S. E. HUENERFAUTH.

RESISTANCE DEVICE.

APPLICATION FILED JUNE 18, 1914.

1,138,659.

Patented May 11, 1915.

3 SHEETS—SHEET 1.

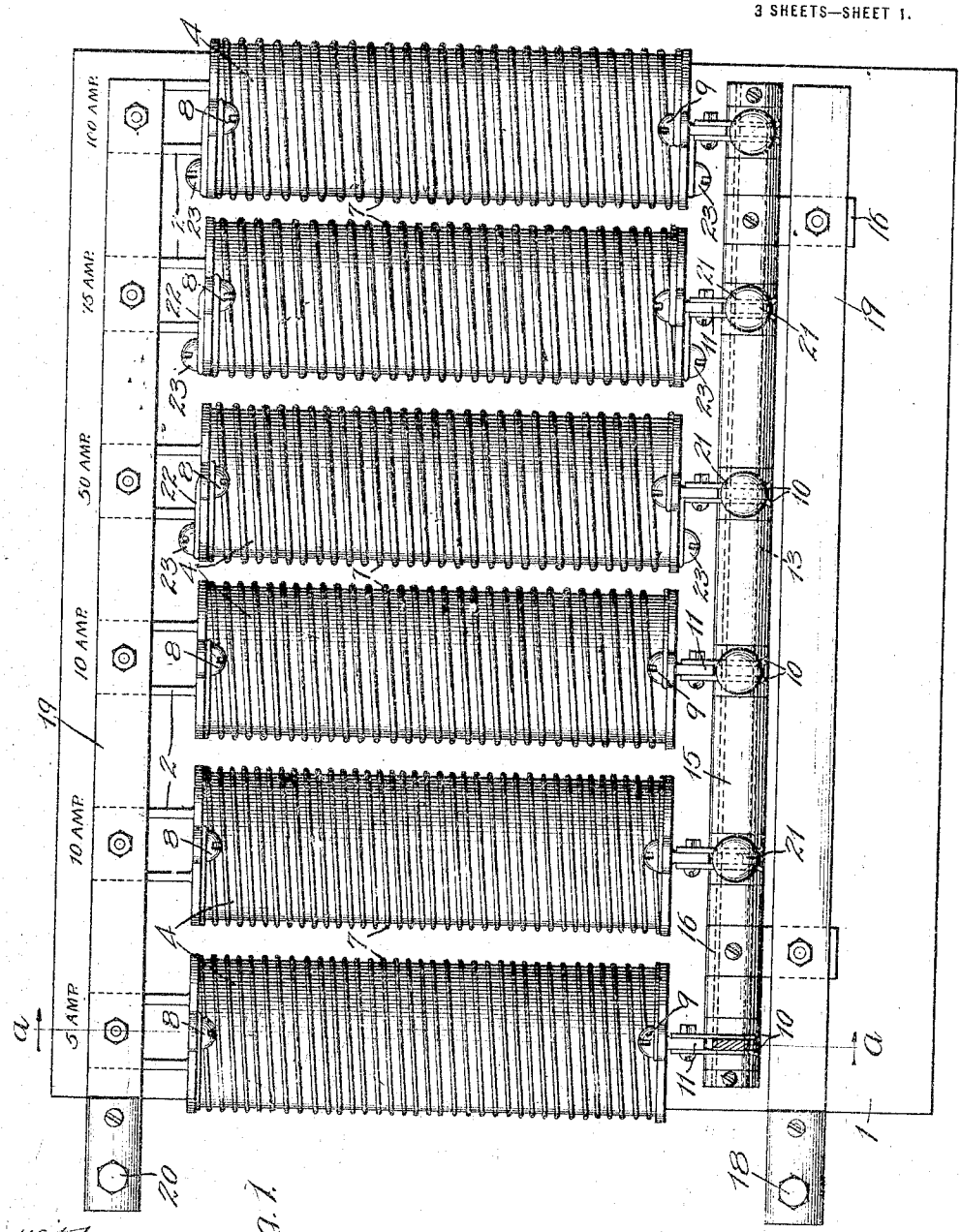


Fig. 1.

