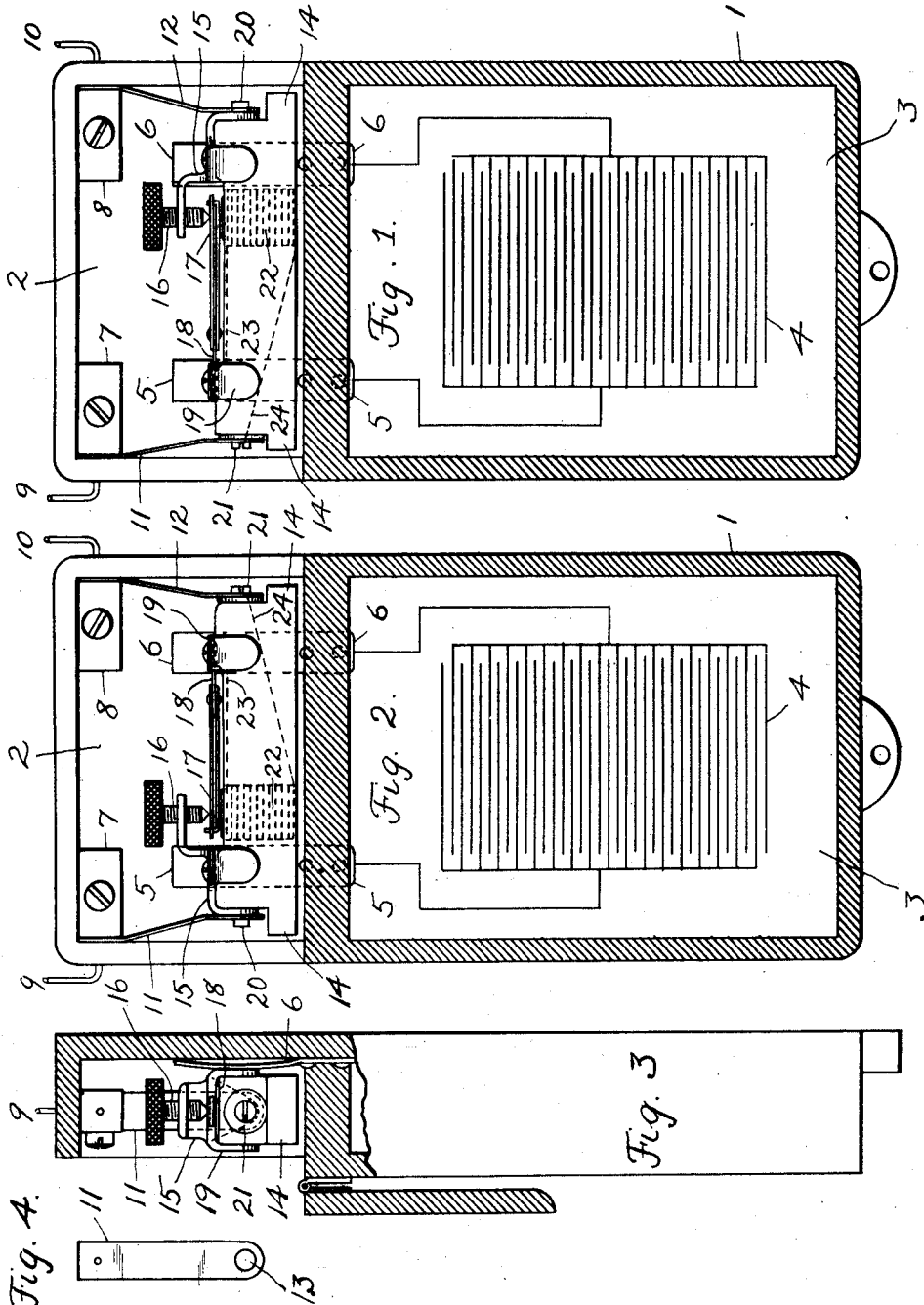


H. C. THOMSON.
VIBRATOR BOX.
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UNITED STATES PATENT OFFICE.

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VIBRATOR-BOX.

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To all whom it may concern:

Be it known that I, HENRY C. THOMSON, citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Vibrator-Boxes, of which the following is a specification.

My invention relates to apparatus forming a part of ignition systems designed to supply high tension electric current to the sparking devices of internal combustion engines or the like.

