R. H. WAPPLER.

INTERRUPTER.

APPLICATION FILED DEC. 9, 1907.

929,353.

Patented July 27, 1909.

2 SHEETS—SHEET 1.

Fig: 1.

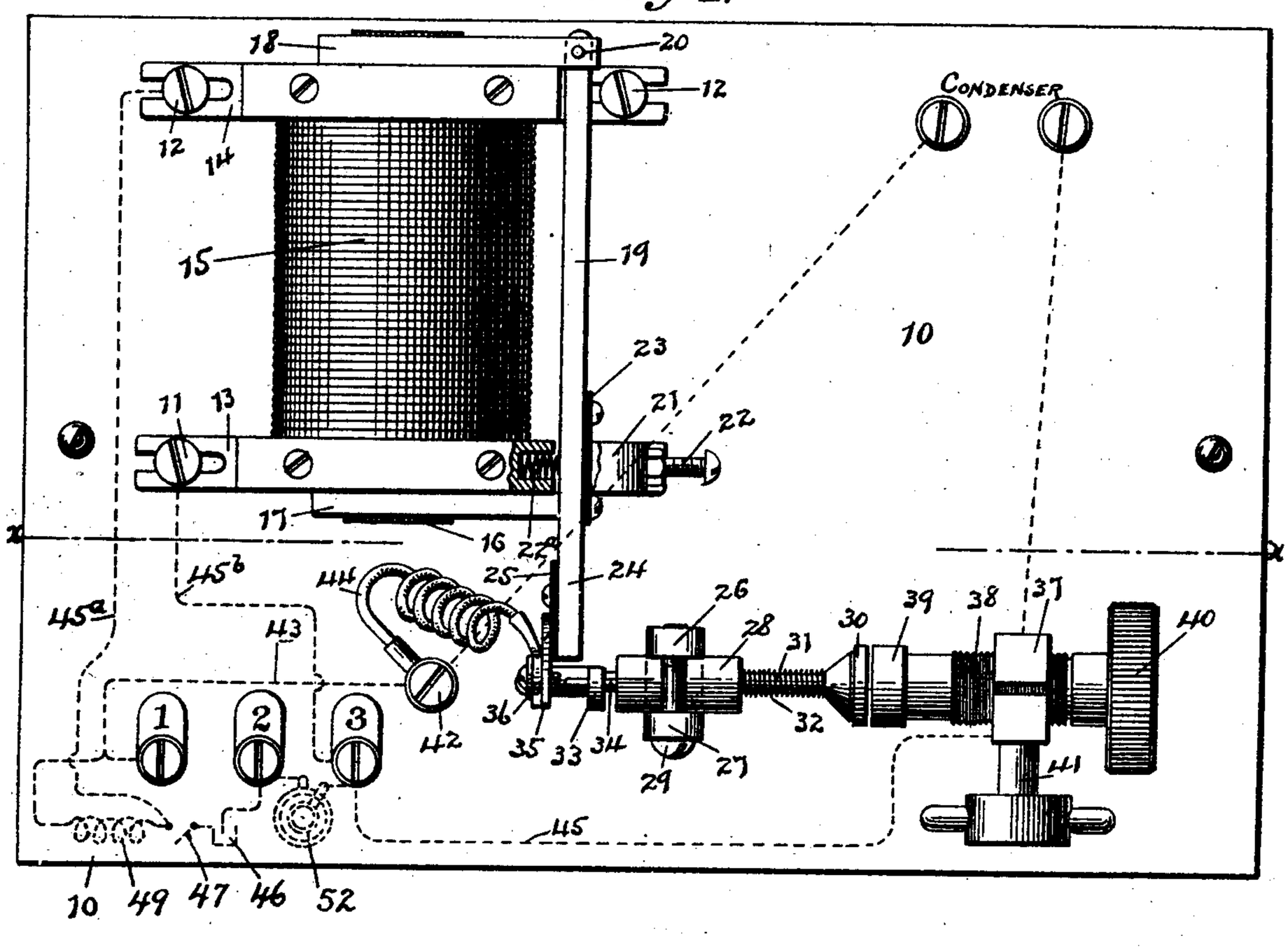
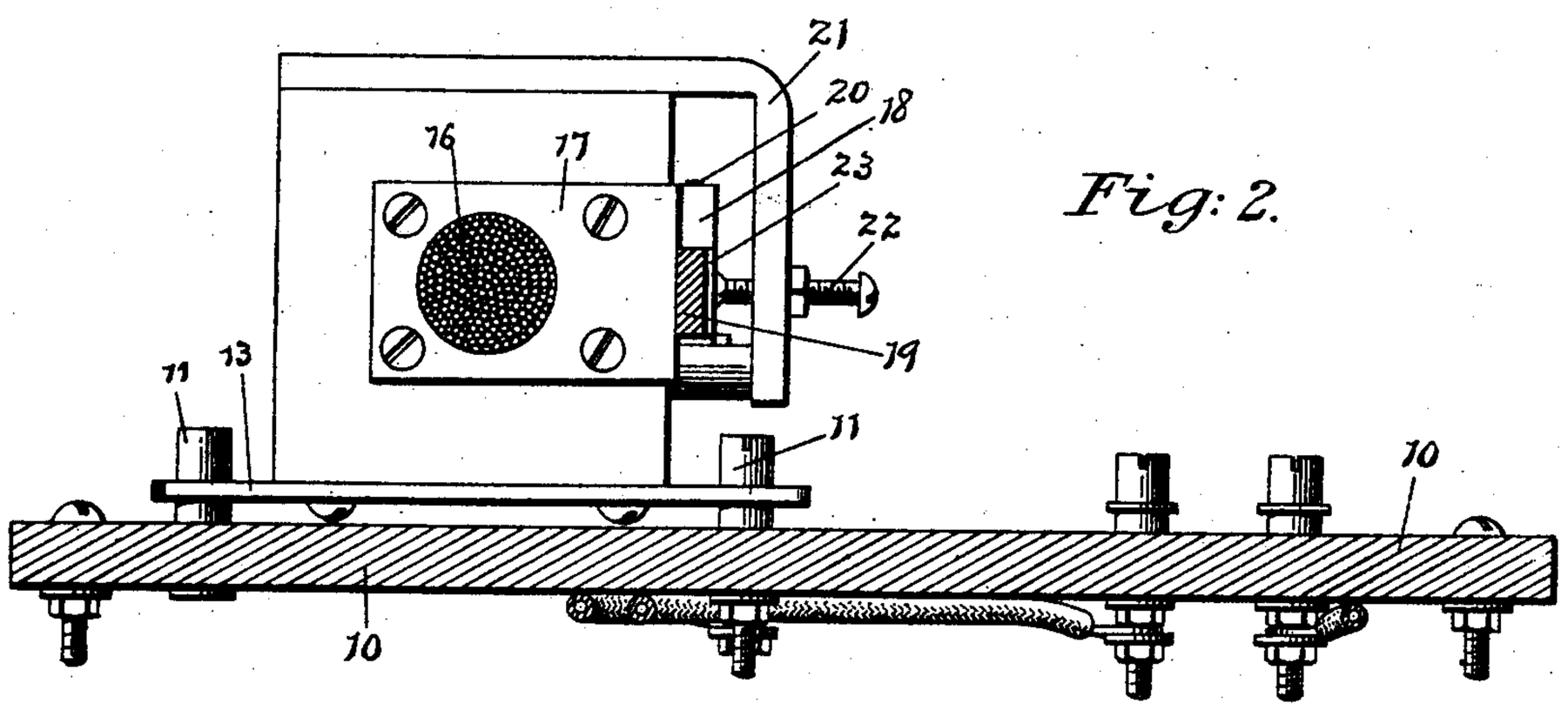


