June 29, 1971 R. C. HOY 3,588,983

EXTRACTOR TOOL

Filed March 10, 1969

Fig. 1.

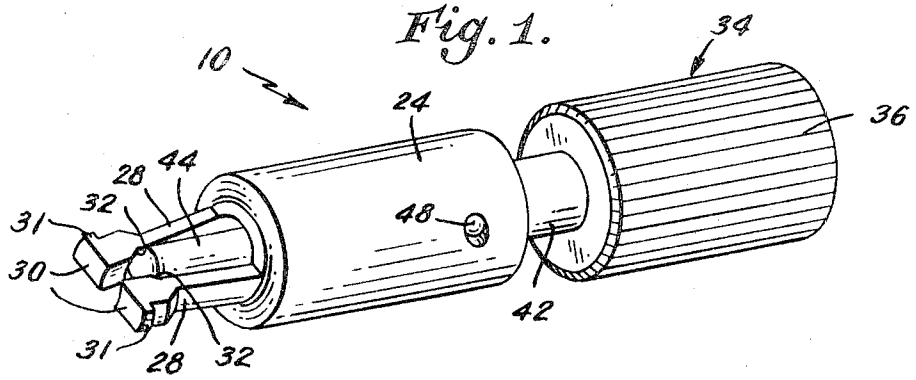


Fig. 2.

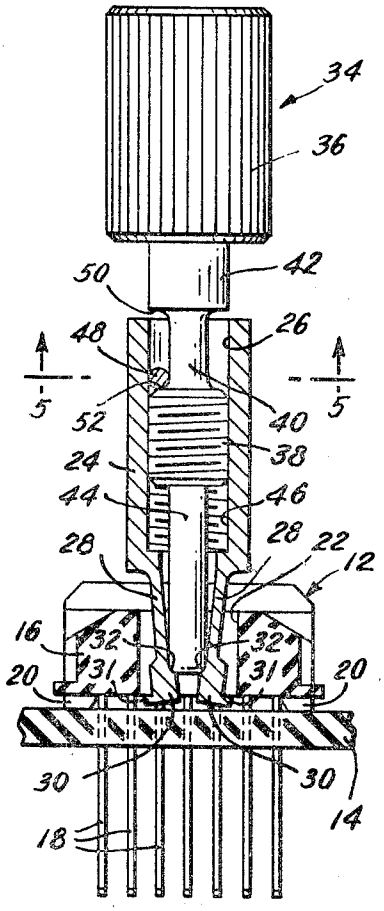


Fig. 3.

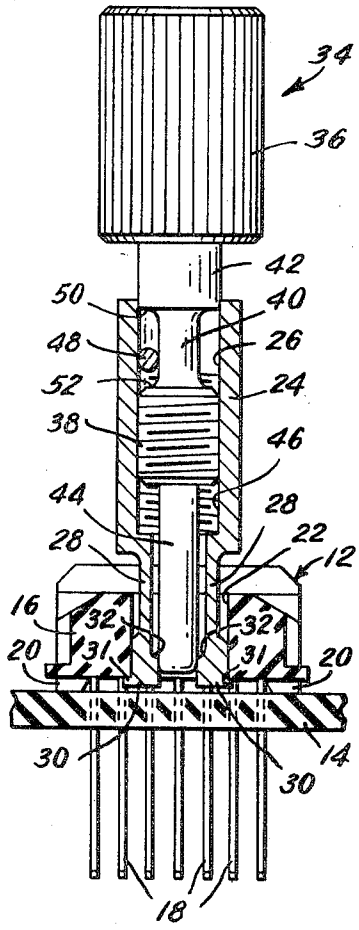
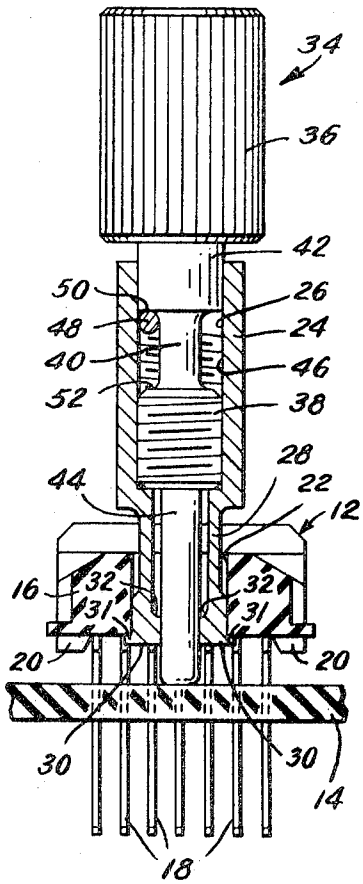


Fig. 4.



