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CIRCUIT CLOSER

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This invention relates to certain new and useful improvements in signaling apparatus and the circuit closer thereof.

The main object of the invention is the production of a signaling apparatus in which the tone emitted is readily and easily varied in accordance with particular adjustable settings and preferably also in accordance with the extent of actuation of the circuit closer.

Another object of the invention resides in the production of a unitary circuit closing device, capable of ready relative adjustment of certain of its parts whereby the current flowing in the circuit including the circuit closer is varied and the horn or signaling device may be caused to emit tones of desired and varied amplitude and pitch.

Further, a circuit closer capable in circuit relation of accomplishing the advantages described above, but in the preferred form of which not only a predetermined varied tone, amplitude and pitch may be produced at particular positions of adjustment, but also the maximum tone, amplitude and pitch may be produced at any position of adjustment by a greater degree of pressure on the movable element of the circuit closer.

Other objects and advantages relate to the details of the structure of the circuit closer and the parts thereof and their particular relative association and arrangement, all as will more fully appear from the following description, taken in connection with the accompanying drawings, in which:—

Figure 1 diagrammatically illustrates a signaling apparatus of this invention.

Figure 2 is a perspective view of a circuit closer of this invention.

Figure 3 is a section on line 3—3, Figure 2.

Figure 4 is a section on line 4—4, Figure 3.

Figure 5 is a section similar to Figure 3 of a modified form of structure.

Figure 6 is a section on line 6—6, Figure 5.

The apparatus of this invention in its preferred relation includes an electric signaling instrument of the character used on automobiles usually including a diaphragm either actuated by an electric magnet motor or a

rotary electric motor connected in circuit with a source of potential, as a battery, such circuit including a switch or circuit-closer. In this assembly, the switch is of such an operative character that it may be readily adjusted to vary the current flowing in the circuit to the signaling instrument prior to, during or after actuation of the switch, to close the circuit, to thereby vary the pitch or amplitude of the note or tone emitted by the signaling instrument, and preferably combined with means for causing the maximum current to flow in the circuit at any of the adjusted positions of the circuit closer at the will of the operator.

In Figure 1 there is diagrammatically illustrated an assembly of this character comprising a signaling instrument —1— of the electrically actuated diaphragm type, a circuit connecting one terminal of the instrument to a source of potential, as battery —2—, the other pole of the battery being connected to one terminal of the circuit closer —3—, the other terminal of the signaling instrument being connected to the other terminal of the circuit closer, or such terminals being preferably grounded as indicated.

The circuit closer of this invention in its preferred form is illustrated in Figures 1 to 3 and includes a cup-shape casing —4— preferably of substantially circular form in horizontal cross-section and formed with a central depending boss —5— preferably of cylindrical form. This casing is formed of conducting material, such as sheet metal. The entire inner surface of the casing —4— is lined with an insulating sheet or layer —6— of suitable material, such as mica or the like and which may be formed in sections, if desired, and the boss —5— is adapted to receive an insulating tube —7— of material such as phenol condensation product which fits tightly within the boss and has a reduced portion —8— extending upwardly into the casing —4— through the layer —6— of insulating material which rests upon the upper surface of the shouldered portion at the juncture of the parts —7— and —8—. Within the casing —4— are positioned two substantially sector-shaped plates —9— and —10— of

sheet metal or the like, and formed at their inner ends with openings through which the upwardly projecting reduced portion —8— extends, the plates —9— and —10— being in effect journaled upon the part —8—.

These plates are formed with vertically extending flanges —11— and —12— respectively resting against the inner surface of the vertical wall of the insulating lining or sheet —6— while the plates —9— and —10— rest upon the horizontal portion of said lining, whereby the plates and their flanges are completely insulated from the casing —4—. These plates —9— and —10— are further formed with inwardly extending vertically disposed flanges —13— and —14—, in this instance disposed somewhat radially of the casing —4— and spaced apart a distance to receive between them a resistance element —15—, in this instance in the form of a coil of wire, the axis of the coil being preferably concentric with the casing —4—, and resting upon and against the insulating lining —6—, and in this illustration extending around within the casing —4— a distance somewhat greater than one-third of the circumference of the casing, altho the length and form of the resistance may be varied, as desired.

One end of the resistance —15— may, as shown, be connected to one of the flanges, as —14— by projecting one end —16— of the wire constituting the resistance, through an opening provided for that purpose in the flange —14— and soldering it there, if desired, while the other end of the resistance —15— is separated from the flange —13— by an insulating plate or strip —17— and the end —18— of the resistance is extended downwardly through the insulating sheet —6— and electrically connected to the casing —4— in any suitable manner, as projecting it into an opening in the casing and securing therein by solder, or otherwise.

The two plates —9— and —10— are maintained in position with their flanges —13— and —14— confining and compressing the resilient resistance element —15— in proper position by a non-conducting spacing bar —60— engaging tongues —61— and —62— respectively formed adjacent the ends of the flanges —11— and —12—.