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3 SHEETS—SHEET 2.

Fig. 2.

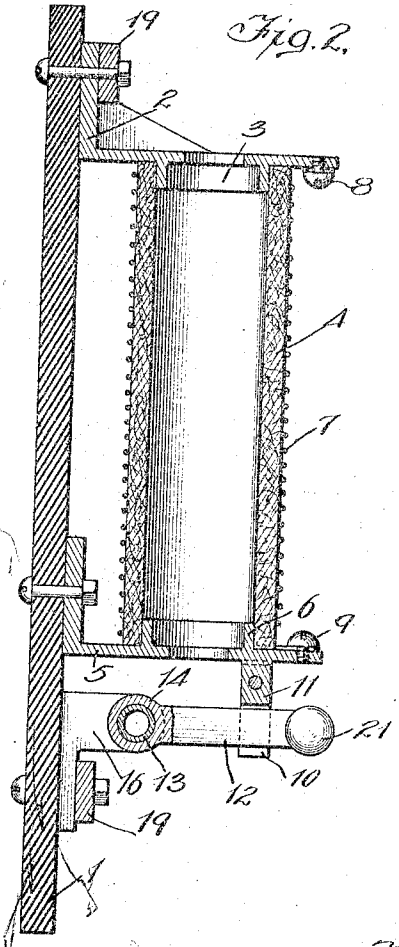


Fig. 4.

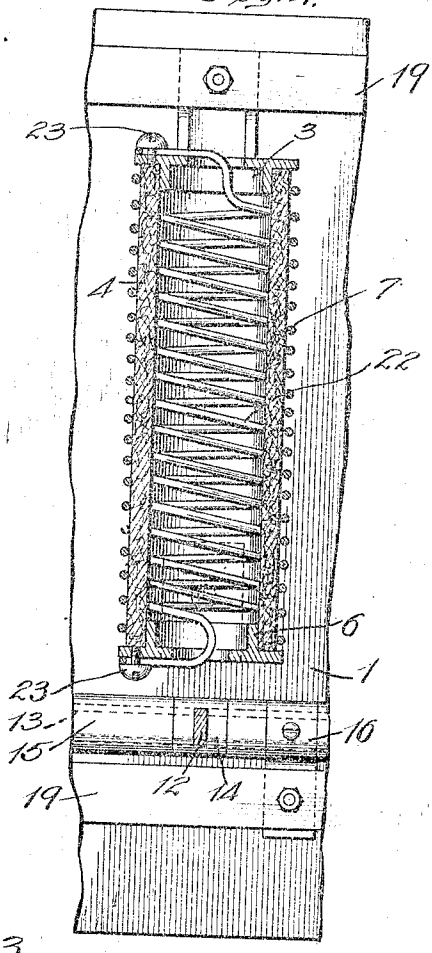
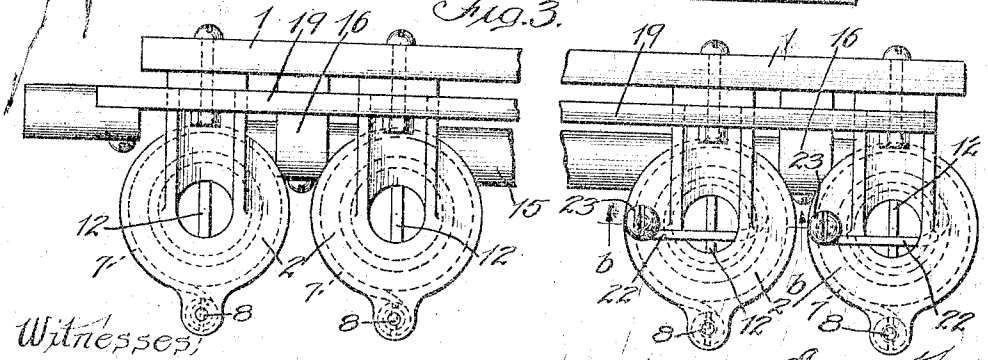


Fig. 3.



