

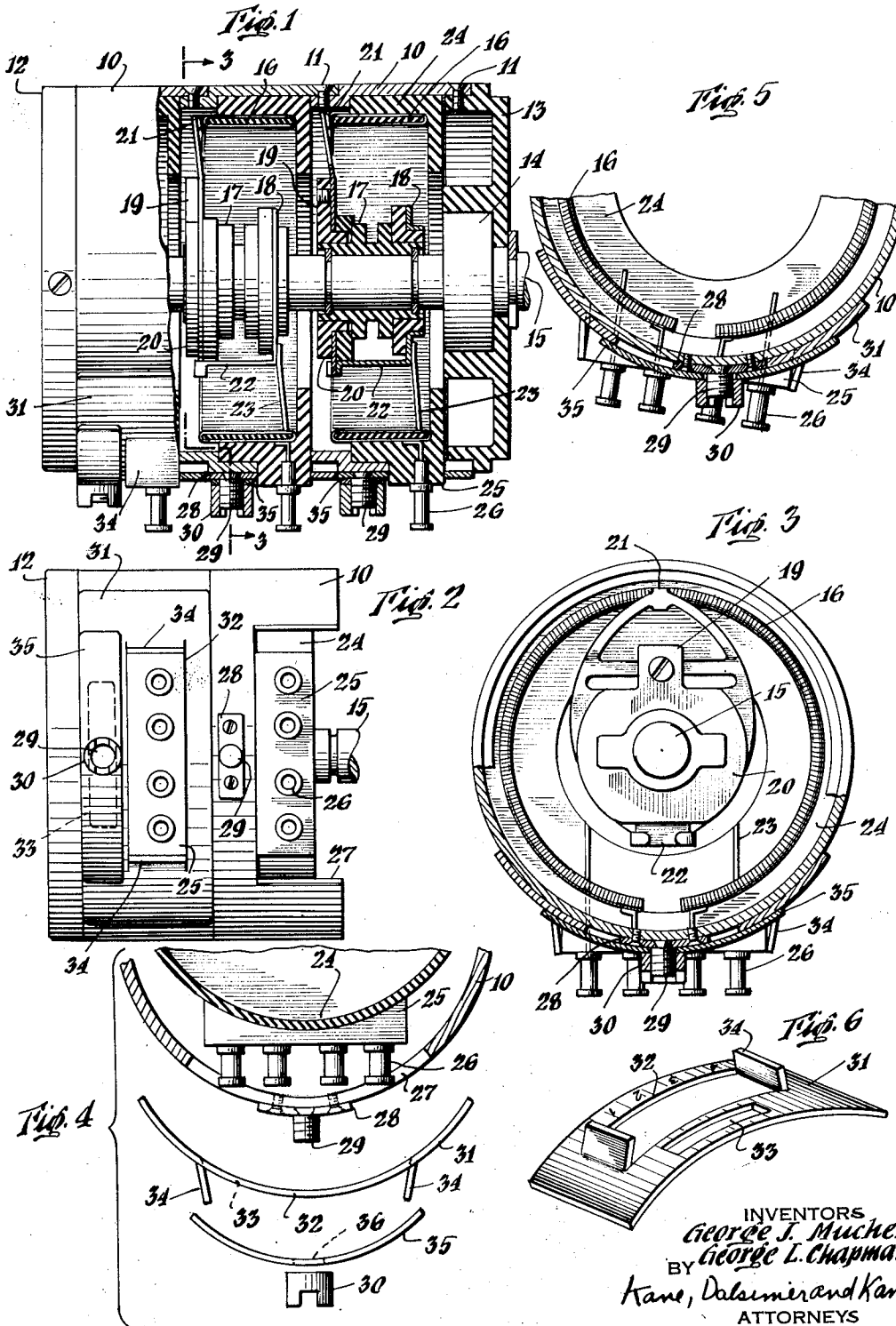
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POTENTIOMETER

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1

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POTENTIOMETER

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This invention relates to a structurally and functionally improved potentiometer and especially a unit of this character incorporating an improved design whereby its phase may be varied.

