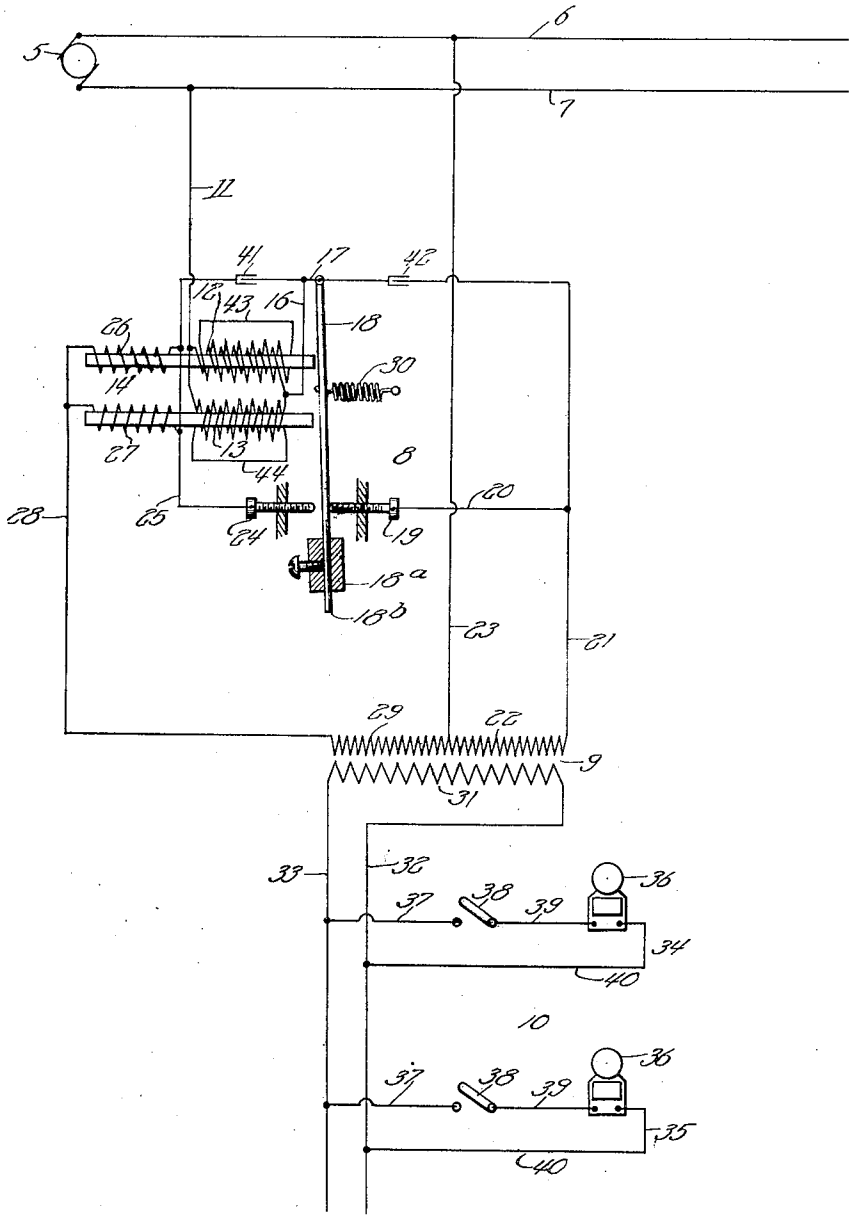
Feb. 9, 1926. 1,572,039

M. R. RICHARD

ELECTRICAL APPARATUS

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ELECTRICAL APPARATUS.

Application filed May 5, 1920. Serial No. 379,055.

To all whom it may concern:

Be it known that I, MARK R. RICHARD, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in an Electrical Apparatus, of which the following is a description.

My invention relates to current modifiers, and in one form of its application is of particular use in providing means, whereby a signal circuit, requiring current of different voltage than that ordinarily supplied from some source, as for instance, from a central station, may be operated by suitable current which is obtained from the current supplied by the central station. The invention has among its objects the production of a device of the kind described which is simple, convenient, reliable, efficient, inexpensive and satisfactory for use wherever found applicable.

More specifically my invention finds great application in an electrically operated signalling system, wherein the initial source of electrical energy may be a central station supplying uni-directional current, and my invention will be readily understood, for in the description I will give, I will explain it more particularly as applied to an electrically operated signal system of the aforesaid character.

The purpose of my invention is to permit an economical modification of the uni-directional current, so that there may be only a negligible loss of energy when the signalling circuits proper are not in operation. The device which I have illustrated and will describe, is arranged to change the uni-directional current to an interrupted uni-directional current having a substantial amperage by means of an electro-magnetically operated vibrator and a transformer, which said transformer modifies this interrupted uni-directional current to a current of different voltage. Many other objects and advantages of the apparatus herein shown and described will be obvious to those skilled in the art from the disclosure herein given.

To this end my invention consists in the novel construction, arrangement and combination of parts herein shown and described, and more particularly pointed out in the claims.

The drawing is a diagrammatic view illustrating my improved apparatus.

Referring to the drawing, I have a source of uni-directional current 5, suplying current to the conductors 6 and 7, having connected across them the vibratory element 8 adapted to deliver an interrupted uni-directional current to the transformer 9, which in turn delivers a current of different voltage, usually lower, to the signal system circuit 10, depending upon the conditions of the particular application of the invention.

