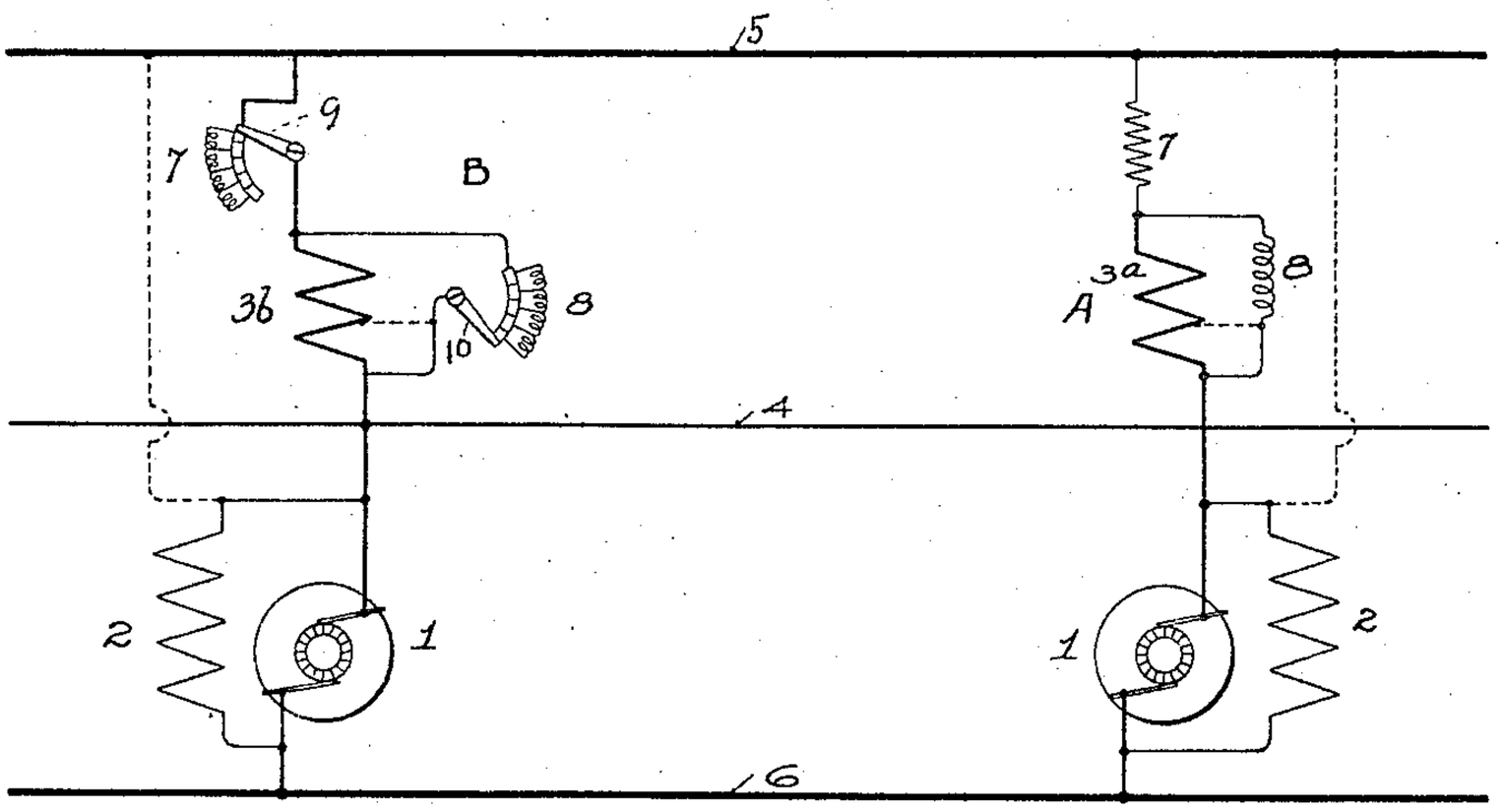
(No Model.)

B. G. LAMME.

MEANS FOR ADJUSTING COMPOUND WOUND DYNAMOS.

No. 574,914. Patented Jan. 12, 1897.



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MEANS FOR ADJUSTING COMPOUND-WOUND DYNAMOS.

SPECIFICATION forming part of Letters Patent No. 574,914, dated January 12, 1897.

Application filed December 28, 1893. Serial No. 495,021. (No model.)

To all whom it may concern.

Be it known that I, BENJAMIN G. LAMME, a citizen of the United States, residing in Pittsburg, county of Allegheny, and State of Pennsylvania, have invented certain new and useful Improvements in Methods of and Means for Adjusting Compound-Wound Dynamos, of which the following is a specification.

