No. 798,589. PATENTED SEPT. 5, 1905.

G. BAEHR.

RESISTANCE DEVICE.

APPLICATION FILED SEPT. 28, 1904.

FIG. 1

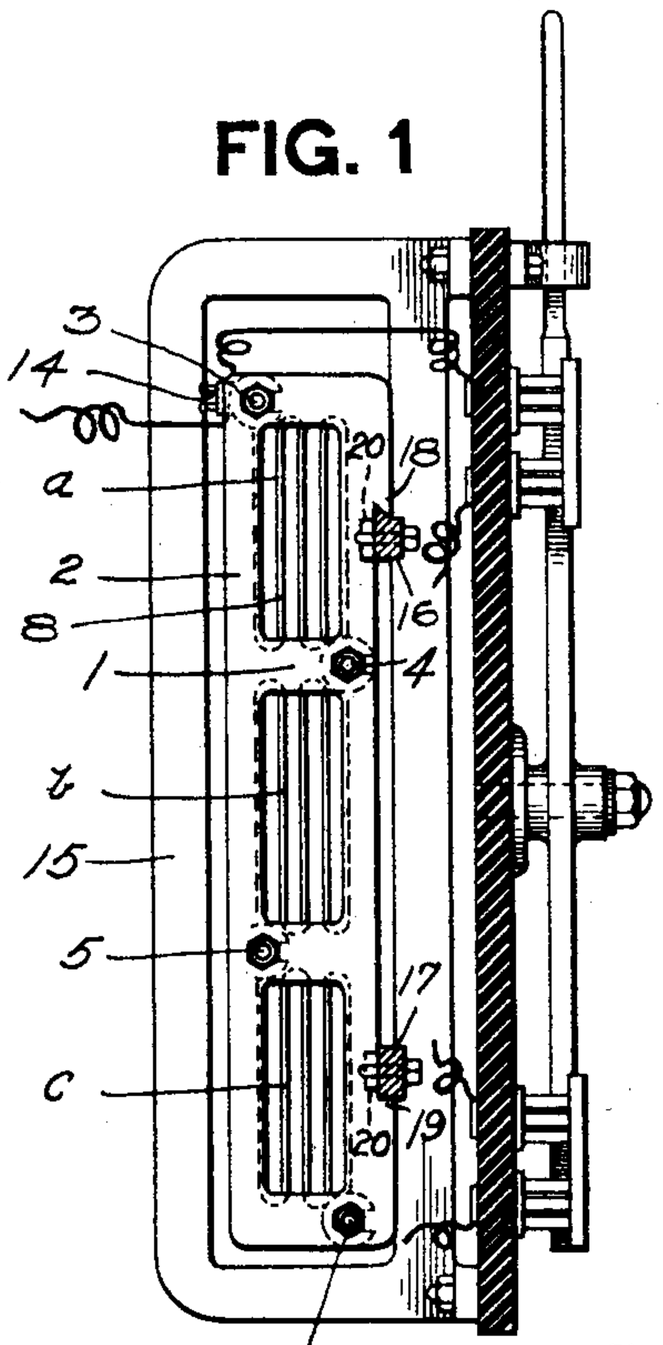


FIG. 2

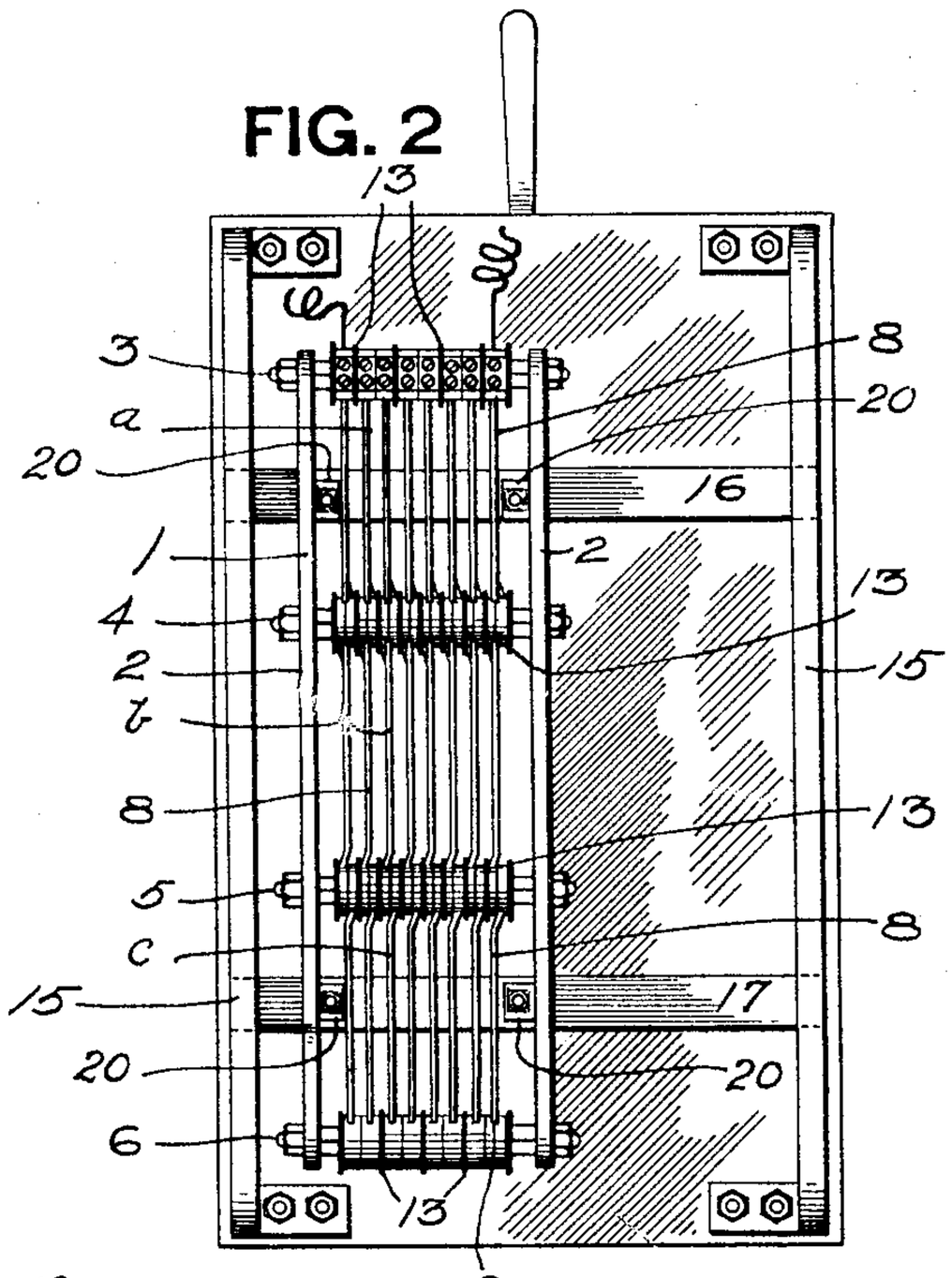


