A. J. BROWN.

ADJUSTABLE SERIES SHUNT.

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1,005,805.

Patented Oct. 17, 1911.

Fig. 1

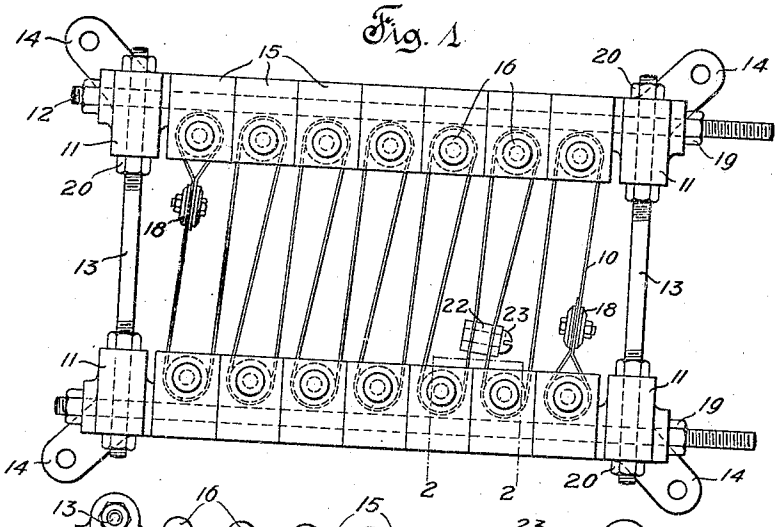


Fig. 2

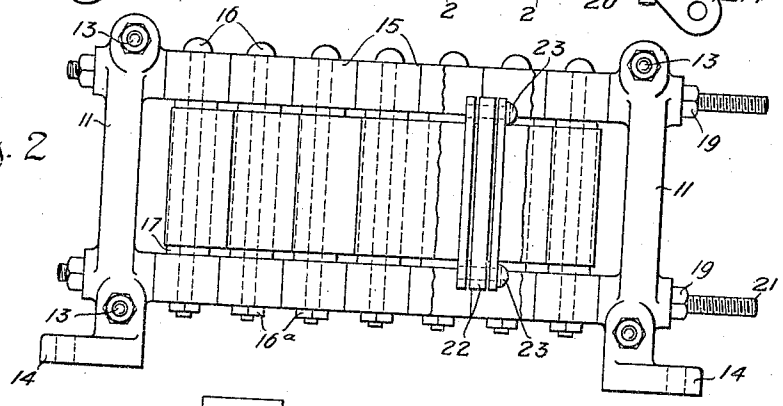
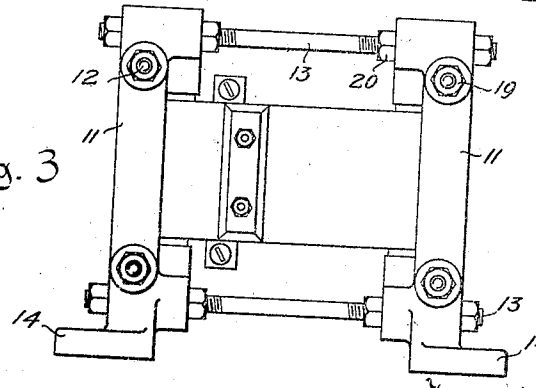


Fig. 3



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UNITED STATES PATENT OFFICE.

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ADJUSTABLE SERIES SHUNT.

1,005,805. Specification of Letters Patent. Patented Oct. 17, 1911.

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To all whom it may concern:

Be it known that I, ARTHUR J. BROWN, a citizen of the United States, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Adjustable Series Shunts, of which the following is a full, clear, and exact specification.

My invention relates to series shunts for compound wound dynamo-electric machines.

