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ELECTRICAL INSTRUMENT COUPLING

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Fig. 1

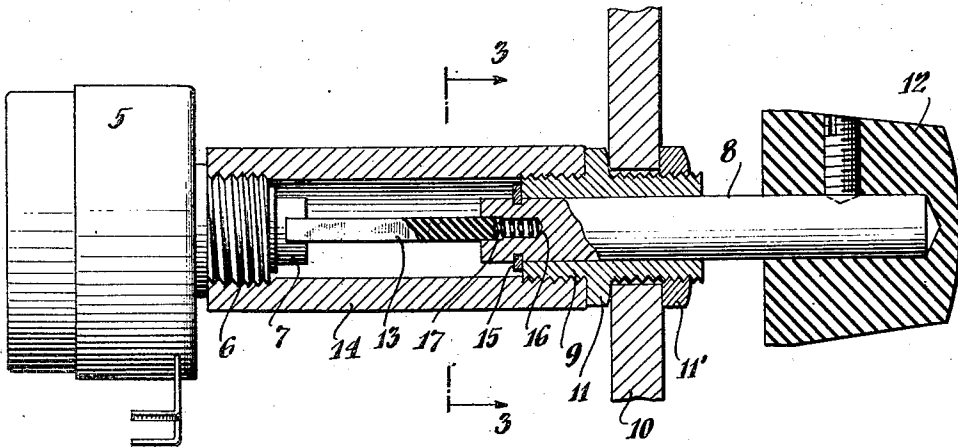


Fig. 2

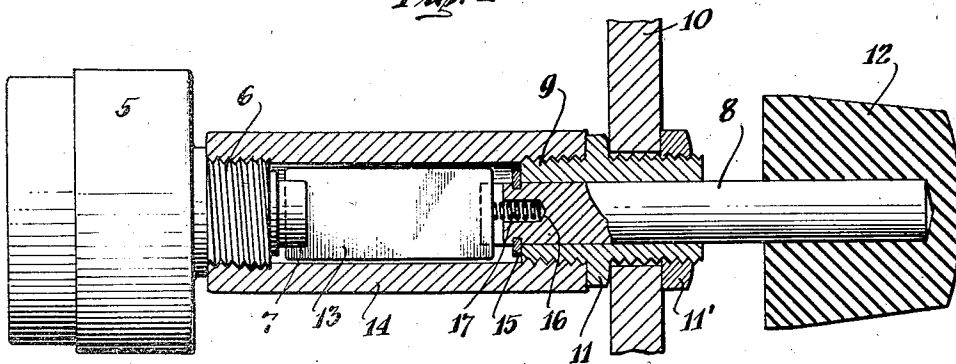
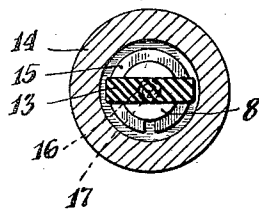


Fig. 3



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ELECTRICAL INSTRUMENT COUPLING

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This invention relates to a structurally and functionally improved coupling and in its more specific aspects aims to provide a structure primarily intended for use in connection with electrical instruments or units such as rheostats and potentiometers.

It is well appreciated among those skilled in the art that considerable difficulty has been experienced where units of these types have been subjected to relatively high voltages and where attempts had been made to electrically isolate the control for the unit in a manner such that leakage would not occur and shock would not be transmitted to the operator. While certain types of construction have functioned in a satisfactory manner, the design involved has been such that parts had to be manufactured with close tolerances and fitted and assembled with extreme care to assure satisfactory results. This has necessarily resulted in high costs of manufacture and relatively small production when measured by quantity manufacturing methods.

Thus, it is a primary object to provide a coupling which will be relatively inexpensive and which will serve to satisfactorily isolate an electrical instrument or unit from a control knob or shaft. Accordingly, an operator may cause a functioning of the latter to in turn control the unit without any danger of being subjected to shock; these results obtaining even when the coupling and unit are mounted in locations subjected to constant vibration such as airplanes adjacent gun stations, etc.

Further objects are those of furnishing a structure of this type which will not impart to the instrument or unit under control undesirable thrusts and vibrations. Accordingly, the operation of the unit will be in no wise impaired by vibration. Moreover, a unit of the present type will be substantially free from lag and backlash and will additionally not accidentally shift from the position to which it has been adjusted.