It is a primary object of the invention to provide a structure whereby the phasing of an assembly involving a single or ganged potentiometer (or similar control) may be accomplished externally, without disturbing the relative axial or radial positions of the parts constituting such control. Additionally, where a series or gang of controls are connected to a single shaft, the adjustment of one or a number of these controls may be readily achieved without disturbing the phasing of other controls included in the assembly.

A further object is that of providing a structure in which the adjustment which may be resorted to in one control will not set up distortion stresses in that or adjacent controls. Accordingly, the user will not have to be apprehensive as to the changing of the electrical characteristics of an assembly when adjusting the parts.

Moreover, an adjusting and locking mechanism will be included in the unit as constructed in accordance with the present teachings, and which will permit of that unit having its parts secured against accidental shifting such as might occur as a consequence of continuous vibration to which the control is subjected.

A still further object resides in the designing of a potentiometer or similar unit which will include relatively few parts, each individually simple and rugged in construction, capable of ready production and assembly to furnish any desired number of units which may be individually adjusted insofar as phasing is concerned with the expenditure of minimum effort and time.

With these and other objects in mind, reference is had to the attached sheet of drawings illustrating one practical embodiment of the invention, and in which:

Fig. 1 is a partly sectional side view of a ganged assembly of potentiometers;

Fig. 2 is a plan view of such an assembly with certain of the parts removed;

Fig. 3 is a transverse sectional view taken along the line 3—3 in the direction of the arrows as indicated in Fig. 1;

Fig. 4 is a fragmentary plan view of a part of a single assembly and showing the elements of the same in separated condition;

Fig. 5 is a fragmentary sectional view under one extreme of the range of adjustment which is permissible; and

Fig. 6 is a perspective view of the shield which preferably forms a part of the mechanism.

Referring primarily to Fig. 1, the numeral 10 indicates in each instance a cylindrical casing which may be formed of metal arranged in effect in the form of an enclosing band. One edge of this band may embrace a reduced flange portion to be overlapped by an adjacent band so that the parts can be secured against movements with respect to each other as, for example, by bolts 11. End plates or caps 12 and 13 may close the outer faces

2

of the end casings 10 of a ganged assembly. Plate 13 conveniently carries a conventional bearing portion 14' within which a shaft 15 has bearing. That shaft may be common to and operate all of the control units in a given assembly. Of course if only a single unit is present, then caps or plates such as 12 and 13 may close the opposite side faces of the same and provide rotatable support for the shaft 15.

Forming a part of each of the controls is a rotor assembly which will cooperate with a resistance 16. That resistance as illustrated, conveniently takes the form of an insulating strip around which the wire convolutions of a resistance coil are wound. The rotor assembly may, by way of illustration, include a hub portion 17 secured against movement with respect to shaft 15. That hub will preferably be formed of insulating material and carry adjacent one of its ends a contact ring 18. Adjacent its opposite end it will support an actuating plate 19. The latter has applied to it a contact grouping conveniently embracing a ring 20 from which an arm 21 extends to engage the windings of the resistance strip 16. A bridging part is electrically connected with ring 20 and includes a strip 22 terminating in ring 18. The latter is engaged by a contact arm 23.

An inner casing 24, conveniently formed of insulating material, is supported in sliding contact with the inner face of casing 10. Casing 24 mounts the resistance 16 which is preferably fixed with respect to it. This casing is also provided with a terminal board or block 25 which may be integral with it and extend beyond its outer annular face. Terminals 26 are supported by the board or block and may in the usual manner be connected with current leads. These terminals will, for example, be connected with the contact arm 23, the ends of the resistance 16 and one or more other desired points in the length of that resistance.

