Nov. 15, 1955 C. W. KLOSTERMANN 2,724,096

SPRING LOADED BUTT CONTACT WITH INTERNAL CONTACTING SLEEVE

Filed Dec. 4, 1952

Fig. 1.

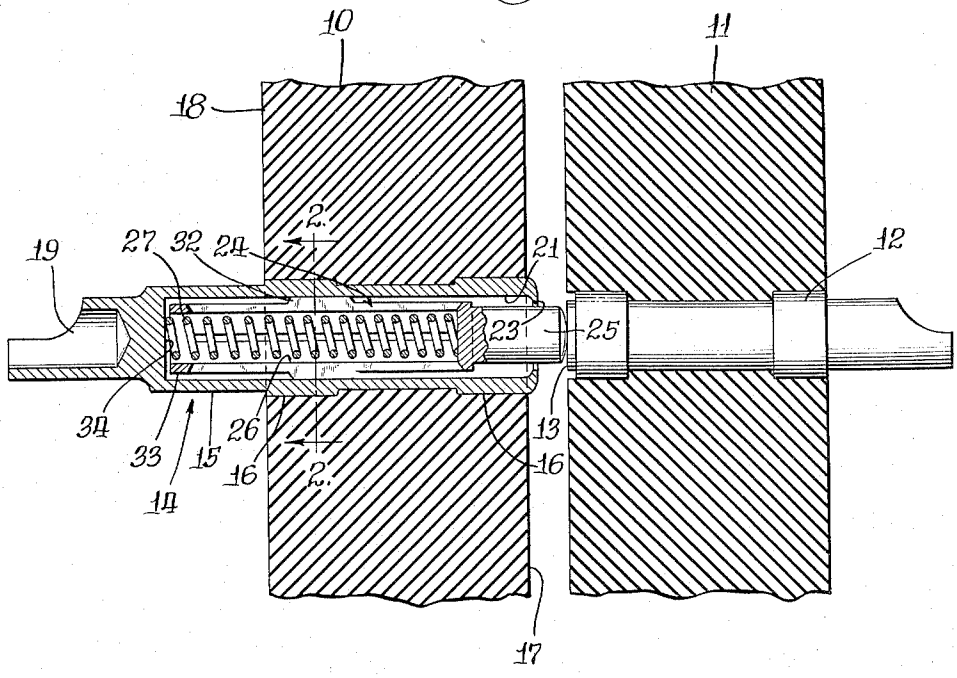


Fig. 2.

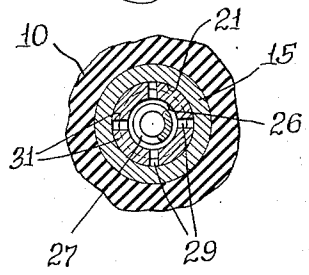
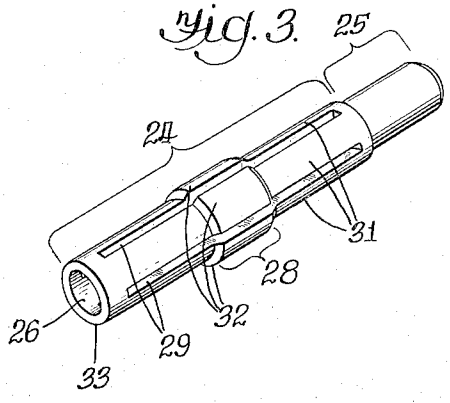


Fig. 3.



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SPRING LOADED BUTT CONTACT WITH INTERNAL CONTACTING SLEEVE

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1 Claim. (Cl. 339—255)

This invention relates to electrical contacts and, more particularly, to a specific form of butt-type contacts known in the trade as pressure contacts. These are distinguished from other contact types in that the connecting elements do not telescope within each other as is customary in the art, but are held in abutting engagement with each other by a pressure spring.

It is the general aim of the invention to provide a spring loaded contact assembly having an exterior housing joined to its conductor, with an internal sliding contact plunger which is capable of smooth mechanical sliding action with respect to the housing, yet which has a relatively intimate electrical union between the moving and stationary parts. In other words, it is an object to provide a structure capable of accomplishing smooth, positive sliding movement of a contact plunger within a mounting sleeve or housing, while maintaining a substantially constant low electrical resistance between the plunger and parts within which it slides.

A further object of the invention is the provision of a pressure type contact including a longitudinally spring urged plunger wherein the assembly includes means for limiting the compression of the spring, so that the spring will not be flexed beyond its elastic limit and cannot be easily distorted by excessive thrusts applied to the contact plunger.

It is a further object of the invention to provide a pressure contact so designed and constructed as to be comparatively free of microphonic effects, and to be of such design that the pressure spring utilized therewith does not form a part of the electrical circuit. This avoids unwanted inductive effects due to the coils of the spring, and prevents damage to the spring by overheating by electrical overload.

It is a further object of the invention to provide a sliding contact plunger and housing assembly comprising a relatively few parts, which may be conveniently and economically produced by mass production methods of manufacture.

These objects are accomplished according to the present teaching by the provision of a tubular slide housing and longitudinally shiftable spring urged plunger in a bore therein, with the plunger formed to include a relatively long guide portion including a plurality of individual contact portions having arcuate wiping surfaces precisely fitting the curvature of the housing bore, and in snug sliding engagement with the internal surfaces thereof, and with a reduced head portion of the plunger projecting from the sleeve and adapted to engage and bear against the mating contact.

