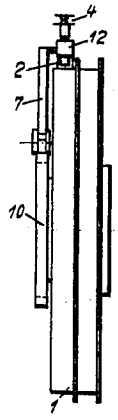
Dec. 9, 1952 E. GRETENER 2,621,266

DEVICE FOR ACTUATING ELECTRICAL SWITCHES

Filed Sept. 27, 1950

Fig. 1b



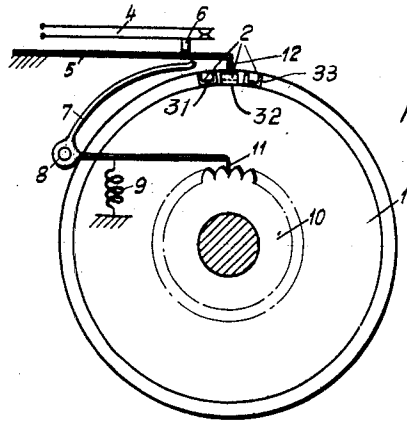


Fig. 1a

Fig. 2c

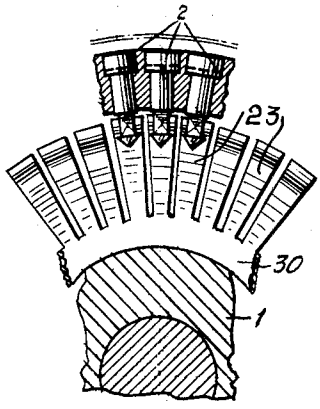


Fig. 2a

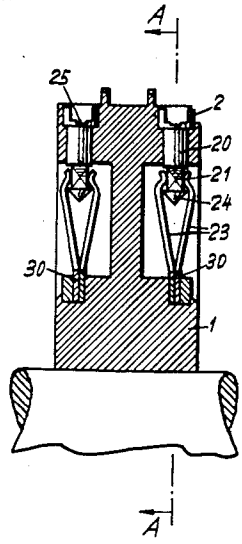
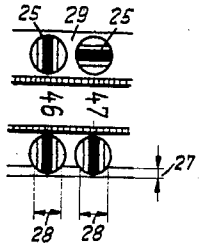


Fig. 2b



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DEVICE FOR ACTUATING ELECTRICAL SWITCHES

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11 Claims. (Cl. 200—18)

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The present invention relates to a device for actuating an electrical switch or switch unit according to a prearranged program. Such devices that have become known are widely employed in the art of automatic control and regulation where the control serves e. g. to put into or out of action in preselected time relation the different mechanisms required to carry out the necessary sequence of steps of an automatically controlled process. Another very interesting field of application is the technique of telecommunication where it is the object of such devices to form current impulses of a prescribed sequence. Such control systems are generally referred to as "program controls" and the sequence of effects brought about by such systems is usually referred to by the term "program."

The object of the present invention is to provide a device for actuating at least one electrical switch according to a predetermined program which may be varied in a very easy and simple manner.

It is another object of the present invention to provide a device for actuating simultaneously two switches, each according to one of two predetermined programs, which programs may be set entirely independent of one another.

It is furthermore an object of this invention to provide a device for actuating switches according to a predetermined program permitting clear indication of the position of the switch actuating means.

Another important object of the invention is to provide means for an easy assembly of the switch actuating means on said device.

The foregoing objects are preferably achieved by the employment of a disc with at least one row of slotted heads disposed turnably along the circumference of said disc in combination with at least one feeler spring adjacent to said row of slotted heads, where said disc is rotated in steps locating consecutively each slotted head beneath the end of said feeler spring, and where the feeler spring actuates said electrical contact according to the position of said slotted head, and where the slot of each slotted head may be set to two definite and secured positions alternatively, and where in one of said positions the contact is actuated and where in the other one the contact is not actuated.

These and other features will become evident and the invention will be best understood from the following detailed description made with reference to the accompanying drawings representing embodiments of the invention, where

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Figs. 1*a* and 1*b* by ways of example show in front and side elevation a disc with one row of slotted heads, and

Figs. 2*a*, 2*b* and 2*c* show a disc with a double row of slotted heads, Fig. 2*a* representing a section along the axis of the disc, Fig. 2*b* a section of the embodiment along plane A—A of Fig. 2*a*, and Fig. 2*c* a development view showing the arrangement of slotted heads along the circumference of the disc.