The insulating tube —7— is preferably internally threaded for the reception of an externally threaded tubular sleeve —19— of metal or other conducting material, and formed with a head —20— at its upper end spaced from the reduced upper portion —8— of tube —7— by an insulating disk —21—, which disk also insulates the head —20— from the inner ends of the plates —9— and —10—. The sleeve —19— has its upper end internally threaded for the reception of the reduced lower end of the conducting metallic post —22— which is externally threaded for that purpose, and the shoulder at the reduced

portion is adapted to contact with the upper surface of the head —20— so as to limit the extent to which the post —22— may be threaded into the sleeve —19—.

The post —22— is likewise formed with a head or enlarged portion —23— at its upper end which rests against the flanged upper end —24— of a metallic conducting sleeve —25—. This sleeve —25— is tightly fitted in or imbedded in an insulating cap —26— of bakelite or other material, formed with a substantially central shouldered opening or conduit —27—, the shoulder formed on sleeve —25— at the head —24— engaging the shoulder —28— in the conduit —27— and the head —24— tightly fitting the larger portion of the conduit while the sleeve —22— tightly fits that portion of the conduit of lesser diameter. The cap —26— when desired, may be molded around the sleeve —25— and the post —22— is of a diameter adapted to fit tightly within the sleeve. The cap —26— includes a circumferential flange —29— of an internal diameter slightly greater than the external diameter of the casing —4— so as to extend downwardly around the casing in substantially tight relation and protect the same against the entry of water, foreign matter, etc.

The cap —26— is normally maintained at its limit of upward movement with the upper surface of flange —24— in contact with head —23— by means of a coil spring —30— surrounding the sleeve —25— and bearing at its lower end against the head —20— upon the tubular sleeve —19— and its upper end against conducting disk —31— bearing against the lower surface of the cap —26—. The under surface of the cap —26— is further provided with a substantially circular metallic contact disk —32— secured to the cap in any suitable manner as by screws —33—, which in this illustration, are positioned at the base of a contact tongue —34— cut out from the disk —32— and bent downwardly therefrom, as perhaps best indicated in Figure 3, so that the end of the contact tongue —34— lies adjacent the resistance —15—, but is normally spaced a slight distance therefrom.

The tubular sleeve —19— is adapted to receive a circuit wire indicated in dotted lines, which may be secured therein in any suitable manner, as by set screw —35—. The case —4— is adapted to be grounded upon any suitable portion of the vehicle in any manner desired.

The operation of the structure will be readily understood. The current entering through wire —36—, indicated in dotted lines Figure 3, passes through sleeve —19— to post —22—, sleeve —25— and contact plate —32—, and contact tongue —34—. When the cap —26— is depressed, sleeve —25— sliding along post —22— a sufficient distance to

bring contact tongue —34— into contact with the resistance —15—, current will flow through such portion of the resistance as may be necessary to the end —18— where it is grounded upon the casing —4—. The amount of current flowing in the circuit will be determined by the resistance through which it is necessary for the current to flow in order to reach the casing —4—. Obviously, therefore, when tongue —34— contacts with the resistance —15— at a point near the end —18—, the resistance offered to the flow of the current will be very slight. On the other hand, when cap —26— is rotated so as to carry contact tongue —34— along the resistance towards the end —16—, the resistance to the flow of current in the circuit increases, dependent upon the extent of such movement and the tone which it is desired to produce in the horn can be predetermined by properly positioning the contact tongue —34— at the desired point along the resistance —15—.

However, in the construction of Figures 1 to 3, the resistance may be entirely cut out and the full tone of the horn produced at any position of the contact finger —34— by pressing cap —26— downwardly until some portion of the disk —32— comes into direct contact with the casing —4—, at which time the current will flow directly from the disk to the casing without passing through the resistance —15—.

Obviously, therefore, the circuit closer may be set to produce any desired horn tone within predetermined limits, and may be varied at any time, if desired, even while the circuit is closed to produce a varying tone, and by additional pressure at any predetermined position, the full tone of the horn may be obtained. In Figures 5 and 6 a slightly modified form of structure is shown in that the additional and preferred construction involved in Figures 1 to 3, and by which a maximum tone can be obtained at any position of the contact finger —34— is omitted.

In Figure 5 the metallic casing —37— is of similar form and construction with the casing —4—, and is formed with a similar boss —38— adapted to receive a similar tube —39— of insulating material which preferably terminates at the upper end of the boss —38— and the insulation lining or sheet —40— extends across the upper end of the tube —39— into contact with the metal sleeve —41— threaded into the tube —39—.

In this structure, the two plates —9— and —10— instead of being formed separately, are formed of a single piece of material, or as a single metal plate —43— having a central opening journaled on the sleeve —41— and positioned between the head —42— of the sleeve and the insulating lining —40—, which insulates the plate —43— from the casing —37—. This plate is formed with a vertical-

ly extending arcuate flange —44—, in this illustration extending throughout substantially the entire circumference of the plate and rising against the insulating lining —40— and formed at its ends with the opposed inwardly extending flanges —45— and —46—, between which the resistance —47— is confined.

