Sept. 8, 1925. 1,552,425

E. A. EVERETT

ADJUSTABLE RESISTANCE UNIT

Filed Oct. 16, 1924 2 Sheets-Sheet 1

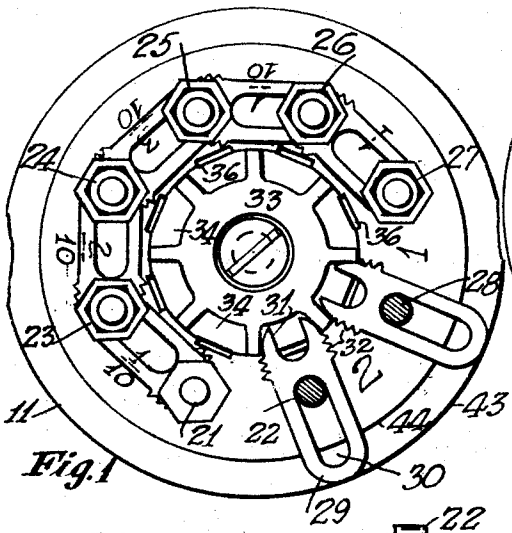

Fig. 1

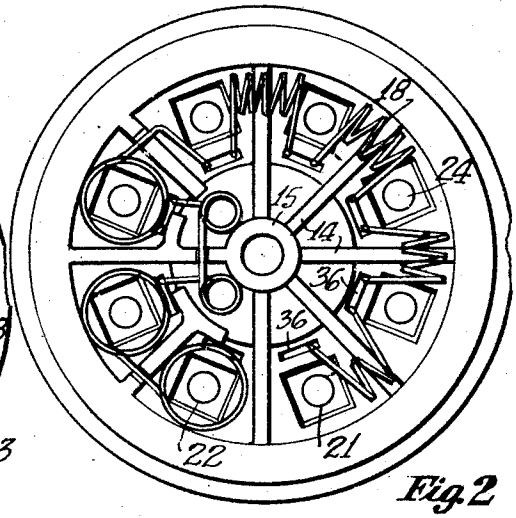

Fig. 2

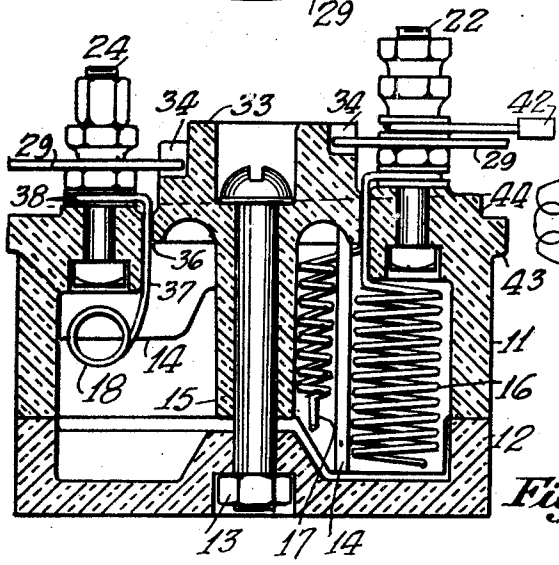

Fig. 3

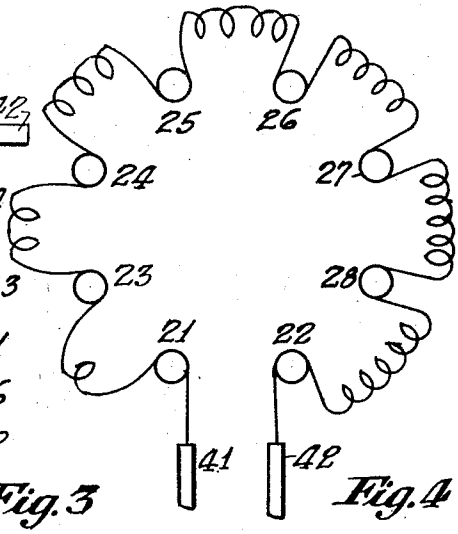

Fig. 4

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Fig. 5

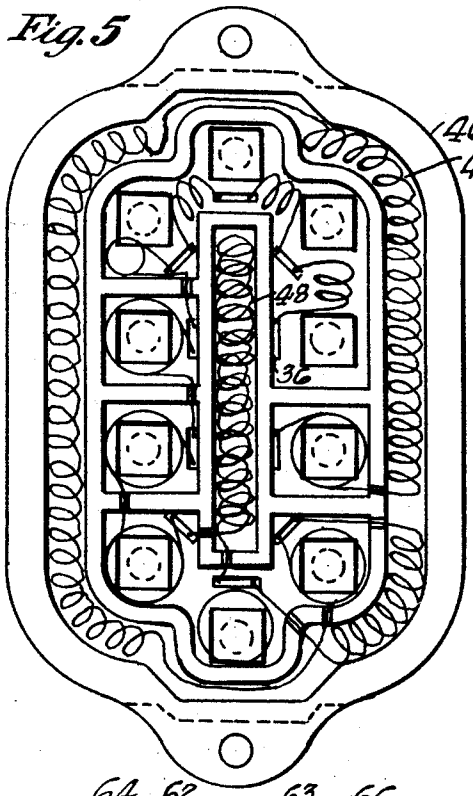
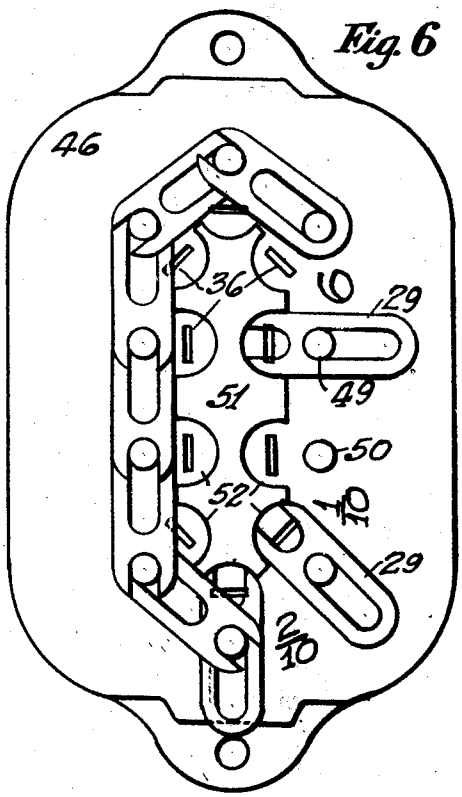


Fig. 6



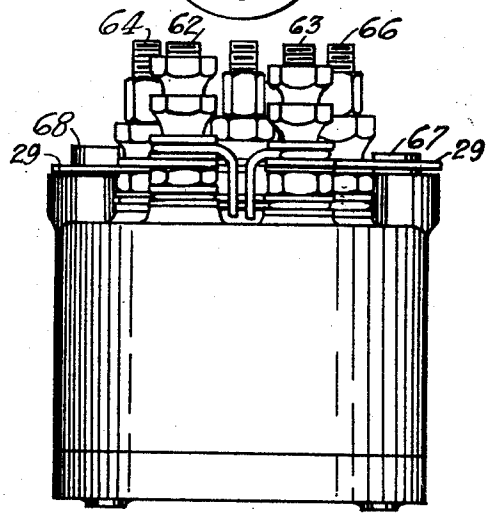


Fig. 7

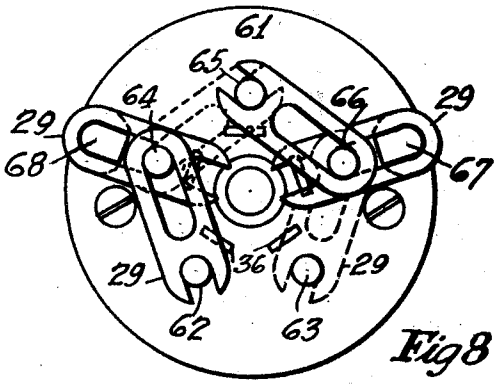


Fig 8

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UNITED STATES PATENT OFFICE.

EDWARD A. EVERETT, OF LONG ISLAND CITY, NEW YORK.

ADJUSTABLE RESISTANCE UNIT.

Application filed October 16, 1924. Serial No. 744,081.

To all whom it may concern:

Be it known that I, EDWARD A. EVERETT, a citizen of the United States, and resident of Long Island City, in the county of Queens and State of New York, have invented certain new and useful Adjustable Resistance Units, of which the following is a specification.

This invention relates to adjustable resistance units for use in electric circuits and has for an object to provide a resistance unit of this type which is readily adjustable, which makes a positive connection, in which the value of the resistance in the circuit can readily be computed and in which the main connections are not disturbed when the value of the resistance is changed. A further object of the invention resides in the use of links for shunting the resistance coils with means for holding these links in a fixed position when they are not used for shunting purposes, also, discharge points between adjacent links arranged to perform the function of a lightning arrester. The resistance is obtained from a special alloy wire wound in coils of various sizes and housed in pockets in a porcelain stand. The coils are connected in series made from one continuous wire with loops at proper intervals connecting to the terminals. These loops are led through a slot in the porcelain and the connection to the terminal is exposed where it is readily inspected and is not subject to excessive temperature changes.

