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CIRCUIT BREAKER

Filed Jan. 19, 1926

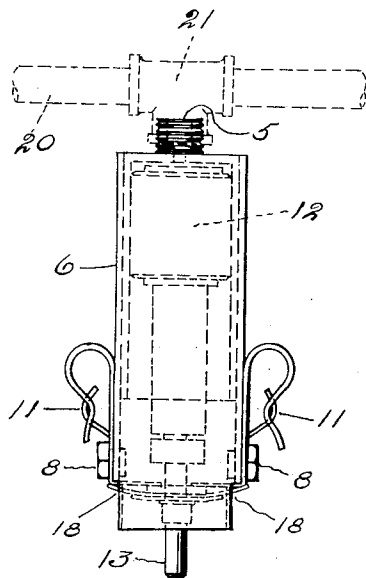


Fig. 1

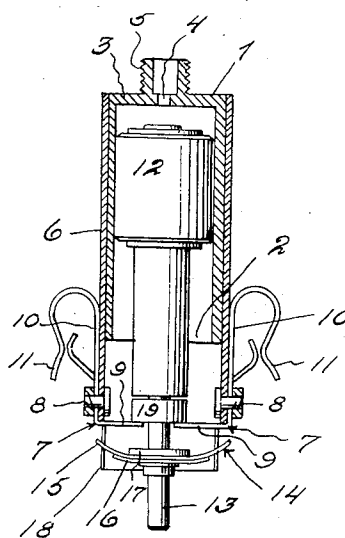


Fig. 2

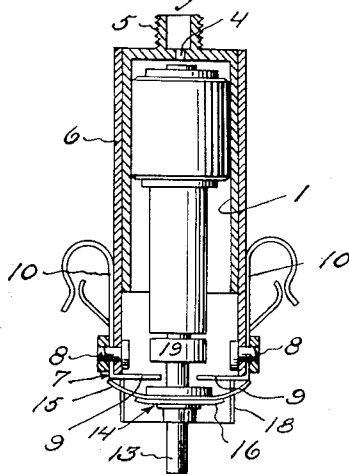


Fig. 3

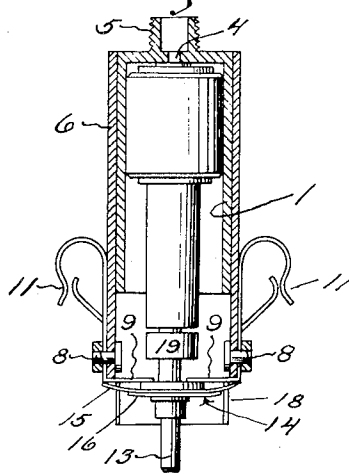


Fig. 4

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CIRCUIT BREAKER.

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This invention relates to circuit breakers, particularly to those intended for or capable of use in connection with the ignition circuit of an internal combustion motor and in fact to any electrically driven device as, for instance, an electric refrigerator, air compressor or the like.

The principal object of the invention, generally stated, is to provide a device which will act automatically to break the ignition circuit of an internal combustion engine, the circuit between a generator and storage battery charged thereby, or in fact any other similar circuit, in the event that the motor or other operating device stalls or fails or in case the ignition switch is left turned on for any reason.

The object of the invention, more specifically stated, is to provide a circuit control device pneumatically actuated by suction produced in the motor, or other similar mechanical device, the arrangement being such that in case the motor chokes or otherwise stalls while the ignition switch is turned on, the failure of suction will result in breaking of the circuit so that there can be no possible discharge of the storage battery back through the generator, the device consequently acting to replace the ordinary automatic cut-out or relay now employed.

Another object of the invention is to provide a circuit controller which may be interposed in the ignition circuit, battery charging circuit, or the like and which will remain in circuit closing position as long as the motor or other device is in operation and which will, moreover, be moved or thrown into circuit closing position when the motor is initially turned over by hand or by a starter to a sufficient extent to bring the pneumatic action into play.

A still further object of the invention is to provide a circuit controller of this character which, on account of its peculiar arrangement and action, will operate to prevent backfiring of the motor.

An additional object of the invention is to provide a device of this character which will be simple and inexpensive to manufacture and install, automatic and positive in action, efficient and durable in service, and a general improvement in the art.

With the above and other objects and advantages in view, the invention consists in the details of construction and arrangement

of parts to be hereinafter more fully described and claimed, and illustrated in the accompanying drawings in which:

Figure 1 is an elevation of the complete device showing it in circuit closing position,

Figure 2 is a longitudinal section showing the parts in circuit breaking position,

Figure 3 is a longitudinal section with the circuit closed by means of the primary contacts,

Figure 4 is a similar view showing the circuit closed by means of the primary and also the secondary contact means.