It is a still further object of the invention to furnish a coupling involving a relatively simple design embracing few and rugged parts capable of ready assemblage, such parts being susceptible to manufacture without resorting to close tolerances while, when assembled, operating in an entirely satisfactory manner. Accordingly, with the expenditure of only small amounts of time by relatively unskilled labor, satisfactory assemblies may be produced which will function for long periods with freedom from all difficulties.

With these and other objects in mind, reference is had to the attached sheet of drawings illus-

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trating a practical embodiment of the invention, and in which:

Fig. 1 is a sectional plan view of a coupling and the assemblies associated therewith;

Fig. 2 is a sectional side view thereof; and

Fig. 3 is a transverse sectional view taken along the lines 3-3 and in the direction of the arrows as indicated in Fig. 1.

In the form of the invention herein illustrated, the coupling has been shown in association with a rheostat or potentiometer. While in many respects the present invention is primarily directed for use in conjunction with a unit of this type, it is to be understood that the coupling might be advantageously employed in other associations. Therefore, except where otherwise stated in the appended claims, the drawings and present descriptions are to be taken in an illustrative rather than a limiting sense.

Thus, in these views, the numeral 5 indicates an electrical unit or instrument of the type afore indicated and which, in the usual manner, is provided with a bushing 6 beyond which an operating shaft 7 extends. As will be understood, units of this type frequently have impressed upon them relatively high voltages and it is therefore necessary that the control which the operator adjusts to rotate the shaft 7 or its equivalent, be electrically isolated from the unit.

With this in mind, a panel 10 or its equivalent is provided at a point spaced from the unit 5, the latter being supported by a suitable mounting surface (not shown). A bushing 9 may extend through an aperture in the panel 10 and rotatably mount a shaft 8. A flange 11 forming a part of this bushing may bear against one face of the panel, the other face of the same being conveniently engaged by a nut 11' mounted by the bushing. Thus, the latter is retained in association with this mounting surface. The shaft 8 may be rotated in any desired manner as, for example, by a knob 12.

As is apparent, the mounting member or panel 10 is separated from the unit 5 and its shaft 7 by a distance adequate to assure that leakage or sparks will not bridge the space extant between the adjacent ends of shafts 7 and 8. In order to maintain the parts in proper relative positions, a sleeve or tube 14 preferably extends between and is mounted by the adjacent ends of the bushings 6 and 9. Also, a bridging strip or member 13 is enclosed by the tube 14 and serves to connect shafts 7 and 8. This bridging strip is formed of di-electric material and has its ends extending into notches formed in the shaft ends

7 and 8. Consequently, when the latter shaft is turned, the former will be rotated to adjust the parts within the casing of the instrument 5.

According to the present invention, the notches in the shaft ends and the bridging strip 13 will not have to be interfitted with great care and, therefore, extreme accuracy will not be necessary in forming either these notches or the bridging strip. This is achieved, for example, by forming the notch in the shaft 8 and which receives the end of the bridging strip of sufficient depth so that the distance between the base portions of the notches in the two shafts will be greater than the overall length of the bridging strip 13. Therefore, it will never be necessary to cut the strip to reduce the overall length thereof in order that it may be accommodated within this space.

The notch in shaft 8 is continued in the form of a well portion 16 which receives a spring 17. The latter bears against the edge of the strip 13 and maintains that strip properly seated within the notch of shaft 7. Thus, an end thrust is created. At the same time, shaft 8 may not move outwardly because any suitable construction may be resorted to to prevent this. For example, a thrust ring 15 may be employed.

While, of course, a duplicate well or recess 16 and spring 17, as well as a relatively deep notch might be provided in the end of shaft 7, I have ordinarily found this to be entirely unnecessary. Rather, in assembly, it is simply necessary to insert the end of the bridging strip 13 in the notch of the shaft 7 with the opposite end of the strip within the notch of shaft 8. Any play between the parts in an axial direction is prevented by the spring 17. Also, no appreciable lag or backlash of the parts will occur when shaft 8 is turned to effect a rotation of the shaft 7.

Accordingly, it is obvious that a cushioning factor is present which will normally allow vibrating of the panel 10 without such vibrations being transmitted to the bridging element 13 and shaft 7. Moreover, if an operator grasps the handle 12 or equivalent part and exerts thrusts upon the shaft 8, such thrust will be absorbed by compression of the spring 17. In other words, the bridging element will simply ride deeper into the indentation or slot of the shaft 8 but will not displace the shaft 7 axially. Moreover, by means of this spring, the shaft 8 is normally thrust outwardly. Accordingly, the bearing 15 is normally urged into contact with the end of the bushing 9. This will serve within limits as a friction or retarding expedient to prevent accidental turning of the shaft 8 and the parts connected therewith even although the shaft be subjected to constant vibration. At the same time, the friction between the elements will not be so great that any appreciable resistance to turning occurs when an operator deliberately rotates the shaft 8.

