Sept. 29, 1942. K. GLÄSSING ET AL 2,297,403

CONTACT SYSTEM

Filed Dec. 8, 1939

Fig. 1

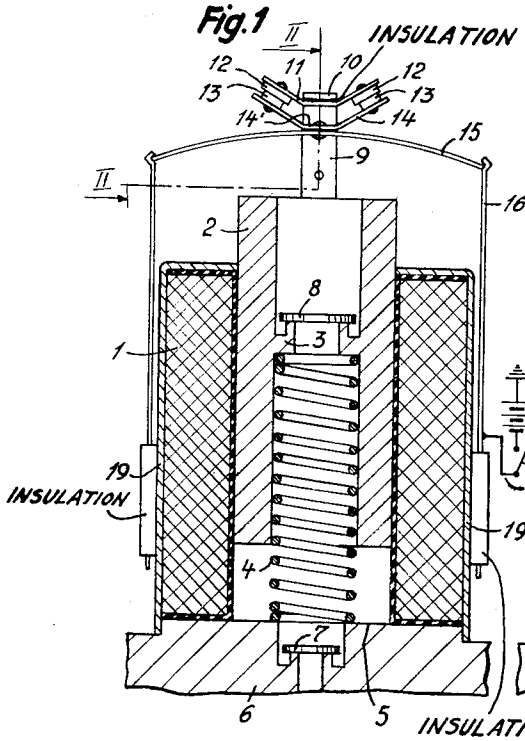


Fig. 2

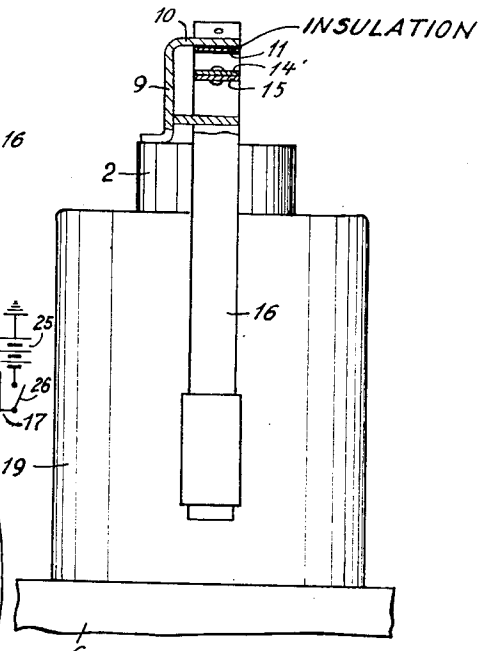


Fig. 3

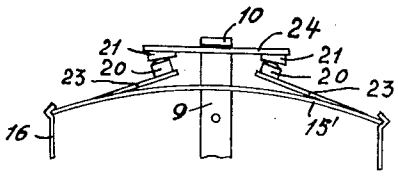
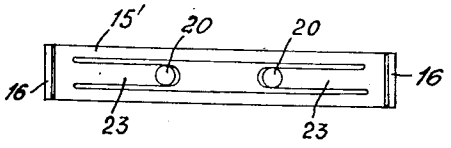


Fig. 4



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UNITED STATES PATENT OFFICE

2,297,403

CONTACT SYSTEM

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Application December 8, 1939, Serial No. 308,264
In Germany December 10, 1938

2 Claims. (Cl. 200—111)

This invention relates to a contact system of the type comprising a snap spring which carries a contact member for breaking and closing an electric circuit in accordance with the movements of an armature or other operating member. It has particular reference to contact devices for electromagnetically operated fuel feed pumps.

It is an object of the invention to provide a contact system ensuring reliable operation under any working conditions.

More particularly, it is an object of the present invention to prevent the detrimental effects of the deposition of particles of dirt from the fuel between the contact surfaces which in the known form of such pumps oftentimes cause undesirable interruptions of the current and of the operation of the pump.

With this and further objects in view, as may become apparent from the within disclosures, the invention consists not only in the structures herein pointed out and illustrated by the drawing, but includes further structures coming within the scope of what hereinafter may be claimed.

The character of the invention, however, may be best understood by reference to certain of its structural forms, as illustrated by the accompanying drawing in which:

Fig. 1 is a fragmentary central section through a fuel feed pump having the invention applied thereto.

Fig. 2 is an elevation and partial section of the pump, on the line II—II of Fig. 1.

Fig. 3 is a fragmentary elevation of a modification and

Fig. 4 is a plan view of said modification.

Similar reference numerals denote similar parts in the different views.

The invention contemplates the provision of two pairs of cooperating contacts instead of a single pair, arranged one behind the other, as viewed in the direction of a snap spring, by which one contact of each pair is carried, whereby the device remains operative, even when one pair of contacts is rendered inoperative by dirt preventing the establishment of an electrical current between its cooperating contact surfaces, as long as the second pair of contacts which is inserted in the same circuit, parallel to the first pair of contacts, remains operative.

