

J. GARDNER.
ELECTRICAL VIBRATORY CONTACT MAKER AND BREAKER.
APPLICATION FILED AUG. 9, 1915.

1,209,281.

Patented Dec. 19, 1916.
2 SHEETS—SHEET 1.

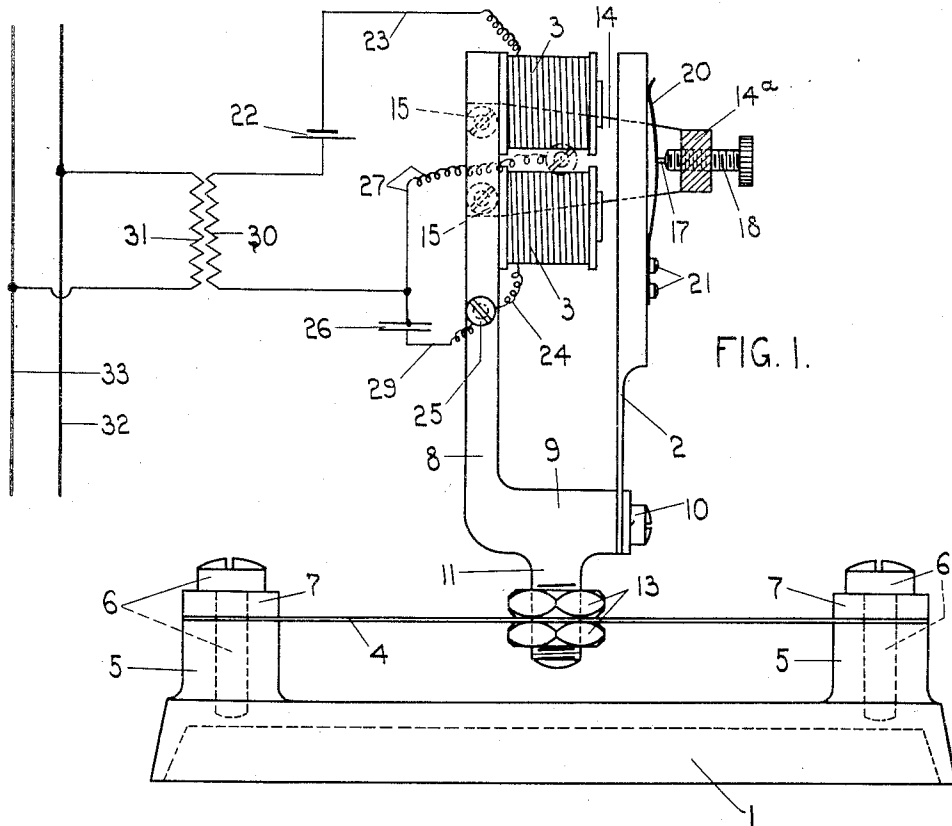
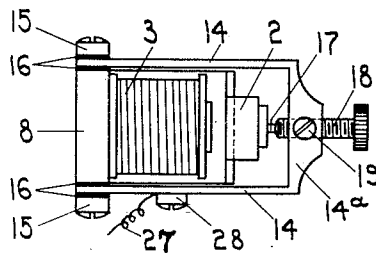


FIG. 2.



