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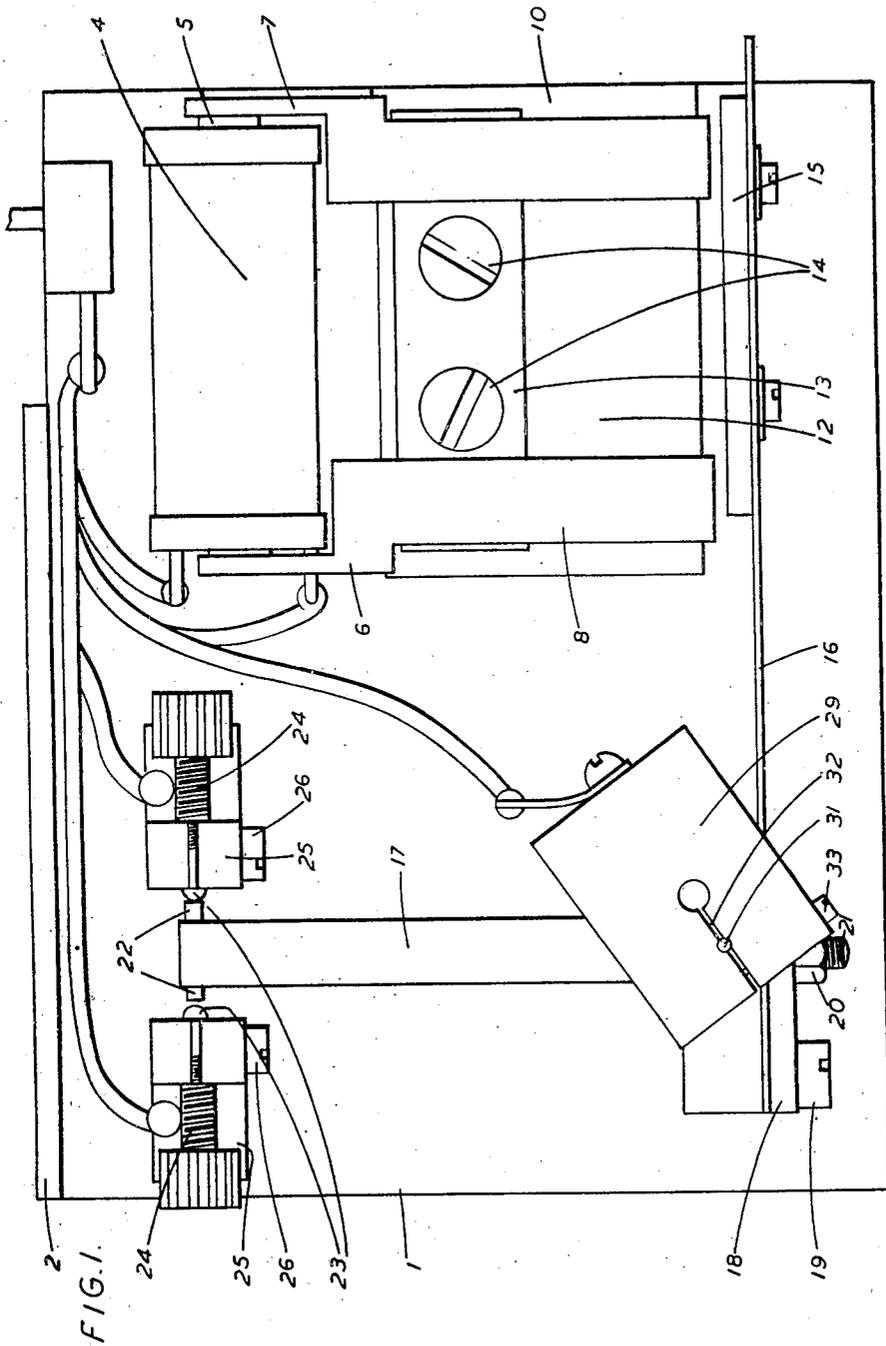
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2,485,624

