27, through the bar 1, the spring plate 23, contact 25, spring 10, lever 5, and wire 4 to the lead 28. The wire 4 being of high resistance, becomes rapidly heated and expands, thereby relieving the tension upon the lever 5, which is immediately drawn to the left by the weight 30. Inasmuch as the leaf spring 10, yields under the action of the weight and its momentum and bends in the manner illustrated in dotted lines, this causes the bar or link 12 to be carried considerably beyond the position it would have assumed had it not been for the effect produced by said yielding spring. In thus moving to the left the spring 10, causes the circuit to be broken at the contact 25. By reason of the large radiating surface throughout the length of the wire 1, it becomes chilled and contracts very quickly after the cessation of the current, exerting a strong pull upon the lever 5, causing the parts to return to their normal position and by reason of the yielding of the springs 10 and 23, the momentum of the

weight 30, causes the link 12 to swing in the same direction considerably beyond the normal position, as indicated in dotted lines. By the time the parts have reached the limit of swing to the right the current being again closed at the contact 25, the wire 4, becomes heated and expands, so that when the tension of the springs 10 and 23, starts the parts back toward normal intermediate position the weight 30, will be free to continue the swing in the same direction. It will be seen, therefore, that as long as the current is supplied to the device, the weighted link arm 12 will vibrate back and forth. The time of the vibration can be regulated by adjusting the position of the weight 30 upon the arm 12.

Instead of the series connection above described, in which the current is actually broken at the contact 25, at each vibration, I may provide a shunt connection in the manner illustrated in Fig. 5, in which the current is alternately shunted around the expansion wire, the circuit remaining unbroken, so that there will be no sparking at the contact 25.

In this figure, it will be observed that the current from the battery 35 first traverses the lead 28, thermo-expansive resistance wire 4, lead 27^a, in which is placed a regulating resistance such as a lamp 36, back to the battery. Thereupon the wire 4 expands, permitting the lever 5 to swing downwardly under the impulse of the weight 30′, bringing the brass spring 10 into contact with the contact stud 25, thereby shunting the current through the conductor 28^a. The springs 10 and 23 permit the momentum of the weight 30′ to carry the link 12 down below the point at which contact is made with the contact stud 25, in the manner described in connection with Fig. 3. By the time the parts have reached their lowest limit, the wire 4 will have cooled and will contract, thereby exerting a strong upward pull upon the lever 5 and the parts carried thereby. The upward swing of the weight and link 12 will be assisted by the recoil of the springs 10 and 23, and this added to the momentum of the weight, will carry the parts above the normal position, bending the spring arm 10 in the reverse direction. As the parts swing upward, the shunting circuit will be broken at the contact stud 25, causing the entire current to flow through the expansion wire 4, and repeating the operations just described, so that the mechanism will be automatically maintained in vibration until the circuit is opened at the switch 37.

In Fig. 1, I have shown my invention applied to an automaton or moving figure toy to move the jaw up and down. The jaw 38 is carried by the link 12, and is normally in the position shown in full lines. As soon as the switch 37 is closed, the current heats the thermo-expansive wire 4, which lengthens and permits the weight of the jaw to swing the parts downward, the momentum carrying the link 12 and jaw 38 below the plane of the lever 5, because of the resiliency of the spring 10, as previously explained. As the contact stud 25 leaves the brass spring-arm 23, the wire cools and contracts just about the time the jaw 38 reaches its lowest limit so that the pull due to the tension of the contracting wire 4, is augmented by the recoil of the bent spring 10, and the upward impulse thus imparted to the jaw causes its momentum to carry it beyond the normal position into the upper dotted line position, thereby completely closing the lips of the figure. As the jaw nears its upper limit the spring arm 23 is being bent upward, offering an increased resistance, so that it serves to check the movement with a cushion or damping effect and prevents a hammer blow upon the upper jaw of the figure. Due to these effects which are accomplished by my apparatus, the chewing motion imparted to the figure is quite natural in appearance. It is obvious that I may employ my apparatus to actuate the arms or other parts of a toy or figure.

