S. B. ALLEN & E. T. KING.

ALTERNATOR.

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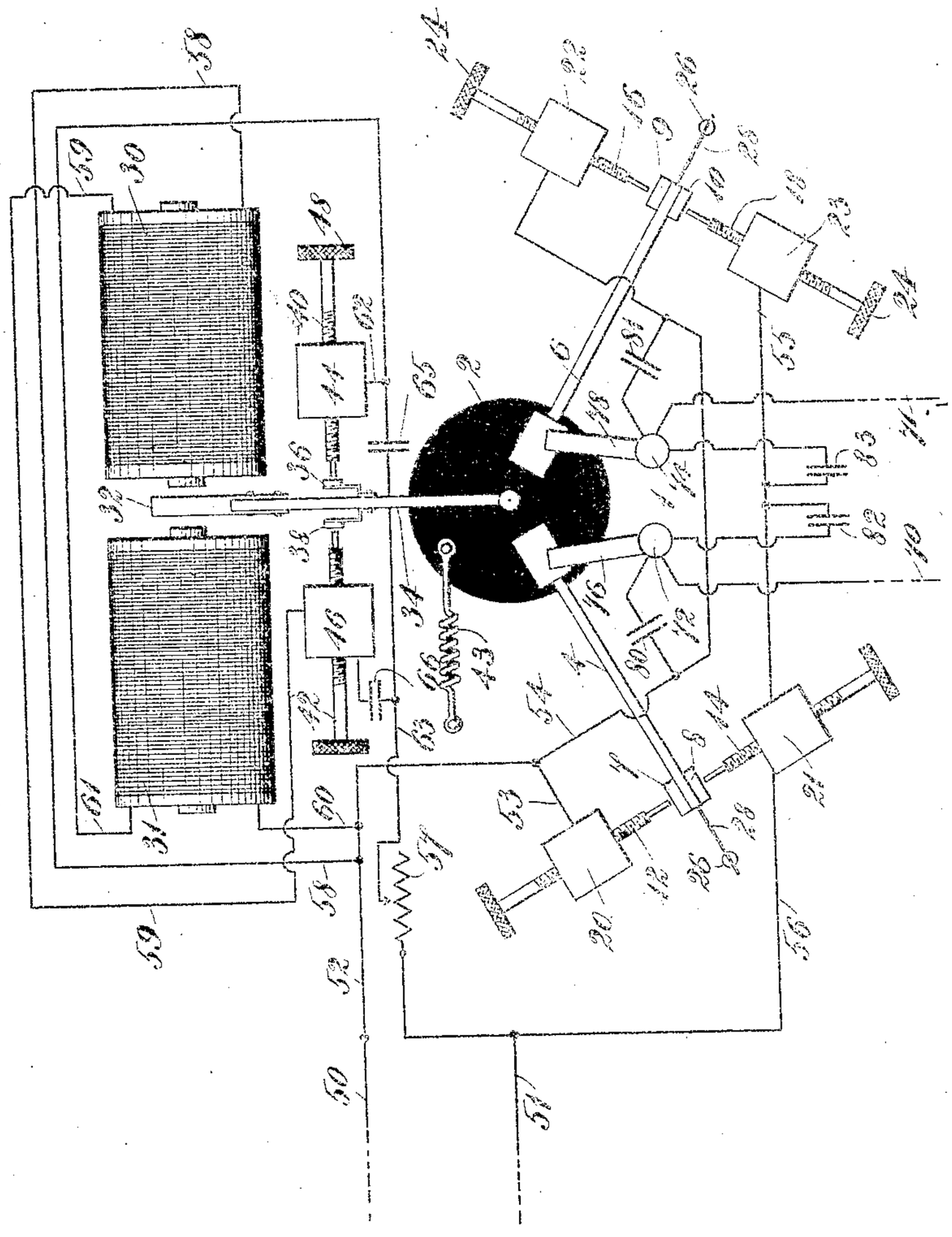
998,147.

Patented July 18, 1911.



WITNESSES

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ALTERNATOR.

998,147. Specification of Letters Patent. **Patented July 18, 1911.**

Application filed August 11, 1910. Serial No. 576,756.

