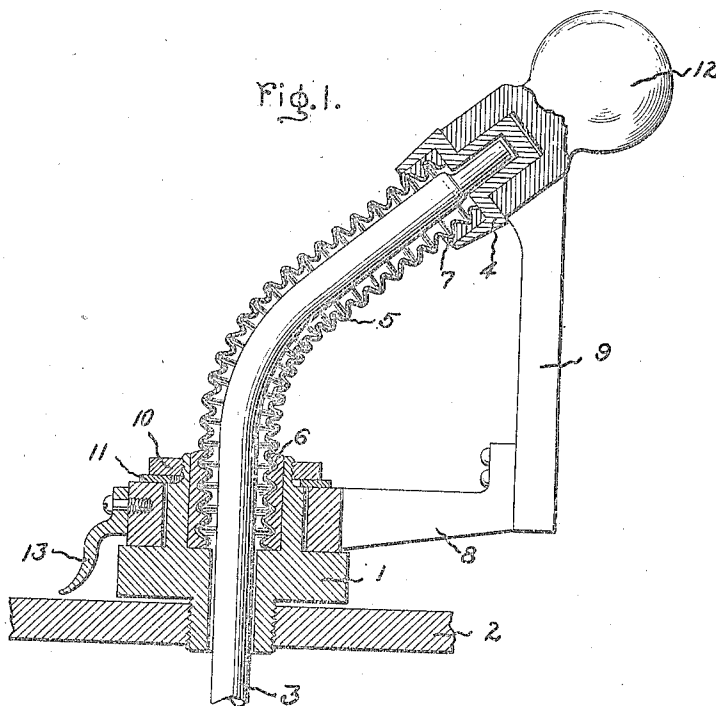
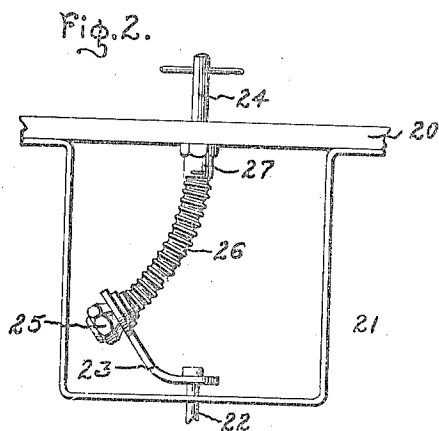


Jan. 9, 1923.

H. A. GERMAIN.
HANDLE FOR RATIO ADJUSTERS.
FILED DEC. 9, 1921.

1,441,794.



Inventor:
Henry A. Germain
by *Alfred Davis*
His Attorney

UNITED STATES PATENT OFFICE.

HENRY A. GERMAIN, OF PITTSFIELD, MASSACHUSETTS, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

HANDLE FOR RATIO ADJUSTERS.

Application filed December 9, 1921. Serial No. 521,211.

To all whom it may concern:

Be it known that I, HENRY A. GERMAIN, a subject of the British Empire, residing at Pittsfield, in the county of Berkshire, State of Massachusetts, have invented certain new and useful Improvements in Handles for Ratio Adjusters, of which the following is a specification.

My invention relates to ratio adjusters. In the operation of various types of electrical induction apparatus such as transformers, it is frequently desirable to provide some means of varying the number of effective turns in one of the windings so as to adjust the voltage or current ratio between this and some other winding or windings. In connection with encased induction apparatus such as oil immersed transformers, it has been found convenient and economical to provide such ratio adjusting means in the form of a tap changing switch immersed with the apparatus in the same casing.

It is the general object of the present invention to provide an improved form of handle for operating an enclosed tap changing switch, the handle being located so as to be easily accessible and operable from outside the casing so as to avoid the necessity of opening the casing to make desired changes in the adjustment of the switch. It is a further object of the invention to provide an arrangement of parts such that the switch may be adjusted without danger of leakage from within the casing of any cooling medium in which the switch may be immersed.

In the accompanying drawing, Fig. 1 is a sectional view of a switch adjusting handle constructed in accordance with the preferred embodiment of the invention and Fig. 2 is a view of a handle constructed in accordance with one modification of the invention.

In the form of handle shown in Fig. 1, a base 1 is threaded tightly into the casing 2 which surrounds the ratio adjusting switch. This switch and the induction apparatus with which it is associated are not shown as they form no part of the present invention. A shaft 3 turns in a bearing formed in the base 1 and outside this base the shaft is curved or bent so that suitable

pressure against its end may serve to rotate the shaft in either direction.