VIBRATOR RELAY

Filed Oct. 6, 1945

2 Sheets-Sheet 1



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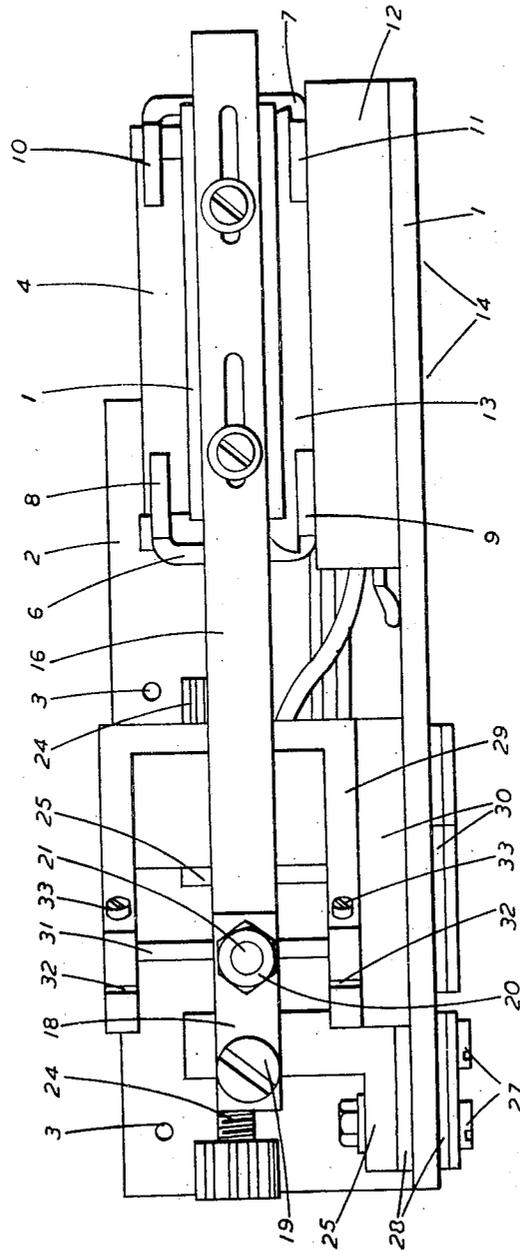
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2 Sheets-Sheet 2

FIG. 2.



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UNITED STATES PATENT OFFICE

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VIBRATOR RELAY

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1 Claim. (Cl. 200—90)

1

This invention relates to vibrator relays.

An object of the invention is to improve such a relay in respect of the accuracy of its timing, and in particular to maintain constancy of frequency despite variations in the applied voltage.

In our prior British patent specification No. 516,386 there is described and claimed a vibrator relay comprising a rigid pivotally-mounted contact-making member to which is fixed one end of a vibratile reed. The present invention also is concerned with a vibrator relay in which the reed is rooted in a rigid contacting-making member and in which that member is itself mounted for movement upon a fixed part; but the present invention is distinctive in the nature of the mounting.

The following description relates to the accompanying drawings in which:

Fig. 1 is a plan view of a pendulum relay in accordance with the present invention; and

Fig. 2 is a front view thereof.

The relay is built on a base-plate 1 having a bracket portion 2 drilled and tapped as at 3 for attachment to a panel. The relay coil is mounted transversely near the back of the base-plate and is fitted with the usual soft-iron core 5. Fixed to opposite ends of the soft-iron core 5 are soft-iron pole-pieces 6 and 7, each of which is bifurcated: thus the left hand pole-piece 6 has upper and lower limbs 8 and 9, and the right-hand pole-piece 7 has upper and lower limbs 10 and 11, all four limbs extending forwardly in parallel. The assembly of coil 4, core 5, and pole-pieces 6 and 7 is raised to the appropriate level above the base-plate 1 by a block 12 and is clamped in position by means of a non-magnetic transverse clamp 13 engaging the pole-piece limbs 9, 11 and fixed to the base-plate 1 by screws 14.

The armature associated with this magnet assembly is in the form of a bar 15 which is located, in a manner to be described, bridge-wise across the extremities of the limbs 8, 9, 10, 11 of the two parallel pole-pieces 6 and 7; and is arranged, again as will be described, for movement inwards and outwards in relation to the space between the four limbs, being attracted inwardly of the pole-pieces upon energisation of their magnet 4.

