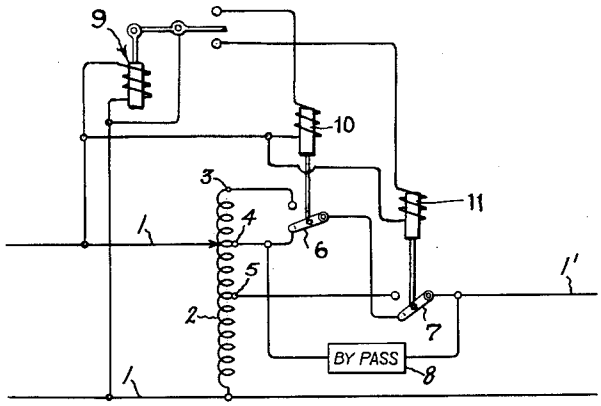
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ELECTRIC CIRCUIT

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ELECTRIC CIRCUIT

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1 Claim. (Cl. 171—119)

This invention relates to electric circuits and more particularly to improvements in transformer tap changing means for step voltage regulators.

A common form of step voltage regulator is one having a 3-position switching mechanism for giving selectively two steps of voltage regulation. Usually the switching mechanism has a neutral position, a voltage lowering position and a voltage raising position, although this is not essential and some regulators have a no buck or boost or a permanent buck or boost position combined with two successive steps of voltage lower or voltage raise. Usually this requires a special and relatively expensive 3-position switch or a plurality of double-pole double-throw switches.

In accordance with this invention there is provided a novel and simple switching arrangement of this type which requires the use of but two standard and relatively inexpensive single-pole double-throw switches.

While this invention is well suited for use with 2-step voltage regulators, it should be understood that the invention is not limited to such use and that it may be used generally in situations where it is desired to make selective connection between a conductor of a circuit and three connection points on electrical apparatus of all kinds.

An object of the invention is to provide a new and improved electric circuit.

Another object of the invention is to provide a new and improved electric switching means.

A further object of the invention is to provide a new and improved step voltage regulator.

The invention will be better understood from the following description taken in connection with the accompanying drawing and its scope will be pointed out in the appended claim.

Referring now to the single figure of the accompanying drawing, which illustrates diagrammatically an embodiment of the invention as applie to a step voltage regulator for an alternating current circuit 1. For simplicity the regulating transformer is shown as an autotransformer 2, although, of course, it will be understood by those skilled in the art that a 2-winding or insulating transformer may equally well be used. The transformer winding is provided with three taps 3, 4 and 5. These taps are selectively connected to a conductor 1' of the main circuit by means of two single-pole double-throw switches 6 and 7. As shown, the arrangement is such that taps 3 and 4 are connected respectively to the fixed contacts of the switch 6, while the tap 5 and the movable contact of the switch 6 are connected respectively to the fixed contacts of the switch 7. The movable contact of the switch 7 is connected directly to the conductor 1'.

The operation is as follows: With the parts in their illustrated positions, the regulator is in its neutral position and the regulating transformer 2 produces neither a raising nor a lowering voltage in the circuit 1. If now switch 6 is moved to its other circuit closing position, in which its movable contact engages the contact connected to the tap 3, a section of the transformer winding between the taps 3 and 4 will be connected in series in the main circuit. This will either raise or lower the circuit voltage depending upon the polarity of the winding section. If instead of moving the switch 6, the switch 7 is moved to its other circuit closing position, the connection between the conductor 1' and the tap 4 is changed to a connection between the conductor 1' and the tap 5, thereby connecting a different section of the transformer winding in the main circuit and causing an opposite voltage change in the main circuit to that produced by the operation of the switch 6.

In order to prevent the interruption of line current during a tap changing operation, a load current by-pass 8 is connected in shunt with the switching arrangement. As shown, it is connected between the tap 4 and the conductor 1'.

From the above description of the operation it will be clear that with the parts in the positions illustrated, the regulator is in its neutral position and the operation of either switch 6 or switch 7 will produce opposite steps of voltage regulation. However, if the upper conductor 1 is connected to tap 3 or to tap 5, the two steps of regulation will be in the same direction and can be made to be either two steps of voltage lowering or two steps of voltage raising.

Although switches 6 and 7 may be manually operated, it will of course be obvious to those skilled in the art that they may also be automatically operated in response to voltage by any of the well-known means which have been developed for this purpose. For example, a voltage relay 9 may selectively energize solenoids 10 and 11 when the voltage of circuit 1 is respectively a given amount below or above a predetermined normal value. When the solenoids are deenergized the switches 6 and 7 assume their illustrated deactuated positions.

While there have been shown and described particular embodiments of this invention, it will be obvious to those skilled in the art that various

changes and modifications can be made therein without departing from the invention and, therefore, it is aimed in the appended claim to cover all such changes and modifications as fall within the true spirit and scope of the invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

In a two-step transformer tap changing-under-load regulator for the no load and load voltage of an alternating current circuit, in combination, a neutral voltage transformer tap, a boosting voltage transformer tap, a bucking voltage transformer tap, boosting voltage controlling switch having a movable contact with a deactuated position in which it engages one fixed contact and an actuated position in which it engages another fixed contact which is connected to said boosting voltage tap, a bucking voltage controlling switch having a movable contact with a deactuated position in wihch it engages one fixed contact and an actuated position in which it engages another fixed contact which is connected to said bucking voltage tap, voltage responsive means for selectively actuating said switches, a connection between the fixed contact of one of said switches which is engaged by its cooperating movable contact when the switch is in its deactuated position and said neutral voltage tap, and a connection between the movable contact of said last mentioned switch and the fixed contact of the other switch which is engaged by its cooperating movable contact when the latter is in its deactuated position whereby the simultaneous actuation of both of said switches cannot produce a short circuit between any of said taps and whereby the simultaneous deactuation of said switches will complete a series connection through said switches to said neutral tap.

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