One end —48— of the resistance is connected to the plate —43— by having such end extended through an opening provided for that purpose in the flange —45—. The opposite end of the resistance —47— is insulated from the flange —46—, as by insulating disk —49—.

The metal post —50— has its lower reduced end threaded into the upper end of the sleeve —41— and its headed upper end —51— is positioned in the enlarged portion of conduit —52— extending through the cap —53— and is preferably spaced from the shoulder —54— formed between the two portions of the conduit —52— which are different sizes, as by washer —55— tightly fitted in or imbedded in the cap —53—. These caps, as stated, are preferably formed of some moldable material, such as phenol condensation product or the like. The portion of conduit —52— of reduced size is of a diameter adapted to just receive the post —50— so that the cap may slide on the post, and spring —56— is interposed between the head —42— on sleeve —41— and the under surface of the cap —53—. In this illustration, the cap is formed with a conducting contact disk —57— on its under surface and the contact tongue —58— is formed of a separate piece of metal secured to the contact disk —57— and to the cap —53— in any suitable manner, as by screws —59—.

In this illustration, the metal contact finger —58— may be at all times in contact with the resistance —47—, as illustrated, or may be slightly spaced therefrom as illustrated in Figure 3, for the reason that with this structure, the circuit is never closed until the contact disk —57— is brought into contact relation with the casing —37—.

With this structure, the contact finger —58— by rotation of cap —53— may be brought to the desired position along resistance —47—, and then by pressure upon cap —53— it is slid along post —50—, bringing disk —57— into contact with the upper edge of casing —37—, the circuit is closed to permit the predetermined desired amount of current to flow therein in the following manner:—

Current flows from wire —36— to the plate —43— and thence to resistance —47—. From resistance —47— current flows to contact finger —58— and thence to contact disk —57— and then to casing —37— and the ground. In this structure the post is not electrically connected to the contact disk —57—.

Obviously the position of the contact finger —58— may be adjusted or varied while the circuit is closed to produce a varying tone, but the maximum tone can only be obtained by moving contact finger —58— to a position where there is a maximum of the resistance —47— included in the circuit.

Altho we have shown and described specific structure and parts thereof and particular assemblage and relation of the elements, some of which are preferred as constituting embodiments of our invention, we do not desire to limit ourselves to the details of form, construction or arrangement of the structures or parts thereof, as various changes and modifications may be made in the same without departing from the scope of the invention as set forth in the appended claims.

We claim:

1. A circuit closer including a casing, an insulation lining within the casing, a resistance within the lining, a cap secured to the casing for rotary and axial movement, a disk contact secured on the under surface of the cap, a contact finger electrically connected to the disk contact and extending below it and rotatable with the cap to vary its position with respect to the variable resistance contact, a circuit closing relation between the contact finger and the variable resistance and also between the disk contact and the casing being accomplished by axial movement of the cap.

2. A circuit closer including a casing, an insulation lining within the casing, a resistance within the lining, a cap secured to the casing for rotary and axial movement, a disk contact secured on the under surface of the cap, a contact finger electrically connected to the disk contact and extending below it and rotatable with the cap to vary its position with respect to the resistance, said contact finger being also movable with the cap during axial movement of the latter to close the circuit at various points along said resistance, and the said disk contact adapted to be brought into circuit closing relation with the casing by further depression of the cap to short circuit the resistance.

3. A circuit closer comprising a casing, an insulation lining within the casing, an elongated variable resistance arranged within the insulation lining and having one end electrically connected to said casing, a contact finger movable along said variable resistance, a cap movably connected to the casing, said contact finger and variable resistance being brought into circuit closing relation by axial relative movement of the cap and casing, and an additional contact carried by the cap adapted to be brought into circuit closing relation with the casing by further axial movement of the cap after the contact finger is in circuit closing relation

with the variable resistance to thereby short-circuit the variable resistance.

4. A circuit closer comprising a casing, an insulation lining within the casing, a contact in the form of an elongated coil of wire arranged within the insulation lining, flanged plates within the insulation lining for confining said coil, a cap connected to the casing for axial movement, a contact finger carried by the cap, and a contact carried by the cap, said contact finger and contact adapted to be brought into circuit closing relation with said coil and said casing respectively by axial movement of the cap with respect to the casing, the circuit closer between the contact and the casing effecting the short circuiting of the coil.

5. A circuit closer comprising a casing, an insulation lining within the casing, an elongated variable resistance arranged within the insulation lining and having one end electrically connected to said casing, a cap movably connected to the casing, a contact finger carried by the cap and movable along said variable resistance, said contact finger and variable resistance being brought into circuit closing relation by axial movement of the cap in relation to the casing, and a second contact carried by the cap and adapted to be brought into circuit closing relation with said casing by a further axial movement of said cap to short circuit said variable resistance.

In witness whereof we have hereunto set our hands this 5th day of May, 1926.

WILLIAM SPARKS.
LLOYD E. JOHNSON.