A. FROHNE.

RESISTANCE BOX AND THE LIKE.

APPLICATION FILED AUG. 31, 1914.

1,189,931.

Patented July 4, 1916.

Fig. 1.

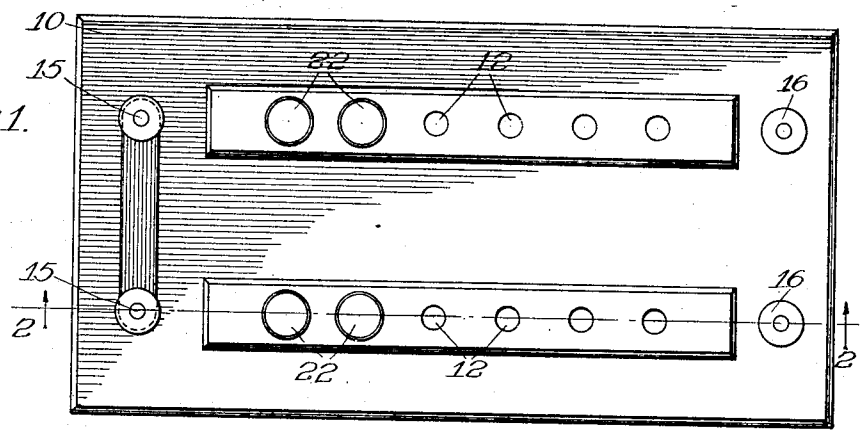


Fig. 2.

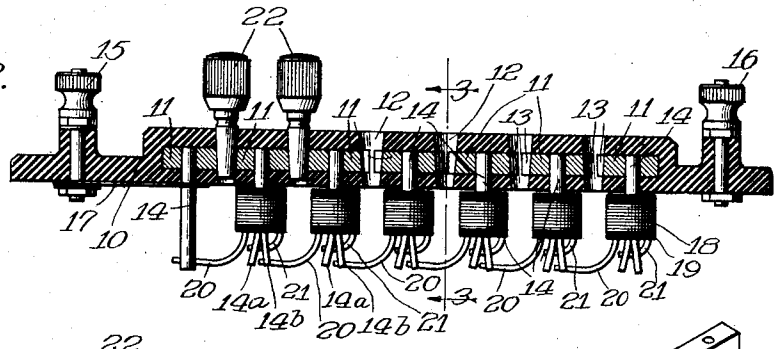


Fig. 3.

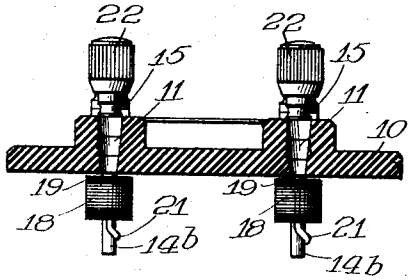


Fig. 4.

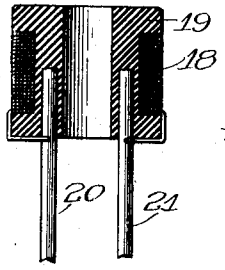


Fig. 5.

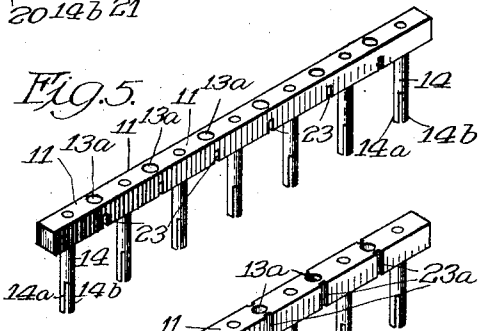
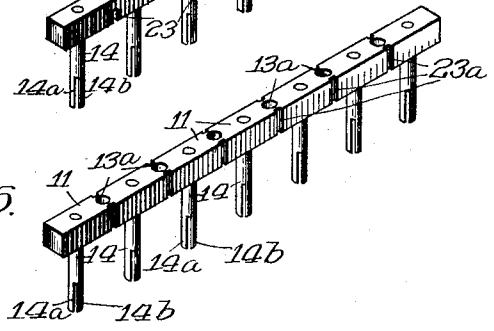


Fig. 6.



Witnesses:

H. G. Barrett

C. H. Rossner.

Inventor:

Albert Frohne

By Michael J. Stark & Sons

Attys.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

ALBERT FROHNE, OF CHICAGO, ILLINOIS.

RESISTANCE-BOX AND THE LIKE.

1,189,931. Specification of Letters Patent. Patented July 4, 1916.

