I. C. ORSWELL.

VIBRATOR.

APPLICATION FILED JUNE 3, 1908.

1,082,475. Patented Dec. 23, 1913.

Fig. 1

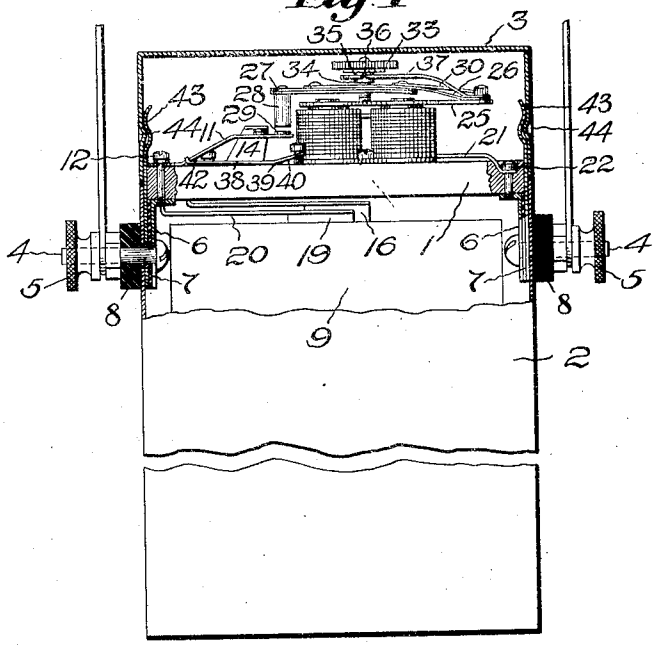


Fig. 2

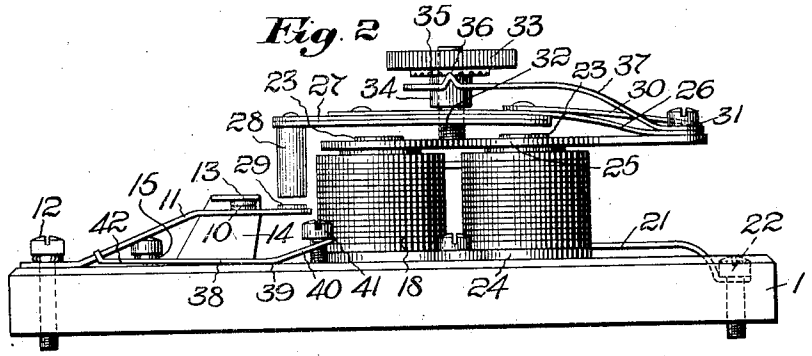
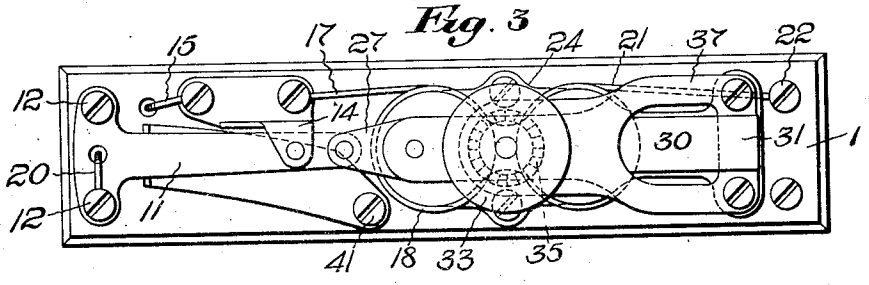


Fig. 3



Witnesses:
Horace A. Crossman
Robert H Kammler.

Inventor:
Israel C. Orswell.
by Emery Booth
Attys

UNITED STATES PATENT OFFICE.

ISRAEL C. ORSWELL, OF HYDE PARK, MASSACHUSETTS, ASSIGNOR TO ORSWELL IGNITER COMPANY, OF BOSTON, MASSACHUSETTS, A CORPORATION OF MAINE.

