April 25, 1950 J. P. SMITH, JR 2,505,218

ELECTRICAL SWITCH

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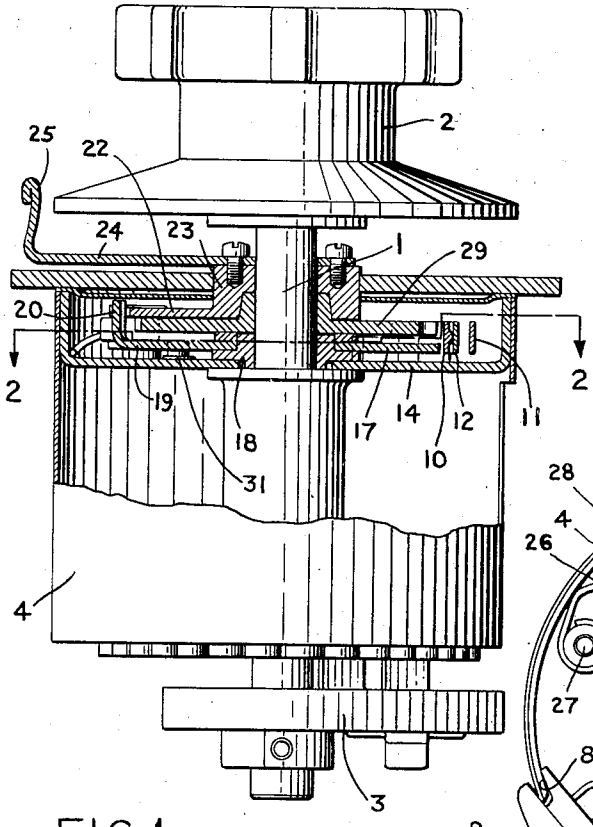


FIG. 1

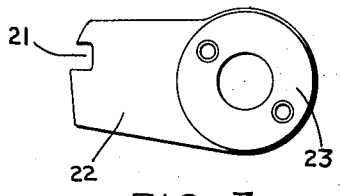


FIG. 3

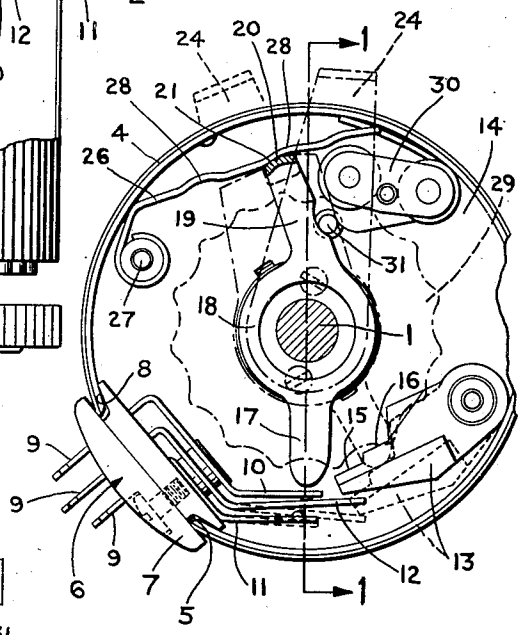


FIG. 2

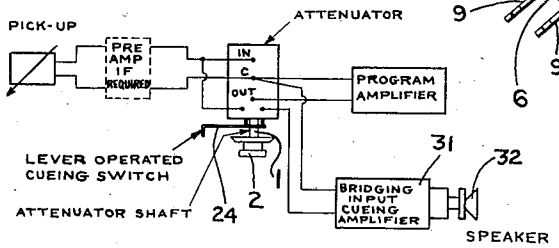


FIG. 4

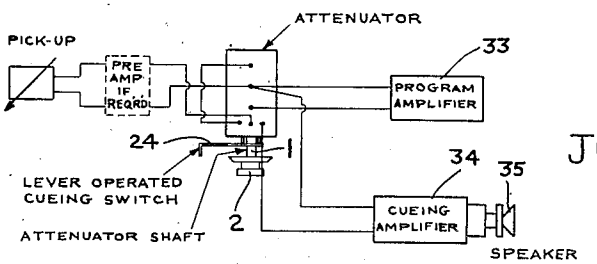


FIG. 5

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ELECTRICAL SWITCH

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16 Claims. (Cl. 200—6)

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This invention relates to electrical switches and more particularly to a switch adaptable for use as an auxiliary switch in the communications field, as a monitoring or cueing switch, an auxiliary signal switch, a switch to cut out an attenuator or for other similar applications.

