No. 869,796. PATENTED OCT. 29, 1907.

E. T. MUG.

SERIES SHUNT FOR DYNAMO ELECTRIC MACHINES.

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Fig. 1.

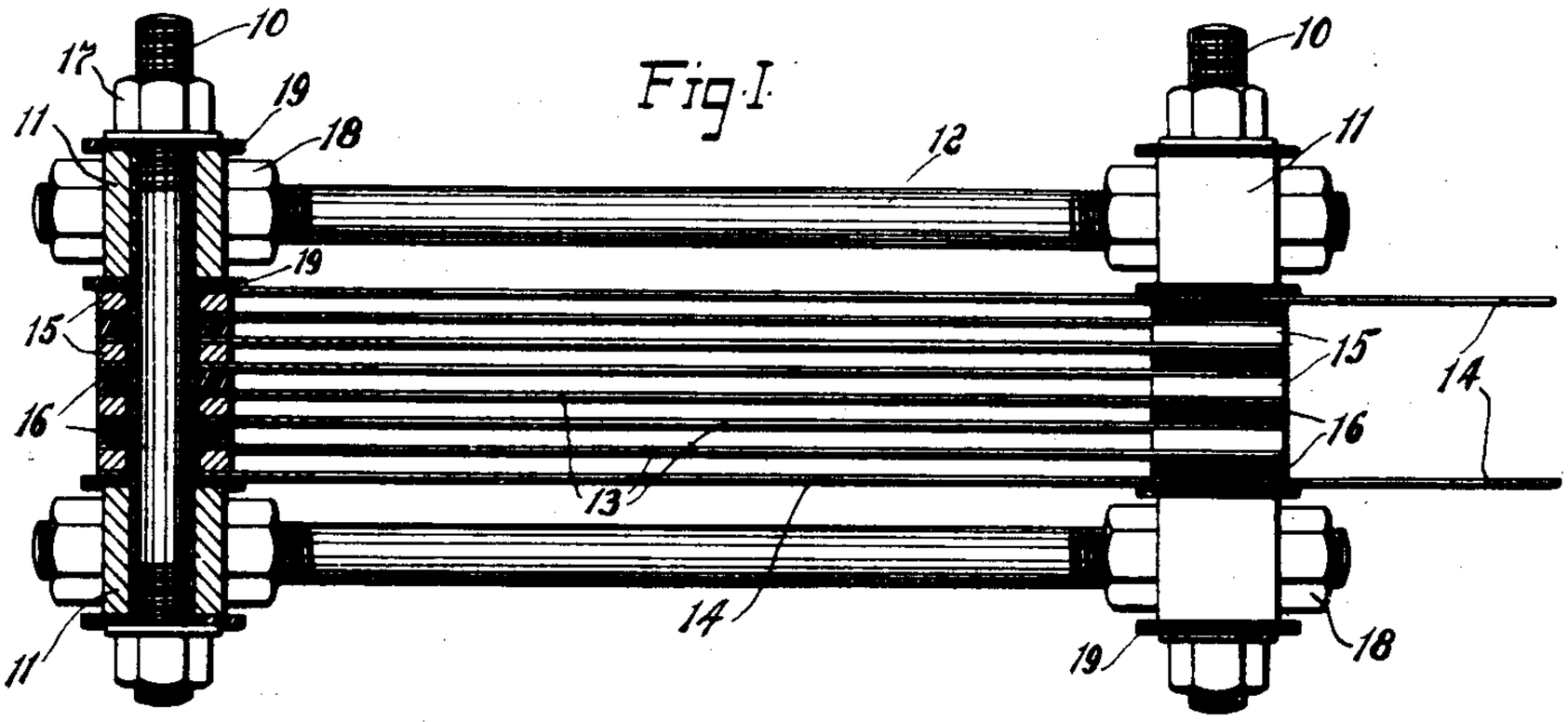


Fig. 2.