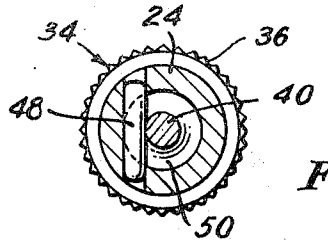


Fig. 5.

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3,588,983

EXTRACTOR TOOL

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Int. Cl. B25b 27/02
U.S. Cl. 29—203 7 Claims

ABSTRACT OF THE DISCLOSURE

A tool for extracting an electrical contact insulator assembly from engagement with a panel board and including a barrel having spaced legs through which an actuating member projects, the actuating member urging the legs into contact with the insulator assembly and the insulator assembly thereafter being moved with respect to the panel board upon rotation of the actuating shaft.

BACKGROUND OF THE INVENTION

The extractor tool as embodied in the present invention has particular application in removing an electrical contact insulator assembly from a panel board, the insulator assembly being of that type illustrated and described in copending application Ser. No. 748,537 filed July 29, 1968.

In the contact insulator assembly illustrated in the above-referred to copending application, a plurality of contacts are mounted in the non-metallic housing of the assembly and in the use thereof, the contacts project through openings formed in a panel board. On occasion, the contacts as they project through the panel board become damaged and the entire insulator assembly must then be removed from the panel board for replacement of the damaged contacts. Heretofore, extracting an insulator assembly from a panel board was difficult to accomplish since the contacts of the insulator assembly were firmly embedded in the openings formed in the panel board; and when efforts were made heretofore to remove the insulator assembly for replacing a damaged contact, by pulling outwardly on the assembly, the assembly was either chipped or additional contacts were bent or broken during the extraction procedure.

SUMMARY OF THE INVENTION

The present invention relates to a tool for use in extracting an electrical contact insulator assembly from engagement with a panel board, and includes a barrel having spaced legs joined to an end thereof. The legs have resilient characteristics that provide for outward lateral movement with respect to each other, and an actuating member extends through the barrel and engages the interior of the barrel in threaded relation, wherein the actuating member is longitudinally movable with respect to the barrel. The legs are inserted through a central opening in the insulator assembly and upon longitudinal movement of the actuating member, an end of the actuating member rides over cam surfaces of the legs and urges the legs laterally outwardly and into locking engagement with the contact insulator assembly. Thus upon continued movement of the actuating member with respect to the barrel, the end of the member contacts the panel board and forces the contact insulator assembly away from its locked position on the panel board.

Accordingly, it is an object of the present invention to provide an extractor tool for lifting an electrical contact insulator assembly from engagement with a panel board so as to expose the contacts of the insulator assembly.

Another object of the invention is to provide an extractor tool for removing a contact insulator assembly from a panel board that includes a barrel through which an actuating member extends for movement with respect thereto, relative movement of the actuating member with respect to the barrel providing for disengagement of the contact insulator assembly from the panel board on which it is mounted.

Still another object is to provide an extractor tool having a barrel through which an actuating member extends, the barrel being formed with spaced legs having feet formed thereon, and the actuating member including a reduced end that is adapted to engage the legs for forcing the feet laterally outwardly for engagement with an element to be extracted.

Other objects, features and advantages of the invention will become apparent as the description thereof proceeds when considered in connection with the accompanying illustrative drawings.

DESCRIPTION OF THE DRAWING

FIG. 1 is a perspective view of the extractor tool embodied in the present invention;

FIG. 2 is a vertical sectional veiw of the extractor tool, showing the position thereof when it is first inserted into a contact insulator assembly for removal of the assembly from a panel board;

FIG. 3 is a sectional view similar to FIG. 2 showing the actuating member of the tool in the position thereof as it urges the legs of the tool into engagement with the insulator assembly;

FIG. 4 is a sectional view similar to FIGS. 2 and 3 and illustrating the position of the actuating member of the tool as the insulator assembly is withdrawn from its mounted position on a panel board; and

FIG. 5 is a sectional view taken along line 5—5 in FIG. 2.