More especially my invention finds its application in connection with the circuit interrupting apparatus, or vibrators, which are commonly employed in such ignition systems for rendering an induction coil operative to produce a high tension current for the purpose of energizing said sparking devices. For many reasons it has been found advantageous to locate such vibrator at a considerable distance from the induction coil or the source of energy included in the ignition system, in order that the vibrator may be conveniently situated for inspection or adjustment. Furthermore, since it is the usual practice in ignition systems to employ an electrical condenser which is connected in shunt around the separable contacts, or "points," of the vibrator for the purpose of improving the electrical efficiency of the ignition system, it has been found expedient to associate the condenser and the vibrator permanently mounted in operative relation in an inclosing or containing box of compact form, externally supplied with suitable binding posts for the attachment of the electrical conductors by which said vibrator or box may be connected in operative relation with the other apparatus comprised in the ignition system. In its preferred form such vibrator box comprises a waterproof case embodying one compartment within which the condenser is hermetically sealed, and another compartment in which the vibrator is designed to be mounted, suitable electrical conductors being provided whereby said condenser is electrically connected in proper operative relation to the vibrator points.

It has been found advantageous in ignition systems, in many instances, to employ a vibrator box which the vibrator is integrally and easily manually detachable from said ignition system. Such integrally detach-

able vibrator embodies the operating instrumentalities, comprising the separable contacts which are designed to be intercalated in circuit with the primary winding, and an electro-magnet for actuating the circuit breaker by causing the disengagement of said separable contacts permanently assembled in their operative relation upon a suitable base. Easily detachable interengaging means, are provided, in part carried by said base and in part secured to said vibrator box, which serve to mechanically support the vibrator in the desired position in the vibrator box and which, at the same time, establish the necessary electrical connections whereby the operating parts of said vibrator are placed in operative relation with the circuit said interrupter is designed to control. Commonly the portions of the detachably interengaging means which are secured to the vibrator box, are in permanent electrical connection with the condenser terminals and with the binding posts afore-mentioned.

In vibrator boxes embodying an integrally detachable vibrator, as at present constructed, the requirement that the condenser be connected in shunt around the separable contacts of the circuit interrupter renders it obligatory to insert the vibrator in its place in the vibrator box in the same relative position with respect to the interengaging supporting means, and in consequence the direction of current flow through the vibrator is always in the same direction. In consequence of the uni-directional flow of current through the vibrator a cone will be built up on the negative separable contact, or "point," of the vibrator, and a corresponding depression or pit will be formed on the positive separable vibrator point. The building up of such a cone on the negative vibrator point and the corresponding pitting of the positive point renders the points liable to "freeze" and renders the correct adjustment of the vibrator after such "freezing" a matter of extreme difficulty, for reasons which are well understood by persons experienced in the art.

The object, therefore, of my invention is to provide a vibrator box having detachable interengaging means which are adapted to support the vibrator therein in alternate operating positions, which permits that the flow of current through the same may be

reversed, and in the provision in combination with such a reversible vibrator, of interengaging contacts, in part in electrical connection with the vibrator points, whereby said condenser is connected in shunt and in operative relation to said vibrator points in either of the alternative operating positions of said vibrator.

As a result of the possibility of reversing the position of the vibrator, a reversal of the direction of the current flowing there-through can be secured by the simple process of manually disengaging the detachable vibrator and reinserting it again in a reversed position. The polarity of the vibrator points may therefore be easily changed and the building up or the pitting of the vibrator points may be thereby reduced to a minimum.

The preferred embodiment of my invention is shown in the accompanying drawings which form a part of this specification.

In the said drawings,—Figure 1 presents partly in section and partly in diagram, a view of my vibrator box showing the vibrator mounted in one of its operating positions. Fig. 2 is a similar view showing the vibrator mounted in said box in its other alternative operating position. Fig. 3 is a view partly in section showing a vibrator box having its side cut away and showing the vibrator therein. Fig. 4 shows the vibrator supporting member employed in the preferred form of my invention.

In said Figs. 1 and 2 is shown a box or casing 1 divided into vibrator and condenser compartments, so called, as indicated at 2 and 3 respectively. The condenser compartment 3, contains a condenser 4 which may be of any approved type; the same being indicated diagrammatically in the drawing. The terminals of said condenser 4 are connected to contact members or strips 5 and 6 which are secured at one end to the inner side of the back of said vibrator box, so as to present free portions projecting into the vibrator compartment, as shown. Said strips 5 and 6 are preferably made of resilient metal, and so formed that said free portions of the same are normally impelled outwardly or toward the front of said box.