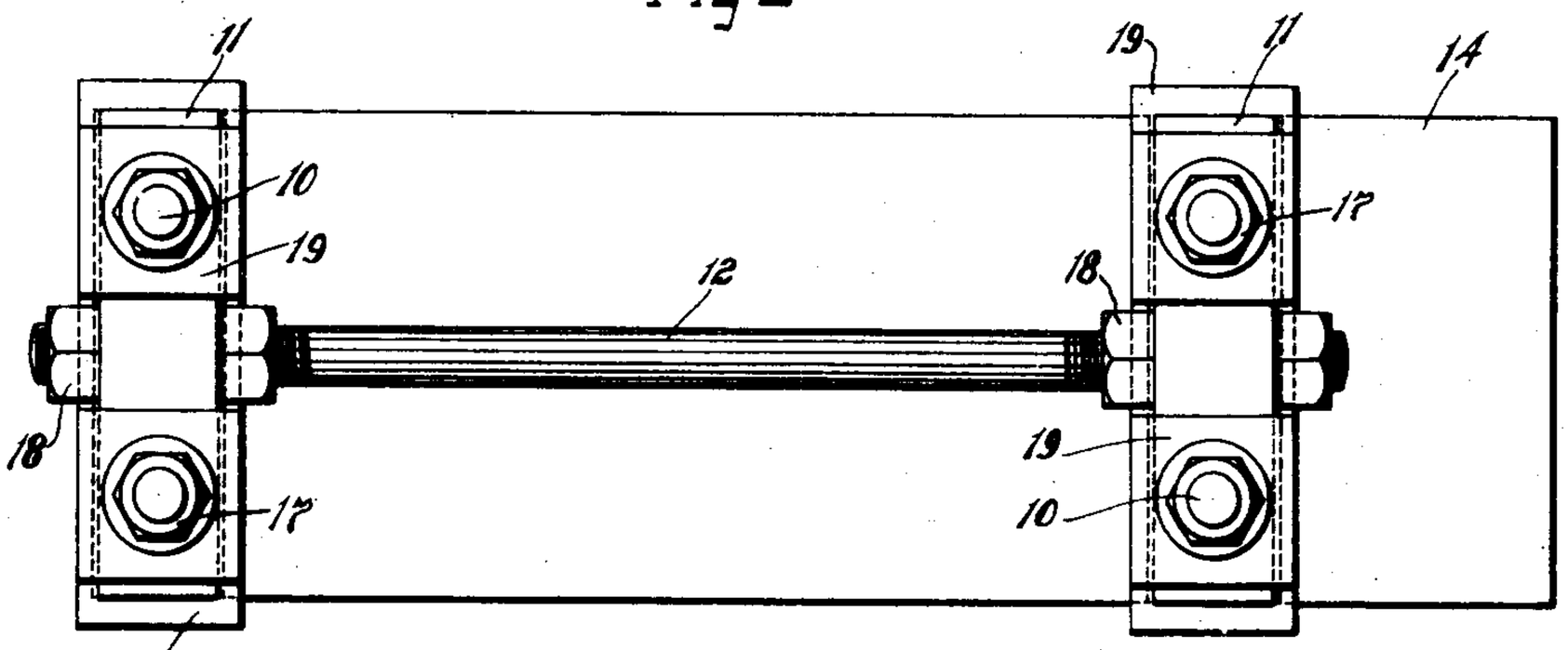
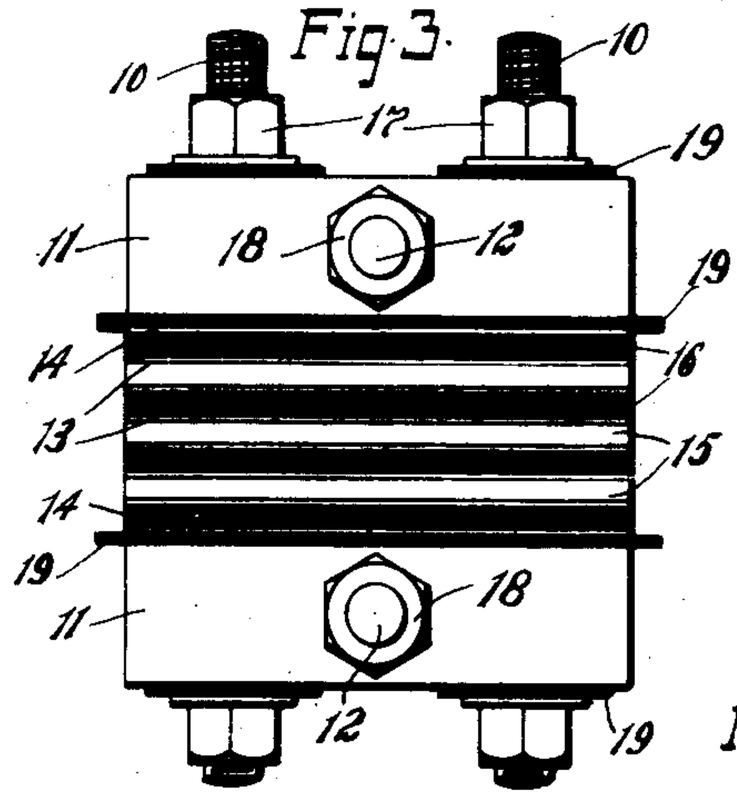


Fig. 3.