It is customary to provide compound wound machines with shunts of German silver (sometimes copper) connected across the terminals of the series field winding, to shunt a part of the armature current around the series winding for the purpose of obtaining a proper compounding effect. Usually in such machines, it is difficult to provide the field magnets with exactly the proper number of series turns. In large machines, designed for heavy current loads, it is generally impossible to do so for the reason that very few series turns are necessary. In fact to obtain the proper series ampere turns with the full load current, frequently fractions of turns will be required. It is therefore customary to provide a greater number of series turns than would be required if the full load current traversed the series winding and to provide a series shunt across the series field terminals whereby a part of the current is shunted around the series winding to obtain the proper ampere turns. The shunt referred to is usually non-inductive, and as commonly constructed, consists of a strip of German silver wound back and forth around porcelain tubes mounted in two parallel plates of insulation. The strip is thin and wide to obtain the proper resistance and heat radiating effects.

The above type of shunt is adjustable. It is therefore not necessary to carry in stock a large number of shunts of different sizes and capacities in order that the proper compounding effect may be obtained for each individual machine. In some of the earlier series-shunt constructions if the resistance of a particular shunt was too great, portions of this resistance material were sheared off until the proper resistance was obtained. In this event an unnecessarily large shunt frame was used. This was objectionable for the reason that the shunt is usually attached to the frame of the machine.

The object of my invention is to provide a shunt, the frame of which can be adjusted for any desired length of resistance material, and to provide means whereby the effective resistance of the shunt in the frame may be materially altered.

In carrying out my invention, I mount the strip of resistance material in a sectional frame, whereby the length of the sides of the latter may be increased or decreased at will for any length of resistance material, and provide the resistance material with an adjustable member so that said member may vary the effect of the resistance.

More specifically considered, my invention consists in a series shunt having a zigzag or looped resistance metal, a substantially rectangular frame for the strip comprising four metal castings for the corners of the frame through which castings pass two pairs of longitudinal parallel bolts each pair of which pass through opposite ends of the same corner castings, a plurality of insulating blocks mounted on each of the bolts, insulated rods mounted in the blocks, said rods being in two opposite parallel sets, said resistance strip being looped about the insulated rods, end-bolts passing through the metal castings at right angles to the aforesaid end-bolts for spreading apart the two pairs of longitudinal bolts and blocks supported thereon, to put the resistance strip under tension, and a member for materially altering the effective resistance movably mounted on said resistance material.

Referring to the accompanying sheet of drawings, Figure 1 is an elevation of my shunt. Fig. 2 is a plan view partly in section, of the same and, Fig. 3 is an end view of the same.

A long flexible strip 10 of resistance material, preferably German silver, is zigzagged or wound back and forth as shown so that the shunt will be compact. This strip is thin and wide so that the resistance will be high and the heat radiation sufficient to prevent an undesirable rise of temperature.

The supporting frame is rectangular in shape, and consists of four similar cast metal corner pieces 11, mounted on four long longitudinal bolts 12, and four short

transverse bolts 13. As is clear from the drawings, each cast metal corner piece is provided with two pairs of openings to receive the bolts, the holes of one pair being arranged at right angles to the holes of the other pair. Each cast metal corner piece 11 is provided with a perforated lug 14 by means of which the shunt may be attached to a support.