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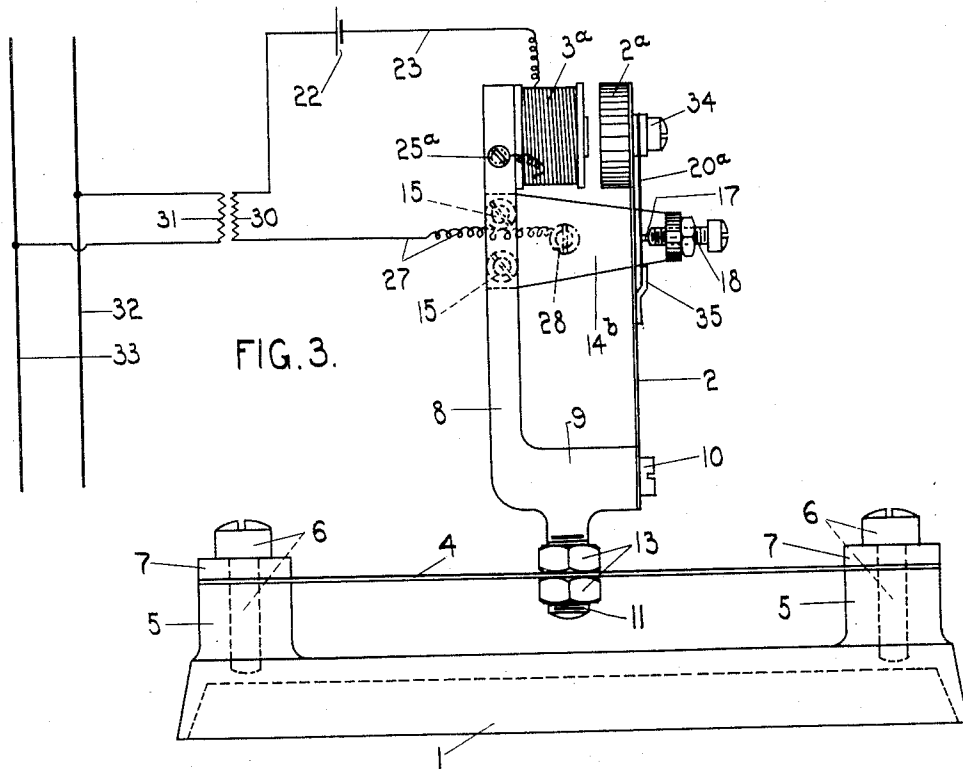
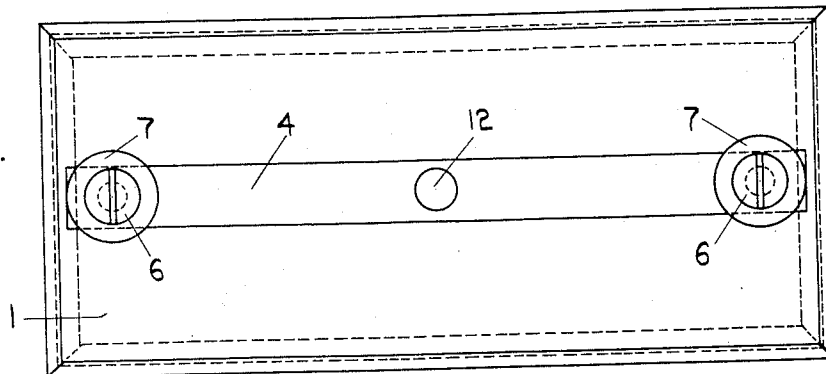


FIG. 4.



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ELECTRICAL VIBRATORY CONTACT MAKER AND BREAKER.

1,209,281.

Specification of Letters Patent.

Patented Dec. 19, 1916.

Application filed August 9, 1915. Serial No. 44,617.

To all whom it may concern:

Be it known that I, JOHN GARDNER, a subject of the King of Great Britain and Ireland, residing at Knott End, near Fleetwood, in the county of Lancaster, England, (whose post-office address is 65, The Esplanade, Knott End, near Fleetwood, in the county of Lancaster, England,) have invented certain new and useful Improvements in and Relating to Electrical Vibratory Contact Makers and Breakers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to vibratory contact makers and breakers more especially of the kind employed for converting a continuous current, such as that derived from a primary or secondary battery, into an intermittent or rapidly interrupted and reestablished current, or into a rapidly weakened or strengthened current.

The present invention has for its object to provide an apparatus of the kind above-mentioned that shall be of simple construction and efficient in action and such that the apparatus will properly operate and perform its functions under conditions which, in the absence of the present invention, would seriously interfere with or prevent the proper working of the apparatus.

The present invention consists principally in an apparatus of the kind above-mentioned so constructed and arranged that shocks or vibrations transmitted to the foundation, base plate or framework upon which the apparatus is mounted will not affect the apparatus in such a way as to interfere with or prevent its proper working.

According to this invention a reed or vibrator, which acts to alternately and rapidly make and break a contact or contacts in the circuit of the battery, as well as an electro-magnet for actuating the said reed or vibrator are resiliently or flexibly connected with or mounted on the base plate or frame of the apparatus. Further in the preferred construction according to this invention a device in the form, or substantially the form, of a tuning fork is mounted on a flat spring or equivalent strip, of suitable width, the opposite ends of which are secured, for instance, by screws, to the base plate or supporting frame of the apparatus; for instance