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SERIES SHUNT FOR DYNAMO-ELECTRIC MACHINES.

No. 869,796. Specification of Letters Patent. Patented Oct. 29, 1907.

Application filed November 17, 1905. Serial No. 287,835.

To all whom it may concern:

Be it known that I, EDWARD T. MUG, a citizen of the United States, residing at Norwood, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Series Shunts for Dynamo-Electric Machines, of which the following is a full, clear, and exact specification.

My invention relates to resistance elements, particularly to series-shunts for compound wound dynamo-electric machines.

It is customary to provide compound wound machines with shunts of German-silver connected across the terminals of the series field winding to shunt a part of the armature current around the series wind ng, 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, and in large machines designed for heavy loads it is generally impossible to do so, for the reason that very few series turns are necessary, and in fact to obtain the proper series ampere turns with the full load current, frequently fractions of turns would 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 across the series field terminals, a resistance member or series shunt, 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 resistance of the above type of shunts is non-adjustable. It is therefore necessary to carry in stock a large number of shunts of different sizes and capacities, to produce the proper compounding effect, according to the conditions and circumstances of each case.

The object of my invention is to provide a cheap and convenient form of a resistance member especially adapted for a series shunt, the resistance of which member can be adjusted, whereby the necessity for carrying in stock a large number of different sizes of shunts is avoided.

With this end in view, I provide a resistance member composed of a plurality of strips of flexible resistance material, supported at their ends, and having means, such as adjustable bolts, for putting tension in the strips so that adjacent strips cannot sag and come in contact with each other.

Considering my invention from a more specific standpoint, it consists in a shunt for series field winding having a group of parallel strips of metal, separated at their ends by alternately arranged conducting and insulating members, whereby the strips are connected in series, bolts or rods passing through the ends of the strips and through the separating members, clamping blocks mounted on the ends of the bolts, and bolts arranged parallel to the strips for holding the blocks apart, the whole being so constructed that the clamping blocks may be removed, and the number of metal strips and the corresponding separating members increased or decreased as desired.

My invention still further consists in the details of construction and combinations and arrangements of parts, more fully described in the specification, and set forth in the appended claims.

For a better understanding of my invention, reference is had to the accompanying drawings in which

Figure 1 is a side view, parts being broken away for the sake of clearness; Fig. 2 is a plan view of the same; and Fig. 3 is an end view of the same.

In this instance the supporting frame for the resistance strips of my improved resistance member consists of transverse bolts 10, on which the strips are mounted, clamping blocks 11, and longitudinal spacing bolts 12. Each resistance member has a number of thin, wide strips 13 of resistance metal, preferably German-silver, and two longer strips 14, arranged at the top and bottom of the assembled group, by means of which the current enters and leaves the shunt. These strips 14 are longer than the strips 13 in order that they may be attached to the terminal blocks of the series winding. In this instance four transverse bolts 10 are provided, two at each end of the frame. The strips 13 and 14 are provided with holes for the purpose and are mounted on these bolts. Between the strips at each end are alternately arranged strips of copper 15 and insulation 16. Between adjacent strips there is at one end a strip of copper 15 and at the opposite end a strip of insulation 16, so that all the strips are connected in series. The bolts 10 also pass through the spacing members 15 and 16. As shown in Fig. 1, the bolts are surrounded by tubes of insulation, so that there will be no short circuit between the strips. As many strips as desired may be thus mounted on the bolts, to provide a resistance member of any desired capacity or resistance. After the requisite number of strips and spacing members are mounted in position, the ends are clamped tightly together by means of the clamping blocks and nuts 17 on the bolts 10. The nuts 18 on the bolts 12 are then adjusted and tightened until a rigid structure is obtained. The clamping blocks are separated from the nuts 17 and end strips 14 by insulation 19. The main purpose of the longitudinal bolts 12 is to put tension in the strips 13 and 14 and prevent sagging and consequent contact between the strips.