Thus, it will be obvious that a coupling is furnished which achieves, among others, the objects afore set forth. It will be understood that numerous changes in construction and rearrangements of the parts of this coupling might be resorted to without departing from the spirit of the invention as defined by the claims.

I claim:

1. In combination, an electrical unit, a mounting member spaced therefrom, substantially aligned bushings extending from said mounting member and unit and having their ends spaced and extending towards each other, a tube

mounted between said bushings and connecting the same, an operating shaft extending from said electrical unit through the adjacent bushing and terminating within said tube, an actuating shaft extending through the bushing supported by said mounting member, into said tube and terminating at a point spaced from said first named shaft, the adjacent ends of said shafts being formed with notches in their end faces and a flat bridging strip having its ends disposed within said notches, said strip being restrained from side-wise displacement from said notches by said tube.

2. In combination, an electrical unit, a mounting member spaced therefrom, substantially aligned bushings extending from said mounting member and unit and having their ends spaced and extending towards each other, a tube mounted between said bushings and connecting the same, an operating shaft extending from said electrical unit through the adjacent bushing and terminating within said tube, an actuating shaft extending through the bushing supported by said mounting member, into said tube and terminating at a point spaced from said first named shaft, the adjacent ends of said shafts being formed with notches in their end faces, a flat bridging strip having its ends disposed within said notches, said strip being restrained from side-wise displacement from said notches by said tube, the actuating shaft being formed with a recess in the base of its notch and a spring disposed within said recess and bearing against the adjacent edge of said bridging strip to urge the latter towards the base of the notch in said operating shaft.

3. In combination, an electrical unit, a mounting member spaced therefrom, substantially aligned bushings extending from said mounting member and unit and having their ends spaced and extending towards each other, a tube mounted between said bushings and connecting the same, an operating shaft extending from said electrical unit through the adjacent bushing and terminating within said tube, an actuating shaft extending through the bushing supported by said mounting member, into said tube and terminating at a point spaced from said first named shaft, the adjacent ends of said shafts being formed with notches in their end faces, a flat bridging strip having its ends disposed within said notches, said strip being restrained from side-wise displacement from said notches by said tube, a thrust member mounted by said actuating shaft and contactable with the bushing supported by said mounting member to increase the resistance to turning of said shaft and means for urging said member into engagement with said bushing.

4. A coupling for use with an electrical instrument from which there extends a notched operating shaft and a concentrically disposed bushing, said coupling comprising a bushing to be associated with a mounting member which is spaced from said instrument, an actuating shaft rotatably supported by said bushing and formed with a notch in its inner end, a tube coupled to said bushing and adapted to be coupled to the bushing of said instrument and a bridging strip extending into the notch of said actuating shaft and adapted for extension into the notch of the operating shaft, said strip being confined against side-wise displacement from the notch of said actuating shaft by said tube.

5. A coupling for use with an electrical instru-

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ment from which there extends a notched operating shaft and a concentrically disposed bushing, said coupling comprising a bushing to be associated with a mounting member which is spaced from said instrument, an actuating shaft rotatably supported by said bushing and formed with a notch in its inner end, a tube coupled to said bushing and adapted to be coupled to the bushing of said instrument, a bridging strip extending into the notch of said actuating shaft and adapted for extension into the notch of the operating shaft, said strip being confined against sidewise displacement from the notch of said actuating shaft by said tube, said actuating shaft being formed with a recess extending to the base of its notch and a spring disposed within said recess and engageable with the adjacent edge of said bridging strip to exert a thrust against the same.

6. A coupling for use with an electrical instrument from which there extends a notched operating shaft and a concentrically disposed bushing, said coupling comprising a bushing to be associated with a mounting member which is spaced from said instrument, an actuating shaft rotatably supported by said bushing and formed with a notch in its inner end, a tube coupled to said bushing and adapted to be coupled to the bushing of said instrument, a bridging strip extending into the notch of said actuating shaft and adapted for extension into the notch of the op-

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erating shaft, said strip being confined against sidewise displacement from the notch of said actuating shaft by said tube, said actuating shaft being formed with a recess extending to the base of its notch, a spring disposed within said recess and engageable with the adjacent edge of said bridging strip to exert a thrust against the same and a thrust member mounted by said actuating shaft and engageable with the adjacent bushing.

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