VIBRATOR.

1,082,475. Specification of Letters Patent. Patented Dec. 23, 1913.

Application filed June 3, 1903. Serial No. 436,395.

To all whom it may concern:

Be it known that I, ISRAEL C. ORSWELL, a citizen of the United States, and a resident of Hyde Park, in the county of Norfolk and State of Massachusetts, have invented an Improvement in Vibrators, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

My invention relates to vibrators, being more particularly concerned with the provision of an efficient vibrator device for use in connection with induction coils such as are employed for ignition systems or any other purposes for which such devices are employed.

My invention will be best understood by reference to the following description when taken in connection with the accompanying illustration of one specific embodiment thereof, while its scope will be more particularly pointed out in the appended claims.

In the drawings: Figure 1 is a side elevation, partly broken away, showing the vibrator parts mounted within an inclosing casing; Fig. 2 is a side elevation, on an enlarged scale, showing more particularly the details of the vibrator parts; and, Fig. 3 is a plan view of the vibrator as seen in Fig. 2.

Referring to the drawings and to the specific embodiment of my invention there illustrated, I have shown a vibrating device mounted upon a suitable support, such as the block 1 of insulating material, the same being fixedly or otherwise secured to the upper part of the casing 2, which latter is provided with the removable cover 3. The casing is provided with external binding posts 4 and thumb nuts 5, by means of which connection may be had, as is usual in this class of devices, to a suitable source of electromotive force such as a battery and to the terminals of one or more induction coils, not herein shown, but the arrangement and relation of which will be clear by reference to my prior Patent No. 878,467, showing the employment of a vibrator in connection with an ignition system.

Referring more particularly to Fig. 1, the insulating support 1 is mounted upon preferably metallic conductive brackets 6 which are rigidly secured to the sides of the casing by the binding posts or screws 5, there being provided suitable insulation 7 between the brackets and the metallic walls of the casing 2, and other insulation 8 to insulate the binding posts also from the casing. The casing 2 is constructed to contain the condenser 9, the latter connected in shunt about the vibrator contacts.

One contact 10 is movably mounted upon the resilient metal strip 11, the latter secured to the insulating support 1 by means of one or more screws 12 which pass through the support and into the supporting bracket 6, thereby completing electrical connection with the binding post and attached lead wire. The other or stationary contact 13 is mounted upon the overhanging metallic strip 14, the latter being directly connected by means of the wire 15 to one terminal 16 of the condenser 9, and also through the wire 17 with one terminal of the magnet coil 18. The other terminal 19 of the condenser is connected by means of the wire 20, which passes upward through the insulation support and the strip 11, to the screw 12, the condenser thereby being connected in shunt between the two contacts. The other terminal of the magnet coil is connected by means of the wire 21 to the screw 22, the latter passing downward through the support into the underlying bracket 6 and thereby connecting the coil to the remaining binding post 4 and the lead wire.

The above connection provides a condenser casing which also acts as a support for the vibrator, the connections from the binding post to the vibrator being so established that they are not broken or disturbed by the removal of the cover for inspection of the parts.

The vibrator magnets are provided with cores 23 secured at the lower ends to a base piece 24, preferably of magnetic material, and at their upper ends provided with a connecting plate 25 preferably of non-magnetic material, the said base piece, plate and

core forming a magnet frame which preferably, though not necessarily, is employed to support also the armature and its resilient connections. For this purpose the connecting plate 25 is extended to one side of the magnets and to this projecting portion there is secured the resilient leaf spring member 26 constituting a resilient hinge, the opposite end of which carries the armature 27, so that the latter overlies the magnet pole piece 23. The free end of the armature, which projects beyond the opposite side of the coils, carries a hammer member 28 adapted, on attraction of the armature by the vibrator magnet, to strike a hammer-like blow upon the end 29 of the underlying resilient contact member 11, the latter acting as an anvil device, thereby causing the separation of the two contacts 10 and 13 and a suitable interruption of the primary circuit.