FIG. 3

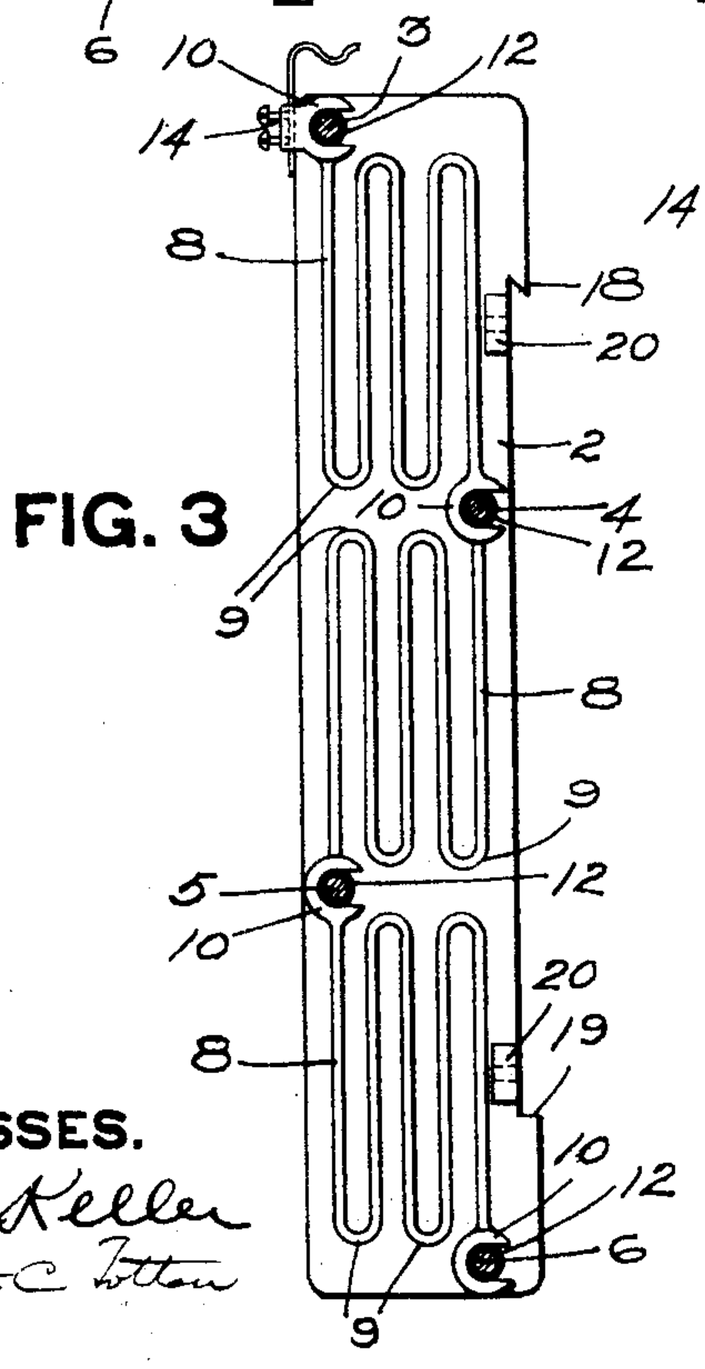
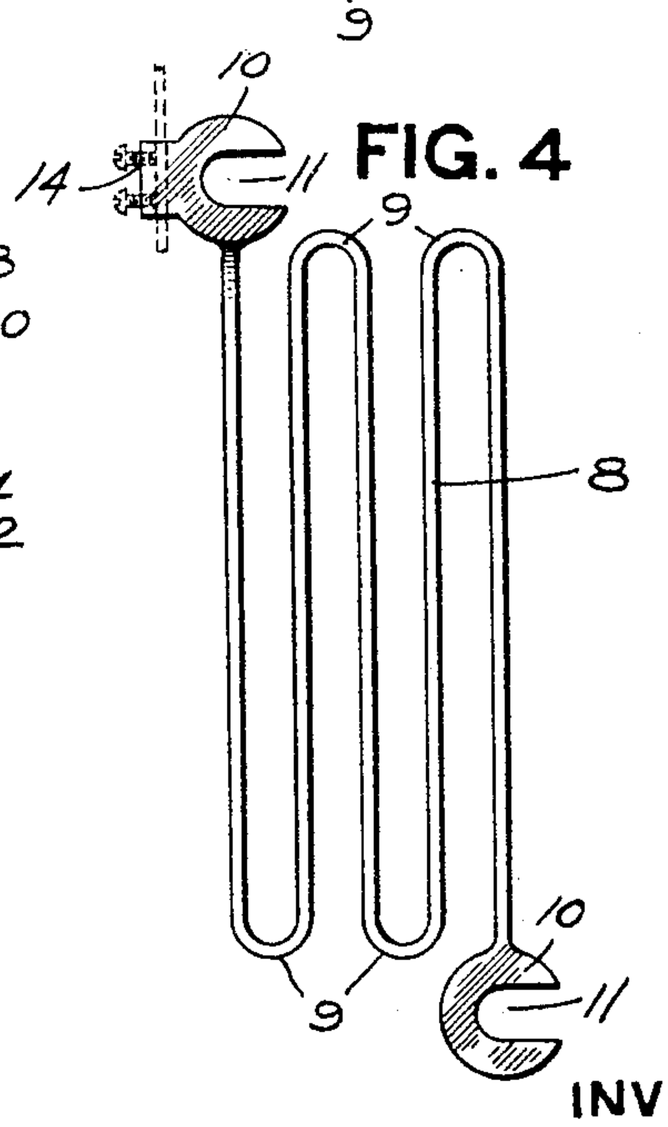