the stem portion of the aforesaid tuning fork may be screw threaded and passed through a central hole in the above-mentioned spring or strip and may be secured to the said spring by means of nuts situated one on either side of the said spring. The prong or arm of the tuning fork which acts as a reed or vibratory contact maker and breaker may be detachably secured (for instance by a screw or screws) at its lower or thinner end to the transverse portion of the tuning fork with which portion the other prong or arm of the fork may be formed integrally, and on the latter (integral) prong or arm the electro-magnet for actuating the reed or vibratory contact maker and breaker is mounted. A suitable bracket, which may be in the form of a bridge piece or bifurcated bracket, may be secured at one end, for instance by screws, to the above-mentioned integral prong of the tuning fork from which the said bracket or bridge piece is suitably insulated, the said bridge piece embracing or inclosing the other prong or arm forming the reed or vibratory contact maker and breaker, and the said transverse portion of the bridge piece carries an adjustable contact or contacts with which a spring contact strip secured to the said reed or vibratory prong of the fork is adapted to make contact.

Further features of the invention will appear from the following description with reference to the accompanying drawings which show, by way of example, apparatus according to the invention arranged for supplying alternating current to a track circuit comprising the track rails of an insulated section of railway.

In the drawings, Figure 1 is an elevation of a suitable construction of apparatus according to this invention, and shows diagrammatically the electrical connections between the apparatus and the insulated rails of a section of railway as hereinafter described. Fig. 2 is a plan view of the apparatus shown in Fig. 1 but removed from its supporting frame or base. Fig. 3 is a similar view to Fig. 1 showing a modified construction of the apparatus. Fig. 4 is a plan view of the supporting base or frame of the apparatus and shows the hereinafter described resilient support for the apparatus.

Like reference numbers refer to corresponding parts in the several figures of the drawings.

In the drawings, 1 is the base or frame on which the vibratory reed 2 and the electro-magnet 3 for actuating the said reed are, as hereinbefore mentioned, resiliently mounted. In the examples shown the resilient support for the apparatus consists of a flat strip 4 of steel or other suitably flexible or resilient material.

As shown the ends of the strip 4 are secured or clamped to projections 5 on the base 2, 6 being screws by which the ends of the strip 4 are held or clamped on the projections 5, 7 being washers or clamping pieces which may, if desired, be provided between the heads of the screws 6 and the strip 4. The base plate 1 may be mounted on a suitable insulating support which might be, for instance, the bottom of a wooden box adapted to inclose the complete apparatus. If desired the strip 4 might be insulated from the base 1 for instance by means of suitable insulating material placed between the ends of the strip 4 and the projections 5 and between the screws 6 and the strip 4.

On the above-mentioned spring or resilient strip 4 the complete electro-magnetic vibratory contact making and breaking apparatus is mounted, so that the said apparatus is mechanically insulated from the supporting base or frame 1 in such a manner that it will be unaffected, either as to amplitude or period of electromagnetically maintained vibrations of the reed, by shocks or vibrations to which the foundation, base-plate or frame of the apparatus may be subjected so that the proper working of the apparatus will not be prevented by such shocks or vibrations as the foundation or base plate of the apparatus may be subjected to under ordinary working conditions.

The electro-magnet 3 of the above-mentioned vibratory contact making and breaking apparatus is as shown mounted on the prong or arm 8 of the hereinbefore mentioned device in the form or substantially the form of or resembling a tuning fork, the vibratory reed 2 constituting the other prong or arm of the tuning fork, and being, in the example shown, secured to the lower horizontal portion 9 by means of a screw or screws 10.

11 is a screw threaded stem of the tuning fork device this stem extending through a hole 12 in the hereinbefore mentioned spring strip 4; 13 are nuts screwed on the stem 11 and by means of which the device or apparatus is secured on the strip or spring 4. As shown in Figs. 1 and 2 of the drawings, the upper end or portion of the reed 2 constitutes the armature of the electro-magnet 3 and is situated opposite the pole pieces of the said magnet.

14 is a bracket or bridge piece the sides

of which are secured at one end to the arm or prong 8 of the so called tuning fork device by means of screws 15, 16 (Fig. 2) being insulating material by means of which the said bracket or bridge piece 14 is insulated from the arm or prong 8.

17 is an adjustable contact which as shown is carried on the inner end of an adjustable screw 18 working through the short side or end 14^a of the bracket 14, 19 being a small screw for holding the screw 18 with the contact 17 in its proper position.

20 is an arched spring which, as clearly shown in Fig. 1, is secured at one end, for instance by screws 21, to the vibratory reed or prong 2 the said spring 20,—when the electro-magnet is deenergized and the reed 2 is quiescent,—bearing against or making contact with the contact 17.