Mounted on each bolt 12 are a number of blocks 15 preferably of insulating material, such as fiber. The blocks 15 are arranged side by side and there is an equal number on each bolt. Each block 15 has a hole or opening to receive the supporting bolt 12, and an opening arranged at right angles to the first opening to receive an insulated rod 16 on which one section or loop of resistance strip 10 is supported. I have, in thise case, shown seven fiber blocks on each bolt. Each of the rods 16, about which the resistance material 10 is looped, is mounted in two opposite insulating supporting blocks 15, and is held in place by a nut 16^a. As is clear from the drawings, the rods are all parallel to each other and are arranged in two sets, the sets being in parallel planes. Mounted on each rod is a tube of insulating material 17, preferably of porcelain. These tubes are of equal length, and hold the inner ends of the blocks the proper distance apart. Each pair of insulating blocks 15 and the insulating rods 16 mounted therein, may be mounted on or removed from the bolts 12 as a unit, and therefore constitute one section of the frame. The resistance strip 10 is wrapped back and forth around all of the tubes and each free end is fastened to the last adjacent section or portion extending between two tubes by means of a clamp 18. By means of these clamps the ends of the resistance strip can be connected to the terminals (not shown) of the series field winding. The longitudinal bolts are provided at both ends with tightening nuts 19, by means of which, the fiber blocks can be held closely together. The shorter bolts 13 are each provided with four nuts 20, located on both sides of the corner members 11. By means of these nuts 20, and particularly the nuts on the inner side of the corner members, the two sets of longitudinal bolts 12, which carry the insulating blocks 15 and rods 16, can be spread apart so as to tighten or put tension in the loops of the resistance strips 10.

As is shown at 21, the longitudinal bolts extend at one end of the shunt, beyond the corner members 11. The object of this is to permit the size of the frame to be increased without changing the bolts 12. If the resistance of the strip 10 is not sufficient, the nuts 19 and 20 can be loosened and another set of insulating blocks 15 and supporting rods 16 can be added and the frame will then support a longer resistance strip. On the other hand, if the resistance is too high, the size of the frame can be reduced by removing a suitable number of supporting blocks or rods. But a better arrangement than this is obtained by employing a member 22 which is mounted upon and engages adjacent portions of the zigzag resistance material. This member 22, which includes three flat pieces engaging the full width of the strip, is mounted slidably on the resistance strip and may be slid along lengthwise of the same. When the proper amount of resistance is obtained the member or clamp 22 may be tightened to the resistance strip by means of screws 23 which pass through the member 22. This member 22 which provides for varying the effective resistance of the series shunt may be taken from any two adjacent resistance turns and placed at points along any other two adjacent resistance turns. It is therefore evident that the resistance of the series-shunt may be varied roughly by adding or removing a suitable number of supporting blocks and rods, and can be accurately and definitely varied with very great precision by means of the adjustable member 22.

It is seen that my improved shunt is simple in construction and compact. As the frame consists of a plurality of sections its size can be easily and quickly adjusted by increasing or decreasing the number of sections. It will only be necessary to carry in stock a few bolts of different sizes for shunts which will produce the proper compounding effect for machines of different sizes and conditions of windings. The real improvement of my invention consists in the provision of the member 22 which is mounted on the resistance strip for varying the effective resistance of the same. The arrangement requires no more room than if it were not present and is of considerable value.

It is evident that there may be many modifications of the precise form and arrangement herein shown and described, and I aim in my claims to cover all such modifications which do not involve a departure from the spirit and scope of my invention.

What I claim as new is:

1. In a series-shunt for a dynamo-electric machine, a frame, a strip of resistance material mounted in said frame, a member adjustably mounted on said strip of resistance material for varying the effective resistance thereof, and another member engaging said adjustable member for clamping it in any desired position.

2. In a series-shunt for a dynamo-electric machine, a frame, a strip of resistance material wound back and forth in said frame forming loops, and adjustable clamping means for short-circuiting one of said loops.

3. In combination, a frame, a zig-zag re-

sistance member supported by said frame, and clamping means mounted on and supported by said resistance member to short-circuit certain portions thereof.

4. In combination, a frame, a strip of resistance material wound back and forth in said frame forming individually supported loops, and adjustable means supported by said strip for short-circuiting one of said loops.

5. In combination, a frame, a zig-zag resistance strip supported by said frame, and clamping means mounted on said resistance strip to short-circuit certain portions thereof, said means including a plurality of flat pieces engaging the full width of said resistance strip.

In testimony whereof I affix my signature, in the presence of two witnesses.

ARTHUR J. BROWN.

Witnesses:
CHAS. L. BYRON,
ROB. E. STALL.