Fig: 2.



WITNESSES

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2 SHEETS—SHEET 2.

Fig: 3.

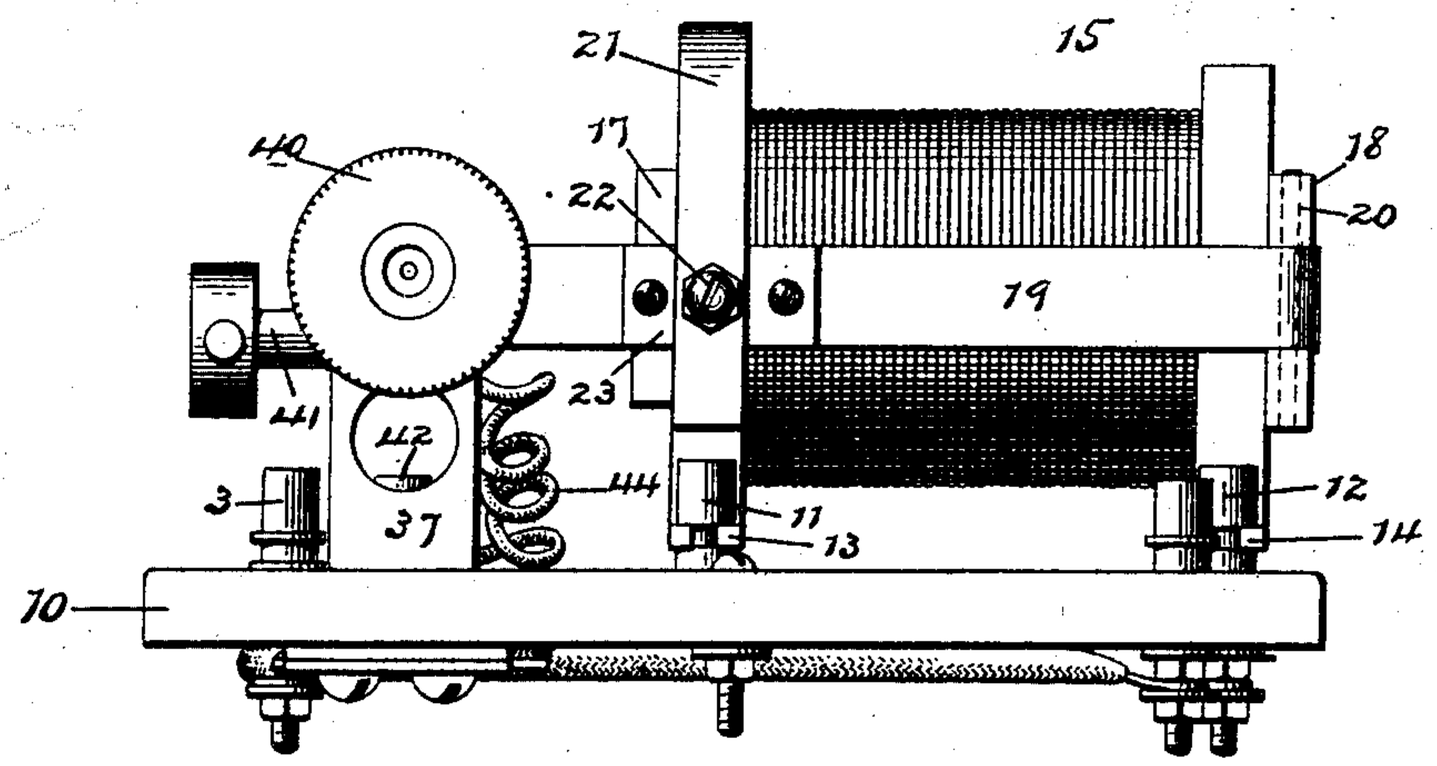
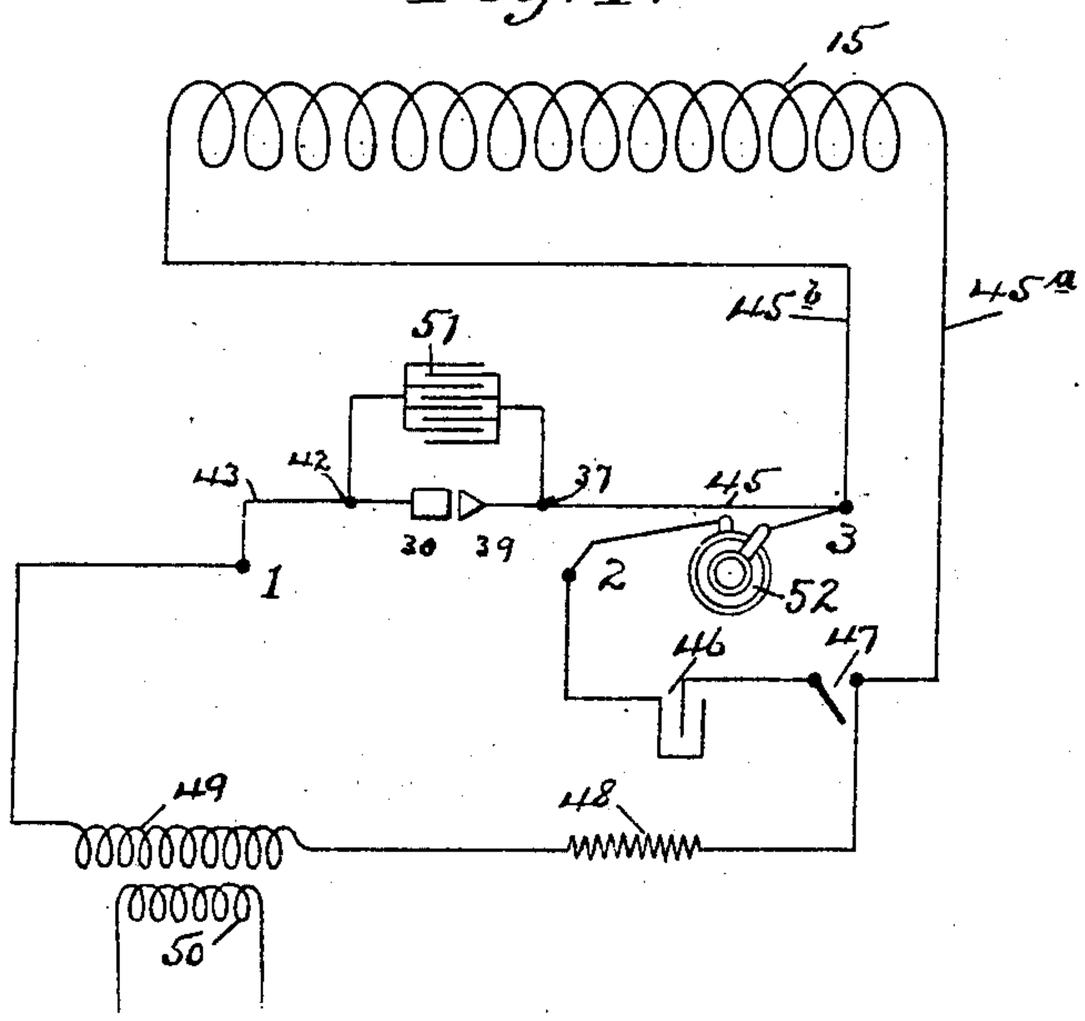


