Dec. 27, 1927. 1,653,941

C. A. BROWN

ELECTRICAL SWITCH

Filed March 8, 1926

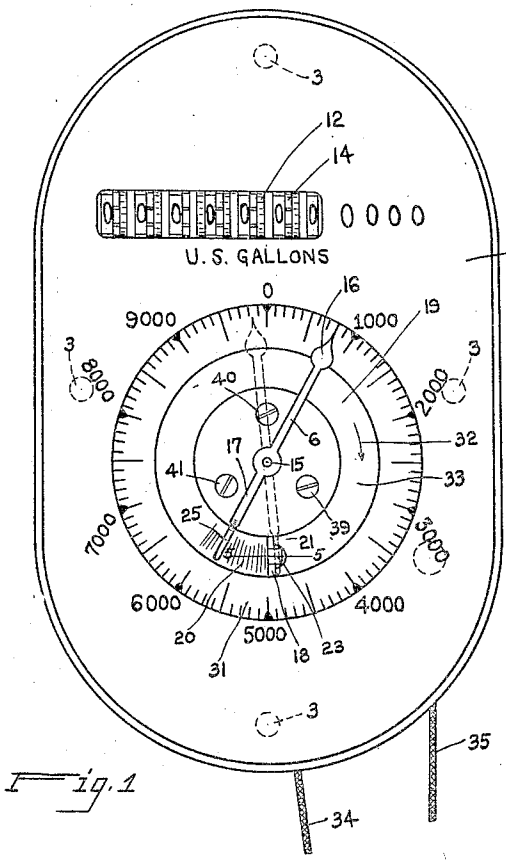

Fig. 1

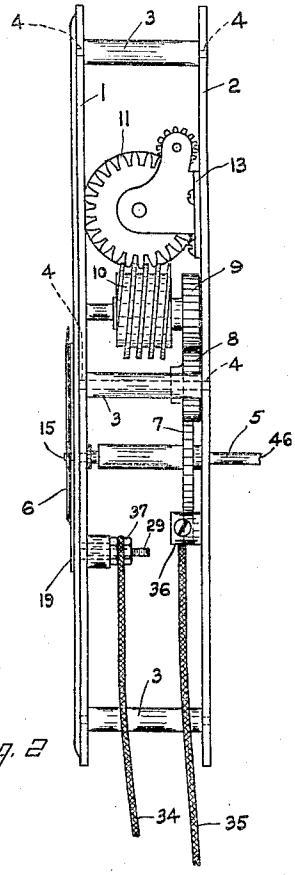

Fig. 2

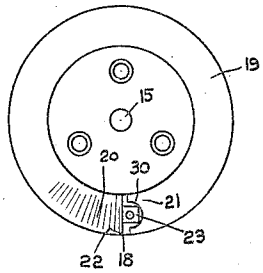

Fig. 4

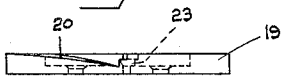

Fig. 3

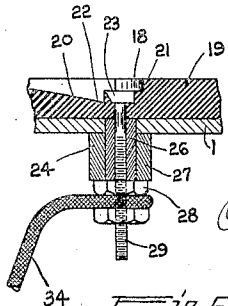

Fig. 5

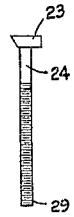

Fig. 6

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UNITED STATES PATENT OFFICE.

CHARLES ARTHUR BROWN, OF LORAIN, OHIO.

ELECTRICAL SWITCH.

Application filed March 8, 1926. Serial No. 93,031.

My invention relates to electrical switches and relates more particularly to those types of electrical switches wherein it is desired to operate a set of electrical contacts quickly, so that sparking at the contacts will be reduced.

An object of my invention is to accomplish the breaking of an electrical circuit quickly to prevent the undue "arcing" at the contacts, which would otherwise occur where the contact elements separated more slowly.

Another object of my invention is to accomplish a closure of an electrical circuit by the continued application of effort of low torque value tending to close the contacts.

Another object of my invention is to accomplish a momentary closure of an electrical circuit which will be positive, though of short duration, and in which the making and breaking of the contacts effecting the closure will be positively and quickly accomplished.

Another object of my invention is to produce an electrical contact mechanism which will be capable of being efficiently operative by indicating apparatus with a minimum of effort, and in which the movements effecting the closure of the contacts may be effected at a very slow rate, but in which mechanism, nevertheless, the movement of the parts at the contact operating period will be rapid.