At a point adjacent that at which the terminal board or block 25 extends from the inner casing 24, casing 10 is provided with an opening 27. The length of this opening is greater than the length of the portion 25. To one side of this opening a key plate 28 is secured by, for example, bolts. Extending from this plate, is a threaded shank 29 which may receive a clamping nut 30. Thus, the board 25 may extend through opening 27 and a limited relative rotation of casing 10 with respect to inner casing 24 may be effected (for example, 10°).

A shield 31 conveniently embracing an arcuate strip of metal is provided and has a curvature corresponding to that embraced in the outer face of casing 10. This strip is furnished with an arcuate slot 32, the length of which is substantially equal to that of terminal block or board 25. A second slot 33 parallels slot 32. The width of this second slot is such that it may receive therein key plate 28. Its length is such that the plate may have limited travel therein. Adjacent the ends of slot 32, the shield includes outwardly extending tongue portions or flanges 34. The shield being preferably of metal, these tongue portions will incorporate a limited amount of flexibility and resiliency. They should preferably incline towards each other to a small extent. The length of the slot 32 being equal to the terminal board or block 25 and the tongues being provided, it follows that as the parts are assembled, these projecting portions will bear one against each of the end faces of unit 25. Accordingly, the shield 31 will normally not be movable with respect to inner casing 24.

A spring member, preferably in the form of a resilient strip 35 is provided. That member should have a length substantially greater than the length of slot 33. Also, this strip should have a smaller radius than that of the shield member 31 or casing 10. It is provided with a central

opening 36 which is smaller than nut 30 but permits of the passage of stem 29 therethrough. In conclusion, while considering this structure, it is to be noted that shield 31 incorporates a length substantially greater than opening 27 of the casing 10 so that even if the parts are relatively adjusted to occupy one or the other extreme position, this opening will still be obstructed or covered by the shield.

Now considering the structure and operation of a single control unit involving, for example, the detailed structure described, it will be understood that the resistance strip 16 is provided and mounted within the inner casing 24 so as to be secured against movement with respect to the same. The ends of the resistance may connect to proper terminals 26 of the block or board 25. This inner casing is disposed within an outer casing such as 10 and with the part 25 extending through the opening 27 of the latter. The rotor assembly is secured to the shaft 15 and the latter has rotatable bearing in one or both of the end plates 12 and 14. Contact arm 23 will be secured to a second terminal 26 and as afore brought out others of these terminals may be electrically connected to suitable points in the length of the resistance strip. With current flowing through the terminals, it will also flow through the arm 21, resistance 16, ring 18 and arm 23. As the shaft is turned the resistance value will be varied.

The shield member 31 will have been applied over the terminal block or board 25. The indicia on this shield may designate the various terminals 26. The flanges or tongues 34 will bear against the ends of the block and the inner face of the shield will ride in contact with the outer face of casing 10. Under these circumstances, stem 29 and plate 28 will extend through slot 33. It will be assumed that nut 30 has been loosened so that while spring strip or member 35 bears against the outer face of shield 31, the engagement will only be with minimum pressure. Also it will be assumed that the operator desires to change the phasing of the control or, in other words, effect an adjustment of the resistance with respect to the outer casing.

With casing 10 stationary, a thrust exerted on the shield 31, one of the ends of block 25 or one of the terminals 26 will cause them to function as actuating means and result in inner casing 24 being rotated within outer casing 10. This will, of course, shift the resistance 16 with respect to the parts of the rotor assembly thereby rephasing the control. During this shifting of the parts, the shield 31 cannot be accidentally detached because strip 35 is bearing against the same and this strip is held against detachment from the stem 29 by nut 30. After the operator has shifted the parts to the desired extent and as determined by suitable instrument tests, he will lock those parts against subsequent shifting. This is accomplished by tightening nut 30 or its equivalent.