Co-pending application, Serial No. 18,002, filed March 30, 1948, illustrates and describes an auxiliary switch of similar structure wherein the switch carried by an attenuator is operated by operation of the knob of the attenuator through the medium of the detent gear and consequently is operated only at predetermined settings of the attenuator, whereas the present invention embodies an auxiliary electric switch which is carried by an attenuator or like instrument and is operable independently of the attenuator or transducer whereby in a communications circuit the program passing through the system can be monitored at any set position of the transducer or the cueing amplifier of such a system may be turned on or off independent of the setting of the transducer.

An object of the present invention is to provide a compact unit such as an attenuator and auxiliary switch combined which will permit operations as above referred to, will require only a single panel mounting, and will eliminate separate panel mounted switches with their requirements of panel space mounting, labor costs, panel engraving, etc., and which device of the present invention will provide an attractive appearing, conveniently operable unit at a material reduction in cost over the present approved methods and apparatus.

With these and other objects in view, as may appear from the accompanying specification, the invention consists of various features of construction and combination of parts, which will be first described in connection with the accompanying drawings, showing an electrical switch of a preferred form embodying the invention, and the features forming the invention will be specifically pointed out in the claims.

In the drawings:

Figure 1 is a longitudinal section through an attenuator showing the auxiliary switch structure in section.

Figure 2 is a cross section taken on the line 2—2 of Fig. 1.

Figure 3 is a detailed plan view of a part of the switch structure.

Figure 4 is a diagrammatic view showing the combined attenuator and auxiliary switch connected for normal use in a communications circuit which will permit cueing or cutting in of the program being broadcast to the auxiliary or cueing amplifier in any position of setting of the transducer.

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Figure 5 is a diagrammatic view showing the attenuator and auxiliary switch in a communications circuit and is arranged as to cut off the regular broadcast signal or program from the program amplifier and switch it to the cueing or auxiliary amplifier.

In the present specification it is to be understood that the term "cueing amplifier" is used in connection with an amplifier and speaker which is located in the control room of a broadcasting system so as to enable the operator to cut in and hear the program at any desired time for the purpose of giving him a cue for alteration in the program such as when disc recordings are being employed, giving him a cue as to when to start a subsequent disc without causing a break in the program or, for giving him a cue as for various other breaks or insertions into the program being broadcast.

Referring more particularly to the drawings, an attenuator or other similar transducer as used in electrical communication systems, is shown in general in Figure 1 of the drawings, with the wiring thereof removed and this instrument includes a rotary shaft 1 which has an operating knob 2 on one end thereof and which operates the switch mechanism 3 of any approved construction such as employed in instruments of this type. The attenuator also includes an enclosing housing 4 which has a portion thereof cut away as shown at 5. The auxiliary switch structure 6 is attached to the housing 4 at the cutaway portion 5 and the switch structure 6 includes a body 7 having slots 8 in its sides which receives and slides over the edges of the cutout portion 5 in the attenuator housing 4 so as to position the contact arms of the switch structure within the attenuator housing with their terminal ends 9 exteriorly of the housing to facilitate the connection of wires thereto. The switch structure 6 embodies an inner stationary contact arm 10 and outer stationary contact arm 11 and an intermediate movable contact arm 12. The contact arm 12 is tensioned so that under normal conditions it will engage the inner contact arm 10 and consequently make a circuit or close the circuit which is connected to the inner stationary arm 10. A cam 13 is pivotally carried by the closure plate 14 of the housing 4 and is positioned so that the outer edge of its free end will engage the movable con-

tact 12. The cam 13 has stepped surfaces 15 and 16 on its inner edge which are engaged by an operating arm 17 to rock the cam to move the movable contact arm 12. When the end of the operating arm 17 engages the step 15 of the cam 13 the movable contact arm 12 will be moved to a neutral position out of engagement with either the inner or outer stationary contact arms 10 or 11, and when the arm 17 is moved into engagement with the step 16 then the cam will move the contact arm 12 into engagement with the outer stationary contact arm 11.