This armature 15 is mounted near the free extremity of a leaf spring or reed 16 which extends

2

transversely across the relay base, with its root at the left-hand side so that on vibration of the leaf spring, the armature 15 will make the above described movement in relation to the pole-pieces. The reed 16 is slotted so that the armature 15 can be adjusted in position lengthwise.

The leaf spring 16 must be mounted suitably for it to make the above described movement, and at the same time it must be connected suitably to a contact set so that its movement may be utilised. It is in the means for attaining these objects that one feature of the present invention lies.

The leaf spring 16 has its root clamped to a stout brass member 17 of L-shape; the leaf spring is held between the short arm of the L-shaped member and a block 18, and the whole is fixed by a screw 19 entering the L-shaped member and by a nut 20 on a threaded stub 21 integral with the L-shaped member 17. The long arm of the L-shaped member 17 extends to the rear and at its extremity is provided with contact tips 22 positioned between two fixed contacts 23 which are mounted on the tips of screws 24 threaded in brackets 25 so that by rotation of the screws the fixed contacts can be adjusted towards and away from the moving contacts 22. After adjustment they are locked by tightening of the clamping screw 26, the brackets 25 being split. The brackets 25 are mounted on the base plate 1 by means of bolts 27, and are insulated from the base plates by gaskets 28.

It remains to describe the mounting of the vibrating system, which mounting constitutes a major feature of the present invention. A U-shaped bracket 29 is mounted on its side upon the base-plate 1, being insulated therefrom by gaskets 30. Extending between the arms of the U-bracket in the vertical direction is a stout wire 31. Each arm is slotted as at 32 to form two jaws. Within the slot 32 there is a circular enlargement receiving an end of the wire 31, and between the two jaws extends a screw 33 so that upon tightening of the screw the jaws are drawn together and the wire-end is rigidly clamped. At an intermediate position the wire passes through the L-shaped member 17 being securely clamped thereto. Thus, as the wire 31 is clamped tightly to the U-brackets 29, and the vibratory system 16, 17 is clamped tightly to the wire 31, the

3

movement of the vibratory system is possible solely by the torsional flexibility of the wire 31.

The relay illustrated and described has been found to possess a high degree of accuracy and constancy in timing. It has been found for instance that for a voltage applied to the magnet coil 4 over a range from 46 volts to 54 volts the frequency of the generated impulses remains constant to 1 in 4000. The applicants believe that this high degree of accuracy and constancy is, at least in part, due to the very loose magnetic coupling between the armature 15 mounted upon the reed 16 and the pole-pieces 6, 7 of the magnet system. This loose magnetic coupling, and the consequent weakness of the force acting upon the reed 16 to flex it, calls for a mounting for the vibratory system which shall absorb the very minimum of energy. Were a pivoted mounting employed, as in our prior British patent specification No. 516,386 already referred to, the obvious expedients would be adopted for reducing friction, such as ball mountings, or pin-and-jewel bearings; but the present invention makes a radical departure from such practices by abandoning altogether a pivoted mounting and utilizing a mounting which, in respect of large angles of turn, must be thought of as rigid, but which can accommodate itself to the minute angles of turn that are here involved by reason of the torsional yieldability of the mounting pin 31. Furthermore so much energy as is absorbed by the pin 31 when it is subjected to a twist as the vibrating system is displaced, is not lost, but is in large measure returned to the vibrating system again as the latter is restored, owing to the torsional resilience of the pin.

The torsion pin 31 may be say, of steel wire, or of beryllium-copper or similar spring wire

4

material; the choice of metal not being found critical. By using a torsion suspension a relay can be biased normally to have a pressure on its front or back contact as decided, this bias thereby influencing the make break ratio obtained. It also can be arranged so that no bias exists normally. In both cases, of course, the bias is applied merely by adjusting the contact screw positions after clamping the torsion suspension. This feature is not obtainable with the normal type of bearing suspension.

What is claimed is:

In a vibrator relay, a magnet, an armature for said magnet, a rigid contact making member, a vibratile reed carrying said armature and fixed at its root to said member, a torsion metal pin mounting for said member, a fixed support, means for rigidly clamping said pin at its ends in said fixed support and means for clamping rigidly said pin intermediately in said member.

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