DESCRIPTION OF THE INVENTION

Referring now to the drawing, the extractor tool embodied in the present invention is generally indicated at **10**, and in its intended use, the extractor tool **10** is adapted to extract a contact insulator assembly generally indicated at **12** from a panel board **14**. As illustrated and described in copending application Ser. No. 748,537, the contact insulator assembly **12** is defined by a housing **16** formed of non-metallic insulating material and having a plurality of openings formed therein through which a plurality of contact members **18** extend. Each of the contact members **18** is formed with a transverse hilt **20** that spaces the bottom of the housing **16** from the panel board **14** when the insulator assembly **12** is in its mounted position on the panel board. As will be described, this spacing between the bottom of the housing **16** and the panel board **14** enables the extractor tool **10** to free the insulator assembly **12** from its locked position on the panel board **14**. Formed centrally in the housing **16** of the insulator assembly **12** is an opening **22** that extends through the housing **16** and has a substantially rectangular configuration when seen in top plan view.

Referring again to FIG. 1, and as further illustrated in FIGS. 2 through 5, the extractor tool **10** includes a barrel

or body portion 24 having an opening or bore 26 formed therein. Joined integrally to the barrel 24 at an end thereof are spaced legs 28 that are formed with feet 30 on the outermost ends thereof. Joined to the feet 30 and projecting laterally with respect thereto are toe portions 31, the purpose of which will be described hereinafter. Formed on the interior surfaces of the legs 28 at the junction of the legs with the feet 30 are inclined surfaces 32 that define camming surfaces, the purpose of which will also be described hereinafter.

Projecting through the bore 26 formed in the barrel 24 is an actuating member generally indicated at 34 that includes an enlarged outer gripping portion 36, and an inner shaft portion that is defined by an intermediate threaded portion 38, a reduced intermediate portion 40, a portion 42 that joins the reduced portion to the gripping portion 36, and an actuating shaft portion 44 that is joined to the intermediate threaded portion 38. A portion of the bore 26 is threaded as indicated at 46, and receives the threaded portion 38 of the actuating member 34 in threaded relation therein. The actuating shaft portion 44 of the actuating member 34 projects through the outer end of the bore 26 and between the legs 28 that are joined to the barrel 24. It is seen that the diameter of the shaft portion 44 is dimensioned so as to be received between the legs 28, and the outermost end of the shaft portion 44 is rounded for being received on the cam surfaces 32 of the feet 30. In order to limit movement of the actuating member 34, a pin 48 extends through holes formed in the barrel 24, but is so located that it is offset with respect to the longitudinal axis of the bore, and thereby is received in an annular chamber defined by the reduced intermediate portion 40 of the actuating member and the bore 26.

It is seen that the reduced intermediate portion 40 of the actuating member cooperates with the portion 42 and the threaded portion 38 to define spaced shoulders 50 and 52, the spaced shoulders 50 and 52 forming limits for movement of the actuating member 34. Thus inward movement of the actuating member 34 with respect to the barrel 24 is limited by engagement of the shoulder 50 with the pin 48. Return movement of the actuating member 34 to its outer position is limited by engagement of the pin 48 with the shoulder 52.

With the contact insulator assembly 12 mounted in place on the panel board 14 and with the contact members 18 extending through the holes in the panel board 14, it may be required to withdraw the assembly 12 from its mounted position in order to replace one or more of the contact members. As illustrated in FIG. 2, the legs 28 of the extractor tool 10 are somewhat inclined toward each other, thereby reducing the overall lateral dimension of the legs. In this position of the legs 28, the actuating member 34 is located in its withdrawn position, the shaft portion 44 being located so that the end thereof merely engages the camming surfaces 32 of the feet 30. In order to extract the contact insulator assembly 12, the legs 28 are inserted into the opening 22 of the insulator assembly. As previously described, the hilts 20 of the contact members 18 space the bottom edge of the insulator assembly from the top surface of the panel board 14. When the legs 28 of the extractor tool are fully inserted into the hole 22 of the insulator assembly, the outwardly extending toe portions 31 of the feet 30 are located so as to be insertable into the space formed between the lower surface of the assembly housing 16 and the panel board 14. With the legs 28 fully inserted into the hole 22 the gripping portion 36 of the actuating member 34 is rotated, thereby forcing the shaft portion 44 toward the panel board 14 and separating the feet 30 in the manner as illustrated in FIG. 3. The outwardly projecting toe portions 31 of the feet 30 are then forced into the space between the lower surface of the housing 16 and the panel board 14, thereby locking the feet 30 to the insulator assembly. As the actuating shaft 44 is moved downwardly upon continued