FIG. 4



WITNESSES.

J. R. Keller

Robert C. Totten

INVENTOR.

George Baehr

By Kay Totten & Wait

attorneys

ANDREW. B. GRAHAM CO., PHOTO-LITHOGRAPHERS, WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

GEORGE BAEHR, OF McKEESPORT, PENNSYLVANIA.

RESISTANCE DEVICE.

No. 798,589. Specification of Letters Patent. Patented Sept. 5, 1905.

Application filed September 28, 1904. Serial No. 226,371.

To all whom it may concern:

Be it known that I, GEORGE BAEHR, a resident of McKeesport, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Resistance Devices; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to electric resistance devices; and its object is to provide a device of this character in which the units are so formed and assembled that one or more can be taken out and replaced in case of breakage or injury without disturbing the others and which device as a whole is so constructed that it can be readily secured in place.

In the accompanying drawings, Figure 1 is a side view of a controller-stand with my improved resistance device applied thereto. Fig. 2 is a rear view of the same. Fig. 3 is a vertical section, on an enlarged scale, through the resistance device; and Fig. 4 is a detail view of one of the units.

My resistance device comprises a frame 1, formed by two side members 2, made, preferably, of cast metal, together with suitable cross connecting bolts or rods, four such bolts or rods being shown and being numbered 3, 4, 5, and 6, respectively. The number of these bolts or rods, however, will vary with the number of sets of units in the resistance device. The resistance-conductors are formed of a number of units or elements 8, each comprising a conductor bent upon itself a number of times to form a number of loops 9, practically parallel with each other, these conductors terminating in enlarged ends 10, which are formed as hooks 11 or holes open on one side. These hooked ends take over the cross rods or bolts of the suspending-frame, and as they open on their sides the units can be taken out or put in place by merely drawing the same out sidewise. These resistance devices are insulated from the cross bolts or rods by suitable sleeves 12 and from each other by disks 13, of mica or other suitable insulating material. Three series or sets of such units are employed in the device shown, one set *a* located at the upper end of the suspending-frame and hooking onto the cross-bolts 3 and 4, the second set *b* located at the middle of the suspending-frame and hooking onto the cross rods or bolts 4 and 5, and the lower set *c* hooking onto the bolts 5 and 6. The number of sets, however, is not material and may vary according to the length of the suspending-frame. In case more than three sets are used all of the intermediate sets will correspond in shape and arrangement with the middle set shown in the drawing.

At the upper ends of the upper sets the enlarged heads 10 are provided with suitable means for securing the conductors thereto, such as holes and intersecting binding-posts 14. The units of the middle set are all insulated the one from the other, while the units of the upper and lower sets are insulated in pairs, the connections being such that the current will pass from a unit in the upper set through a unit in the middle set into a unit of the lower set, from this to another unit of the lower set, thence up through a unit in the middle set to a unit in the upper set, which latter unit is insulated from the unit in the upper set, from which the current started, but is arranged in a pair with another unit, so that the current will pass to the latter and thence again down through the middle and lower sets and up through other units, thus passing up and down through the various units until it reaches the outgoing binding-post. The resistance is due to the length of conductor formed by the several units when united in the manner described.