The operating arm 17 is carried by a carrying body 18 which is mounted upon the shaft 1 of the attenuator for rotary movement independently of the shaft. A second arm 19 is carried by the body 18 and projects therefrom substantially diametrically opposed to the cam operating arm 17. The arm 19 has its free end 20 upturned and its outer surface rounded slightly, as shown at 21. The upturned end 20 of the arm 19 engages in a notch or cut-out 21 formed in the arm 22. The arm 22 is carried by a carrying body 23 rotatably mounted upon the shaft 1 and has an operating lever 24 connected thereto. The operating lever 24 projects radially from the shaft 1 and has its outer free end upturned as shown at 25 to permit easy operation of the lever and consequently of the cam operating arm 17. A spring brake or detent 26 is carried by the closure plate 14 and has one end anchored as shown at 27, while the other end engages the interior of the housing 4. The spring 26 has indentations 28 therein which engage the arcuate upturned end 29 of the arm 19 for indicating the proper positions of the cam operating arm 17 and holding the cam operating arm 17, body 18 and arm 19 in adjusted positions. The attenuator or transducer has the usual detent gear 29 thereon with which a spring pressed pawl member 30 cooperates.

A stop-pin 31 is carried by the closure plate 14 and engages the arm 19 for limiting the movement of this arm and, consequently, movement of the cam operating arm 17.

Two of a number of several applications of the transducer embodying the auxiliary switch structure of the present invention is shown in Figures 4 and 5.

Figure 4 shows the attenuator structure connected in a communications circuit with the contact arms 10, 11, and 12 of the auxiliary switch structure connected to circuit with the program amplifier and the bridging input cueing amplifier, and with this hook-up operation of the auxiliary switch structure of the present invention by means of the lever 24 will permit cutting in of the program being broadcast to the auxiliary or cueing amplifier indicated at 31 and thence to the speaker 32, while the attenuator or transducer is in any adjusted position.

Figure 5 shows the auxiliary switch structure connected in a communications circuit in such manner as to cut off the transmission of the program being broadcast to the program amplifier 33 when the switch structure is operated to divert the program to the cueing amplifier 34 and its speaker 35. These two circuits show only two applications of the improved auxiliary switch structure and it is to be understood that its use is not to be limited to such installations but it may also be used as an auxiliary switch, a switch to cut out an attenuator or any other similar application without departing from the spirit of the present invention.

The switch structure herein shown and described may be employed as a single or multiple pole, multiple position switch as desired.

It will be understood that the invention is not to be limited to the specific construction or arrangement of parts shown, but that they may be widely modified within the invention defined by the claims.

What is claimed is:

1. In an electrical instrument, the combination with a rotary shaft, of a switch for controlling an auxiliary circuit and comprising inner and outer stationary contact arms and a movable contact arm, a cam for moving said movable contact arm, a lever mounted on said shaft for swinging movement upon the shaft as an axis and independently of the shaft and means operated by said lever for moving said cam.

2. The combination as claimed in claim 1 wherein said movable contact arm is tensioned to engage one of said stationary contact arms, and said cam is provided with surfaces whereby upon initial movement of the cam said movable contact arm will be moved to neutral position and upon subsequent step movement of the cam it will be moved into contact with the other of said stationary contact arms.

3. The combination as claimed in claim 1 embodying a spring detent for holding said cam operating means in adjusted position.

4. The combination as claimed in claim 1 wherein said cam operating means includes a body mounted on said shaft, a cam operating arm on said body, a second arm on said body and a yieldable detent engaging said second arm for holding the cam operating means in adjusted positions.

5. The combination as claimed in claim 1 wherein said movable contact arm is tensioned to engage one of said stationary contact arms, and said cam is provided with surfaces whereby upon initial movement of the cam said movable contact arm will be moved to neutral position and upon subsequent step movement of the cam it will be moved into contact with the other of said stationary contact arms, said cam operating means including a body mounted on said shaft, a cam operating arm on said body, a second arm on said body, and a yieldable detent engaging said second arm for holding the cam operating means in adjusted positions.

6. The combination as claimed in claim 1 including means carried by said shaft and connected to said lever and engaging said cam operating means for moving the cam operating means upon movement of the lower.

7. The combination as claimed in claim 1 wherein said cam operating means includes a body mounted on said shaft, a cam operating arm on said body, a second arm on said body and means carried by said body and means carried by said shaft and connected to said lever and engaging said second arm for moving the cam operating arm upon movement of the lever.

8. The combination as claimed in claim 1 wherein said cam operating means includes a body mounted on said shaft, a cam operating arm on said body, a second arm on said body and means carried by said shaft and connected to said lever and engaging said second arm for moving the cam operating arm upon movement of the lever, and a yieldable detent engaging said second arm for holding the cam operating means in adjusted positions.