Other objects of my invention and the invention itself will be apparent from the following description of an embodiment of my invention, in which description, reference will be had to the accompanying drawings forming a part of this specification, and in which drawings is illustrated an embodiment of my invention as applied to a liquid meter mechanism, for the purpose of closing an electrical circuit at certain points in the operation of the meter mechanism when it records a predetermined amount of liquid flow.

Referring to the drawings:

Fig. 1 shows a plan view of the said embodiment of my invention;

Fig. 2 shows an elevational view of the said embodiment;

Fig. 3 shows a side elevational view of an insulating cam element comprised in the said embodiment;

Fig. 4 is a plan view of the said cam element;

Fig. 5 is an enlarged view in section, of a portion of the said insulating cam and electrical contact provided in a face thereof, together with a portion of the mounting therefor, and electrical connection means associated therewith; and

Fig. 6 is a view of the electrical contact element with an integral stem of Fig. 5.

Referring now to all of the figures of drawing, in all of which like parts are designated by like reference characters, at 1, I show a face plate and at 2 a back plate, of a recorder of liquid flows, the said plates being suitably joined together by spacing rods 3, which preferably have reduced ends, such as 4, riveted over at their heads to retain the plates on the said reduced ends. At 5, I show a driving rod, herein shown as broken off at 46, but which would be joined at a portion beyond the point 46 to a driving element of a liquid flow meter so that rotative movements of the rod 5 will be commensurable at all times with the amount of liquid flow passing the meter.

At 7, 8, 9, 10 and 11, I show a train of gear pinions adapted to drive the pinion 11 from the rod 5 to operate the odometer shown generally at 12. The odometer and its driving connections are no part of the present invention and will not be described in detail. The odometer portion, however, is secured by its face plate 13 to the back plate 2 and presents its numeral carrying disks to view through an opening 14 in the face plate 1 of the mechanism. The rod 5 has a reduced end 15 projected through an opening in the face plate 1 and rigidly secured thereto. Adjacent the end of the reduced portion of the rod 5, I affix a pointer hand 6 having a scale division pointer arm 16 and a rearwardly extending electrical contact arm 17. Secured to the front of the face plate 1 by machine screws 39, 40 and 41, I provide an insulating cam element 19, the said insulating cam element having a recessed face 20 disposed within an outer raised cam face 21 of annular form and whose outer surface is in the form of a helix.

In that portion of the description following, relating to the insulating cam element 19, the contact arm 6 and associated parts, the description will be given, using the terms "upper and lower", "up and down" and the like, under the assumption that the mechanism is placed in a position wherein the face

plate 1 is horizontal. With this in mind, the upper surface of the insulating element 19 is in the form of a helix, the helix having its lowermost portion at 22 and its most elevated portion at 21. Intermediate the portions 22 and 21, I provide a step surface 18 which is elevated relative to the surface portion 22 of the insulating element and preferably equally depressed from the surface portion 21 thereof. The step 18 is preferably faced at 23, as shown, with an end of an electrical contact element and having its body portion embedded in the insulating material of the element 19 and having an integrally joined stem 24 projecting therefrom through the face plate 1 but insulated therefrom by a bushing 26 and an outer bushing 27 concentric therewith, the contact 23 being secured in its place by means of a clamping nut 28 screw threaded upon the threaded end 29 of the stem 24. The insulating portions of the step 18, disposed laterally of the contact 23, have their surfaces preferably depressed slightly from the surface of the contact 23. At 30, I cut away an end portion of the annular helix of greatest height to permit the proper placement of the contact 23, a portion of the contact 23 being disposed between the forks of this portion of the insulated helix. At 25, I provide a depressed contact portion for the arm 17 of the indicator hand 6 and which portion, at all times, is spring pressed by the power of the inherent resiliency of the metallic spring material, of which the hand 6 is preferably made, against the upper helical surface of the insulating element 19. This accomplished by giving the hand 6 a normal form wherein the contact end 25 would be deflected downwardly to a greater extent than is the case when, secured upon the reduced end of the rod 5, it bears upon the upper surface of the insulating element 19.

In Fig. 1 is shown one of the rotative positions of the indicator hand relative to the scale 31, affixed to the face plate 1 extraperipherally of the annular insulating element 19 and relative to the contact 23. In this position no electrical contact would be had between the contact portion 25 of the hand and the contact 23. The direction of rotation of the hand is herein assumed to be that indicated by the arrow 32. However, when the hand is rotated by the mechanism driving the rod 5 to an indicating position, where it points to a point just in advance of the point marked "0", the contact portion 25 will have moved upwardly, being propelled on the upwardly ascending helical surface to a point indicated by dotted lines in Fig. 1, riding upon, at the time, the most elevated portion 21 of the helical surface of insulating material.

