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J. J. PUSKAS

3,355,704

CONTACT PIN

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Fig. 1

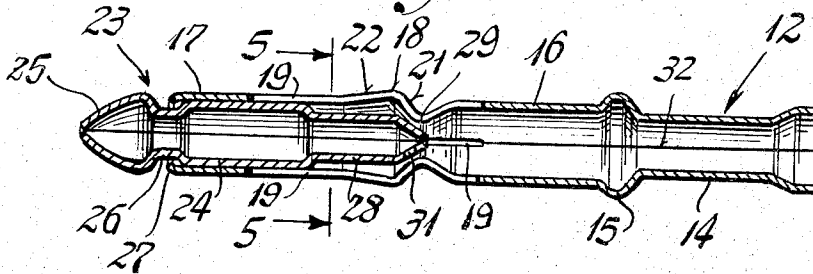


Fig. 2

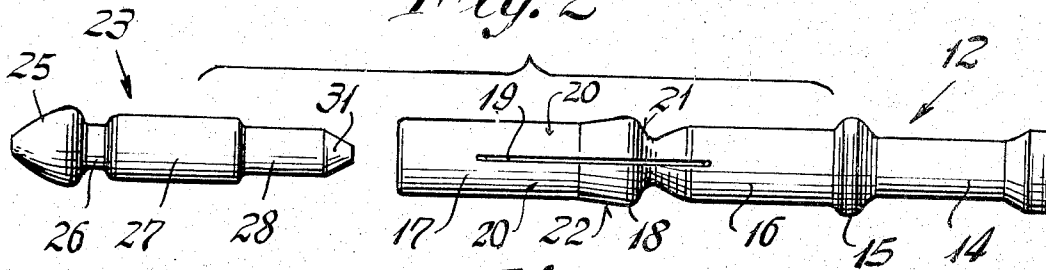


Fig. 3

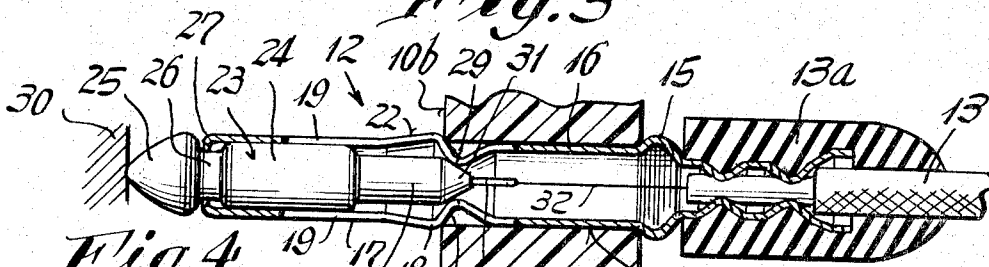


Fig. 4

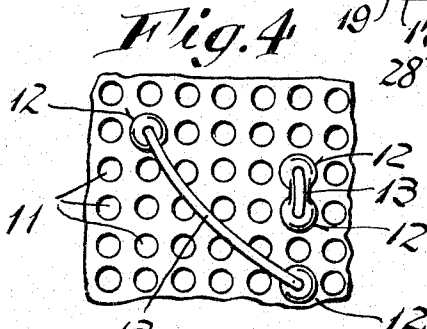


Fig. 5

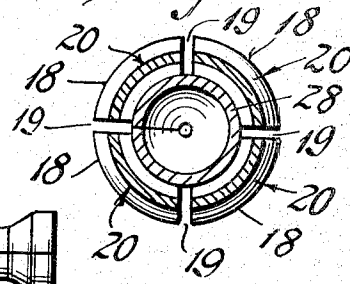
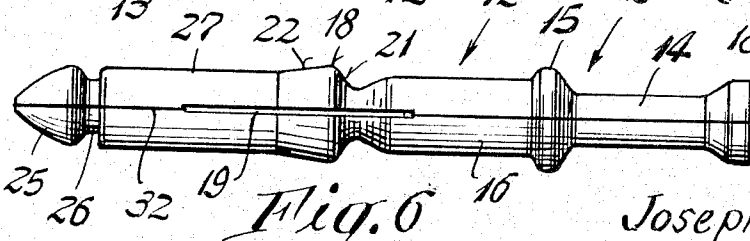


Fig. 6



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CONTACT PIN

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ABSTRACT OF THE DISCLOSURE

A tubular electrical contact pin having a barrel portion adapted to slidably fit in a hole in a pin board is provided with longitudinal slits forming a plurality of segmental strips, each integral at both ends with the barrel portion and formed with a protrusion yieldable to permit the pin to be pushed into and pulled out from a hole in a pin board, and a plug within the barrel to prevent the strips from yielding and permit the protrusion to re-enter the hole in the board when axial pressure is applied to the end of the plug which would otherwise push the pin from the hole.

This invention relates to improvements in contact pins adapted for use in programing devices such as are used in tabulating, computing and other machines.