Application filed August 31, 1914. Serial No. 859,395.

To all whom it may concern:

Be it known that I, ALBERT FROHNE, a subject of the Emperor of Germany, and a resident of the city of Chicago, in the county of Cook and State of Illinois, in the United States of America, have invented certain new and useful Improvements in Resistance-Boxes and the like; and I do hereby declare that the following description of my said invention, taken in connection with the accompanying sheet of drawings, forms a full, clear, and exact specification, which will enable others skilled in the art to which it appertains to make and use the same.

This invention relates generally to improvements in resistance boxes and the like, and it consists, essentially, in the novel and peculiar combination of parts and details of construction, as hereinafter first fully set forth and described and then pointed out in the claims.

This invention relates to resistance boxes and has for its object the improvement of the construction and the method of constructing such boxes, in that the contacts or blocks are rigidly and securely held and the resistance coils are positively secured thereto.

Heretofore, boxes of the plug type have proven very unreliable and inaccurate as to the contacts or blocks, which has primarily been caused by the loosening of the contacts or blocks on the rubber plates, thus destroying their alinement and their contact with the plugs. To obviate this difficulty and to insure the secure and proper mounting of the coils this invention is designed.

In the drawings already referred to, which serve to illustrate my said invention more fully, Figure 1 is a plan view of a resistance box constructed in accordance with the present invention. Fig. 2 is a longitudinal vertical section taken along line 2—2 of Fig. 1 and illustrates the mounting of the blocks or contacts in the top plate, and the arrangement and coöperation of the coils. Fig. 3 is a transverse vertical section taken along line 3—3 of Fig. 2. Fig. 4 is a central vertical section through one of the coils. Fig. 5 is a perspective view of a bar from which one set of coils or contacts is formed. Fig. 6 is a modification thereof.

Like parts are designated by corresponding symbols or characters of reference in all the figures of the drawings.

As has been said this invention not only resides in the construction of the box but the method whereby such construction is produced. The plates upon which the contacts or blocks are mounted being of hard rubber are therefore capable of being molded and the present invention utilizes this characteristic.

The blocks or contacts are initially formed in a bar which is drilled with undersize apertures, dividing the bar into sections which constitute blocks or contacts. Then the longitudinal sides of the bar are reduced in thickness adjacent these apertures. This bar is entirely surrounded by a hard rubber plate into which the bar is molded and vulcanized. By molding or otherwise forming apertures in the plates to exactly correspond to the apertures in the bar, entrances for the plugs are provided, so that the insertion of a plug will cause a connection between any two blocks or contacts. After the bar has been molded in the rubber plate it is necessary to separate the sections thereof to form the contacts or blocks. To accomplish this the openings are reamed to the proper taper, both those in the rubber and those in the bar, thereby causing the reduced connections between the sections of the bar to be severed and the individual blocks or contacts produced.

Reference being had more particularly to the drawings 10 indicates a rubber plate, having the blocks or contacts 11 molded and vulcanized therein. The rubber of the plate 10 which surrounds the blocks or contacts 11 is pierced by the tapered apertures 12, one of which alines with and conforms to the taper of each pair of adjacent end depressions 13 in the blocks or contacts 11 (see Fig. 2). Medial of the length of each block or contact 11 is a split stem 14, said split forming the arms 14^a and 14^b and provides means for locking or holding the coöperating spool or coil in place. The binding posts 15 and 16 at the ends of the plate 10 are connected by the conductors 17 to the adjacent stems 14.

As shown in Fig. 4 the coil 18 is wound about a hard rubber spool 19 and has its ends connected with the terminals 20 and 21, the terminal 21 being of less length than the terminal 20. The terminals 20, 21 being vulcanized into the hard rubber spool are rigidly and permanently secured thereto, and

the coil as a result thereof assumes a permanent structure.

A spool 19 and its coil 18 is fitted over each stem 14, the arms 14[a] and 14[b] being separated to lock and hold the spool in place. The shorter terminal 21 of each coil 18 is bent and secured by solder or otherwise to the arm 14[a] of the stem on which it is mounted; while the longer terminal 20 is bent and similarly secured to the arm 14[b] of the next adjacent stem 14.

