United States Patent Office 2,734,962 Patented Feb. 14, 1956

2,734,962

VIBRATOR

Herbert A. Cook, Baltimore, Md.

Application June 11, 1951, Serial No. 230,985

4 Claims. (Cl. 200—93)

This invention relates to electric circuit controllers, and more particularly, to a vibrating contact structure characterized by high contact pressure and minimum requirements for starting voltage.

The prior art is familiar with vibrating interrupter assemblies used in conjunction with suitable transformers for the transformation of relatively low voltage direct currents to alternating current potentials of any desired order of magnitude. Early equipment of this type employed relatively low operating frequencies for the vibrating interrupter, which necessitated the use of relatively large and bulky cooperating transforming equipment. In later years, with the application of polarized vibrators, it has been possible to steadily increase the operating frequencies with corresponding diminution in the net weight of the power supply, because of the resulting decrease in the iron and copper needed in the associated transformer. At the same time, the power requirements demanded of such vibrating interrupter assemblies have also increased. Reasonable contact life under such severe conditions of operation demands relatively high contact pressure and, as previously, reliability of the initiation of operation is still required.

Accordingly, one of the primary objects of the invention is to provide a new and novel vibrating interrupter assembly.

Another object of the invention is to provide a new and novel vibrating interrupter assembly uniting high contact pressure and reliable starting.

Still another object of the invention is to provide a novel magnet assembly for use in polarized vibrators.

A further object of the invention is to provide an improved relationship between the contact driving reed and the actuating magnet assembly in a vibrating interrupter.

Still another object of the invention is to provide a high power vibrator with modest driving coil power.

A further object of the invention is to provide a new and novel vibrator in which driving action is relatively unaffected by changes in load.

Other objects and advantages of the invention will in part be discussed and in part be obvious when the following specification is read in conjunction with the drawings in which:

Figure 1 is a side view of a vibrator embodying the principles of the invention illustrating in detail the relationship of the parts,

Figure 2 is a side view taken at right angles to the view of Figure 1 of the vibrator assembly,

Figure 3 is a view in perspective of the polarizing magnet and,

Figure 4 illustrates schematically a representative circuit employing the vibrator of the invention.

Referring now to Figures 1 and 2, the vibrator mechanism is seen to be assembled between the side plates **10** and **12** secured at the top by tie bolts **14**, **15** and at the bottom by similar tying members **16** and **17**. A permanent magnet **18** of any suitable alloy is provided with

pole piece assemblies **20** and **21** which may be secured to it by clamping bands **22**. The entire assembly is then secured between the upper arms of the side plates by taking up on tie bolts **14** and **15**.

An insulation stack, indicated at **25**, is secured between the lower ends of the side plates **10**, **12** by tension in the tie screws **16** and **17**. The insulation stack **25** serves to secure the side arms **26** and **28**, each of which is provided with a contact at its upper end and apertured to receive a connecting conductor at its lower end. In addition, a spring hinge is clamped in position by the insulation stack **25** and supports a paramagnetic armature **30** whose free end projects into cutout portions of the pole pieces **20**, **21**. These pole pieces, it will be noted, are disposed in opposing relationship with essentially planar faces sloping away from each other with an included angle which may be approximately twenty degrees. The edges of the pole faces are cut away or rebated adjacent the narrower portion of the air gap and the free tip of the vibrating armature **30** projects within the rebate. The usual bolster plates secure contacts to either side of the vibrating reed and armature assembly, which contacts cooperate with the corresponding contacts on the side arms **26**, **28**.

In addition to the side arms **26**, **28**, an additional pair of similar contact bearing members may also be secured in the insulator stack beside the contacts **26**, **28**. The lower projection of one of such members is identified as **27** in Figure 2, the other being in register therewith and obscured in this view. Another set of bolster plate mounted contacts driven by the vibrating motion of the armature **30** is disposed for cooperation with the second set of contacts on the side arms **27**, **29**. These contacts lie directly behind contacts **26**, **28** in Figure 1 and, being of similar size and shape, are obscured in this view. Their arrangement is, however, obvious from the figure. The bolster plates carrying the second set of contacts may be supported from the same spring hinge.

The position of the side arm **26** is adjusted by rotating the adjusting screw **34**, which may be tipped with a synthetic jewel **32**, in the side frame member **10**. When the proper adjustment has been obtained, the screw **34** is locked in position by the use of a locking nut **36**. A similar adjusting screw arrangement is associated with the side arm **28**. The side frame **10** is also cut away at **35**, **37**, **38**, and **40** to receive projecting lugs on the ends of the coil spool **42**. The coil **44** mounted on the spool **42**, embraces the movable armature **30**. By virtue of this arrangement, the passage of current through the coil **44** develops a magnetic field in the armature **30** causing it to be attracted to one side or the other of the air gap defined by the faces of the pole pieces **20**, **21**.