Such a programing device comprises a suitable board, usually of insulating material, having a plurality of spaced holes corresponding to contact-receiving sockets in a panel forming part of the machine. The holes in the board are adapted to receive contact pins carried at opposite ends of flexible conductors to interconnect the various circuits in the machine by the contact pins carried by the board engaging the desired sockets when the board is applied to the socket panel.

An object of this invention is to provide an improved contact pin which may be pushed into a hole in the board with little effort and may likewise be pulled therefrom when the circuit connections are to be changed, and yet which will prevent the pin from being pushed out of the hole should it inadvertently engage the socket panel between the sockets when the board is being applied to the socket panel or while the programing board is being stored or handled.

A feature of this invention is the provision of a satisfactory contact pin which is simple in construction and more economical to manufacture than those heretofore produced.

This is accomplished in the form of the invention illustrated herein as exemplary thereof by making the pin in only two parts, both of which can be economically made from continuous flat strip material by progressive swaging operations, which parts can be easily assembled by hand or by automatic machinery. The pin may also be made by standard progressive blanking and forming dies.

Other features and advantages will hereinafter appear.

In the accompanying drawings:

FIG. 1 is a longitudinal section of the contact pin of the present invention.

FIG. 2 is an exploded view showing in elevation the two parts of the contact pin before they are assembled.

FIG. 3 is a view similar to FIG. 1, but shows the contact pin mounted in a hole in the panel board and the relative positions of the parts when a force is applied to the inner end of the contact pin which would push it through the hole in the panel.

FIG. 4 is a fragmental view showing a part of the programing board with several pin-carrying connectors in position on the board.

FIG. 5 is a transverse cross section of the pin as shown in FIG. 1.

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FIG. 6 is an elevation of the assembled contact pin showing the abutting edges of the formed pin.

The programing board 10, a fragment of which is shown in FIG. 4, is provided with a plurality of holes 11 arranged in vertical and horizontal rows corresponding to and alignable with pin-receiving sockets on a panel forming part of the electrical system of a tabulating machine or the like.

The holes 11 in the programing board are adapted to receive contact pins 12 carried on the ends of coupling conductors 13. The contact pins are of such length that the outer and inner end portions thereof extend beyond the front and back faces 10a and 10b of the panel, the inner portions being adapted to enter the sockets in the machine panel when the board is pressed against the latter.

In common with contact pins heretofore proposed, the contact pin 12 of the present invention has an outer end portion 14 which is hollow and receives the bared end of the conductor 13 after which the material of the end portion 14 is crimped to secure the conductor in good electrical connection with the contact pin. The end 14 and the conductor 13 are then usually encased in insulating material 13a.

The contact pin has a bulge 15 forming a stop to limit the inward movement of the pin in a hole 10 as shown in FIG. 3. Inwardly of the bulge 15 the pin has a tubular barrel portion 16 having a diameter providing a sliding fit in any of the holes 10.

Inwardly of the barrel portion 16 the pin has a tubular cylindrical portion 17 adapted to engage and make electrical contact with a socket carried by the panel of the machine. The cylindrical portion 17 has a diameter allowing it to pass through the hole and a length to extend substantially beyond the inner face 10b of the panel.

As pointed out above, the present invention provides improved means which retains the contact pin in the hole in the panel 10 against casual removal and yet which is yieldable to permit the pin to be removed from the hole when it is desired to do so by applying a pulling force to the outer end 14 of the pin but does not yield and prevents the pin from being pushed out of the hole by a force applied to the inner end of the pin. Such pushing force may be applied to the inner end of the pin or pins should they not align with the sockets which are to receive them, or should the pins have such a snug fit with the sockets as to require a force which would overcome the means for holding the pin in the hole against casual removal.

The yielding means for retaining the pin in proper position in the panel board, according to the present invention, comprises radially protruding means at the junction of the barrel portion 16 and the contact portion 17 so as to engage the margin of the hole on the inner surface 10b of the panel.

According to the present invention, the radially protruding means comprises an outwardly extending bulge 18 which as shown may extend circumferentially around the contact portion 17. The contact portion 17 and an adjacent part of the barrel 16 are provided with longitudinal slots 19 which have the effect of producing a plurality of yieldable strips 20 each carrying a section of the bulge 18 so that when the pin is being pulled from the hole in the panel, the sloping portions 21 of the bulges 22 will engage the margin of the hole in the panel and be cammed inwardly allowing the bulges to enter and pass through the hole.

The material of which the pin is made is resilient so that when the bulges inwardly move clear of the panel they will return to their normal positions shown in FIG. 1. Likewise, when the pin is being inserted in the panel

due to the sloping portions 22 of the bulges, the strips 20 yield inwardly until the bulges clear the inner end of the hole, whereupon they resiliently return to their normal position shown in FIG. 3.

At this point it should be noted that the pin of the present invention is preferably and most economically made from a resilient sheet metal strip by progressive multiple swaging operations. Therefore, it is most convenient to produce the bulges 15 and 18 in annular form. However, it should be understood that one or more separate or discontinuous bulges 15 and 18 forming the protrusions could be provided and would suffice.