By the insertion of the plugs 22 into the apertures 12 and 13 any two blocks or contacts 11 are connected, thus, as the current flows in the direction of the least resistance, shutting out one of the coils 18. Obviously therefore the current flows from the binding post 15 through the conductor 17 to the first stem 14. As there are two plugs 22 inserted (Figs. 1 and 2) the current will then flow through the blocks or contacts 11 until it reaches the third block or contact 11. Here it flows into the stem 14, through the medium of the arm 14[b] thereof, and the connected terminal 20 of the connected coil 18, will flow through such coil. Leaving this coil by the short terminal 21, the current passes through the arm 14[a] to the stem 14 carrying the same and is then conducted to the next coil by means of the arm 14[a] and terminal 20. This flow of the current continues until it passes from the box through the conductor 17 and the binding posts 15 and 16. After each plug is inserted a coil 18 is shunted out of the circuit thereby reducing the resistance.

In Figs. 5 and 6 are illustrated two forms of the bar from which the contacts are made and used in the process of manufacturing the box now to be described. This bar (in Fig. 5) is drilled with the undersized apertures 13[a], thus dividing the same into the contacts or blocks 11[a], said blocks or contacts, however, not being separated at this time. The stems 14 are secured to the bar medially of the apertures 13[a], after which the bar is notched as at 23 adjacent to each aperture 13[a] thereby reducing the connection between each pair of blocks 11. Inasmuch as the bar is a unit it may be readily molded into and vulcanized with the plate 10 so that it will be entirely surrounded by rubber except to the apertures 12 in the plate which are molded therein. A reamer is then inserted in the apertures 12 and the action thereof not only enlarges both the apertures 12 and 13[a] but also imparts the proper taper thereto. By this finishing of the plug apertures the connection between the contacts or blocks of the bar are severed producing a series of independent blocks with semi-circular depressions in their ends rigidly and permanently mounted in the plate 10. The modification illustrated in Fig. 6 differs from the form in Fig. 5 only in that the notches 23[a] thereof extend vertically the entire height of the bar; whereas the notches 23 of the form in Fig. 5 are in the under side of the bar and extend substantially one-half the height thereof.

Having thus fully disclosed my invention I claim as new and desire to secure to myself by Letters Patent of the United States:—

1. An improvement in the art of producing goods of the general class described, consisting in molding a bar into a plate of insulating material, and then separating said bar to provide a series of contacts.

2. An improvement in the art of producing goods of the general class described, consisting in surrounding a bar of suitable conducting metal with a covering of insulating material and then forming a series of contacts in said bar.

3. An improvement in the art of producing goods of the general class described, consisting in initially forming a metal bar, surrounding said bar with insulating material and finally dividing said bar into sectional contacts.

4. An improvement in the art of producing goods of the general class described, consisting in vulcanizing a metal bar within a hard rubber covering and then separating said bar into a series of contacts.

5. An improvement in the art of producing goods of the general class described, consisting in vulcanizing a metal bar within a covering of insulating material, and then forming a series of contacts in said bar.

6. An improvement in the art of producing goods of the general class described, which consists in vulcanizing a covering of insulating material completely around a perforated bar and then separating said bar at the perforation into a series of contacts.

7. The method of manufacturing goods of the general class as described consisting in forming contacts in a bar, partially separating said contacts, molding the same into a plate of insulating material, and then completely separating the contacts.

8. The method of manufacturing goods of the general class as described consisting in drilling a bar, molding said bar into a plate of insulating material, and then separating the same into contacts at said drill holes.

9. The method of manufacturing goods of the general class as described consisting in forming contacts in a bar by drilling said bar, partially separating said contacts, molding the same into a plate of insulating material and finally separating said contacts.

10. The method of manufacturing goods of the general class as described consisting in forming contacts in a bar by drilling said bar, partially separating said contacts, molding the same into a plate of insulating material, forming openings in the plate to cor-

respond to the drill holes in the bar, and finally and completely separating said contacts.

11. The method of manufacturing goods of the general class as described consisting in forming contacts in a bar by drilling said bar, partially separating said contacts, molding the same into a plate of insulating material, forming openings in the top plate to correspond to the drill holes in the bar, and reaming both the openings in the top plate and the drill holes in the bar to taper the same and completely separate the contacts.

12. A device of the class described, comprising a metal bar, having apertures, and the sides of said bar reduced in thickness adjacent to the apertures and an insulating covering completely surrounding said bar and having perforations registering with the apertures in said bar.

13. A device of the class described, comprising a metal bar, having apertures, and the sides of said bar reduced in thickness adjacent to the apertures and an insulating covering of hard rubber vulcanized upon and completely surrounding said bar and having perforations registering with the apertures in said bar.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

ALBERT FROHNE.

In the presence of—
WILLIAM O. STARK,
W. HARDING.

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