Fig: 4.



WITNESSES

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UNITED STATES PATENT OFFICE.

REINHOLD H. WAPPLER, OF NEW YORK, N. Y., ASSIGNOR TO WAPPLER ELECTRIC CONTROLLER COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

INTERRUPTER.

No. 929,353. Specification of Letters Patent. Patented July 27, 1909.

Application filed December 9, 1907. Serial No. 405,700.

To all whom it may concern:

Be it known that I, REINHOLD H. WAPPLER, a citizen of the United States, residing in the borough of Manhattan, city, county, and State of New York, have invented an Improvement in Interrupters, of which the following is a specification.

My invention relates to an interrupter for electric circuits for X-ray apparatus and other similar uses and particularly to a mechanical as distinguished from an electrolytic interrupter, the object of the invention being to provide an apparatus in which an alternating current, such as is customarily supplied for light and other service, may be utilized in the work for which the apparatus made in accordance with my present invention, is intended to be employed.

In carrying out my invention, I employ a pair of contacts, one of which is preferably movable and the other stationary but adjustable and at which an electric circuit may be made and broken, and broadly means operated electro-magnetically by a varying flux set up in a magnetic circuit for actuating the said contacts in order to make and break the electric circuit through an X-ray coil or other apparatus at these contacts,—all of which will be hereinafter more particularly described.

In the drawing, Figure 1 is a plan view of an apparatus in which my present invention is embodied. Fig. 2 is a partial front elevation and section on the dotted line *x*, *x*, Fig. 1. Fig. 3 is an end elevation looking at the apparatus from the right hand side thereof as shown in Fig. 1, and Fig. 4 is a diagrammatic illustration of the apparatus and the electrical circuits employed in connection therewith.