I have found it to be preferable, in order to secure the full hammer effect of the armature movement, to cause the armature to strike the movable contact member at a point well removed from the fulcrum fixed end of the spring 26, the armature, therefore, for this purpose, overlying the magnets and carrying the hammer member 28 at the side thereof opposite from the point of its attachment to the plate 25. If the leaf spring 26 is alone employed to control the movements of the armature, the moment the hammer member 28 touches the anvil device 29 in its attractive movement, thereby meeting with resistance at that point, further attractive effect of the magnet tends to deform or straighten the resilient spring member 26, instead of causing the armature, as it should, to continue to swing as a hinge about the point of spring attachment. This diminishes somewhat at the critical time the effect of the armature blow upon the anvil member 29 and impairs the efficiency of the apparatus in giving a sharp, quick break to the contacts. I have, therefore, provided an additional attachment 30 for the armature preferably stiffer than the spring 26, such attachment, in the form shown, consisting of a resilient metallic strip, rigidly secured at one end to the armature, but having a free end 31 overlying and in contact with the fixed support 25 at the point of attachment of the spring thereto. This additional attachment 30 does not affect the resiliency of the spring or its action, so long as the armature and the spring continue to swing about the fulcrum point without deformation. But, if, through the hammer meeting resistance in contacting with the device 29, the attractive effect of the magnet tends to pull down the inner end of the armature and straighten the spring, such tendency is resisted by the contact of the free end 31 of the stiffer spring attachment with the underlying part against which it rests. It, therefore, serves to compel the armature structure to swing as a rigid structure about its fulcrum point while, however, permitting the full resiliency of the spring 26 at all times to be availed of.

In my earlier patent, to which reference has already been made, provision was made for an adjustable stop to limit the outward spring movement of the armature. Such adjustable stop, however, was provided upon the removable cover of the apparatus and, in practice, frequently became disarranged when the cover was removed. It also provided a somewhat inexact adjustment owing to the resiliency of the cover itself. One object of my present invention is to provide a rigid adjustable stop for the outward movement of the armature by means of which any required adjustment can be maintained at all times. To secure this in the illustrated form of my invention I provide a threaded stud 32 fixedly secured to the plate 25 and projecting outwardly therefrom through an opening of suitable size in the armature. Upon the end of such stud I provide the threaded adjusting nut 33 having the downwardly projecting sleeve portion 34 adapted to overlie and contact with the armature, such portion serving as an adjustable abutment to limit the outward armature movement.

Suitable means are preferably provided to lock the adjusting nut in any selected position, the under surface of the head being herein notched, as at 35, and adapted to engage a toothed member 36 which may be pressed into the notched portion by means of the resilient arm 37, having its opposite end fixedly secured to the end of the connecting plate 25. Pressure of the arm 37 and the tooth 36 against the under side of the nut not only locks the latter in position but takes up any backlash existing between the threads of the nut and of the screw, so that such backlash cannot in any wise affect the designed adjustment.

In the illustrated form of my invention I have also provided means for adjusting more or less the resiliency of the movable contact member 11. Such means herein are afforded by the resilient plate 38 which, as shown, may be slightly bent to provide a fulcrum portion 39, resting upon the insulation support 1. The portion 40 projecting from the fulcrum part is engaged by an adjusting screw 41 by which the opposite end 42 may be more or less elevated. The end 42 is forked and underlies the movable contact member a short distance from its attachment to the insulation support, so that as the forked end 42

is more or less elevated the resilient member 11 becomes more or less stiffened.