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3 SHEETS—SHEET 3.

Fig. 5

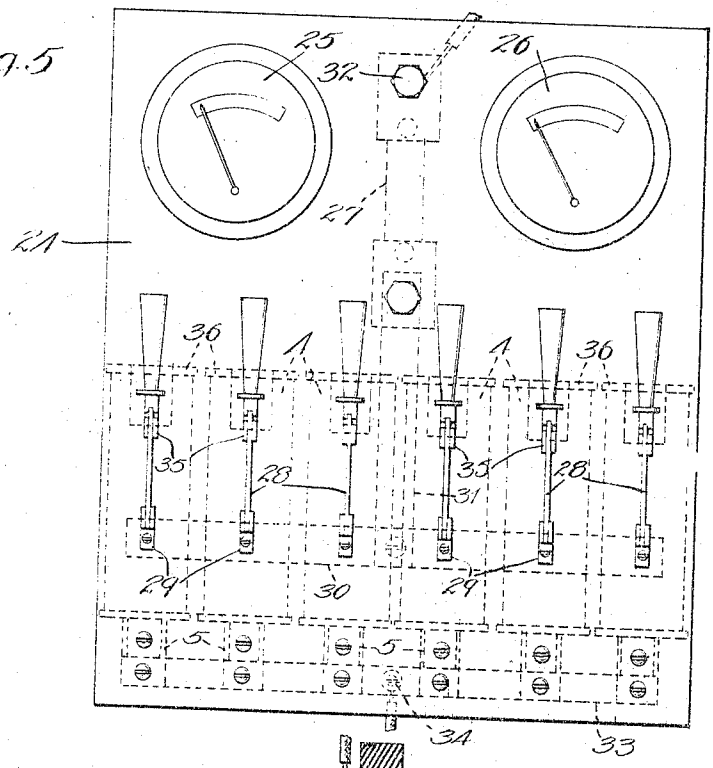
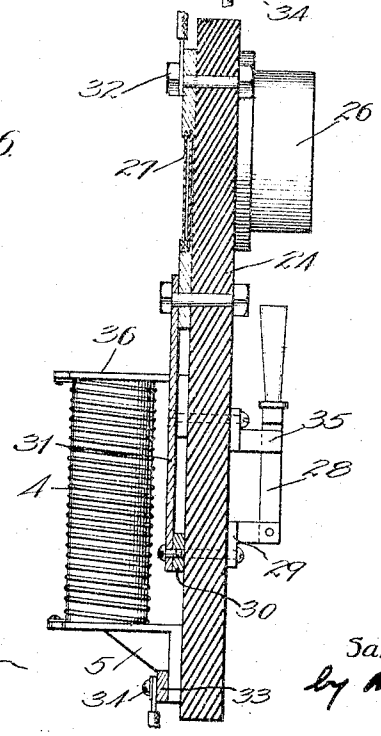


Fig. 6



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UNITED STATES PATENT OFFICE.

SAMUEL E. HUENERFAUTH, OF CHICAGO, ILLINOIS.

RESISTANCE DEVICE.

1,138,659. Specification of Letters Patent. Patented May 11, 1915.

Application filed June 18, 1914. Serial No. 845,807.

To all whom it may concern:

Be it known that I, SAMUEL E. HUENERFAUTH, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Resistance Devices, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to resistance devices and more particularly to those resistance devices used for instance in connection with electroplating tanks, or similar uses wherein it is desired to vary the amount of current being supplied to such tanks or devices.