Referring to the drawing, I employ a suitable base indicated at 10 and which is preferably made of rubber, slate or other insulating material. On this base 10, support posts 11, 11, and 12, 12, are secured and connected to these support posts are cross bars 13 and 14 respectively and mounted on the cross bars 13, 14, is a magnet coil 15. This magnet coil 15 is provided with a core 16 connected with one end of which is a head 17, a similar head 18 being connected to the opposite end of the core 16 at the other end of the magnet coil 15. A movable armature 19 is pivotally connected at 20 in the head member 18 and is adapted at its free or swinging end to contact with that edge of the head 17 which projects beyond the adjacent side of the magnet coil 15. I also provide a yoke member 21 secured to the magnet coil 15 or the frame thereof and at the same end that the head 17 is connected, the free end of the armature 19 being adapted to swing between the side of the head 17 and the extremity of an adjusting screw 22 passing through the yoke member 21, whereby as will be readily apparent, the movement of the armature 19 may be adjusted to any degree within the limits of the distance between the inner side of the yoke 21 and the adjacent edge of the head member 17, and the armature 19 is normally maintained against the extremity of the adjusting screw 22 and away from the edge of the head 17 by means of a spring 22^a or otherwise. I prefer to provide the armature 19 with a strike plate 23 suitably secured thereto in such a position as to contact with the extremity of the adjusting screw 22 and this strike plate 23 is preferably made of insulating material. The armature 19 is also provided with an extension indicated at 24 and on the side opposite to that in which the strike plate 23 is secured, a similar strike plate 25 is connected with the extension 24 on the armature 19. I also employ a contact structure similar in all respects to that shown and described in Letters Patent No. 861783, granted July 30th, 1907, to Reinhold H. Wappler and Charles F. Fayer, and constituting a post which is secured in the base 10 and divided at its upper end, providing the arms 26, 27, between which a bearing block 28 is secured by means of a clamp screw 29.

The movable contact of this apparatus is indicated at 30 and is secured to a contact rod 31 passing longitudinally through the block 28 and being journaled therein and having a spring 32 surrounding that portion of the contact rod between the movable contact 30 and the adjacent end of the said block 28. At the other side of the block 28 this contact rod is provided with a plate 33 which is secured thereto and provided with an aperture to receive a guide pin 34, one end of which is fixed in the block 28, whereby as will be understood, any rotary movement in the contact 30 and contact rod 31 is prevented. At the extremity of the contact rod 31, opposite that to which the contact 30 is secured, I employ a strike plate 35 adapted to be engaged by the strike plate 25 secured on the extension 24 of the armature

19, and also by a contact plate 36 to which an electrical connection may be made with a conductor. This contact apparatus also includes a post 37 secured in the base 10, divided at its upper end and adapted to receive an adjusting screw 38, to one end of which a stationary contact 39 is secured and to the other and opposite side of the post 37 a thumb piece 40, 41 being a set screw by means of which the adjusting screw 38 may be made fast in any desired position within the post 37, it being understood that the parts are so arranged that the adjusting screw 38 and the contact rod 31 are in actual alinement.

Mounted on the base 10, there are terminal connections indicated at 1, 2 and 3, and also a binding post 42, the terminal connection 1 being connected to the binding post 42 by means of a wire 43 and the binding post 42 to the terminal 36 at the extremity of the contact rod 31 by means of the wire 44 and the post 37 is electrically connected to the terminal connection 3 by means of the wire 45. Furthermore, one end of the magnet coil 15 is connected to the contact 2 by means of the wire 45^a and the other end of the magnet coil is connected to the terminal 3 by means of the wire 45^b, it being understood that the terminal contacts 2 and 3 are connected respectively to the source of electrical power 52 employed in operating the apparatus.

In connection with the hereinbefore described apparatus, I also employ (as indicated diagrammatically in Fig. 4,) a rectifier 46, a switch 47, which as will be understood, may be mounted on the base 10, a suitable resistance indicated at 48, an X-ray coil whose primary winding is indicated at 49 and whose secondary winding is indicated at 50 or other suitable apparatus, all of which are connected in circuit between the contact terminals 1 and 2, and furthermore connected across the make and break contact points 30, 39, I may employ a condenser 51.

The rectifier indicated at 46 in the diagrammatic illustration in Fig. 4, while not new *per se*, is of such a nature that only the positive portion of the alternating current is employed; that is to say, instead of the current varying from the positive to the negative maximum, it merely varies from the positive maximum to zero, and as will be apparent, this current varying in intensity being passed through the magnet coil 15 will set up a varying flux in the magnet circuit comprising the magnet core 16, the heads 17 and 18 and the armature 19.

As hereinbefore stated, the armature 19 is normally held by means of the spring 22^a with its free end in contact with the extremity of the adjacent screw 22 and the arrangement of the parts and the strength of the spring are such that at the moment when this varying magnetic flux reaches the point of its greatest density, the free end of the armature 19 will be drawn over to contact with the edge of the head 17, thereby closing completely the magnetic circuit described. This swinging of the armature 19 causes the strike plate 25 on the extremity 24 thereof to contact with the strike plate 35 on the extremity of the contact rod 31, causing a longitudinal movement of this contact rod 31 against the action of the spring 32 and thereby separating the contact 30 from the contact 39 and in so doing breaks the electric circuit through the primary of the X-ray coil or other apparatus placed in the circuit between the contact terminals 1 and 2. It will also be noted that inasmuch as this break occurs at the point of greatest density of magnetic flux in the magnetic circuit set up by the coil 15, that the make and break of the electric circuit through the primary of the X-ray coil or other apparatus will be synchronous with the phase of alternating current employed in the work.