rotation of the gripping portion 36, the outer end of the actuating shaft engages the panel board 14 and as rotation of the actuating member is continued, the barrel 24, together with the legs 28 are reversely moved relative to the actuating member 34 thereby withdrawing the insulator assembly 12 therewith. When the actuating member 34 reaches the limit of movement as determined by engagement of the shoulder 50 with the pin 48, the contact members 18 have been lifted sufficiently from the panel board, as illustrated in FIG. 4 to then enable the extractor tool 10 to be withdrawn from the assembly. After the extractor tool is withdrawn, the insulator assembly can be removed by hand from the panel board by pulling upwardly thereon. After the extractor tool has been removed from the insulator assembly, the actuating member 34 is rotated in the opposite direction to retract the actuating shaft portion 44 from between the feet 30. The limit of movement in this direction is defined by engagement of the shoulder 52 with the pin 48 as illustrated in FIG. 2. The extractor tool 10 is then ready for the next extracting operation.

What is claimed is:

1. In a tool for extracting an electrical contact insulator assembly from engagement with a panel board, a barrel having spaced legs joined to an end thereof, said legs having resilient characteristics that provide for outward lateral movement with respect to each other, and an actuating member extending through said barrel and engaging the interior of the barrel in threaded relation, wherein said member is longitudinally movable with respect to said barrel, an end of shaft being engageable with said legs upon longitudinal movement for urging said legs laterally outwardly and into locking engagement with said contact insulator assembly, whereby continued movement of said member into contact with said panel board forces said contact insulator assembly out of its engaging position on said panel board.

2. In a tool as set forth in claim 1, said legs having lateral projecting portions formed thereon that are forced into engagement with said contact insulator assembly upon inward longitudinal movement of said actuating member, wherein said legs force said contact insulator assembly away from said panel board as said member is moved longitudinally inwardly with respect to said barrel.

3. In a tool as set forth in claim 2, said actuating member including a reduced portion that defines spaced shoulders, between which an annular chamber is formed in said barrel and means fixed in said barrel and being received in said chamber and being engageable by said shoulders upon longitudinal movement of said member, whereby said shoulders define the limits of longitudinal movement of said member.

4. In a tool as set forth in claim 3, said means fixed in said barrel including a pin that extends through said chamber transversely of the longitudinal axis of said barrel and being laterally offset with respect thereto, wherein longitudinal movement of said member is limited by the length of said chamber in which said pin is received.

5. In a tool as set forth in claim 1, said legs being normally inclined inwardly and including laterally projecting toe portions on the outermost ends thereof, cam surfaces formed on the inside edges of said legs and being engageable by said shaft upon the inward longitudinal movement thereof, wherein said member urges said legs outwardly to force said toe portions into locking engagement with said contact insulator assembly.

6. In a tool as set forth in claim 5, said actuating member including an enlarged outer portion that defines a gripping portion for rotating the member, an intermediate portion, an area of which is threaded for threadably engaging the interior of said barrel and a reduced inner end portion that extends between said legs, the innermost end of said inner end portion engaging said cam surfaces.

7. In a tool as set forth in claim 6, said intermediate portion including a reduced portion that defines spaced shoulders between which an annular chamber is formed in said barrel, and a pin extending through said chamber transversely of the longitudinal axis of said barrel and being laterally offset with respect thereto, said pin being engageable by said shoulders upon longitudinal movement of said member, wherein said shoulders define the limits of longitudinal movement of said member.

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U.S. Cl. X.R.

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