These and other objects of the invention will be more particularly understood from the following specification and the accompanying drawings in which Fig. 1 is a top view of a circular resistance unit embodying my invention, Fig. 2 is the interior bottom view of a resistance unit corresponding to Fig. 1; Fig. 3 is a sectional elevation of a resistance unit similar to Fig. 1 and Fig. 4 is a diagram showing the electrical connections.

Fig. 5 is an interior bottom view of a resistance unit of larger capacity than Fig. 1 embodying my invention and Fig. 6 is a top view of the unit shown in Fig. 5.

Fig. 7 is a side elevation of a small sized resistance unit embodying the features of my invention and Fig. 8 is a top view of Fig. 7.

Resistance units of the character contemplated by this invention are extensively used in railway signal work for track circuit connections, signal lighting and other purposes. The objects are to obtain a comparatively inexpensive resistance unit which can be quickly adjusted and the value of the resistance readily determined, to make positive connections and to insure that the parts will not become misplaced by vibration and the conditions of service. Slide type resistance coils adjustable by a sliding contact do not make the positive connection desired and resistance coils made in multiple units with combination series-multiple connections are difficult to determine the value of the resistance.

In the present invention a single coil of wire of uniform size is used looped around adjacent terminals so as to include a fixed resistance between these terminals. On the top of the casing a link is used to bridge adjacent terminals and thus shunt the resistance. When this link is not used for shunting purposes it is placed radially on the device where it engages with the porcelain casing and is rigidly held in this position; it is impossible therefore, for these links to become misplaced or accidentally make contact with each other. When the links are placed in the radial position the inner ends are comparatively close together; these ends are provided with discharge points so that they act as a lightning arrester shunt to discharge high potential currents from the resistance coil.

Resistance coils of this type are frequently required to carry heavy currents for considerable intervals. This leads to the heating of the coil and it is found in practice that an alloy wire of the kind used in these coils makes an unreliable contact with the terminal post due to these intermittent heatings. In the present invention therefore the resistance coil is enclosed in a porcelain housing but the connection to the binding post is made on the outside of the porcelain where it cannot become excessively heated and where it is readily inspected.

Referring to the drawings, 11 is a hollow porcelain container having the base 12 which is secured thereto by the central screw 13, which passes through and is insulated by the sleeve 15. The interior of the container is divided by ribs 14 as indicated in Fig. 2 to provide pockets for the resistance coils. The resistance coils when made from the same gage wire have different values as determined by the length of the coils such, for instance as 16 and 17 or

18. These coils are placed both vertical and horizontal as indicated in Fig. 2 according to their size and the space available.

A row of terminal posts 21, 22, 23, 24, 25, 26, 27 and 28 are centrally spaced on the top of the housing and around each of these terminal posts the resistance wire is looped as indicated in Fig. 4. It will be noted that the coil is preferably, an endless wire looped around the terminal posts with a resistance unit between each pair of terminals. The coil starts at 21 and ends at 22, these are therefore the main terminals to which the conductors 41 and 42 are connected.

A link 29 having a slot 30 is placed over each of the terminal posts and is provided with a jaw 31. These links will bridge any pair of adjacent terminal posts by moving on the slot until the jaw engages the adjoining post when it is clamped in position by the binding nut and lock nut as indicated between the posts 21 and 27 inclusive Fig. 1. The resistance of the link and its connection to the post is assumed to be zero so that the resistance coils between these terminals are shunted. When a link is not used for bridging purposes it is placed in the position shown on posts 22 and 28. That is, the longitudinal axis of the link is radially disposed on the circular top and the jawed end is placed in a recess 34 of the elevated central section 33 of the porcelain top. In operation, the nuts are backed off and the links are raised until they fall into the recess and when the nuts are tightened the links are securely held by the sides of the recess and by the post engaging the inner end of the slot; adjoining links therefore cannot swing around and shunt the resistance coil. The opposing edges of the inner end of the links are provided with saw teeth as at 32 which constitute a spark-gap arrester for the discharge of lightning which, otherwise would pass through the resistance coil with possible injury thereto.

The value of the resistance is indicated by figures on the porcelain top between the terminal posts as indicated by the figures 1/10, 2/10; 3/10; 4/10, 1, 1, and 2 in Fig. 1. It will be noted that these figures are partially covered when the links are in the shunting position but are fully exposed when the links are in the non-shunting position. The value of the resistance in circuit is the sum of the resistance between the posts which are not shunted.

Opposite each terminal post an oblong slot 36 is made in the cover for the passage of the loop such as 37, Fig. 3, of the resistance wire to the outside and around the terminal post where it is clamped in place by the binding nut at 38. This removes the connection from the interior of the housing which is subject to temperature variation in the resistance coil, to the outside of the casing exposed to the atmosphere, and also, to a position where the connection can always be inspected. This is an important feature when alloy wire is used as it would not be possible to obtain a reliable connection by clamping this wire under the interior head of the terminal post and this wire cannot be soldered.