22 is an electric battery one pole of which is connected by wire 23 to one of the coils of the electro-magnet 3 the other coil of which in the example shown is connected by wire 24 to a terminal screw 25 which as shown is screwed into the arm or prong 8 of the tuning fork device.

26 is a condenser which may be provided in connection with the apparatus one plate of the condenser being in the example shown connected by wire 27 to the terminal screw 28 which is screwed into one side of the above-mentioned bracket or bridge piece 14 the other plate of the condenser 26 being connected by a wire 29 to the terminal screw 25. To the opposite pole of battery 22 the primary 30 of a transformer is connected at one end the other end of the said primary being, as shown, connected to the wire 27 or otherwise arranged in connection with the circuit which comprises the battery 22 and the electro-magnet 3.

31 is the secondary of the transformer one end of which is connected to one of the running rails 32 of an insulated section of railway and the other end of which is connected to the other rail, 33, of said section of railway.

Referring to the alternative construction shown in Fig. 3, this is the same as the construction shown in Figs. 1 and 2 except that an electro-magnet 3^a having but one coil is employed which is connected to the terminal screw 25^a as shown, and in place of the bridge piece or double sided bracket 14 shown in Fig. 2 a single sided or L-shaped bracket 14^b is employed this bracket being suitably insulated from the prong or arm 8 of the so-called tuning fork. Further in the construction according to Fig. 3 the vibratory reed or prong 2 instead of being thicker at its upper end as in Fig. 1 is thin throughout its length and is provided at the upper end with an armature piece 2^a situated opposite the pole piece of the electro-magnet 3^a this armature piece being secured to the

reed 2 by means of a screw 34 which also holds one end of a spring contact 20^a the other or free end of which is retained or has its movement away from the reed 2 limited by a stop 35 suitably secured, for instance brazed, or riveted to the reed or prong 2, this stop 35 serving to limit the independent vibration of the spring contact 20^a.

10 A condenser (26 Fig. 1) is not shown in Fig. 3, but a condenser may if desired be provided in connection with the apparatus shown in Fig. 3, the object of providing a condenser being to prevent sparking at the
15 contact 17.

The action is briefly as follows:—Current generated by the battery 22 and flowing through the coils of the electro-magnet 3 (3^a Fig. 3) also flows through the arms or
20 prongs 8 and 2 of the so called tuning fork, through the spring contact 20 (20^a Fig. 3), contact 17, bracket 14 (14^b Fig. 3), terminal screw 28, the current also flowing through the primary 30, of the transformer. The
25 current thus flowing through the coils of the electro-magnet attracts the arm or prong 2 (constituting the vibratory reed) so that contact between the spring 20 and contact 17 is broken whereupon the circuit through
30 the electro-magnet is broken and the magnet being thus deenergized the prong or reed 2 moves away from the magnet so that the spring 20 again makes contact with the contact 17 whereupon current from the battery
35 22 will again flow as above-mentioned, this alternate energizing and deenergizing of the electro-magnet and making and breaking of the contact at 17 taking place so long as the battery 22 is active. The rapidly inter-
0 rupted and reestablished current thus set up in the circuit including the primary 30 of the transformer induces an alternating current in the track circuit comprising the rails 32,

33 and the secondary 31 of the transformer this track circuit current being employed for 45 operating or controlling railway signals or signaling appliances in the usual way.

What I claim as my invention and desire to secure by Letters Patent is:—

1. In a device of the character described, a 50 supporting base provided with projections, a substantially horizontal spring extending between the said projections, a rigid arm having its lower end portion secured to the middle part of the said spring, a vibrating 55 armature carried by the said arm, an electro-magnet secured to the upper part of the said arm and arranged between it and the said armature, a support insulated from the electro-magnet, and a contact device carried by 60 the said support and armature and operating to close the circuit intermittently.

2. In a device of the character described, a supporting base provided with projections, a substantially horizontal spring extending 65 between the said projections, a rigid arm having its lower end portion secured to the middle part of the said spring, a vibrating armature carried by the said arm, an electro-magnet secured to the upper part of the said 70 arm and arranged between it and the said armature, a support secured to the said arm and insulated from the electromagnet and extending crosswise of the said armature, a contact spring secured to the opposite side 75 of the said armature from the electromagnet, and a contact piece carried by the said support and engaging intermittently with the said contact spring.

In testimony whereof I have affixed my 80 signature, in presence of two witnesses.

JOHN GARDNER.

Witnesses:

W. H. LINSON,
D. BUCK.