The vibrator illustrated incorporates two independent contact assemblies. The one facing the viewer in Figure 1 is a single pole, double throw assembly connected with the ends of the operating winding **44**, which is center-tapped. The rear contact assembly is similar in structure and governs the flow of current in the power circuit. Isolation of the electric circuits in this manner minimizes the reaction between conditions in the load circuits and the mode of operation of the vibrator itself.

The perspective view of Figure 3 affords a better opportunity for visualizing the configuration of the pole pieces **20**, **21**. The magnet **18** is composed, as noted above, of any suitable permanent magnetic alloy, while the pole faces **20**, **21** are made up from a softer magnetic alloy. The pole faces have the shape of opposing truncated quadrangular cones in which the truncating plane is inclined at an angle to the altitude of the cone. An edge cut or rebate is taken out of the lower portion of the opposing cones.

Feb. 14, 1956 V. H. ARDIA 2,734,963

SWITCH

Filed Jan. 28, 1953

FIG. 1

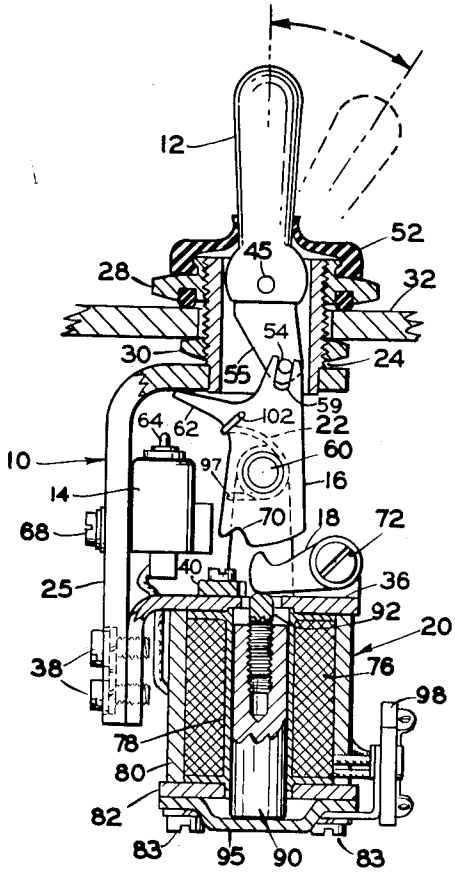


FIG. 2

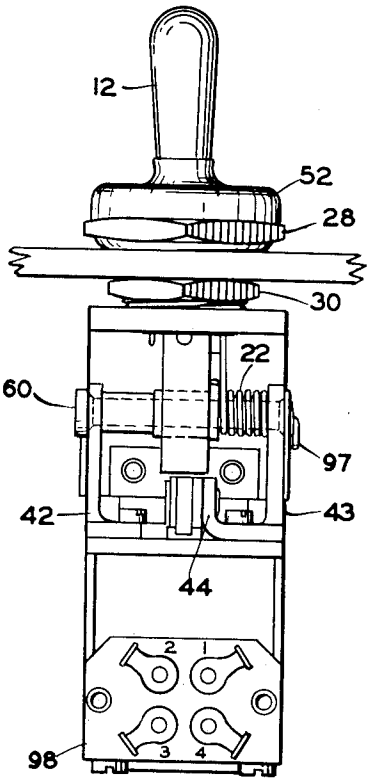


FIG. 3

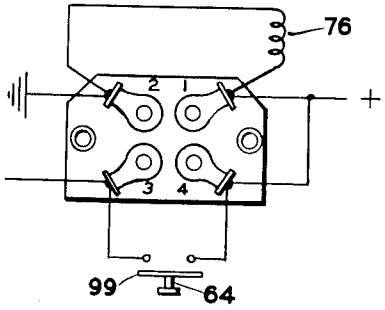
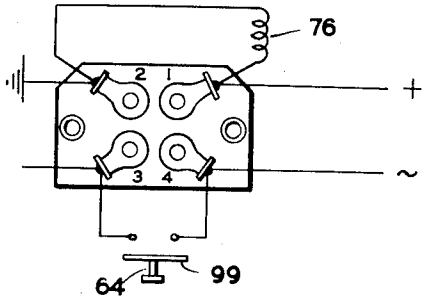


FIG. 4



INVENTOR.
VINCENT HENRY ARDIA
BY
Oscar B Brumback
ATTORNEY