With such tightening, strip 35 is caused to intimately bear adjacent its end portions in frictional contact with the outer face of the shield. In effect, it functions as a brake-shoe against the shield with the latter serving as a drum. All stresses will be outwardly insofar as stem 29 is concerned. That stem being secured to the outer casing 10, no distortion will be transmitted by these stresses to the inner casing and to the resistance contained therein. These stresses have heretofore resulted in defective operation where a variable phasing of an electrical control where strains are transmitted to the internal parts.

In the case of a ganged assembly, as shown in Figs. 1 and 2, it is of course apparent that adjustments to individual controls will in no wise affect the shaft common to those controls and the rotor assemblies mounted by that shaft. The key plate or equivalent abutment will limit the adjustment to a maximum range which might be required under extreme conditions. That range might be greater or less than 10° to each side of a center position. The shield 31 will, in all instances, cover the opening 27,

The same will be true of the strip 35 with respect to slot 33. It is apparent that, for example, a centrally disposed unit in an assembly may have its phasing adjusted without disturbing the electrical values present in end units. The reverse is also true. Consequently an operator may, with assurance, adjust each individual control in a ganged assembly and correlate the same to other controls therein with assurance that none of the difficulties inherent to attempted solutions of the present problem, and as heretofore practiced, will come into being.

Thus among others, the several objects of the invention as specifically aforementioned are achieved. Obviously numerous changes in construction and rearrangements of the parts may be resorted to without departing from the spirit of the invention as defined by the claims.

We claim:

1. In a potentiometer assembly, in combination a rotatably mounted casing, a terminal block extending therefrom, a shielding member formed with an opening receiving said block, an outstruck part included in said member adjacent said opening and bearing against a surface of said block to retain said member fixed with respect thereto, a fixed casing interposed between said first-named casing and said member and means carried on said fixed casing and bearing against said member for securing said casings against movement with respect to each other.

2. In a potentiometer and similar assembly in combination an outer casing, an inner casing secured within said outer casing for rotation therein, a resistance rigidly supported within the inner casing, means connected to the latter and extending beyond said outer casing whereby said inner casing may be rotated with respect to said outer casing for phasing said assembly, locking means connected with said rotating means, said locking means including a brake element, means connecting the same to said outer casing, a unit including a drum surface connected to the inner casing to move with the same and means for pressing said elements into engagement with the surface of said unit.

3. In a potentiometer and similar assembly in combination an outer casing, an inner casing secured within said outer casing for rotation therein, a resistance rigidly supported within the inner casing, means connected to the latter and extending beyond said outer casing whereby said inner casing may be rotated with respect to said outer casing for phasing said assembly, locking means connected with said rotating means, said locking means including a shield bearing against said outer casing and connected to move with said inner casing and a resilient unit bearing against said shield and connected to said outer casing.

4. In an assembly as specified in claim 3, said resilient unit comprising a strip formed with an opening, a stem extending from the outer casing and passing through said opening and means secured to said stem for varying the pressure on said strip.

5. In an assembly as specified in claim 3, a terminal block extending from said inner casing through an opening in said outer casing, said shield being formed with an opening through which said block extends and certain edges of said block bearing against certain edges of said opening whereby said shield moves as a unit with said block.

6. In an assembly as specified in claim 5, upstruck portions forming a part of said shield and defining said opening thereof and said upstruck portions yieldingly bearing against the adjacent surfaces of said block.

7. In a potentiometer and similar assembly in combination a contact member rotatable in a circular path, a substantially circular resistance engaged thereby, means mounting said resistance for movement in a path corresponding to that of the contact member, actuating means connected to said mounting means for moving the latter and said resistance, said actuating means extending outwardly from and in a direction radial to said resistance,

5

a stationary casing enclosing said mounting and formed with an opening through which said actuating means projects and means for obstructing said opening to prevent casual access through the latter.

8. In an assembly as defined in claim 7, said obstructing means comprising a shield connected to move with said actuating means and said shield covering the opening of said casing. 5

9. In an assembly as defined in claim 7, and means locking said mounting against movement, said locking 10

6

means being supported by said casing to act against said obstructing means.

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