

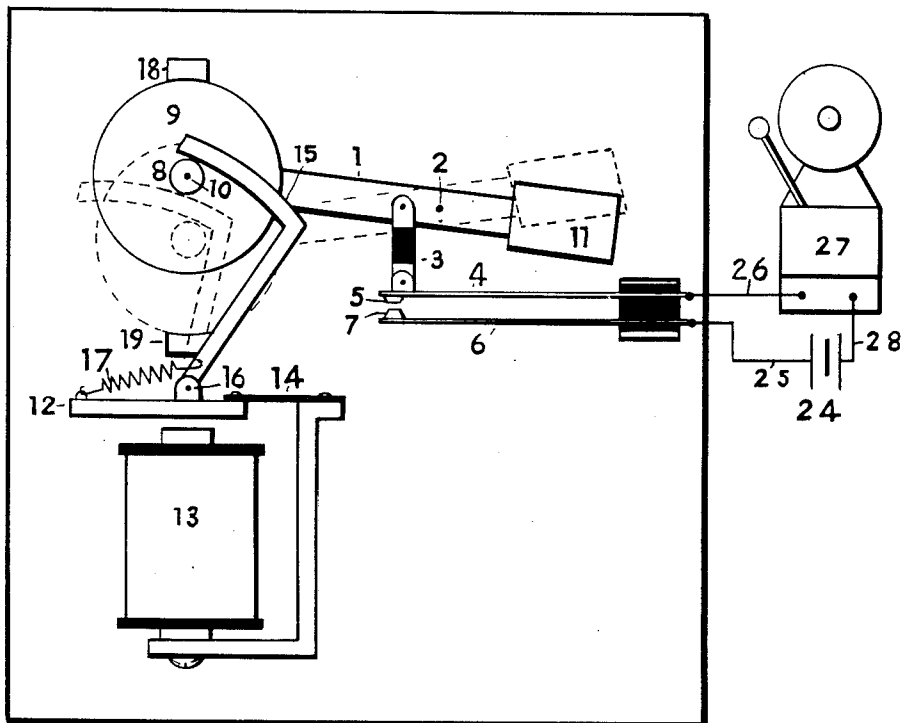
Jan. 5, 1954

H. BURTON

2,665,345

RELAY

Filed Feb. 16, 1951



INVENTOR.

Henry Burton

UNITED STATES PATENT OFFICE

2,665,345

RELAY

Henry Burton, Gardena, Calif.

Application February 16, 1951, Serial No. 211,310

4 Claims. (Cl. 200-97)

1

My invention relates to electric relays. The principal object is to provide a slow acting relay of high efficiency to be operated by alternating or pulsating current. It is particularly suitable for relaying signals transmitted over telephone lines by the conventional magneto.

In describing my invention reference is made to the accompanying drawing. The figure shows the principal elements in their relative positions. Solid lines show the elements in normal position and dotted lines show the position assumed by some of the elements responsive to vibrations caused by an alternating current.

In the figure the actuating lever 1 is supported so that it will oscillate freely upon the pivot 2 and is connected by a link of insulating material 3 to the leaf spring 4 which is tensioned so as to lightly bias lever 1 to the position shown in solid lines. Spring 4 also carries the contact point 5 and serves as a switch member. Spring 6 is the other switch member and carries the contact point 7, in position to be contacted by point 5, when the lever 1 is depressed. The drum 8 with its attached wheel 9 is freely rotatable upon the pivot 10, carried on the end of lever 1, as shown. Wheel 9 is of such size and weight that it resists sudden rotary movement. The weight of drum 8 and wheel 9 is counterbalanced by the weight 11. The armature 12 is supported in the field of magnet 13 by the leaf spring 14 so that it will vibrate, like the armature of a buzzer, whenever the magnet 13 is intermittently energized, as by alternating current. The armature 12 carries the arcuate member 15, freely oscillatable upon the pivot 16, eccentric to the arc of member 15, which is lightly biased to the left by spring 17. When the drum 8 is in raised position the outer end of arcuate member 15 bears upon the nurlled periphery of drum 8, as shown. Because the pivot 16 is off center the pull of spring 17 causes the arcuate member 15 to exert some downward pressure upon drum 8, but this is slightly overbalanced by the upward pressure of leaf spring 4, so that the normal position of the elements is as shown in solid lines with the wheel 9 resting against the stop 18 and the switch points 5 and 7 open.

