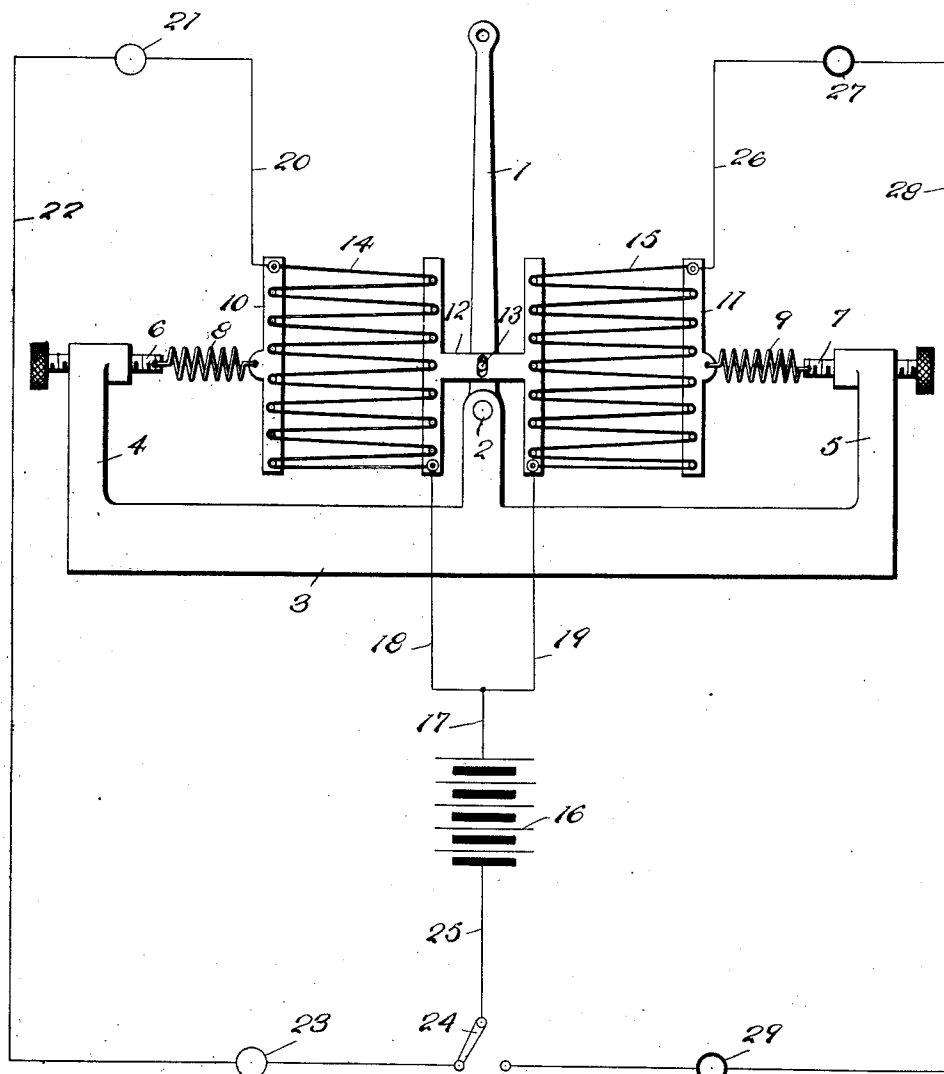


A. A. LOW, M. J. WOHL & H. HERTZBERG.
ELECTROTHERMAL MEANS FOR PRODUCING MECHANICAL MOVEMENT.
APPLICATION FILED APR. 21, 1908.

954,682.

Patented Apr. 12, 1910.



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UNITED STATES PATENT OFFICE.

ABBOT A. LOW, OF HORSESHOE, AND MAURICE J. WOHL AND HARRY HERTZBERG, OF NEW YORK, N. Y., ASSIGNORS TO SAID ABBOT A. LOW, OF HORSESHOE, NEW YORK, SAID MAURICE J. WOHL AND SAID HARRY HERTZBERG, OF NEW YORK, N. Y., TRUSTEES.

ELECTROTHERMAL MEANS FOR PRODUCING MECHANICAL MOVEMENT.

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Specification of Letters Patent.

Patented Apr. 12, 1910.

Application filed April 21, 1908. Serial No. 428,384.

To all whom it may concern:

Be it known that we, ABBOT A. LOW, MAURICE J. WOHL, and HARRY HERTZBERG, citizens of the United States, and residents, respectively, of Horseshoe, county of St. Lawrence, and State of New York, and of the city of New York, borough of Manhattan, county and State of New York, and of the city of New York, borough of Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in Electrotthermal Means for Producing Mechanical Movement, of which the following is a specification.

This invention relates to electrotthermal means for producing mechanical movement, the object being to provide a device in which the thermal action of an electric current is utilized to cause one member to expand while at the same time a similar member is cooling and contracting thus producing a movement in one direction which may be reversed by cutting off the current from the first thermal member and connecting the second member in circuit. The expansion and contraction of these thermal members are utilized by means of suitable mechanical connections to produce mechanical movement of another member.

The object sought to be attained is to provide a simple mechanism for the purpose above described which may be utilized for various purposes such as operating a direct switch, operating the steering mechanism of a boat, operating the semaphore of a block system as well as many other uses and purposes which will be obvious.