Although the position of the contact portion 25 is above that portion of the contact 23, which lies between the forks of the annular track, which is designated by the reference numeral 33, no electrical contact is had therewith, since the contact portion 25 will be maintained elevated by resting upon the elevated fork portions.

Now, assuming a continued movement of the point or hand in a clockwise direction, indicated by the arrow, the contact portion 25 thereof will be brought to the brink of the precipice formed by the edge of the elevated portion of the helix, and by the inherent resiliency of the arm 17 of the hand, it will snap downwardly, making a quick, positive contact with the contact element 23. Likewise, being brought to the brink of the second precipice formed by the edge of the step 18, which comprises the contact 23, a second rapid spring pressed descent will be effected to cause the contact portion 25 of the hand 6 to snap to its lowermost position, wherein it will rest upon the surface indicated at 22 of the annular insulating cam element. Continued rotation of the hand will gradually raise the portion 25, moving it along the helical surface as before described and with the above operation repeated.

I find that by varying the length of the step 18, I may prolong the period of contact had between the hand 6 and the contact 23, or, as illustrated, by making this very short I secure but momentary contact between these elements, the contact being made and then immediately broken, both actions being simultaneous, extremely rapid and without involving any undesirable degree of sparking at the contacts upon the making or breaking of the circuit, even though circuit conductors 34 and 35 are connected to the frame of the mechanism, and thereby to the hand 6 and to the electrical contact 23, respectively, by a suitable electrical connecting post shown at 36 for the conductor, and by a machine nut 37 adapted to clamp the circuit conductor 34 to the threaded end 29 of the stem 24 for the contact 23.

Having described my invention in a specific embodiment, I am aware that the same is capable of being embodied in structures varying in width from that herein illustrated and described but comprised within the scope of my invention, being of the spirit thereof.

What I claim is:

1. In an electrical switching mechanism, the combination with a rotatable driving element for the switch, a resilient metallic blade secured thereto, an element of insulating material having an outer cam surface upon which a portion of the said blade is pressed and rides whenever rotative movements are imparted to the blade, said blade exerting a constant spring pressure upon the

said cam surface and being rotatable in a direction whereby its contacting portion is elevated to increase such spring pressure, said cam surface having its most elevated and most depressed portion joined by a step surface intermediate thereof, an electric contact element comprising a portion of the said step, said most elevated portion having a precipice edge adjacent the step, said step having a precipice edge adjacent the said most depressed cam portion, a contact portion of the said blade, upon rotative movements imparted thereto, adapted to snap over the precipices consecutively.

2. In an electrical switching mechanism, the combination with a rotatable driving element for the switch, a resilient metallic blade secured thereto, an element of insulating material having an outer cam surface upon which a portion of the said blade is pressed and rides whenever rotative movements are imparted to the blade, said blade exerting a constant spring pressure upon the said cam surface and being rotatable in a direction whereby its contacting portion is elevated to increase such spring pressure, the opposite end of the blade is provided with a pointer projecting beyond the cam surface over a scale disposed extraperipherally thereof, the most depressed and most elevated portions of the cam surface being disposed closely adjacent, an electrical contact element comprising a portion of the said step, said most elevated portion having a precipice edge adjacent the step, said step having a precipice edge adjacent the said most depressed cam portion, a contact portion of the said blade, upon rotative movements imparted thereto, adapted to snap over the precipices consecutively.

3. In an electrical switch, the combination of a rotatable arm with two ends, one of which constitutes a hand to indicate the fraction or whole of a revolution of said hand, the other constituting a spring electrical terminal in contact with and revolving over an insulating element, said insulating element having, at a point in its periphery, a short inclined plane rising above the mean level of the insulating element, up which the spring electrical terminal must travel and from which it must snap instantaneously off onto a short horizontal plane in which is embedded a second electrical contact and across which second electrical terminal the traveling spring electrical terminal must brush after such instantaneous contact has been made, thus keeping both terminals clean, the traveling spring electrical contact then snapping off instantaneously from the imbedded terminal onto a lower inclined plane in the insulating element, from which it travels back up to the mean level of the insulating element, thus making and breaking electrical contact instantaneously, keeping both terminals clean and preventing electrical arcing between terminals.

In testimony whereof I hereunto affix my signature this 1st day of March, 1926.

CHARLES ARTHUR BROWN.