In any convenient position, as for example in the upper corners of the vibrator compartment, are located the binding posts 7 and 8, to which conductors 9 and 10 leading to the terminals of the primary winding or energizing circuit of the induction coil may be permanently secured. In electrical communication with said binding posts 7 and 8, are the vibrator supporting members 11 and 12, which form a part of the detachably interengaging means adapted to support the vibrator. Said members are preferably made from resilient strips having their upper ends secured to the inner sides of

the vibrator compartment, and having downwardly extending free portions lying adjacent the said inner sides as shown. Said free portions are normally impelled, preferably by the inherent resiliency of the material of which said supporting strips are formed, so that the said free portions tend to approach one another. A hole or aperture 13 is formed near the free end of the said supporting strips, as shown in Fig. 4 for the purpose hereinafter set forth.

Within the vibrator compartment is located the vibrator, said vibrator, in its preferred form, comprising the base 14 preferably made of insulating material, having mounted thereon a screw support 15 carrying the adjustable contact screw 16 in threaded engagement therewith. Said contact screw carries at its tip one of the vibrator "points", the same being normally in contact with a second vibrator point carried upon a movable armature 17. Said armature is mounted upon a resilient strip 18 fixedly clamped at one end between said base 14 by a clamping clip 19, which is screwed to or secured upon the said base in any approved manner. In its operating positions the said vibrator is adapted to lie transversely across the vibrator compartment as shown; in which positions it lies between, and is supported by the engagement of the members or pins 20 and 21, which project from the vibrator base at either end, within the apertures 13 formed in the free ends of said strips 11 and 12. Said pins 20 and 21 together with the supporting members 11 and 12 constitute the detachably interengaging means by which the vibrator is supported in its alternate operating positions. The said pins 20 and 21 and the apertures 13 in said supporting strips are so located with reference to each other that said pins will interengage within the said apertures either when the vibrator is placed in the box in the operating position in which it is shown in Fig. 1 or in the reversed or alternative operating position in which it is shown in Fig. 2. Preferably embedded in said base block or otherwise mounted thereupon is the electro-magnet 22, indicated in dotted lines in the drawings; the same being adapted when magnetized to cause a downward movement of the armature 17. One terminal 23 of the winding of said magnet 22 is in electrical engagement with the said armature 17 through the strip 18 and the clamping clip 19 to which said terminal 23 is led. The other terminal 24 of the winding of said magnet 22 is carried through the vibrator body to the pin 20.

When the vibrator occupies the position in which it is shown in Fig. 1 it is apparent that the interengagement of contact strip 11 with the pin 21 and the contact strip 12 with pin 20 will complete the circuit which

extends from conductor 10 and the binding post 8 through said strip 12, pin 20, screw support 15, screw 16, and the vibrator points to armature 17, spring strip 18, clamping clip 19, through the winding of the electromagnet 22, to pin 21 and thence through the pin 21 and the supporting strip 11 in engagement therewith to conductor 9 through binding post 7. Moreover when the vibrator occupies the alternate operating position or that in which it is shown in Fig. 2, it is apparent that the circuit through the binding posts 7 and 8 will be again closed, the path of the same being through the elements above enumerated comprised in the vibrator, although the direction of current flow through the same will be reversed as compared with the direction of current flow when the vibrator is in the operating position shown in Fig. 1. Furthermore it is apparent that the act of placing the vibrator in either of its operating positions and the consequent interengagement of the supporting strips with the projecting members or pins carried at the ends of the vibrator body will effect the electrical connection of the vibrator elements in their operative relation to the energizing circuit of the inductive means. When it is desired to remove said vibrator from either of its operative positions for the purpose of inspection, repair, or substitution, either one or both of said supporting strips 11 or 12 may be manually pressed away from the vibrator end, so as to disengage the apertured end of the said strips 11 or 12 from the pin with which it has been in engagement, and the vibrator may be then bodily removed from the vibrator box.