In Figs. 1*a* and 1*b* **1** represents a disc along the circumference of which a multitude of slotted heads is arranged in one row, three of which are shown. In the drawing the slotted heads **31** and **33** are disposed with slots parallel to the axis of the disc. The slot of head **32** is in a position tangent to the circumference of the disc in that particular point. Hereinafter the position of heads **31** and **33** will be referred to as axial, the position of head **32** as tangential. The employment of such two positions seems particularly advantageous, although any two other distinctly distinguishable positions may be employed. The slotted head disc **1** serves to operate a switch unit **4**. This is effected in the embodiment shown by a testing spring **5** providing a stud **6** and a bent end **12** which latter may enter into the slot of the adajcent head if it is in axial position. The spot on the circumference of disc **1** which is located beneath the bent end **12** is referred to hereinafter as the scanning spot. An auxiliary lever **7** rotatable around its axis **8** is urged downward by a spring **9** against a cam wheel **10**. Said cam wheel is coaxially attached to the slotted head disc **1** and provides a number of rises **35** equal to the number of slotted heads on disc **1**. By the rises **35** on cam wheel **10** the bent end **11** of lever **7** is actuated.

The embodiment operates as follows: The position of spring **5** is determined by the position of the slot of that head of the disc **1** which is at that given moment located at the scanning spot, i. e. beneath the bent end **12** of the spring. If the slot is in tangential position, e. g. as head **32**, the bent end is stopped by the edges of the slot. As the bent end cannot enter into the slot, the switch unit **4** remains closed, contact leaf spring being held upwards by the stud **6**. If, however, e. g. the head **31** or **33** would be located underneath the bent end **12**, this can enter into the slot, as the slots of such heads are in axial position, i. e. parallel to the bent end **12** of spring **5**. In this position of the disc the switch **4** is opened.

The slotted heads are consecutively located

beneath the bent end 12 preferably by a step-by-step rotation of the disc. Thus head after head is brought into the testing position. During the intervals of transport, the spring 5 must be lifted so far as to permit free movement of the disc unrestricted by the end 12 of the spring. This may be achieved in different ways. In the embodiment of Fig. 1*a* the cam wheel 10 and the auxiliary lever 7 serve for this purpose. During the intervals of transport the lever 7 is tilted counterclockwise. Thereby spring 5 is deflected upwards, so that the transport movements may be executed without interference by that spring. The shape of the cams and their position on the circumference of the cam wheel must match with the position of the heads on disc 1 in such a manner that the bent end 12 is lifted out of the slot of the adjacent head before it can strike the edge of the slot.

A further embodiment of a slotted head disc is shown in Figs. 2*a* to 2*c*. On the disc shown two circular rows of slotted heads are disposed symmetrically to the plane of the disc. With such an embodiment two separate switch units may be actuated independently of one another by the slotted heads of the two rows on both sides of the disc.

In the Figs. 2*a* to 2*c* the switch units and the appertaining actuating mechanism, which do not represent any feature of novelty, have been left away in order not to impair the clearness of the drawing.

This embodiment shows a particular form of the slotted heads in order to ensure easy setting of the program and securing of the position of the slots. As will be seen from Figs. 2*a* and 2*b* the slotted heads form the upper part of a cylindrical peg 20 which provides a rotatable mounting of said head on disc 1. A square prismatic part 21 adjoining to said circular part 20 of the peg serves to secure the position of the slot in one of the above mentioned two definite positions. This is effectively achieved by separate flat arms 23 of two disc springs 30, slotted according to the number of pegs, which press with equal tension against opposite sides of the square prismatic part of each peg.

Such an arrangement of the flat separate arms of the disc springs on each side of each peg eliminates superfluous friction in the support of the pegs. Besides the shown construction provides the advantage that the slotted heads may be rotated in both senses and no restrictions exist as to the sense of rotation and to the number of successive rotations.

A circular cone 24 at the bottom end of every peg permits very easy assembly of the pegs into the disc 1 as the pegs have only to be inserted into the holes of the disc and pressed downwards.

The circular base of such cones protrudes from the square part of the peg as may be seen from the drawing. Thereby a very simple method is provided to secure the pegs against falling out as the flat arms of the disc spring 30 embrace the cone. With regard to an easy manufacture the base of the circular cone is made equal in diameter to the cylindrical part of the peg. Thus the square prismatic part may be easily machined out of the cylindrical part originally reaching up to the conical end.

