

Aug. 30, 1932.

E. FALCKE

1,875,229

NOTCHING DEVICE

Filed Nov. 1, 1928

Fig.1.

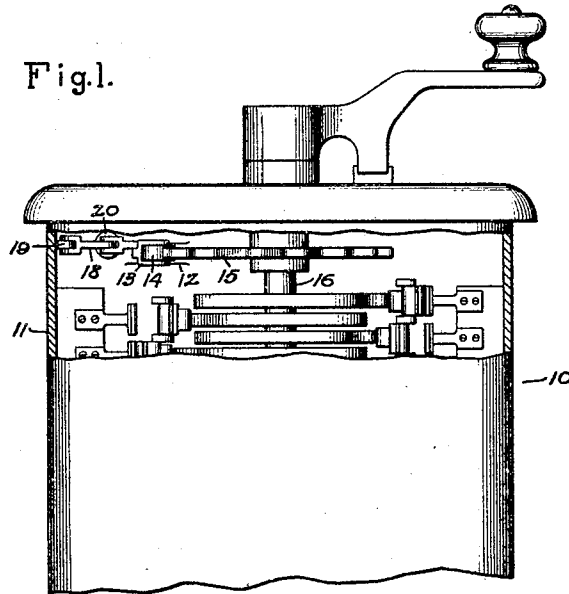
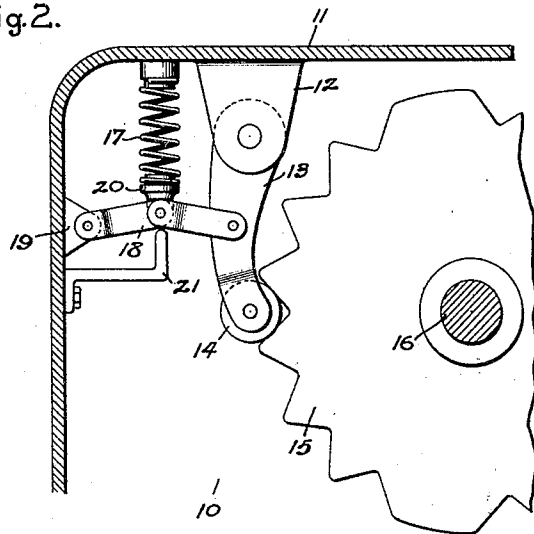


Fig.2.



Inventor:
Emil Falcke,
by *Charles O. Tuller*
His Attorney.

UNITED STATES PATENT OFFICE

EMIL FALCKE, OF BERLIN, GERMANY, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK

NOTCHING DEVICE

Application filed November 1, 1928, Serial No. 316,554, and in Germany January 7, 1928.

My invention relates to notching devices for controlling the operation of a movable member between a plurality of positions and the object is to insure more effective notching action of such devices.

In electrical switching apparatus having contact parts rotatable about an axis between a plurality of switching positions, such for example as rotary switches, switching drums and the like, it is customary to provide notching devices in order to make the definite switch positions perceptible to the operator. The ordinary form of notching device consists of a spring pressed roller and a disc provided with notched recesses. The notched recesses on the disc are so arranged that when the spring pressed roller enters the notch and has reached its lowest position, the rotatable switching member occupies one of its definite switch positions in which the switching device can be held without danger of arcing or burning at the contacts. Thus the notching device serves to show to the operator through the marked variations in operating torque that the switching apparatus is in the proper switching position.

In certain cases, for example in the case of switches controlled by cam drums, these well-known notch arrangements are not sufficient for sure operation, because the pressure of the cam switching mechanism in different positions allows additional torques to act on the switch shaft which may either aid or retard the torque applied by the operator. In such cases the well-known forms of notching devices do not function satisfactorily and it frequently happens that the desired switch positions are overrun or not reached, so that the operator leaves the cam controller in an improper operating position.

According to the present invention this drawback is overcome by connecting the notch roller and the spring controlling it, by means of a lever transformation mechanism which with progressive penetration of the roller into the notch, in spite of the spring losing tension, produces an increased pressure on the roller. In this way the notching action is accentuated so as to be readily perceived by the operator.