The normal path of the uni-directional current, which actuates the vibratory element 8, is through the conductor 11, windings 12 and 13 of the electro-magnet 14, conductor 16, conductor 17, armature 18 of the electro-magnet 14, adjustabe contact 19, conductor 20, conductor 21, primary winding 22 of the transformer 9, and conductor 23.

I have illustrated the windings 12 and 13 of the electro-magnet 14 connected in parallel into the circuit, but it is readily understood that the windings may be in series. The function of the windings 12 and 13 is to energize the electro-magnet 14 and thereby attract the armature 18, disengaging the armature 18 from the adjustable contact 19 and drawing the said armature 18 into engagement with the adjustable contact 24. The path of the uni-directional current through the vibratory element 8 will then be through conductor 11, windings 12 and 13 of the electro-magnet 14, conductor 16, conductor 17, armature 18, adjustable contact 24, conductor 25, windings 26 and 27 of the electro-magnet 14, conductor 28, primary winding 29 of the transformer 9, and through the conductor 23. The windings 26 and 27 of the electro-magnet 14 are so connected into the circuit that the flow of the uni-directional current therein will be in the opposite direction to the flow of the uni-directional current through the said wind-

ings 12 and 13 respectively. The function of said windings 26 and 27 is to counteract the energizing influence of the windings 12 and 13 upon the core of the electro-magnet 14, thus permitting the springs 30 to retract the armature 18, and again bring it into engagement with the adjustable contact 19.

I have provided a plurality of adjustable contacts, namely the adjustable contacts 24 and 19, to permit a greater flow of current through the primary of the transformer 9. The inductive reactance of the circuit comprising the vibratory element 8 causes the current to lag behind the voltage. An appreciable interval of time is necessary to permit the current to attain its maximum flow, and as the transformer 9 is only actuated while there is a changing condition in the current flowing in the vibratory element 8, the best results are obtained, when the armature 18 is permitted to remain in contact with the adjustable contacts 19 and 24 until such time has elapsed to permit the current flowing in the vibratory element 8 to nearly reach its maximum.

The employment of the adjustable contacts 24 and 19 therefor permits the slower operation or vibration of the armature 18 by which I obtain an interrupted series of impulses of uni-directional current, each of which impulses is amplified until the current nearly reaches the maximum capacity of the circuit. To aid in control of the speed at which the armature 18 operates, I use a weight 18^a, adjustably secured to the free end 18^b of the armature 18, which weight 18^a, by reason of its inertia, retards the speed at which the armature 18 operates.

The interrupted uni-directional current supplied by the said vibratory element 8 to the primary windings 22 and 29 of the transformer 9 induces in the secondary winding 31, a current of lower voltage. The secondary winding 31 of said transformer 9 feeds the current to conductors 32 and 33 of the signal circuit 10. A plurality of signalling devices may be connected in parallel across the conductors 32 and 33, as shown at 34 and 35. I have illustrated the signalling device as having bells 36, which are actuated by means of the current flowing through conductors 37, switches 38, and conductors 39 and 40.

To retard the sparks and overcome the corroding effect of the sparks at the spark gaps in the said vibratory element 8, I have shunted condensers 41 and 42 across the said gaps. In addition, upon the said electro-magnet 14, I have placed short-circuit windings 43 and 44, which, by reason of the induced currents which are caused to flow in them whenever the other windings of the electro-magnet 14 are energized, will tend to retard the spark across the spark gaps.

From what has been described, it is thought that the nature of my invention will be readily clear to those skilled in the art, and it will also be clear that many modifications may be made within the scope of the appended claims without departing from the spirit of my invention; hence I do not wish to be understood as limiting myself to the exact form, construction, arrangement and combination of parts herein shown and described, or uses mentioned.

What I claim as new and desire to secure by Letters Patent is:

1. A current modifying system comprising a source of unidirectional current, an electro-magnetically operated vibrator having a plurality of opposed windings, means associated with the source of unidirectional currents for alternately exciting one of the opposed windings and both of the opposed windings, and means for delivering pulsations of current from the vibrator.

2. A current modifying system comprising a source of unidirectional current, a transformer, an electro-magnetically operated vibrator having a winding, a second winding opposed to the first mentioned winding, a plurality of contacts, and a vibratory armature for engaging the contact, a circuit connecting the source of unidirectional current with the vibrator for alternately exciting the first mentioned winding and both windings, and means for delivering a pulsation of current from the vibrator to the transformer for each stroke of the armature.

3. A current modifying system comprising a source of unidirectional current, a transformer, an electro-magnetically operated vibrator having a winding, a second winding opposed to the first mentioned winding, a circuit connecting the source of unidirectional current with the vibrator for alternately exciting the first mentioned winding and both windings, and means for delivering a pulsation of current from the vibrator to the transformer during each excitation of the first mentioned winding and during each excitation of both windings.

4. A current modifying system comprising a source of unidirectional current, a transformer, an electro-magnetically operated vibrator having a winding, a second winding opposed to the first mentioned winding, means coacting with the source of unidirectional current for alternately exciting the first mentioned winding and both windings, and means for delivering pulsations of current from the vibrator to the transformer.

5. A current modifying system comprising an electro-magnetically operated vibrator having a plurality of opposed windings, means for alternately exciting one of the opposed windings and both of the opposed

windings, and means for delivering pulsations of current from the vibrator.

6. A current modifying system comprising an electro-magnetically operated vibrator having a plurality of opposed windings and a vibratory armature, means for alternately exciting one of the opposed windings and both of the opposed windings, and means for delivering a pulsation of current for each stroke of the armature.

In testimony whereof, I have hereunto signed my name.

MARK R. RICHARD.