9. The combination as claimed in claim 1

wherein said movable contact arm is tensioned to normally engage one of said stationary contact arms, and said cam is normally out of engagement with said movable contact arm and wherein said cam moving means first operates the cam to move the movable contact arm into neutral position and secondly into engagement with the other of said stationary contact arms.

10. In an electrical instrument the combination of, a rotary switch operating shaft, a switch for controlling an auxiliary circuit, said switch including inner and outer stationary contact arms and a movable contact arm, a cam pivotally carried by the transducer for moving said movable contact arm, a lever mounted on said shaft for movement independently of the shaft, said movable contact arm being tensioned to normally engage one of said stationary contact arms, said cam provided with step surfaces and arranged whereby the cam is normally out of engagement with the movable contact arm, a body mounted on said shaft, a cam operating arm on said body for engagement with the stepped surfaces of the cam, means for connecting said arm with said lever to provide movement of the arm upon movement of the lever, said cam operating arm adapted to engage the cam and move it in stepped movements in such manner that the first step movement of the cam will move the movable contact arm into neutral position and the second stepped movement of the cam will move the movable contact arm into engagement with the outer stationary contact arm.

11. In an electrical instrument the combination of, a rotary switch operating shaft, a switch for controlling an auxiliary circuit, said switch including inner and outer stationary contact arms and a movable contact arm, a cam pivotally carried by the transducer for moving said movable contact arm, a lever mounted on said shaft for movement independently of the shaft, said movable contact arm being tensioned to normally engage one of said stationary contact arms, said cam provided with stepped surfaces and arranged whereby the cam is normally out of engagement with the movable contact arm, a body mounted on said shaft, a cam operating arm on said body for engagement with the stepped surfaces of the cam, a second arm on said body, means for connecting said second arm with said lever to provide movement of the contact operating arm upon movement of the lever, said cam operating arm adapted to engage the cam and move it in stepped movements in such manner that the first stepped movement of the cam will move the movable contact arm into neutral position and the second stepped movement of the cam will move the movable contact arm into engagement with the outer stationary contact arm, and a spring detent engaging said second arm for holding the cam operating arm in adjusted positions.

12. In an electrical instrument, in combination, a rotary switch operating shaft, a housing, said housing having a portion thereof cut away, a switch for controlling an auxiliary circuit mounted in the cut away portion of said housing, said switch including an inner and outer stationary arm and an intermediate movable arm projecting into the housing, a cam for moving said movable contact arm, a lever mounted on said shaft for movement independently of the shaft and means operated by said lever for moving said cam.

13. In an electrical instrument, in combination, a rotary switch operating shaft, a housing, said housing having a portion thereof cut away, a switch for controlling an auxiliary circuit mounted in the cut away portion of said housing, said switch including an inner and outer stationary arm and an intermediate movable arm projecting into the housing, a cam for moving said movable contact arm, a lever mounted on said shaft for movement independently of the shaft, a carrying body carried by said shaft and movable independently of the shaft, a cam operating arm on said movable body for engagement with said cam, a second arm on said carrying body and means establishing connection between said second arm and said lever.

14. In an electrical instrument, in combination, a rotary switch operating shaft, a housing, said housing having a portion thereof cut away, a switch for controlling an auxiliary circuit mounted in the cut away portion of said housing, said switch including an inner and outer stationary arm and an intermediate movable arm projecting into the housing, a cam for moving said movable contact arm, a lever mounted on said shaft for movement independently of the shaft, said movable contact arm normally being out of engagement with said cam and in contacting engagement with the inner of said stationary contact arms, said cam provided with stepped surfaces whereby upon initial engagement of the cam operating arm with the cam said movable contact arm will be moved into a neutral position and upon successive movement of the cam operating arm the movable contact arm will be moved into contacting engagement with said outer stationary contact arm.

15. The combination as claimed in claim 14 wherein said switch includes a carrying body provided with grooves in its side edges which receive therein the edges of the cut out portion of said housing for connecting the switch structure to the housing.

16. In an electrical instrument the combination with a rotary shaft, of a switch for controlling an auxiliary circuit comprising inner and outer stationary contact arms and an intermediate movable contact arm tensioned to normally contact one of said stationary arms, a lever, an arm mounted on said shaft for rotary movement independent of the shaft and rigidly connected to said lever, a second arm, means establishing a loose connection between said rigidly connected arm and said second arm for moving said movable contact arm into a neutral position out of contact with either of said stationary contact arms or into engagement with the outer of said contact arms.

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