In order to retain the cover 3 firmly in position any suitable means may be provided, but herein I have supplied a spring fastening engaging the inner walls of the cover so as to hold the latter free from interference with any of the vibrator parts and, at the same time, being invisible when the cover is in position. Such a form of fastening is comprehended in the spring tongue pieces 43, which are provided one at each side of the casing, being clamped in upright position by the binding screw 4 between the wall of the casing and the connected parts. These resilient tongue pieces 43 project upwardly and are suitably formed to snap over indentations 44 formed in the side walls of the cover to hold the latter firmly in position.

While I have herein shown and described one form of my invention for illustrative purposes and have disclosed and discussed in detail the construction and arrangement incidental to one specific application thereof, it is to be understood that the invention is limited neither to the mere details or relative arrangement of parts, nor to its specific application herein shown, but that extensive deviations from the illustrated form or embodiment of the invention may be made without departing from the principles thereof.

Having thus described my invention, what I claim is:

1. A vibrator having a magnet and a swinging armature; a fulcrum attachment for the armature having its main portion freely resilient; and means for compelling a fulcrum action of the attachment during the armature movement.

2. A vibrator having a magnet, an armature member, a support having a resilient body portion therefor, the latter being connected to a fixed part of the device, a contact carrying member adapted to be struck an impact blow by the opposite end of said armature, and means for preventing deformation of the body portion of said resilient connection between its fixed end and the armature.

3. A vibrator having a magnet, a fixed support and armature member having an intermediate resilient support connecting it to the fixed support, a contact carrying member adapted to receive a hammer blow from the armature member and located on the opposite side of the magnet from the fixed support, and a relatively stiffer member attached to said armature and also having engagement with said fixed support.

4. A vibrator having an armature member, a magnet, a fixed support having a contact member engaged by said armature member on its attracted movement, a spring having one end attached to said support and the other to said armature member, and a relatively stiffer member having one end attached to the armature and the other in free engagement with said support.

5. A vibrator having the coil 18, the armature 27, the spring support 26 having one end fixed and the opposite end carrying the hammer member 28, the contact member 29, and the relatively stiff member 30 having one end attached to the spring and the opposite end free to move upon the fixed support.

6. A vibrator having a magnet, a support therefor, an armature, a contact carrying member adapted to be struck on the attracted movement of the armature, a plate connecting the pole pieces of the magnet, and means mounted upon said plate for adjusting the outward movement of the armature.

7. A vibrator device having a magnet, an armature, a resilient attachment having a fixed support at one side of said magnet, a hammer device carried by said armature at the opposite side of said magnet, a resilient contact carrying member adapted to be engaged by said hammer device, said member having a fixed connection to a suitable support, a fixed and movable contact intermediate said hammer device and fixed connection, and means for varying the resistance of said resilient contact carrying member to the armature.

8. A vibrator having a contact carrying member, an armature carrying member adapted to strike the contact carrying member an impact blow, a resilient support for the armature member having an attachment to a fixed part of the device, and means to prevent deformation of the support between the armature and the fixed point of attachment of the resilient support.

9. A vibrator having a magnet; a contact carrying member on one side; a support on the other side; an armature; a freely resilient member connecting said armature to said support; and means to enforce swinging movement of said member about said support.

10. A vibrator having a magnet, an armature carrying member, a contact carrying member adapted to receive a hammer blow from the armature, said contact carrying member being located on the opposite side of the magnet from the support for the armature carrying member, a freely resilient attachment for the armature and means to compel the armature member to swing rigidly about its fulcrum point, while permitting the resiliency of the body of its attachment to be available.

11. A vibrator having a magnet, a fixed

support, a resilient armature carrying member having one end attached to said fixed support, an armature carried by said resilient member, a relatively stiff spring member having one end secured to the free part of said armature carrying member and the opposite end in contact with the fixed support, and a movable contact carrying member having a part underlying the armature carrying member and adapted to be struck an impact blow thereby on the attraction of the armature by the magnet.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

ISRAEL C. ORSWELL.

Witnesses:
THOMAS B. BOOTH,
EVERETT S. EMERY.