Should any one or more of the units become broken, it is only necessary to loosen up the nuts on the ends of the cross bolts or rods 3, 4, 5, and 6, when the disabled unit can be drawn out sidewise and another one put in its place without taking the entire frame apart and without disturbing the other units in said frame.

Another feature of the invention consists in the manner of suspending the frame 1. In the drawings it is shown connected to an ordinary controller-frame 15. This frame is provided with a pair of cross bars or cleats 16 and 17, the upper one preferably being provided with a beveled upper edge. The side frames 2 are provided near their upper ends with hooks 18, which take over the cross-bar 16, and at their lower ends with shoulders 19, which will bear against the lower edge of the cross-bar 17. The cross-bars 16 and 17 extend entirely across the controller-frame, and the manner of suspending the resistance-frame is such that the latter may be very much narrower than the former. As a matter of fact any size of resistance device less than the full width of the controller-frame can be suspended on the cross-bars 16 and 17 with equal

facility. The side frames 1 are provided with perforated ears or lugs 20, whereby the frame may be bolted to the cross-bars 16 and 17. The controller-frame 15 is open on the side, so that the resistance device can be easily pulled out sidewise when necessary. This is advantageous in confined spaces, when there is little room to work in.

Resistance devices of the general character shown herein are not new, the novelty in this case being entirely in the manner of uniting the units to the cross bars or rods in the suspending-frame, so as to facilitate the removal and replacement of said units, and also in the manner of suspending the resistance device in the controller-frame so that it can be easily removed and replaced and so that any size of resistance device can with equal facility be placed in the controller-frame.

What I claim is—

1. In a resistance device, the combination of a frame, three or more rods supported thereby, two or more series of units, each provided with hooked ends opening in the same direction for engaging said rods, and insulation between said units and said rods, the units of the two series being arranged in pairs and insulated the one from the other, and the units of one pair of one series being electrically connected with units of different pairs of the other series.

2. In a resistance device, the combination of two side members, cross-rods connecting the same, two or more series of units, each unit having hooked ends in different planes transversely of the unit and opening sidewise whereby they can be engaged with and disengaged from the cross-rods without disturbing the other units, and insulation between said units and said rods, the units of the two series being arranged in pairs and insulated the one from the other, and the units of one pair of one series being electrically connected with units of different pairs of the other series.

3. In a resistance device, the combination of a frame, rods supported thereby, three or more series of units, each provided with hooked ends in different planes transversely of the unit and opening sidewise and engaging said rods, and insulation between said units and said rods, the units of the two end series being arranged in pairs and insulated the one from the other, and the intermediate series being arranged singly and insulated one from the other and electrically connecting a unit of one pair of one end series with a unit of another pair of the other end series.

4. In a resistance device, the combination of two side members, cross rods or bolts connecting the same, three or more series or sets of units, each provided with hooked ends opening in the same direction for engaging the cross rods or bolts, and insulation between said units and said cross rods or bolts, the units of the two end series being arranged in pairs and insulated the one pair from the other, and the intermediate series being arranged singly and insulated one from the other and serving to electrically connect a unit of one pair of one end series with a unit of another pair of the other end series.

5. The combination with a supporting-frame, of a plurality of resistance units, and a suspending-frame in which said units are mounted, said frame being provided with projections for engaging the supporting-frame.

6. The combination with a supporting-frame, of a suspending-frame comprising two side members, resistance units secured therebetween, and projections on the edges of said side members for engaging the supporting-frame.

7. The combination with a supporting-frame provided with a pair of cross-bars, of a suspending-frame comprising side members having hooks on their edges for engaging the cross-bars of the supporting-frame, and resistance units secured between said side members.

8. A resistance device comprising a pair of side members, suspending-hooks formed on the edges thereof, and a series of resistance units secured between said side members.

In testimony whereof I, the said GEORGE BAEHR, have hereunto set my hand.

GEORGE BAEHR.

Witnesses:
ROBERT C. TOTTEN,
G. KREMER.