To all whom it may concern:

Be it known that we, STRATFORD B. ALLEN and EVERETT T. KING, both citizens of the United States, residing in Cambridge, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Alternators, of which the following, taken in connection with the accompanying drawings, is a specification.

This invention relates to a device for converting direct current into alternating current.

One object of the invention is to provide a device which shall convert direct current into alternating current by means of mechanical vibration without the use of a rotary converter, motor-generator, or the like.

A further object of the invention is to provide a device for converting direct current into alternating current of comparatively high frequency and suitable for wireless telegraphy, X-ray work, or the like.

With the above objects in view the invention consists in the device of the character set forth and as hereinafter described and claimed, the advantages of which will be obvious to those skilled in the art from the following detailed description.

The accompanying drawing is a diagrammatic plan view of a preferred embodiment of the invention.

As illustrated in the drawing the device comprises a switch composed of two contact carrying arms each coöperating with a pair of opposed adjustable contacts, and electromagnetic means for rapidly oscillating the switch. Condensers are connected across the make-and-break contacts and a condenser is connected across each pair of coöperating switch contacts. One function of the condensers is to reduce sparking at the contacts. The condensers across the switch contacts as they discharge after each impulse of the direct current, when the latter is interrupted, produce a momentary oscillatory current which is opposite in polarity to that of the direct current impulse preceding it. The condensers thus located discharge through the instrument in the alternating current circuit and thus increase the spark produced by the apparatus at the interruption of each alternation.

The switch 1 comprises a block 2 of insulating material, which is pivoted to swing in a horizontal plane. Attached to the block 2 and radiating at substantially 120° are two contact-carrying arms 4 and 6 provided at their outer or free ends with contacts 7, 8, and 9, 10, respectively. These contacts are adapted to be brought into contact with the inner ends of the opposed screws 12, 14, 16 and 18, which are threaded in binding posts 20, 21, 22 and 23, respectively, and provided at their outer ends with knurled heads 24, by means of which they may be adjusted to vary the limit of throw of said arms. The free ends of the arms 4 and 6 may be provided with weights 26 adjustably mounted on springs 28 secured to said arms. The purpose of these resiliently supported weights is to quicken the action of the separation of the contacts 7, 8, 9, and 10 from their respectively opposed screws, when the contact-carrying arms are oscillated or vibrated as will be hereinafter explained.

The switch 1 is oscillated by means of a pair of opposed electromagnets 30 and 31, having a common armature 32 carried by a metallic arm 34 mounted on the insulating block 2. A pair of resilient contacts 36 and 38 are mounted on opposite sides of the arm 34 and are adapted to be brought into contact with the opposing ends of the screws 40 and 42, respectively, threaded in the binding posts 44 and 46, respectively, and provided at their outer ends with knurled heads 48, by means of which they may be adjusted with relation to the contacts 36 and 38 to vary the speed with which the armature will be vibrated.

The direct current enters through the conductor 50 and leaves through the conductor 51. The conductor 50 is connected by the conductors 52 and 53 with the post 20. A conductor 54 connects the junction of the conductors 52 and 53 with the post 22; a conductor 55 connects the posts 23 and 21; and a conductor 56 connects the post 21 with the conductor 51.

The magnets 30 and 31 are connected in a shunt circuit which may be provided with a variable resistance 57. It will be understood however that the magnets may be operated by an independent source of electrical energy if desired. A conductor 58 connects the conductor 52 with one end of the magnet coil 30, and the other end of said coil is connected by a conductor 59 to the post 46. A conductor 60 connects the conductor 52 with one end of the magnet coil

31, and the other end of said coil is connected by conductors 61 and 62 to the post 44.

A conductor 63 connects the arm 34 with the conductor 51 through the variable resistance 57. Condensers 65 and 66 are connected between the posts 44 and 46, respectively, and the magnet circuit, that is, across the make-and-break contacts, to reduce the spark when this circuit is broken at the contacts 36 and 38.