In the preferred form of the invention, the arrangement is such that the plunger is urged longitudinally by a relatively small coil spring, which is housed entirely within the plunger and so arranged that the plunger itself forms a limiting stop to prevent excessive thrusts on the plunger from damaging the spring. The inside guide portion of the plunger is somewhat smaller than the diameter of the bore but larger in diameter than the

forward aperture or neck formed by an inturned flange at the end of the housing, so that the plunger will be retained therein, with the parts held in assembled relationship. The plunger itself is of slotted construction so that its exterior walls comprise a plurality of independent resilient arms carrying the several contact segments, with each contact segment in resilient wiping engagement with the smooth interior cylindrical surface of the bore in the tubular housing.

A preferred embodiment of the invention is illustrated in the drawings of this specification, wherein:

Figure 1 is a central sectional view of a contact assembly as here contemplated, shown embedded in the dielectric insert of an electrical connector and in engagement with a mating contact member;

Figure 2 is a detail sectional view taken substantially on the plane of the line 2—2 of Figure 1; and

Figure 3 is a perspective view of the plunger member of the assembly.

The plug and socket of a conventional electrical connector are ordinarily each provided with an insulating insert of dielectric material in which the contacts are mounted. These inserts are represented by the numerals **10** and **11** in the drawings, where it will be seen that the insert **11** may carry a contact **12** having a forward face surface **13** arranged to be engaged by the sliding plunger of a pressure contact assembly, generally designated as **14**. The present invention deals with the novel features of this pressure contact assembly.

As shown, the assembly includes an outer housing or sleeve **15**, the exterior surface of which may be knurled or provided with shoulders **16** so that it may be securely molded into the dielectric material **10**. The housing extends through the dielectric from the front face **17**, and projects from the rear surface **18**, where it is provided with an open socket **19** which serves as a soldering pocket in the manner well understood in the art.

The housing **15** includes a straight, smooth cylindrical interior bore **21** in which a sliding plunger assembly such as shown in Figure 3 is mounted. The plunger comprises, in general, an interior guide portion **24** and a projecting contact portion **25** formed integrally therewith. The plunger is retained in position within the bore by spinning the forward or outer end portion of the housing inwardly, to provide a constricted neck portion **23** at the forward end of the bore. The guide portion **24** of the plunger is of somewhat greater diameter than the neck of the housing, so that when once assembled, the parts are held against disassembly. The forward contact portion **25** of the plunger is of reduced diameter, however, so that it will pass through the neck without interference and will be free to slide therein.

The guide portion **24** of the plunger is of tubular form, comprising a thin walled metal sleeve with an internal bore **26** in which a small helical coil spring **27** is housed. The guide portion includes an enlarged central collar **28**, however, and its walls are longitudinally slotted at **29** to divide them into a plurality of longitudinally extending resilient arms **31** which serve to support the individual convex slide contacts **32** of the central collar portion **28**.

With this type of assembly, it is to be noted that the arcuate exterior surfaces of the wiping contacts **32** may be of precisely the same radius as the interior bore **21** of the housing, so that these parts are in surface-to-surface engagement throughout almost the entire circumference of the unit (Figure 2). This accomplishes an intimate electrical union between the outer housing of the contact and the plunger thereof, yet limits the area of the sliding engagement between the parts to such an extent that the plunger may slide freely with relatively light spring pressure. By this means the spring is short-

circuited electrically, so that there is no appreciable current flow therethrough. Consequently there is no tendency to overheat the spring, and it does not produce unwanted inductive effects.

It is also to be noted that with this arrangement it is unnecessary to initially flex or distort the arms **31** to maintain firm expanding force upon the contacts, since the original dimensions to which the parts are made may be such as to impose the necessary degree of flexing on the arms **31** as the plungers are inserted into the bores **21**.

It is also to be noted that the assembly is such that the small internal coil spring **27** cannot be damaged or distorted by excessive force applied upon inward thrusts of the plunger, inasmuch as the rearmost end **33** of the plunger will come into abutting relationship with the bottom **34** of the bore **21** before the spring **27** reaches its elastic limit.

From the foregoing it will be apparent that the present disclosure provides a pressure contact assembly which comprises only three parts, yet is entirely self-contained and well suited to be molded into the dielectric inserts of electrical connectors. Further, it will be seen that this simple construction accomplishes a good electrical union between the solder pocket **19** and the projecting connector contact **25**, yet achieves this result without the sacrifice of free mechanical sliding action. The arrangement is also such that the coil spring within the unit is electrically isolated from the main current path through the assembly, so that it cannot be damaged by overheating. Moreover, it is protected against mechanical damage due to excessive thrust.

Having thus described my invention, what I claim as new and desire to secure by United States Letters Patent is:

In an electrical connector, a butt-type pressure contact assembly comprising a tubular metallic housing having a straight cylindrical bore therein, with a constricted open neck at the forward end thereof; a free floating plunger having a long, slender, tubular guide portion within the bore of the housing and a reduced diameter contact portion extending outwardly through the neck thereof, said tubular guide portion comprising a metallic sleeve of larger diameter than the neck of the housing but substantially smaller than the interior diameter of the housing bore, with an enlarged central cylindrical collar substantially the same diameter as said bore and in surface contact therewith; said sleeve having a plurality of longitudinal slots passing through said collar and extending forwardly and rearwardly of said collar substantially equal distances along the walls of the sleeve but terminating short of the forward and rearward ends of said sleeve respectively and dividing said sleeve into a plurality of resilient arm portions integral with each other at their opposite ends whereby the central collar portion comprises a plurality of convex semi-cylindrical wiping contacts held parallel with the walls of the bore and having their entire surface area held in resilient sliding engagement with the interior walls of the bore by the inherent resiliency of both the forward and rearward portions of the individual arms of the sleeve; with a coil spring adapted to be compressed entirely within the sleeve; said spring having one end bearing against the contact portion of the sleeve and the other end adapted to project from the inner end of the sleeve and bear against the housing to urge the sleeve and contact resiliently outwardly with respect to the housing.

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