It is seen that the number of strips 13 in the resistance

member can be changed at will according to the circumstances of each case. By removing the upper clamping block, and upper strip 14, the number of strips 13 can be increased or decreased as desired, thus increasing or decreasing the resistance of the shunt.

It is evident that many changes may be made in the structure shown and described without departing from the spirit and scope of my invention. For example, I do not wish to be confined to the exact form of clamping means and supporting frame.

If desired, the relative number of transverse and longitudinal bolts can be changed. A single bolt can be passed transversely through the strips and two longitudinal bolts instead of one may be used at each side of the group of strips for holding the clamping blocks a predetermined distance apart.

I have described an arrangement whereby the strips are all connected in series. I do not desire to be confined however to this arrangement as in some cases a parallel arrangement may be desired. In the latter case all the insulation between the strips would be removed and the latter would be spaced apart by copper or other conducting material. With this arrangement the current would enter the strips at one end of the shunt and leave at the other end. Also a series-parallel arrangement may be used if desired.

I aim in my claims to cover all such modifications which do not depart from the scope of my invention.

What I claim as new and desire to secure by Letters Patent is:—

1. A resistance member comprising a plurality of parallel strips of flexible resistance material supported at their ends, and means for putting tension in said strips.

2. A resistance member comprising a plurality of parallel strips of sheet metal, adjustable clamping members at the ends of said strips, and means for putting tension in said strips.

3. A resistance member comprising a plurality of parallel, series-connected strips of sheet metal, transverse clamping members at the ends of said strips, and adjustable means for spreading apart said clamping members.

4. A resistance member, comprising a plurality of flexible parallel strips of sheet metal, alternately arranged strips of conducting and insulating material at the ends of the members, whereby the strips are connected in series, adjustable spaced clamping members at the ends of the strips, and adjustable means for spreading apart said clamping members.

5. A resistance member, comprising a group of parallel strips of sheet metal, spaced rods or bolts passing through the ends of said strips, adjustable clamping means at the ends of the strips, and means for putting tension in said strips.

6. A resistance member, comprising a group of parallel strips of metal, alternately arranged conducting and insulating spacing members arranged between the ends of the strips whereby the latter are connected in series, clamping means comprising bolts passing transversely through the spacing members and the ends of the strips and means for spreading apart said clamping means so as to put tension in said strips.

7. A resistance member, comprising a group of parallel series connected resistance strips, adjustable clamping means at the ends thereof, the first and last strips of the group being longer than the intermediate strips whereby the group may be connected to terminals, and longitudinal bolts for putting tension in said strips.

8. A resistance member, comprising a group of parallel strips of metal, alternately arranged conducting and insulating members arranged between the strips at each end, whereby the strips are connected in series, one or more bolts or rods passing through the ends of the strips and through the separating members, clamping blocks mounted on the ends of the bolts, and means for spreading apart said blocks so as to put tension in said strips.

9. A resistance member, comprising a group of parallel strips of metal, alternately arranged conducting and insulating members arranged between the strips at each end, whereby the strips are connected in series, bolts or rods passing through the ends of the strips and through the separating members, means for clamping the ends of the group together and means for holding the bolts or rods a predetermined distance apart.

10. A resistance member, comprising a plurality of strips of metal, means for clamping the ends of the strips, and means for forcing said clamping means apart.

11. A resistance member, comprising a plurality of strips of thin sheet-metal, bolts passing through the ends of the strips and means for forcing said bolts apart to put tension in said flexible strips.

12. A series shunt, comprising a plurality of thin sheet-metal, series connected strips, bolts passing through the ends of the strips, clamping blocks on the ends of the bolts, and a plurality of longitudinal studs or bolts for forcing the blocks apart.

13. A series shunt, comprising a group of strips of thin sheet metal, one or more bolts passing transversely through each end of the group, a pair of clamping blocks at opposite sides of each end of the assembled group, and a plurality of bolts or studs parallel to the strips passing through the blocks for holding the latter a predetermined distance apart, and for putting tension in the flexible strips.

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

EDWARD T. MUG.

Witnesses:
FRED J. KINSEY,
ARTHUR F. KEVIS.