The operation of the relay shown in the figures is as follows: When magnet 13 is energized by alternating current armature 12 vibrates. Each downward movement of armature 12 is transmitted by the arcuate member 15 so as to urge both rotary and downward movement of drum 8 but because of the inertia of wheel 9 rotation is retarded, so that the downward movement of

2

armature 12 causes equal downward movement of drum 8 together with wheel 9 and end of its supporting lever 1. In its downward motion lever 1 acquires some momentum and continues to move downward while the retraction of armature 12 raises the arcuate member 15 out of contact with drum 8 and it moves, responsive to spring 17, quickly to the left until it contacts drum 8 at a point farther along its arc and nearer to the pivot 16. In this manner the end of lever 1 is moved progressively with each vibration of armature 12 until the arcuate member 15 reaches the limit of its leftward travel and the downward motion as well as any incipient rotary motion of wheel 9 is arrested by the brake shoe 19, as shown in dotted lines, thereafter each succeeding vibration reverses any incipient retrograde movement of lever 1 so that it remains depressed as long as armature 12 continues to vibrate. When armature 12 comes to rest the drum 8, responsive to pressure of leaf spring 4, bears with contact pressure upon the eccentric arc of member 15 urging clockwise rotation of drum 8. The inertia of wheel 9 is quickly overcome and the drum 8 rolls along the arc of member 15 forcing it to the right until both the upward and rotary motion of wheel 9 is arrested by the stop 18. Depression of lever 1 flexes spring 4 to close a local circuit from battery 24, over conductor 25, spring 6, points 5 and 7, spring 4, conductor 26, through winding of bell 27, conductor 28, back to battery, this local circuit is closed when the lever 1 is about midway of its downward stroke, spring 6, yielding to permit completion of the stroke, and the circuit is opened at the same point of the upward stroke of lever 1, so that the circuit is held firmly closed as long as the armature 12 vibrates even though there be some slight vibration of the lever 1.

In addition to being slow acting and non-chattering this relay is much more efficient than a conventional relay because it requires a smaller air gap between the armature and its magnet also because the effect of the vibrations is cumulative to move the actuating element over a longer space thus permitting greater leverage for moving the switch member.

When the purpose for which the relay is to be used is merely to open and close a local circuit coordinately with the opening and closing of another circuit, rotation of the drum 8 will be sufficiently retarded by the mere inertia of wheel 9, as described, however, if it is desired to use the relay as a time switch in which the local circuit will remain closed for a longer period after cessa-

tion of the energizing current then other retarding means such as an escapement, governor or the like may be added or substituted.

Another advantage of this relay is that the armature 12 may be harmonized to respond only to a current of a certain frequency to make the relay suitable for use on telephone lines using the harmonic system of selective ringing. It will be observed that the actuating lever 1 is responsive only to vibrations of the vibrating element viz. armature 12, with its arcuate member 15. The magnet 13 is shown here merely as one convenient means for causing the vibrations, obviously the same result would be achieved if the vibrations were caused by other means.

I claim:

1. A relay comprising in combination first and second switch elements positioned and supported so that the first switch element, biased to a normal position, is movable into and out of cooperation with the second switch element, a vibrator fashioned and supported for rhythmic vibration, yielding transmission means linking the first switch element with the vibrator, effective to communicate energy of vibratory movements of the vibrator to the first switch element as pressure impulses counter to its bias, the degree of pressure being proportional to the velocity of the vibratory movements, so that the first switch element is progressively moved in opposition to its bias incident to rhythmic vibrations of the vibrator, whenever the resultant recurring pressure impulses combine to exert substantially continuous pressure upon the first switch element counter to and greater than its bias, and the first switch element recedes responsive to its bias whenever said counter pressure is less, whereby to provide switch means responsive to variations of the rhythm of sustained vibrations.