I find that in plating and similar operations that the circularly mounted resistance controlling contacts coöperating with one rotatable switch element corrode very readily and that it is extremely difficult to maintain good contact. In manipulating these devices it frequently is necessary to move the switch element back and forth in order to get a good contact, and under these conditions too much or too little resistance may be included in the circuit, thereby to frequently cause burning of the articles to be plated, or rupture of the circuit.

My invention contemplates the provision of a resistance device of a character which will at all times provide satisfactory contact and in which the resistance elements are adapted for inclusion in the circuit in a parallel relation.

My device makes it possible to interpolate readily between resistance values as I may have certain resistance units for varying values of reasonably large carrying capacity, and then other units of various small carrying capacities so that an accurate adjustment between narrow limits can be made throughout the entire scale of use of the resistance device. In this way I am enabled to accurately set the resistance to accommodate the predetermined amount of current and to obviate the necessity of cut and try operation of the ordinary rotatable resistance. By the use of my device I also have a separate contact for each additional resistance element included in the circuit, thus to increase the contact area and not have it remain the same as in the rotatable or similar switches.

Another novelty in my invention is that previously tested units are used to give the required current as set forth on the device and by the reason no more or less current can pass than the predetermined amount.

Another important factor is to control the exact number of amperes as per previously tested resistance, and therefore deposit an exact amount of metal, on any surface in a given time.

I am also enabled by reason of the structure thus outlined to construct small resistance devices of both a high and low current carrying capacity of any desired size.

My invention also contemplates various structural details and novel features of arrangement, all as will appear more in detail from the specific description in which I will now set forth two specific forms of my improved device in connection with the accompanying drawings in which:

Figure 1 is a front view of one form of device constructed in accordance with my invention; Fig. 2 is a sectional view on line *a*—*a* of Fig. 1; Fig. 3 is a top view of the device shown in Fig. 1, a portion thereof being broken away as shown; Fig. 4 is a sectional view on line *b*—*b* of Fig. 3; Fig. 5 is a front view of a modification, and Fig. 6 is a sectional view of the modified form shown in Fig. 5.

Referring more particularly to Figs. 1, 2, 3, and 4, I show an insulating face plate 1, which carries at its upper portion a plurality of metallic brackets 2. These brackets have a circular and depending shell or apron 3 adapted to support one extremity of an insulating tube 4, the opposite extremity of which is supported by brackets 5 also mounted on the face plate 1. The brackets 5 also have circular aprons 6 to engage the opposite extremity of the insulating tube 4. The insulating tube 4 is adapted to form a guide for resistance and coil of resistance wire 7 as shown more in detail in Fig. 2, which resistance wire has its upper extremity in electrical contact with the bracket 2 by means of the screw 8, and its lower extremity in electrical contact with the bracket 5 through the agency of the screw 9. It will thus be seen that the electric circuit through the resistance wire extends from bracket 2 to bracket 5. Bracket 5 carries at its lower extremity a pair of spring fingers 10 which are in electrical contact with a projection 11 forming part of the bracket 5, which spring fingers are adapted