A ledge 43 is formed around the casing equal in diameter to the extension of the links 29 to act as a shield for these links. This ledge may be formed in a series of ridges registering with the links in the non-shunting position.

It will be noted that the elevation of ledge 44 is greater than the corresponding ledge on the opposite side as this ledge is formed on a spiral indicated by the dotted line. The object of this spiral elevation is to so arrange the links that the slot end of one passes below the jaw end of the next progressively around the terminal posts.

In adjusting the resistance it should be noted that the wire connections to the main terminals are never disturbed, the adjustment being made by the links as desired.

The resistance unit shown in Fig. 5 is constructed along the lines described. This is for a larger unit with more coils and is oblong in shape. The casing 46 is provided with an annular pocket 47 housing a long resistance coil and a central pocket 48 houses a double resistance coil. The terminal posts are arranged in a row between these two sets of resistance coils. The resistance coils between terminals may be arranged vertically or horizontally as desired and according to the space available.

The top is provided with an elevated ledge 51 having pockets or recesses 52 formed therein opposite each terminal post to receive the free end of the connecting link and hold it in the non-shunting position. The main terminals are indicated at 49 and 50 and as shown in Fig. 6 the resistance between these terminals is $6\frac{3}{10}$ ohms.

A small type of resistance unit is shown in Figs. 7 and 8. Five terminal posts indicated by 62, 63, 64, 65 and 66 are provided; 62 and 63 being the main terminals. A pair of links 29 are placed on post 64 and a similar pair are placed on post 66. These four links may be used to bridge all the terminal posts from 62 to 63 as indicated by the full and dotted lines, or one link may be used to shunt any pair and the other link placed in the non-shunting position, or both links may be placed in the non-shunting position.

The links on post 66 are held in the non-shunting position by the projection 67 from the porcelain top and the links on post 64 are similarly held by projection 68. These projections engage the slot of the link and will engage one or both links at the same time. When the links are placed over these

projections and clamped by the binding nuts they are securely held in the non-shunting position.

This construction is largely made of moulded material, is comparatively inexpensive and enables adjustments and connections to be made in a positive and reliable manner.

Having thus described my invention, I claim:

1. In an adjustable resistance unit of the class described, the combination of a housing, a plurality of resistance coils in said housing, a terminal post connected between each pair of resistance coils, links connecting said terminals for shunting said coils and means associated with said housing for holding said links in the non-shunting position.

2. In an adjustable resistance unit of the class described, the combination of a housing, a plurality of resistance coils in said housing, a terminal post connected between each pair of resistance coils, links connecting said terminal posts for shunting said coils and pockets in said housing co-operating with said posts for holding said links in the non-shunting position.

3. In an adjustable resistance unit of the class described, the combination of a housing, a plurality of resistance coils in said housing, a terminal post connected between each pair of resistance coils, links connecting said terminal posts for shunting said coils, a projection on said housing and means whereby said links may be brought into engagement with said projection and held rigidly thereby when in the non-shunting position.

4. In an adjustable resistance unit of the class described, the combination of a housing, a plurality of resistance coils in said housing, a terminal post connected between each pair of resistance coils, a link on each post having discharge points at one end and means whereby said links may be used to shunt said resistance coils and may be positioned to act as a lightning arrester for said coils.

5. In an adjustable resistance unit of the class described, the combination of a housing, a plurality of resistance coils in said housing, a terminal post connected between each pair of resistance coils, a link on each post having discharge points at one end, means whereby said links may be used to shunt said resistance coils and means associated with said housing for holding said links in a fixed position to act as a lightning arrester.

6. In an adjustable resistance unit of the class described, the combination of a housing, a plurality of resistance coils in said housing, a terminal post connected between each pair of resistance coils, a link having a slotted opening at one end and a jaw at the other end engaging each post, said link arranged to engage a pair of adjacent posts when the post is at one end of the slot and to be firmly engaged by a projection on said housing when the post is at the opposite end of the slot.

7. In an adjustable resistance unit of the class described, the combination of a housing, a plurality of coils in said housing, a terminal post connected between each pair of resistance coils, a link on each post for connecting to the adjacent post, said posts arranged on said housing each on a higher elevation than the preceding post whereby the end of one link will overlap the end of the link on the adjacent post.

8. In an adjustable resistance unit of the class described, the combination of a housing, a plurality of coils in said housing connected in series, said coils having fixed resistance indicated by numerals on the cover of said housing, a terminal post connected between each pair of coils and extending through said cover, slotted links for bridging said terminal posts, said links when in the bridging position partially covering said numerals.

Signed at New York in the county of New York and State of New York this 14th day of October A. D. 1924.

EDWARD A. EVERETT.