In order to prevent a pin from being pushed out of the hole from the panel by axial force applied to the inner end of the pin, the present invention provides means for preventing the inward movements of the strip 20 and the bulges 18 thereon under this condition.

For this purpose, a plug 23 is inserted in the inner open end of the portion 17 of the pin and has a body portion 24 having a sliding fit in the portion 17 so as to move longitudinally therein. The plug has a tapered head portion 25 to guide the pin into a socket and an annular groove 26 between the body portion 24 and a head portion 25 which extends beyond the end of the portion 17. An inturned flange 27 of the portion 17 extends into the groove 26 to limit the inward and outward movements of the plug.

The plug has an inner end 28 to block the inward movement of the strips 20 when the plug is in its innermost position shown in FIG. 3. To accomplish this, in the form of the invention herein illustrated, the strips 20 are provided with radially inwardly extending bulges 29 which, for convenience in manufacture, may form a continuation of the outwardly extending bulges 18. The bulges 29 are so formed and positioned that when the plug 23 is held in its innermost position by a force being applied to the end of the head 25 by the latter engaging a stationary part 30 when applying programming boards to the sockets for instance, the end 28 of the plug prevents the strips from moving inwardly, thus preventing the bulges 18 from entering the hole in the board.

The end 28 of the plug has a cam surface 31 positioned to be engaged by the bulges 29 if the plug happens to be in blocking position. Therefore, in the absence of any inward longitudinal pressure on the plug when the bulges 28 are caused to recede by engagement with the edge of the hole in the panel, the plug 23 will be cammed outwardly and thus allow the bulges to completely recede and enter the hole in the panel, and this occurs whether the pin is being inserted into the panel or removed therefrom.

The end 28 of the plug is reduced in diameter so as to allow the strips 20 to move inwardly, and this is also facilitated by having the slots 19 of sufficient width to permit such movements.

The plug 23 may be assembled in the portion 17 and then the end of the latter may be spun-in to form the flange 27. Or, the flange 27 may be formed initially with the forming of the portion 17, and then the plug can be pushed into position, the end of the portion 17 expanding to permit the body 24 to pass the flange 26, such expansion being permitted by the free abutting edges 32 of the pin.

The plug 23 may be made as a solid piece, if desired, however it can advantageously be made from strip sheet metal swaged to the desired form as shown in FIG. 1.

Variations and modifications may be made within the scope of the claims and portions of the improvements may be used without others.

I claim:

1. A tubular electrical contact pin for insertion in and removal from holes in a programming board comprising a barrel portion snugly fitting the aperture and having an inner end portion extending beyond the inside surface of the board, an outer portion of the pin extending beyond

the outside surface of the board for connection to an electrical conductor and having a shoulder to limit the movement of the pin inwardly of the board, the barrel including a portion extending beyond the inside surface of the board having an open end and also a plurality of longitudinal slots forming between them inwardly flexible and outwardly resiliently biased strips each integral at both ends with the barrel, said strips being formed intermediate their ends with an outwardly extending portion forming a protrusion adapted to engage the inside surface of the board when the pin is inserted therein to prevent casual axial movement of the pin therefrom, said strips being capable of yielding to permit said protrusions to pass through the hole when pushed in and pulled out of a hole in the board, said strip being formed to have an inwardly extending portion forming an inner protrusion, and a plug slidably carried by, and projecting from the open inner end of, the barrel and having a blocking surface adapted to be moved to position to engage said inner protrusion and prevent movement of the outer protrusion which would permit it to enter the hole in the board and thereby prevent the removal of the contact pin from the board when the plug is moved inwardly of the barrel in response to axial pressure applied to the end of the plug.

2. A tubular electrical contact pin for insertion in and removal from an aperture in a programming board comprising a barrel portion having an inner end portion extending beyond the inside surface of the board, a central portion adapted to be supported in the board, an outer end portion of the pin extending beyond the outside surface of the board for connection to an electrical conductor and having a shoulder to limit the movement of the pin inwardly of the board, the inner end and central portions having a diameter snugly fitting the aperture in the board, the inner portion of the barrel having an open end and also a plurality of narrow longitudinal slots forming a continuous circumferential series of inwardly flexible and outwardly resiliently biased segmental strips, said strips each being formed to have an outwardly extending segmental protrusion adapted to engage substantially the entire surface of the board at the margin of the aperture when the pin is inserted therein to prevent casual axial removal of the pin therefrom, said segmental strips yielding to permit said protrusions to pass through the aperture when pushed in and pulled out of the board, said segments being formed to have inwardly extending segmental protrusions, and a plug slidably carried by and projecting from the open inner end of the barrel and responding to axial pressure thereon toward the board for engaging said inwardly projecting segmental protrusions for preventing inward movement of the strips and the outwardly extending protrusions thereon from yielding and thereby preventing the latter from entering the aperture when axial pressure is applied to said plug.

3. A tubular electrical contact pin according to claim 2, in which the segmental strips are integral at both ends with the barrel portion, and the outwardly extending protrusions and the inwardly extending protrusions are located adjacent said central portion of the barrel.

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