Referring now to the drawing in greater detail, and first to Figs. 1 and 2, 1 designates a cylindrical magnet coil and 2 is an armature and pump piston mounted for sliding movement in a central bore of the coil. The pump piston in turn has a central bore with an inward flange 3, the lower face of which is acted upon by a helical spring 4 tending to move the piston upwardly. The lower end of the spring bears on a face 5 of a pump casing 6 which is shown in a fragmentary section. An inlet valve 7 is seated in a central bore of the base plate or casing 6 while a discharge valve 8 is seated on a collar of the inner flange 3. Mounted on the upper part of the piston 2 is an angle member 9, the top part 10 of which extends at right angles to the pump axis. A V-shaped holder 11 for two contacts 12 is secured to the lower side of the top part 10 and insulated therefrom. The laterally extending portions of the holder 11 are upwardly inclined and the contact pieces 12 are symmetrically mounted on its lower side. Associated with each contact piece 12 is a countercontact piece 13 secured to a V-shaped resilient holder 14 and engaging its associated contact piece 12 in the position shown in Fig. 1. The central portion 14' of the holder 14 is secured to a snap spring 15 whose ends are held in sockets or recesses formed by suitable bends of plate springs 16 which are secured to a sleeve or casing 19 surrounding the coil 1. One of the plate springs may be provided with a terminal (not shown) for connection to a source of current 25, through a feed wire 17 and switch 26.

Upon the upward stroke of the piston 2, the spring 15 snaps from its lower to its upper end position, whereby the contacts 13 on the snap spring 15 strike against the contacts 12 on the angle member 9 which advances or leads, following the stroke of the piston 2 to which it is connected.

The existence of two pairs of contacts 12, 13 offers the advantage that the operation of the device will not be interrupted if one of the pairs of contacts becomes inoperative due to the deposition of particles of dirt, since the second pair of contacts establishes a parallel or shunt connection, the active surfaces of the second pair of contacts being pressed together by action of the resilient carrier 14 or by the elasticity of the snap spring proper. On the other hand, since the contact surfaces are inclined relative to the direction of movement of the piston, any particles of dirt deposited on these contact surfaces are immediately rubbed off in an outward direction, as the contacts are being closed. An additional sliding of the contacts 13 relative to the contacts 12 may be caused by the resiliency of their carrier 14, whereby the removal of particles of dirt is promoted. As a result, dirty contacts

will be cleaned again at least after some strokes and the danger of intermitting of the pump is avoided.

A modification of the contact devices in accordance with the invention is shown in Figs. 3 and 4. In this modification, resilient tongues **23** are worked out of the snap spring **15**, for carrying contacts **20**, instead of the V-shaped carrier **14** and contacts **13** of Figs. 1 and 2. A contact carrier **24** which is secured to the member **10** carries counter contacts **21** on its underside, which advantageously are formed with an inclined active surface. The operation is the same as above described with reference to Figs. 1 and 2.

The method and apparatus of the present invention have been described in detail with reference to specific embodiments. It is to be understood, however, that the invention is not limited by such specific reference but is broader in scope and capable of other embodiments than those specifically described and illustrated in the drawing.

The general operation of electromagnetic fuel pumps of the type referred to in the specification is described in Glässing application Serial No. 263,574 filed March 22, 1939, now Patent No. 2,258,586, so that it will not be required to describe this pump operation in detail in this specification.

We claim:

1. A contact system for electromagnetic fuel supply pumps, comprising a snap spring, electromagnetic means for operating said snap spring, V-shaped resilient contact carrier means supported at the center of said spring, and two pairs of contact members for opening and closing the circuit of said electromagnetic means, one contact member of each pair being carried by said V-shaped carrier means on said snap spring and the other contact member of each pair being carried by said electromagnetic means, all of said contact members lying in the fuel stream passing through the pump, the contact members carried by said V-shaped carrier means being resiliently supported by and spaced apart longitudinally of said spring and arranged on the same side thereof, one on one side, and the other on the other side, of the center of the spring, whereby the contact surfaces of the snap spring contact members slide on the associated contact surfaces of the other contact members upon engagement therewith, said spring being free to yield independently of said operating means.

/2. A contact system for electromagnetic fuel supply pumps, comprising a snap spring adapted to be flexed in opposite directions, electromagnetic means for operating said spring, V-shaped resilient contact carrier means supported at the center of said spring, complementary V-shaped contact carrier means carried by said electromagnetic means, and two pairs of contact members for opening and closing the circuit of said electromagnetic means, one contact member of each pair being carried by said resilient V-shaped carrier means on said snap spring and the other contact member of each pair being carried by said carrier means carried by said electromagnetic means, all of said contact members lying in the fuel stream passing through the pump with their contact surfaces inclined relative to the direction of movement of said spring, the two contact members carried by the spring being spaced apart longitudinally of the spring and arranged on the same side thereof, one on one side and the other on the other side, of the center of the spring, said spring being free to yield independently of said operating means.

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