The lower end of the shaft is of course operably connected with the switch so that the rotation of the shaft may effect any desired adjustment of the switch. A thimble 4 has bearing contact with the upper or outer end of the shaft 3 so that the two are relatively rotatable. A flexible sleeve or tube 5, preferably of transversely corrugated thin metal, surrounds the shaft 3 between the base 1 and the thimble 4 and the two ends of this sleeve are joined permanently, as by soldered connections 6 and 7, to the base 1 and thimble 4 respectively, these connections forming joints which are impervious to the oil or other cooling fluid within the casing 2. The base 1, sleeve 5 and thimble 4 thus form a tubular sealed enclosure surrounding the outer end of the shaft 3 so as to prevent at all times any escape or leakage of cooling fluid through the switch adjusting handle. In order to provide additional support and rigidity to the structure, a bracket is shown, this bracket being composed preferably of two rigidly connected arms 8 and 9 to facilitate assembly. One end of the arm 8 of the bracket rotatably surrounds the base 1, being held loosely in place by a nut 10 and washer 11. The other end of the bracket is rotatable upon the outer end of the thimble 4 and is formed with a knob or grip 12 for convenience in operating the handle. A pointer or indicator 13 may be attached to the lower part of the bracket to indicate the switch adjustments.

In operating or adjusting the switch, a side pressure upon the grip 12 rotates the bracket about the axis of the main or lower portion of the shaft 3. The bracket carries the thimble 4 and the upper or curved end of the shaft with it about this axis so as to rotate the shaft. The flexible tube or sleeve 5, however, being rigidly attached at its lower end to the base 1, cannot rotate about its own axis but merely flexes to accommodate itself to the direction of the curved portion of the shaft, this being permitted by relative rotation between the thimble 4 and its bearing in the upper end of the arm 9 of the bracket.

A modified form of the invention is shown

in Fig. 2 of the drawing. As shown here, the casing 20 supports a frame 21 which provides a bearing for the upper end of the shaft 22. This shaft extends downwardly to the switch to which it is operably connected, the switch not being shown, however, as it forms no part of this invention. A crank arm 23 is rigidly secured to the upper end of the shaft 22. A short shaft or handle 24 extends through an opening in the casing 20 in line with the shaft 22, the lower portion of this handle being curved to one side and its lower end fitted into a bearing in a thimble 25 which is in turn rotatable in a bearing in the outer end of the crank arm 23. A flexible sleeve or tube 26 surrounds the lower curved portion of the handle 24 and its two ends are permanently sealed, as by soldered connections, into the thimble 25 and a sleeve 27, the sleeve 27 being secured in any suitable manner to the casing 20. When the handle 24 is turned, its lower end with the thimble 25 moves the crank arm 23 and thus the shaft 22 is turned to give the switch any desired adjustment. The flexible sleeve or tube 26, being rigidly fixed at its upper end to the casing 20, cannot turn about its own axis but merely flexes to adjust itself to the direction of the curved portion of the handle 24, its function corresponding to that of the flexible tube 5 of Fig. 1 and being to form a complete seal to prevent leakage of fluid through the handle from within the casing.

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

1. A switch adjusting handle including a curved shaft rotatable about the axis of one end thereof, and a seal enclosing the other end thereof.

2. A switch adjusting handle including a curved shaft rotatable about the axis of one end thereof, and a flexible tubular seal enclosing the other end thereof, said seal be-

ing secured against rotation about its own axis.

3. A switch adjusting handle including a fixed base formed with a bearing, a shaft rotatable in said bearing and having an end portion curved to one side beyond said bearing, and a flexible tubular seal enclosing the curved end of the shaft and sealed to said base to prevent rotation about its own axis.

4. A switch adjusting handle including a base formed with a bearing, a shaft rotatable in said bearing and having an end portion curved to one side beyond said bearing, a thimble rotatable upon the end of the shaft, and a flexible sleeve surrounding the shaft between said base and thimble.

5. A switch adjusting handle including a base formed with a bearing, a shaft rotatable in said bearing and having an end portion curved to one side beyond said bearing, a thimble rotatable upon the end of the shaft, and a flexible sleeve surrounding the shaft and with its ends sealed into said base and thimble.

6. A switch adjusting handle including a base formed with a bearing, a shaft rotatable in said bearing and having an end portion curved to one side beyond said bearing, a thimble rotatable upon the end of the shaft, a flexible sleeve surrounding the shaft between said base and thimble, and a support with its opposite ends rotatably connected to said base and thimble.

7. A switch adjusting handle including a base formed with a bearing, a shaft rotatable in said bearing and having an end portion curved to one side beyond said bearing, and a flexible sleeve surrounding and extending along the curved portion of the shaft and with one end sealed to said base.

In witness whereof, I have hereunto set my hand this 6th day of Dec., 1921.

HENRY A. GERMAIN.