I may place the lamp or lamps 36, used to regulate the resistance of the circuit, in the eyes of the figure, as shown in Fig. 1, and the periodic breaking of the circuit will give a blinking effect to the eyes.

The spring arms 10 and 23, yield or flex together under the impulses imparted by the tension of the wire 4 and the momentum of the weight and produce a firm rubbing contact between the stud 25 and the spring contact arm 23, which maintains the contact surfaces in good condition and insures a good electrical contact.

I have described in detail the specific devices illustrated in the accompanying drawings for the purpose of disclosing embodiments of my invention, but it will be evident to engineers that various changes may be made therein without departing from the spirit of my invention and that the thermo-expansive mechanism may be employed to actuate not only figure toys and other similar devices but also fans, signals, and other automatic devices.

I claim:—

1. An automaton or other automatic device comprising a movable jaw-member, a pivoted metallic lever having an inner rigid portion and an outer resilient portion, said outer portion carrying said jaw-member, a thermo-expansive wire or rod secured to a fixed support at one end and having its other end secured to said lever upon the opposite side of the pivot from said flexible portion, a resilient metal arm supported adjacent said resilient lever portion and carrying a contact stud adapted to contact therewith, and means for connecting said

support and said arm to a source of electric energy.

2. An automatically operated device, comprising a pivoted metallic lever and having an inner rigid portion and an outer resilient portion adapted to be connected to the movable parts of the device, a thermo-expansive member secured to a fixed support at one end and connected at its other end to said lever at a point upon the opposite side of the pivot from said resilient portion, a contact arm secured adjacent said resilient lever portion and adapted to contact therewith, and means for connecting said arm and said support to a source of electric energy.

3. An automatically operated device, comprising a pivoted metallic lever and having an inner rigid portion and an outer resilient portion adapted to be connected to the movable parts of the device, means for adjusting the effective weight of said parts toward or from the pivot of the lever, a thermo-expansive member secured to a fixed support at one end and connected at its other end to said lever at a point upon the opposite side of the pivot from said resilient portion, means for adjusting the normal tension of said member, a contact arm secured adjacent said resilient lever portion and adapted to contact therewith, and means for connecting said arm and said support to a source of electric energy.

4. An automatically operated device, comprising a pivoted metallic lever having a rigid inner portion and a resilient outer portion, a thermo-expansive member secured at one end to a fixed support and at the other end to said lever upon the opposite side of the pivot from said resilient portion, means for adjusting the normal tension upon said expansive member, a contact arm supported adjacent said lever and adapted to contact therewith, and means for connecting said arm and said fixed support with a source of electric energy.

5. An automatically operated device, comprising a pivoted metallic lever having a rigid inner portion and a resilient outer portion, a thermo-expansive member secured at one end to a fixed support and at the other end to said lever upon the opposite side of the pivot from said resilient portion, means for adjusting the normal tension upon said expansive member, a resilient contact arm supported adjacent said lever and adapted to alternately make and break contact therewith during each vibration of the lever, means for varying the rate of vibration of the lever, and means for connecting said arm and said fixed support with a source of electric energy.

6. An automatically operated device, comprising a rigid metal bar, a metallic lever pivotally mounted upon one end thereof but insulated therefrom, a thermo-expansive member having one end secured to the opposite end of said bar but insulated therefrom and the other end of said member being connected to said lever, a contact arm secured to the bar adjacent said lever and adapted to make and break contact therewith during each vibration thereof, and means for connecting said bar and the fixed end of said expansive member to a source of electric energy.

7. An automatically operated device, comprising a rigid metal bar, a metallic lever pivotally mounted upon one end thereof but insulated therefrom, said lever having a rigid inner portion and a resilient outer portion, a thermo-expansive member having one end secured to the opposite end of said bar but insulated therefrom and the other end of said member being connected to said lever, a contact resilient arm secured to the bar adjacent said lever and adapted to make and break contact therewith during each vibration thereof, and means for connecting said bar and the fixed end of said expansive member to a source of electric energy.

In testimony whereof I affix my signature.

MILTON H. SHOENBERG.