My invention is intended to provide a method and means whereby compound-wound dynamos of various capacities and types of construction may be employed in multiple arc for supplying current to systems of electrical distribution.

By the practice and use of my invention the above-mentioned arrangement of dynamos may be made to produce constant potential with varying loads, or with varying loads different potentials may be produced. Furthermore, by use of my invention any one of these dynamos may have the compounding effect of its series coil varied without disturbing the regulation and compounding effect in the other dynamos in parallel circuit therewith.

Compound-wound dynamos have hitherto been used in multiple arc, and in so using them it has been customary to employ an equalizing or compensating wire of negligibly small resistance electrically connecting that terminal of the various series coils which is next to the commutator-brush of each dynamo. This wire thus putting the series coils in parallel maintains the same difference of potential across these coils. Where the series field-coils are all of the same character, they will take the same current and their compounding effects will be equal. Where, however, dynamos of different types are used having series field-coils of different resistances and ampere-turns, it is obvious that the use of an equalizing-wire will not insure the transmission of such currents through the various series field-magnet coils as will insure the proper compounding in each dynamo. Consequently if such dynamos are to be given approximately identical characteristics or to receive approximately identical compounding effects from their series coils means must be supplied whereby these series coils may be made to take such currents as shall produce the proper magnetizing effects on their respective field-magnets. On the other hand, if it is desired to use machines having different compounding effects, but having series coils which take the same current when connected in multiple, means must be provided whereby the various series field-magnet coils may be made to take their various appropriate currents with identical differences of potential across the terminals.

The above-named conditions are necessary where a permanent arrangement of one or the other kind above named is to be secured; but my invention is also useful where it is desirable to vary or regulate the compounding effect of one or more of the group of dynamos without disturbing the other members of the group. This regulation will be necessary in cases where a fresh dynamo is added to the group or substituted for one of its members. Here, although when the dynamo is fresh and cool its compounding may be correct, the change of resistance due to the heating of the coils must be compensated for in some way or the compounding effect of the series coil will change appreciably.

My invention is designed to accomplish the ends above set forth and is illustrated in the accompanying drawing, which is a diagram of the circuits as employed with two compound-wound dynamos in parallel and provided with my invention.

In the drawing the armatures of the dynamo are shown at 1, the shunt field-magnet coil at 2, the series coils at 3^a and 3^b, the equalizing or compensating wire at 4, and the feeding or omnibus wires at 5 and 6.

It will be seen from the drawing that the series coils 3^a and 3^b are in parallel between the wires 4 and 5, the latter being of practically no resistance. The potentials across their terminals will therefore be identical, and if their resistances are equal they will take the same current independently of accidental variations in the total potential of each dynamo. Supposing, however, that the dynamos A were of such a character that the proper compounding was produced by a series coil 3^a of a lower resistance than that used in the dynamo B with the same current, it would tend to take a greater current than

the series coil of B, and therefore to overcompound. Consequently it will be necessary in such a case to introduce a resistance 7 in series with said series coil 3^a. Of course this principle and my entire invention is applicable to a greater number of dynamos in circuit in this relation. Again, suppose that the dynamo A is so constructed that it requires a less current to pass through its series field-magnet coil in order to produce the field magnetism requisite for proper compounding. In this case the introduction of the resistance 7 would, while cutting down the current in the series coil, tend to drive an undue current through the series coil of the dynamo B. In order to remedy this difficulty, I employ a resistance 8 in shunt with the series field-magnet coil 3^a. This coil produces a path for sufficient current to bring up the current capacity of the whole branch to the proper point and to avoid the production of an undue current in the series field-magnet coil of the dynamo B.

Where varying conditions are to be expected, it is desirable to employ the construction shown in connection with the generator B. Here the two resistances 7 and 8 are put into a variable form and are provided with any well-known means for throwing more or less resistance into 7 and 8, respectively. Supposing that the dynamo B, having been newly introduced into a system containing other dynamos, as A, is properly compounded at starting for the range of load desired. Supposing, further, that this compounding is produced when the movable arm 9 is placed to put the whole resistance 7 into circuit, and the arm 10 is so placed as to cut out the resistance 8. Now as the coil 3^b becomes heated during the working of the dynamo its resistance will increase and said coil will tend to take less current than is desirable, and also to drive more current than is desirable through the other series field-magnet coils, as 3^a. In order to remedy and prevent this evil, the proper current may be obtained by cutting out a portion of the resistance 7, thus lessening the total resistance of the branch and reducing the current in the coils 3^a to the proper extent.