The alternating current work-circuit is connected to the conductors 70 and 71 attached to binding posts 72 and 74 respectively, which in turn are connected to the contact-carrying arms 4 and 6 by conductors 76 and 78. Condensers 80 and 81 are connected between the posts 72 and 74, respectively, and the conductor 54; and condensers 82 and 83 are connected between the posts 72 and 74, respectively, and the conductor 55. The purpose of these condensers is to decrease the spark at the switch contacts at each break of the alternating current, and to increase the spark with induction coil or transformer at each break of the circuit. This is especially desirable in wireless telegraphy and X-ray work. It increases the efficiency of closed-core transformers and increases the sending distance of open-core transformers when used in wireless telegraphy.

The operation of the device is as follows: The direct current enters through the conductor 50 and a portion of the current is shunted through the magnet circuit. The contact 38 may be held against the screw 42 by a spring 43 attached to the disk 2 in order to start the device. The current then passes through the conductors 52, 58, magnet coil 30, conductor 59, post 46, screw 42, contact 38, arm 34, conductor 63, and the variable resistance 57 to the conductor 51. The resistance 57 may be regulated to allow any desired amount of current to pass through the shunt to energize the magnets 30 and 31. The magnet 30 being energized draws the armature 32 toward the right and oscillates the support 2 and the contact arms 4 and 6, so that the contact 7 is brought into engagement with the screw 12, and the contact 10 is brought into engagement with the screw 18. At this moment the current flows through conductors 50, 52, 53, post 20, screw 12, contact 7, arm 4, conductor 76, post 72, conductor 70 to the alternating current work-circuit and returns through the conductor 71, post 74, conductor 78, arm 6, contact 10, screw 18, post 23, conductor 55, post 21, conductor 56, to the conductor 51. As the armature 32 is drawn toward the right the circuit is broken between the contact 38 and the screw 42, and the circuit is closed between the contact 36 and the screw 40. Thereupon the magnet 30 is deënergized and the magnet 31 is energized. The armature 32 is now drawn to the left and the disk 2 is oscillated to bring the contact 9 into engagement with the screw 16 and the contact 8 in engagement with the screw 14. At this time the current passes from the conductor 50 through the conductors 52, 54, post 22, screw 16, contact 9, arm 6, conductor 78, post 74 and conductor 71 to the alternating current work-circuit, and returns through the conductor 70, post 72, conductor 76, arm 4, contact 8, screw 14, post 21, and conductor 56 to the conductor 51. It will thus be seen that at each vibration of the armature 32 the direction of the current through the alternating current work-circuit is reversed. The rapidity of these alternations can be varied by varying the speed at which the magnet circuits are interrupted. By using the condensers as shown the sparks of induction coil or transformer are increased at each break of the circuit and in each alternation.

While we have illustrated and described a preferred embodiment of the invention, we are aware that many modifications can be made by any person skilled in the art without departing from the scope of the invention as expressed in the claims. Therefore we do not wish to be limited to all the details of construction shown and described, but

What we claim is:—

1. In a device of the class described, the combination with a supply of direct current, of a switch comprising a pivoted insulating block having three arms radiating from the pivotal center thereof, a pair of contacts on each of said arms, adjustably stationary contacts opposed to and coöperating with the contacts on said arms, and electromagnetic means coöperating with one of said arms for oscillating said block.

2. In a device of the class described, the combination of a pivoted insulating block having three arms mounted thereon and radiating from the pivotal center thereof, an armature carried by one of said arms, a pair of make-and-break contacts coöperating with the armature-carrying arm, a pair of switch contacts on each of the other two arms, adjustable stationary contacts opposed to the contacts on said arms, and opposed electromagnet coils coöperating with said armature for rapidly oscillating the arms between the switch contacts.

3. In a device of the class described, the combination with a supply of direct current, of a switch comprising a pivoted insulating block having three arms mounted thereon and radiating from the pivotal center thereof, an armature carried by one of said arms, electromagnetic means energized by said direct current for coöperating with said armature to oscillate said block, make-and-break contacts in the circuit of said electromag-

netic means, condensers connected across said make-and-break contacts, a pair of switch contacts carried by each of the other two arms, adjustable stationary contacts co-operating with said switch contacts, and a condenser connected across each pair of co-operating switch contacts.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

STRATFORD B. ALLEN.
EVERETT T. KING.

Witnesses:
CHARLES F. HOWE,
GEORGE CLARENDON HODGES.