I claim as my invention:

1. An interrupter comprising a magnetic circuit including means for opening and closing the same, means whereby a flux is set up in the magnetic circuit, separable contacts at which an electric circuit may be made and broken, the said separable contacts and the means for setting up a magnetic flux in the magnetic circuit being in multiple between a common source of electricity, and means actuated by the means for opening and closing the magnetic circuit for actuating the said separable contacts to make and break an electric circuit thereat.

2. An interrupter apparatus comprising a magnetic circuit including means for opening and closing the same, a magnet coil by which a flux may be set up in the said magnetic circuit, a pair of separable contacts at which an electric circuit may be made and broken, the said separable contacts and magnetic coil being in multiple between a common source of electricity and means actuated by the said means whereby a magnetic circuit may be opened and closed for actuating the said separable contacts to make and break an electric circuit thereat.

3. An interrupter for electric circuits adapted for use in alternate current service, comprising separable contacts at which an electric circuit may be made and broken, a magnet coil for setting up a varying magnetic flux, a movable armature forming part of and by means of which the said magnetic circuit may be closed when the said magnetic flux is at its maximum, a rectifier, and means actuated by the said armature for actuating the said separable contacts to make and break an electric circuit thereat.

4. An interrupter for electric circuits

adapted for use in alternate current service, separable contacts at which an electric circuit may be made and broken, a magnet coil, a rectifier, and means actuated by the varying magnetic flux when at its maximum for actuating the said separable contacts to make and break an electric circuit thereat.

5. An interrupter for electric circuits adapted for use in alternate current service comprising contact points at which an electric circuit may be made and broken, a coil, a rectifier, and a magnetic circuit including means actuated by the varying density of a flux set up therein for actuating the said separable contacts to make and break an electric circuit thereat.

6. An interrupter for electric circuits adapted for use in alternate current service, comprising contact points at which an electric circuit may be made and broken, a coil, a rectifier, and a magnetic circuit including means actuated by the varying density of a flux set up therein for actuating the said separable contacts to make and break an electric circuit thereat in synchronism with the phase of the alternate current employed.

7. An interrupter for electric circuits adapted for use in alternate current service, comprising contact points at which an electric circuit may be made and broken, a coil, a rectifier, and means operative by the varying magnetic flux when at its maximum, the said flux being set up in a magnetic circuit by said coil for actuating the said separable contacts to make and break an electric circuit thereat.

8. An interrupter for electric circuits adapted for use in alternate current service, comprising separable contacts at which an electric circuit may be made and broken, a magnet coil, a core therefor, a movable means for completing a magnetic circuit through said core and by which the said magnetic circuit may be closed when the flux set up therein by the said coil is at its maximum, a rectifier, and means actuated by the said movable means for actuating the separable contacts to make and break an electric circuit thereat.

9. An interrupter for electric circuits adapted for use in alternating current service, comprising separable contact points at which an electric circuit may be made and broken, a magnetic coil, a core therefor, a head of permeable material connected to each end of the said core, an armature pivotally connected to one of the said heads and adapted to contact with the other to complete a magnetic circuit when the flux set up therein by the coil is at its maximum, a rectifier, means for normally maintaining the free end of the armature away from the adjacent head of the core and means actuated by the movement of the armature for actuating the said separable contacts to make and break an electric circuit thereat.

10. An interrupter for electric circuits adapted for use in alternate current service, comprising separable contact points at which an electric circuit may be made and broken, a magnetic coil, a core therefor, a head of permeable material connected to each end of the said core, an armature pivotally connected to one of the said heads and adapted to contact with the other to complete a magnetic circuit when the flux set up therein by the coil is at its maximum, a rectifier, means for adjusting and limiting the extent of the movement of the said armature, means for normally maintaining the free end of the armature away from the adjacent head of the core and means actuated by the movement of the armature for actuating the said separable contacts to make and break an electric circuit thereat.

Signed by me this 13th day of November 1907.

REINHOLD H. WAPPLER.

Witnesses:
GEO. T. PINCKNEY,
BERTHA M. ALLEN.