To permit quick and easy setting or resetting of a given program it is of predominant importance that the position of the slots is easily distinguishable. For this purpose narrow coloured strips are painted on the bottom of each slot. The colour of such strips must form a distinctly discernible contrast to the colour of the bottom, e. g. white on black. In order to protect the coloured strips against damaging by a tool eventually employed for setting the heads, e. g. a special screw driver, the coloured strips are located in a recess at the bottom of the slot.

It is furthermore required that no slotted head of the disc must inadvertently be turned when setting the adjacent heads. In order to achieve this the heads themselves are recessed with respect to the circumference of the disc as is shown in Figs. 2*a* and 2*c*.

The slotted heads on the left side of the embodiment shown in Fig. 2*a* are mounted in recesses so that they are flush with the circumference of the disc. Thus the slot is closed at both sides in the radial position as well as in the tangential one. In the axial position, which permits the bent end of the feeler spring 5 to enter into the slot, this is not very convenient with regard to the tolerances of manufacture. Feeler spring 5 ought to be made as broad as possible in order that it may be arrested securely at both ends by the edges of the slot, if it is in tangential position. On the other hand a sufficiently large clearance must be provided on both sides of the end of the spring to warrant safe entering into the slot if it is in axial position.

The design shown at the right side of the embodiment of Fig. 2*a* meets with both requirements as the slot is left open towards the flange of the disc if it is in axial position. By simply turning off the flange of said disc by a small amount, indicated at 27, the cylindrical recess into which the slotted head is mounted leaves open a small gap 28. Thereby the above mentioned requirements are considerably simplified and the admissible tolerances for manufacture are increased.

The slotted heads may be numbered, e. g. "46" and "47" as shown in Fig. 2*c* representing a developed view of a part of the circumference of the disc, in order to facilitate the setting of a program. The numerals are preferably applied to the disc on a separate track in between the two rows of slotted heads.

I claim:

1. A device for actuating an electrical switch according to a predetermined program, the switch having two alternative end positions, said device comprising a disc supported for step-by-step movement, a row of slotted elements turnably disposed along the circumference of the disc, a feeler element constituting a switch operator and having a feeler portion positioned to contact said slotted elements in sequence on a step-by-step advance of said disc, and means for retaining the several turnable elements each in adjusted relation on said disc with the slot thereof in position to be entered by the feeler portion of said feeler element or alternatively in position to block entry thereof by the feeler portion, whereby the switch is actuated to one or the other of its alternative end positions in accordance with the adjustment of the feeler element as determined by the position of the slot of the turnable element contacted by the feeler element.

2. A device according to claim 1, where said turnable elements have slotted heads mounted in recesses along the circumference of said disc.

3. A device according to claim 2, wherein one of said positions the slot is disposed parallel to

the axis of said disc, and where in the other one said slot is at right angles to the axis of the disc and disposed in a plane tangential to the circumference of the disc.

4. A device according to claim 3, where a rim of the disc is provided with lateral openings in elongation of said slots when in axial position.

5. A device according to claim 4 where said rim of the disc is of reduced diameter to leave open the adjacent edges of said disc recesses in which said slotted heads of the turnable members are mounted.

6. A device according to claim 2, where the position of the slot is marked by a colored strip at the bottom of the slot and where the color of said strip forms a distinctly visible contrast to the color of the bottom of the slot.

7. A device according to claim 6, where said colored strip is located in a recess at the bottom of each slot, whereby protection against mechanical damaging thereof by said feeler portion of said feeler element is obtained.

8. A device according to claim 1, where two rows of slotted elements are disposed symmetrically to the plane of said disc, and a feeler element is provided for each row of slotted elements, whereby two separately operating devices are obtained.

9. A device according to claim 1, where each of said slotted elements comprises a peg having a

cylindrical slotted head for mounting said peg rotatably on said disc, an adjoining square prismatic part cooperating with said retaining means to secure the peg in adjustment for the desired position of the slot, and a circular conical part to facilitate the assembly of pegs on said disc.

10. A device according to claim 9, where for a row of slotted heads two disc springs are employed concentrically mounted on said disc and slotted according to the number of pegs, and where the position of the slot on said pegs is secured by the separate flat arms of said discs pressing from both sides against opposite sides of the square prismatic part of the pegs.

11. A device according to claim 10, where the base of said conical part of the pegs is equal in diameter to said cylindrical part and where the surfaces of said square prismatic part in cross-section chords of the cylindrical portions of said pegs, whereby the pegs are secured by said disc springs against falling out.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,486,909	Babajoff	Nov. 1, 1949