If for any reason it becomes desirable to vary the compounding effect of the coil 3^b without disturbing the current present in the other dynamos, it is evident that the current in the coils 3^b must be varied without varying the total resistance of the branch in which the coil is located. The adjustment of resistance by cutting the coils or other fractional resistances 7 in or out would not be appropriate in such a case, as such a change would not affect the coil 3^b alone, but would change the total resistance of the whole branch, and thus, secondarily, affect the current in the other series coils, as 3^a. The following operation will be employed in this case in lieu of that above described: The resistance 8 in the shunt may be lessened or increased where it is desired to lessen or increase the current flowing through the coil 3^b. At the same time a change is made in the rheostat 7, such as to keep the total resistance of the branch the same as before. This will be done by introducing a certain amount of resistance at 7 when the resistance 8 is lessened, and vice versa. The relative amounts of change in resistance will of course depend upon the total change to be produced in the current through 3^b.

Another application of my invention is where one prime mover is employed to drive two or more compound-wound dynamos in parallel with each other and where less than all of said machines are driven together during a part of the time. It frequently occurs in such arrangements that the prime mover does not itself regulate properly for the whole number of dynamos which it drives, in which case it is desirable to modify the compounding effects of the dynamos driven by it without at the same time disturbing other generators with which they may be in circuit. This is accomplished by the means above pointed out.

It will be evident that any appropriate form of rheostat may be used at 7 and 8, and that my invention is applicable in connection with any desired number of dynamos in parallel.

The resistances 8 may be put in shunt with more or less of the series coils 3^a 3^b, as indicated in dotted lines, and where less than all of the coils 3^a 3^b are thus shunted the coils not shunted will act with 7 as a portion of the series resistance. Indeed, under some circumstances the resistance of the coils not shunted may replace the resistance 7 altogether.

The shunt 2 on the dynamo may be a short shunt, as shown in full lines in the drawing, or a long shunt, as indicated in dotted lines.

What I claim is—

1. Two or more compound-wound dynamos working in parallel, and an equalizing or compensating wire connecting them; in combination with means for shunting more or less current around more or less of the series field-magnet coils of one or more of said dynamos, and a variable resistance in series with one or more of said series field-magnet coils, substantially as described.

2. In an electric supply system, two or more compound-wound dynamos working in parallel, and an equalizing or compensating wire connecting them; in combination with a resistance in series with the series field-magnet coils of each of said dynamos, between one outgoing wire of the system and said equalizing-wire, substantially as described.

3. The method of adjusting the compounding or series coil of a compound-wound dynamo, which consists in varying its compounding effect, while maintaining a constant resistance between its terminals, substantially as described.

4. The method of varying the magnetizing

effect of one coil among a number working in parallel between two conductors, without varying the current in the other coils, which consists in placing a resistance in series with said coil, and simultaneously providing a shunt around it, substantially as described.

5. The method of adjusting compound-wound dynamos, which consists in maintaining a substantially constant resistance in circuit with the series field-magnet coil between the commutator-brush and line, while varying the current passing through said series field-magnet coil, substantially as described.

6. The method of adjusting compound-wound dynamo-electric machines connected in multiple, which consists in maintaining a substantially constant resistance in circuit with the series field-magnet coil between the omnibus-wire and the equalizing-conductor, while varying the current passing through the series field-magnet coil, substantially as described.

7. The method herein set out of adjusting compound-wound dynamo-electric machines connected in parallel, which consists in maintaining a resistance constant in amount but variable in distribution in circuit with the series coil between the omnibus-wire and the equalizing connection, while varying the current passing through the series coil; thus permitting the independent adjustment of one of the machines in parallel while allowing the others to run undisturbed, substantially as described.

8. The method of individually regulating the compounding effect of the series coils of a number of dynamos feeding the same work-circuit in parallel, and connected as described, which consists in separately varying the currents flowing through said series coils without changing the resistance between the omnibus-wire and the equalizing connection substantially as described.

9. The method of individually regulating the compounding effect of one of the series coils of a number of compound-wound dynamos feeding the same work-circuit in parallel, which consists in inversely varying two resistances, one in series with said series coil and the other in shunt thereto, substantially as described.

10. The method of adjusting an electric coil, which consists in varying the compounding effect of the coil while maintaining a constant resistance between its terminals substantially as described.

In testimony whereof I have hereunto subscribed my name this 23d day of December, A. D. 1893.

BENJAMIN G. LAMME.

Witnesses:
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