In the accompanying drawing a preferred form of notching device embodying the invention is illustrated in connection with an electric controller. Fig. 1 is a front view of the controller with the casing broken away to show the arrangement of the notching device and Fig. 2 is a sectional view illustrating more in detail the operating parts of the notching mechanism.

In Figs. 1 and 2 the controller 10 is shown of the cam type having a plurality of definite circuit controlling positions and having a casing wall 11 on which a bearing bracket 12 is mounted. In the latter is pivotally mounted the notching pawl 13 carrying the roller 14. The notching pawl 13 is biased by the spring 17 into engagement with the notched disc 15, which is fixed on the rotatable shaft 16 of the controller. In this way the notching pawl cooperates with the notched disc to vary the force required to move the controller 10 to and from its definite position. In order to bring the force of the biasing spring 17 into action on the notching pawl 13, a toggle lever system 18 is provided which consists of two levers. One end of these levers pivotally engages with the notching pawl 13 and the other end is rotatably secured in a bearing bracket 19 on the casing 11. At the central connection of the two toggle levers, a spring plate 20 is provided with which the biasing spring engages.

Thus upon a rotary movement of the shaft 16 the roller on the notching pawl 13 enters into a notch of disc 15 and due to the leverage transformation ratio of the toggle levers 18 varying with progressive movement, the speed of entry of the roller is reduced, but on the other hand the effective bias of spring 17 is correspondingly increased, so that the pressure on the roller in its lowest position is greatest, in spite of the fact that the compression of the spring 17 is reduced and hence delivers less actual pressure to the toggle levers 18.

Care must of course be taken that the toggle levers 18 do not reach the full straightened position, but always remain at an angle on the side adjacent the spring, so that on a

further rotation of the shaft 16 the roller 14 can again be withdrawn from the notch with a corresponding bending of the levers 18 and a compression of the spring 17. The notch itself may serve as a stop for the levers 18, or if desired a fixed stop 21 may also be provided in order to maintain the toggle levers 18 at an angle so that, after a long time of working and wearing away of the notching parts, reliability of operation of the device is insured.

While the preferred mechanical embodiment of the invention has been illustrated and described it will be understood that various changes and modifications may be adopted without departing from the scope of the invention as set forth in the appended claims.

What I claim as new and desire to secure by Letters Patent of the United States, is,—

1. A notching device for rotatable electric switches having a plurality of definite positions comprising a disc having notches in the periphery thereof, a movable pawl for cooperating with the notches in said disc to maintain the rotatable electric switch in each of said definite positions, a spring for biasing the pawl into engagement with said notches, and a toggle lever mechanism connected at one end with said pawl and at the other end with a fixed support and at the center with said spring whereby the biasing force of the spring exerted upon the pawl is increased when the pawl enters each notch.

2. In combination, a member movable between a plurality of definite positions and having notches therein corresponding to said positions, a notching pawl cooperating with said notches to vary the force required to move the member to and from said positions, and means for biasing the pawl into engagement with the notches in said movable member, said biasing means including means for increasing the bias when the pawl enters a notch.

3. In combination, a switch element movable between a plurality of definite circuit controlling positions, a member movable therewith and provided with notches therein corresponding to said positions, a notching pawl cooperating with said notches to vary the force required to move the switch element to and from said circuit controlling positions, a spring for biasing the pawl into engagement with the notches in said member, and mechanism for controlling the biasing force of said spring to increase the bias when the pawl enters a notch.

4. A notching device for controllers rotatable between a plurality of definite circuit controlling positions, comprising a rotatable member having notches in the periphery thereof corresponding to said definite circuit controlling positions, a notching pawl cooperating with said notches to vary the force

required to rotate the switch member to and from said definite circuit controlling position, a spring for biasing the pawl into engagement with said notches, and a leverage transforming mechanism associated with the spring for increasing the biasing force acting upon the pawl as the pawl enters the notches.

In witness whereof, I have hereunto set my hand this 16th day of October, 1928.
EMIL FALCKE.