For the purpose of connecting the condenser 2 in shunt around the separable contacts of the vibrator comprised in the armature 12 and the contact screw 11 in either of the positions of the vibrator, I provide contacting devices which are in permanent electrical connection with said vibrator points, by circuits electrically exclusive of the magnet winding and preferably arranged to extend laterally from the vibrator and to engage the contact members forming the terminals of the condenser in either of the operative positions of the vibrator. In the preferred form the screw support 15 is formed with laterally projecting lugs which extend downwardly for a short distance on either side of said base block, as is shown more clearly in Fig. 3. Hence one of said lugs always lies at the rear side of the vibrator in either operating position of the same; such rearwardly lying lug being adapted to engage in either of such positions with one of the contact strips which forms one of the terminals of the condenser. For example the rearward lug formed in screw support 15 is shown in Figs. 1 and 3 as an

engagement with the strip 6. In a similar manner the clamping clip 19 is formed with lugs extending downwardly on either side of the vibrator base and projecting laterally therefrom. In consequence, in either of the alternative positions of the vibrator the rearward lying lug is adapted to engage with one of the contact strips forming the second terminal of said condenser 4. Hence when the vibrator is in either of its alternative operating positions, both the contact strips forming the condenser terminals, are in simultaneous contacts with those lugs forming a part of the clip 19, and of the screw support 15, which lie at the rear of the vibrator. In consequence of the electrical contact so established said condenser will be electrically connected in shunt around the separable contacts of the vibrator in either of the alternate operate positions of the vibrator. Furthermore said contact strips 5 and 6 are positioned in said casing so as to lie substantially equidistant from the center of the same. Similarly the lugs carried by screw support 15 and the clamping clip 19, are also located on the vibrator substantially equidistant from its center so that contact will be established, in either of the alternative positions of the vibrator, between the said contact strips and both rearwardly lying lugs on said screw support and said clamping clip.

While I have described my invention as embodied in a form in which the vibrator and condenser are inclosed together within the same containing box, it is to be understood that such arrangement is not of the essence of my invention. If more expedient the vibrator may be mounted in the preferred location by means of suitable detachably interengaging means, with a capacity for occupying alternate operating positions, said vibrator being adapted in either of said positions to electrically engage contact members electrically connected with the terminals of a condenser, which may be located at some remote point, if desired, so as to connect said condenser in shunt around the separable contact of the vibrator.

Having described my invention, I claim,

1. In combination with a condenser having separate contact members electrically connected with each of its terminals; an integrally detachable vibrator comprising circuit interrupting mechanism assembled in operative relation on a vibrator base, said mechanism including separable vibrator points and a magnet winding for causing the separation of said points, detachably interengaging means adapted to support said vibrator base in alternate operative positions, contacting devices carried upon said vibrator base and individually in electrical connection with one of said vibrator points, each of said contacting

devices being adapted to separately engage one of said condenser contact members through a circuit electrically exclusive of the magnetizing winding in either of the alternative operative positions of said vibrator.

2. In combination with a condenser having separate contact members electrically connected with each of its terminals; an integrally detachable vibrator comprising circuit interrupting mechanism assembled in operative relation on a vibrator base, said mechanism including separable vibrator points and a magnet winding for causing the separation of said points, detachably interengaging means adapted to support said vibrator base in relatively reversed positions, separate contacting devices carried upon said vibrator base and having contact surfaces located on either side of said base, said contacting devices being individually in electrical connection with one of said vibrator points, the contact surfaces of said contacting devices located on one side of the base being in electrical engagement with said condenser contact members in either of its reversed positions.

3. In combination with a condenser having a contact strip in electrical connection with each of its terminals, an integrally detachable vibrator comprising circuit inter-

rupting mechanism assembled in operative relation on a vibrator base, and including separable vibrator points carried in part on a contact screw and on a movable armature, and a magnet winding for causing the separation of said vibrator points, said contact screw being carried on a screw support having contact surfaces located on both sides of the vibrator base, and said armature being in electrical connection with a clip having contact surfaces located on both sides of said vibrator base, detachably interengaging means adapted to support said vibrator base in relatively reversed operative positions, the screw support contact surface and the clip contact surface located on one side of the vibrator base being adapted to separately engage the condenser terminal strips in one position of the vibrator base, and the screw support surface and the clip contact surface located on the other side of the vibrator base being adapted to separately engage the said strips in the reversed position of the vibrator base.

In testimony whereof I affix my signature in presence of two witnesses.

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."