Referring more particularly to the drawings, we have shown the device as comprising a cylinder 1 of any desired size, shape and material and capable of being mounted by any preferred means at any suitable location but preferably, though not necessarily, in a vertical position. One end of this cylinder is open as indicated at 2 while the other end 3 is closed except for a relatively small hole 4 surrounded by an externally threaded boss or flange 5.

The cylinder 1 carries a support 6 of insulating material which in the present instance is shown as consisting of a sleeve surrounding and suitably secured to the cylinder though it is obvious that variations in this respect may be made inasmuch as the purpose is to provide supporting and insulating means for a pair of contacts 7 which are oppositely arranged and which may be riveted or otherwise suitably secured as indicated at 8 upon that portion of the support 6 which projects beyond the cylinder. In the present instance these contacts 7 are shown as of angular form, including portions 9 which extend toward each other and which terminate short of the longitudinal axis of the cylinder and support 6, the contacts further including elongated portions 10 located outwardly of the support 6 and constructed similarly to Fahnestock clips 11 which constitute efficient terminal means or attaching means whereby the conductors of an ignition or other circuit may be connected so that the device may be interposed in the circuit to be controlled. Quite clearly, any equivalent terminal means might be provided within the scope of the invention.

Slidably mounted within the cylinder 1 is a piston 12 of any suitable or preferred construction, the piston having a reduced portion or stem 13 here represented as pro-

jecting beyond the support 6, though the length is immaterial, within certain limits. The stem 13 carries a transversely arranged spring contact structure 14 here disclosed as preferably consisting of plural leaves 15 and 16 secured upon the stem in any suitable manner and preferably of curved shape as clearly indicated in the drawings. The stem also carries a disk or other metallic element 17 preferably engaging the spring. The spring and disk are located outwardly of the contacts 7 and the end portion of the support or sleeve 6 is slotted at opposite points as indicated at 18 for the accommodation not only of the contact arms 9 but also to provide guide means for the spring contact, the spring being consequently maintained opposite to or in alinement with the contacts as will be readily understood. Inwardly of or above the contacts 7 the piston stem carries a block, disk or other element 19 of insulating material which will engage upon the contacts when the piston 12 is in lowered position.

In installing the device, it is intended that the boss 5 be connected with the vacuum line in case the device is employed in connection with an internal combustion motor or other device in which use is made of a vacuum tank. In Figure 1 I have illustrated a vacuum pipe 20 having a T 21 thereon connected with the boss or nipple 5. In case there is no vacuum tank used in connection with the motor or other device being controlled, it is a simple matter to tap the pipe 20 into or otherwise connect it with the intake manifold of the motor, or with an equivalent part of an analogous device. The whole idea is to produce suction within the cylinder when the motor or other device is in operation.

Assuming that the device has been constructed and installed as above indicated and as illustrated, it will be apparent that when the motor is at rest the piston 12 will be in lowered position as indicated in Figure 2, gravity accomplishing this action, though if desired spring means might be provided interposed between the piston and the adjacent end 3 of the cylinder for making the action certain and positive. At such a time it will be observed that the spring member 14 will be out of engagement with the contacts 7. If the device is used in connection with a motor these contacts are interposed in the ignition circuit so that when the spring member 14 is disengaged from the contacts the ignition circuit will be broken, thus preventing any possible discharge of current. The downward movement of the piston is limited by the stop 19 carried by the piston rod or stem, which stop engages upon the contacts 7. As this member 19 is of insulating material the circuit is of course open. When the motor is turned over by hand or by means of a starter, or while the motor is in operation, it is apparent that suction produced in the intake manifold will produce suction through the pipe 20 regardless of whether the latter form a part of the vacuum fuel feed system or whether it be a separate element connected with the manifold. Naturally, as the cylinder is connected with the pipe 20 there will be suction produced within the cylinder above the piston 12, resulting in upward movement of the piston and spring member 14 carried thereby. After the upward movement has continued for a short distance the ends of the spring leaves 15 will engage against the contacts 7 and as the upward movement continues the spring leaves will flex until the disk or other equivalent metallic member 17 comes into engagement with the arms 9 of the contacts 7. The initial circuit closing position is illustrated in Figure 3 and the final position is shown in Figure 4. The purpose in providing the metallic member 17 to bridge the contact arms is to insure thorough contact and to reduce likelihood of sparking with the resultant pitting and burning away of the contacting metal parts. Of course, when the spring structure 14 and disk 17 engage the contacts the ignition circuit is closed. In case the motor chokes or stalls from any other reason it is clear that there will be a cessation of suction so that the piston and parts carried thereby will drop, the circuit being thus automatically opened so that discharge of the storage battery or other source of current will be prevented even though the ignition switch may be left turned on.