In the drawings accompanying this specification we have shown a simple embodiment of our invention to illustrate the several features thereof. A part of the view as shown is diagrammatic and the mechanical features are illustrated by simple means and mechanism which will of course, be changed in design to adapt the device for various uses.

A movable member or arm 1 may be pivotally mounted at 2 to a suitable support frame 3, which may be provided at either end with uprights 4 and 5 in which are carried adjusting screws 6 and 7 to which are attached coil springs 8 and 9 respectively. To the opposite ends of these springs 8 and 9 are attached the supports 10 and 11.

Pivotally mounted upon the movable member 1 is a support 12 which preferably comprises two parallel members similar to the supports 10 and 11 connected by a cross piece which is provided with a slot engaging a pin 13 on the movable member 1. The purpose of the slot is to provide for the circular movement of the pin 13 when the movable member 1 is swung about its circuit.

A pair of opposed thermally expansible members 14 and 15 are carried by the supports 10 and 12 and 11 and 12, respectively. These thermal members are preferably in the form of wires stretched back and forth between the supports as shown, but insulated therefrom and provided with suitable connections at either end providing means for passing an electric current therethrough.

A suitable source of current supply is indicated at 16 from which connection is made by means of the leads 17 and 18 to one end of the thermal member 14 and through leads 17 and 19 to one end of the thermal member 15. From the opposite end of the thermal member 14 is a lead 20 to an indicator or light 21 and from thence through a lead 22 to a second indicator or light 23, switch 24 and lead 25, connection being made to the source of current supply 16. From the opposite end of the thermal member 15 is a lead 26 to an indicator or light 27 and from thence by means of lead 28 to an indicator or light 29 connection may be made through the switch 24 and lead 25 to the source of current 16.

In the position as shown in the drawing, the current flows from the current supply 16 through the leads 17 and 18 to the thermal member 14 through the lead 20, to the indicator or light 21, lead 22, indicator or light 23, switch 24, lead 25 causing the thermal member 14 to expand.

As no current is flowing in the thermal member 15, the expansion of the thermal member 14 allows the support 12 to be moved to the right by the spring 9. The springs 8 and 9 are adjusted by means of the adjusting screws 6 and 7 so that when no current flows in the thermal members 14 and 15 the parts are held in their central position but when the current flows through one of the thermal members as just described the springs take up the expansion and cause

the lever 1 to move to the right. If the switch 24 now be moved to the right either by hand or by any other suitable means it will be seen that the current will be cut out of the thermal member 14 and will then flow through leads 17 and 19 to the thermal member 15, through the lead 25 to the indicator or light 27, through the lead 28 to the indicator or light 29, switch 24, lead 25 to the source of supply 16. The current flowing in the thermal member 15 causes the same to expand and current being cut out from the thermal member 14 allows the same to contract at the same time that the thermal member 15 is expanding and the support 12 is moved to the left causing a corresponding movement of the lever arm 1. The expansion of the thermal member 15 and the contraction of the thermal member 14 should be equal in amount, and, consequently, the lever arm 1 will be moved to an amount equal to this expansion or contraction. Any difference in the amount between the two thermal members will be taken up by the springs 8 and 9. This operation may now be reversed and operated as often as desired, thus producing a reciprocal movement of the lever arm 1 and should it be desired to retain the lever in either position it is only necessary to lift a switch in the position corresponding to the movement when the lever will be held by the action of the thermal member.

It will be noted that the amount of movement may be controlled by the amount of current flowing and that the movement may be made continuous by the automatic operating means of the switch 24.

The purpose of the indicating lights 21, 23, 27 and 29 is to indicate at any desired number of points the direction of movement of the mechanism.

As many changes could be made in the above construction and many apparently widely different embodiments of our invention designed without departing from the scope thereof, we intend that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative merely of an operative embodiment of our invention and not in a limiting sense.

What we claim is:

1. In a device of the character described, in combination, a pair of thermally expansible wires stretched between supports and arranged to pull in opposite directions, said supports comprising a central support to

which both of said wires are attached and to which a reciprocating movement is imparted by the alternate expansion and contraction of said wires, supports at the opposite ends of said wires, resilient members holding said last named supports and wires in position, and means for alternately heating said wires.

2. In a device of the character described, in combination, a pair of thermally expansible conductors stretched between supports and arranged to pull in opposite directions, said supports comprising a central support to which both of said conductors are attached and to which a reciprocating movement is imparted by the alternate expansion and contraction of said conductors, supports at the opposite ends of said conductors, resilient members holding said last named supports and conductors in position, and means for passing a heating current alternately through said conductors.

3. In a device of the character described, in combination, a pair of thermally expansible wires stretched between supports and arranged to pull in opposite directions, said supports comprising a central support to which both of said wires are attached and to which a reciprocating movement is imparted by the alternate expansion and contraction of said wires, supports at the opposite ends of said wires, adjustable resilient members holding said last named supports and wires in position, and means for alternately heating said wires.

4. In a device of the character described, in combination, a pair of thermally expansible wires each stretched back and forth several times between supports and arranged to pull in opposite directions, said supports comprising a central support to which both of said wires are attached and to which a reciprocating movement is imparted by the alternate expansion and contraction of said wires, supports at the opposite ends of said wires, resilient members holding said last named supports and wires in position, and means for alternately heating said wires.

Signed at Brooklyn, N. Y. city, in the county of Kings and State of New York, this 17th day of April, 1908.

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