2. A relay comprising in combination an actuating element, suitably supported for alternate movement in a fixed path of travel between a normal and an advanced position, biased to the normal position, including a rotary member supported by the actuating element for lateral movement therewith and rotation relative thereto, a vibrator fashioned and supported for rhythmic vibration, transmission means cooperating to communicate the energy of the vibratory movements of the vibrator to the periphery of the rotary member as pressure impulses in the direction of the advanced position of the actuating element, to urge both rotation and lateral movement of the rotary member, the degree of said urge being proportional to the velocity of the vibratory movements, means to retard rotation of the rotary member so that the actuating element is progressively moved in opposition to its bias incident to rhythmic vibrations of the vibrator, whenever the recurring pressure impulses combine to urge movement of the rotary member at a greater rate than its rate of rotation and the actuating element recedes responsive to its bias when the rotary member rotates so that the point of pressure upon its periphery overruns the pressure impulses and manifesting means responsive to the actuating element.

3. A relay comprising in combination an actuating element suitably supported for alternate movement in a fixed path of travel between a normal and an advanced position, biased to the normal position, including a rotary member supported by the actuating element for lateral movement therewith and rotation relative thereto, a vibrator fashioned and supported for rhythmic

vibration codirectional with the travel of the actuating element, including an arcuate member supported by the vibrator for vibration therewith and rotation relative thereto upon an axis eccentric to the arc of the arcuate member, perpendicular to its plane and parallel to the axis of the rotary member, the arcuate member being positioned and biased for cotangent contact with the rotary member so that one movement of the vibrator causes pressure between the arcuate member and the rotary member to urge mutual rotation of said members and lateral movement of the rotary member and the reciprocal movement of the vibrator reduces said pressure to permit independent rotation of the arcuate member responsive to its bias, means to retard rotation of the rotary member, so that the actuating element is progressively moved in opposition to its bias and the arcuate member rotates responsive to its bias incident to rhythmic vibrations of the vibrator whenever they urge the rotary member at a greater rate than its rate of rotation and the actuating element recedes responsive to its bias rotating the arcuate member counter to its bias when the rotary member rotates so that its periphery overruns the vibrations and manifesting means responsive to the actuating element.

4. A relay comprising in combination an actuating element suitably supported for alternate movement in a fixed path of travel between a normal and an advanced position, biased to the normal position, including a rotary member supported by the actuating element for lateral movement therewith and rotation relative thereto, an electromagnet energized at times by alternating current, an armature suitably supported for vibration codirectional with the travel of the actuating element responsive to the rhythmic pulsations of the electric current, including an arcuate member supported by the armature for vibration therewith and rotation relative thereto upon an axis eccentric to the arc of the arcuate member, perpendicular to its plane and parallel to the axis of the rotary member, the arcuate member being positioned and biased for cotangent contact with the rotary member, so that one movement of the armature causes pressure between the arcuate member and the rotary member to urge mutual rotation of said members and lateral movement of the rotary member and the reciprocal movement of the armature reduces said pressure to permit independent rotation of the arcuate member responsive to its bias, means to retard rotation of the rotary member so that the actuating element is progressively moved in opposition to its bias and the arcuate member rotates responsive to its bias incident to rhythmic vibrations of the vibrator, whenever they urge movement of the rotary element at a greater rate than its rate of rotation and the actuating element recedes responsive to its bias rotating the arcuate member counter to its bias when the rotary member rotates so that its periphery overruns the vibrations and manifesting means responsive to the actuating element.

HENRY BURTON.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
1,554,652	Pons	Sept. 22, 1925
1,665,318	Mead	Apr. 10, 1928
1,967,451	Rich	July 24, 1934
1,978,729	Vachris et al.	Oct. 30, 1934
2,181,497	Smith	Nov. 28, 1939