While the specific details of construction are more or less immaterial it is preferable that the piston 12 be of such construction as to insure easy sliding movement while preventing leakage therearound and in actual practice this piston might be conveniently formed of graphite especially as that particular material has the advantage of being self-lubricating. It is of course true that alternative structures might be provided in this and other respects and there is consequently no limitation thereto.

While we have shown and described the device as particularly designed for use in connection with motors of the internal combustion type, its employment is not restricted to such use as we reserve the right to use the device for any purpose and in connection with any type of machine or apparatus having control or operating circuits. We also reserve the right to make all such changes in the details of construction and the form and arrangement of parts as will increase the adaptability and widen the field of utility of the device and make all modifications and variations which will constitute no departure from the spirit of the invention or the scope of the appended claims.

Having thus described the invention, we claim:

1. In a pneumatically operated circuit controller, a cylinder adapted to have suction producing means connected therewith, a piston movably mounted within the cylinder and adapted to be moved in one direction upon the application of suction to the cylinder, contacts mounted upon and insulated from the cylinder and provided with terminal means located exteriorly of the cylinder, a member of insulating material carried by the piston and engageable with the contacts for limiting movement of the piston in one direction, and a spring structure extending transversely with respect to the piston and carried thereby and adapted to engage and bridge said contacts upon movement of the piston in the other direction.

2. A pneumatically operated circuit control device comprising a cylinder adapted to have suction producing means connected therewith, a piston operating within the cylinder and having a stem, a support of insulating material mounted exteriorly upon the cylinder, contacts mounted on said support and including portions located exteriorly of the cylinder and constituting terminal elements, the contacts further including portions extending adjacent said stem, a member of insulating material carried by the stem and engageable with the second named portions of the contacts for limiting movement of the piston in one direction, and a metallic member carried by the piston and adapted to engage and bridge said contacts upon movement of the piston in the other direction.

3. A pneumatically operated circuit controller comprising a cylinder, a piston slidable therein and having a stem, a member of insulating material mounted upon the cylinder, contacts mounted upon said insulating member and including portions extending toward each other beyond one end of the cylinder and further including other portions formed as terminal clips located exteriorly of the cylinder, and a metallic member carried by said stem and adapted to engage and bridge said contacts.

4. A pneumatically operated circuit closer comprising a cylinder, a piston slidable therein and having a stem, a member of insulating material mounted upon said cylinder exteriorly thereof and projecting beyond one end thereof, said projecting end being formed with slots, contacts secured upon the exterior of said insulating member and having portions extending toward each other through said slots, a member of insulating material mounted on the stem and engageable with

said inwardly extending portions of the contacts for limiting movement of the piston in one direction, and a transverse metallic member carried by said stem and extending through said slots to be guided thereby, said element being adapted to engage and bridge said contacts upon movement of the piston in the opposite direction.

5. A pneumatically operated circuit closer comprising a cylinder, a piston slidably mounted therein and having a stem, a member of insulating material telescoped upon the cylinder and projecting beyond one end thereof, said projecting portion being formed with diametrically opposite slots extending longitudinally, contacts mounted exteriorly upon said insulating member and having inwardly directed portions extending through said slots toward each other, an insulating element on the stem engageable with said inwardly directed portions of the contacts for limiting movement of the piston in one direction, a disk carried by the stem at the opposite sides of said inwardly directed portions of the contacts and adapted to engage and bridge the same upon movement of the piston in the opposite direction, and an elongated metallic member of resilient nature carried by the stem and slidably mounted within said slots for engagement with the contacts.

6. A pneumatically operated circuit closer comprising a cylinder, a piston slidable mounted therein and having a stem, a member of insulating material telescoped upon the cylinder and projecting beyond one end thereof, said projecting portion being formed with diametrically opposite slots extending longitudinally, contacts mounted exteriorly upon said insulating member and having inwardly directed portions extending through said slots toward each other, an insulating element on the stem engageable with said inwardly directed portions of the contacts for limiting movement of the piston in one direction, a disk carried by the stem at the opposite sides of said inwardly directed portions of the contacts and adapted to engage and bridge the same upon movement of the piston in the opposite direction, and an elongated metallic member of resilient nature carried by the stem and slidably mounted within said slots for engagement with the contacts prior to the engagement of the disk therewith for cushioning the movement of the piston.

In testimony whereof we affix our signatures.

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