to make electrical contact with the rotatably mounted switch arm 12. The rotatably mounted switch arm 12 is carried by a shaft 13 about which the hub 14 of the element 12 rotates. Suitable distance pieces or sleeves 15 are interposed between the adjoining hubs 14. The shaft 13 is supported by means of arms 16 upon the face plate 1 as readily apparent. It will thus be noted that when the switch arm 12 is in association with its coöperating contact springs 10, that the circuit through a resistance wire extends from the bracket 2 to the bracket or arm 16. The two brackets are united by means of a conducting strip 17 having at its extremity a binding post 18 for the purpose of making electrical connection therewith. All of the arms 2 are electrically connected with a conducting strip 19 having at its extremity a binding post 20 for electrical connection purposes. It will thus be apparent that the binding posts 18 and 20 connect the device in circuit and the amount of current that may pass from the binding post 18 to the binding post 20 depends upon the number of resistance elements connected in bridge of the conductors 17 and 19, and this of course depends upon the number of switch arms 12 that are moved upwardly into contact with their coöperating spring fingers 10. Buttons 21 are provided for the various switch arms 12. The various units are provided with indicia at the top as shown in Fig. 1 to indicate the carrying capacity of each unit, such as 5 amperes, 10 amperes and the like. Three of the resistance units, respectively the three right hand ones of Fig. 1, in order to obtain the necessary carrying capacity have in addition to the outside resistance wire 7 the internally placed resistance wire 22, which at its opposite extremity by means of screws 23, 23, is also electrically connected between the arms 2 and 5. I am thus enabled to provide a resistance device in which the current carrying capacity may be varied from five to two hundred and fifty amperes at five ampere steps, merely by selecting the proper switches 12. It will be readily seen that with very few instrumentalities a wide selection of current carrying capacities is provided for, as with the six devices shown, a great many different selections are to be attained. Thus having given the necessary current for a certain piece of work, knowing the current density required, the device can be readily set to accommodate such current without any guesswork and good contact will be attained because of the cable blade contact arrangements as shown. It is well known of course that in plating work the contact resistance must be very low as the voltages used are extremely low.

Referring now more particularly to Figs. 5, and 6, I show a somewhat modified form of the device in which I provide the panel 24 which carries a volt meter 25 and the ammeter 26. An ammeter shunt 27 is likewise provided. The spools 4′ are mounted to the right of the panel 24 and are similarly controlled by means of switch arms 28 as shown, the switch arms being mounted on brackets 29. These brackets 29 are electrically connected by the conducting strip 30 and a fuse conducting strip 31 leads directly to the shunt 27 to the binding post 32, to which the closing circuit may be connected. The lower brackets 5 are again suitably interconnected by the conducting strip 33 which has a binding post 34 for the external circuit. The spring fingers 35 are connected respectively each to each of their coöperating resistance tube supporting arms 36. This particular form provides a somewhat more complete device in that a volt meter and ammeter are added and the structure is given an appearance more or less of a switch panel.

I do not limit myself to the use of resistance wire as any suitable resistance material might be used to accomplish the result.

From what has been described the nature of my invention will be readily apparent as well as its various uses.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A resistance device of the character described having a pair of bus bars, a plurality of insulating tubes, a backboard, current conducting arms for mounting said tubes on said backboard, a coil resistance unit coiled about the exterior of each tube, a coiled resistance unit interiorly of each tube, said resistance units being carried between said arms, and a switch element carried by one of the arms of each tube.

2. A resistance device for electroplating tanks having a pair of bus bars, a plurality of individual resistance units of unlike resistance and high current carrying capacity adapted to be connected in parallel across said bus bars, a switch element for each unit so that various combinations of carrying capacities depending upon the selection of the switch elements can be made, said resistance units being coiled, and an insulating tube for each unit.

3. A resistance device for electroplating tanks having a pair of bus bars, a plurality of individual resistance units of unlike resistance and high current carrying capacity adapted to be connected in parallel across said bus bars, a switch element for each unit so that various combinations of carrying capacities depending upon the selection of the switch elements can be made, said resistance units being coiled, an insulating tube about which each unit is mounted, and current conducting end plates mounted to

said tubes to which the corresponding extremities of the associated resistance unit are connected.

4. A resistance device or electroplating tanks having a pair of bus bars, a plurality of individual resistance units of unlike resistance and high current carrying capacity adapted to be connected in parallel across said bus bars, a switch element for each unit so that various combinations of carrying capacities depending upon the selection of the switch elements can be made, said resistance units being coiled, and arms carried upon one bus bar for supporting one terminal of each of said units, said switch elements being electrically associated with the other bus bar.

In witness whereof, I hereunto subscribe my name this 12th day of June, A. D. 1914.

SAMUEL E. HUENERFAUTH.

Witnesses:
HAZEL ANN JONES,
MAX W. ZABEL.