May 11, 1965 G. M. RAPATA 3,182,544

TUNING CORE GROMMET

Filed May 3, 1962

Fig. 1

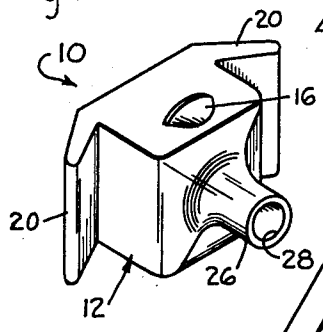


Fig. 2

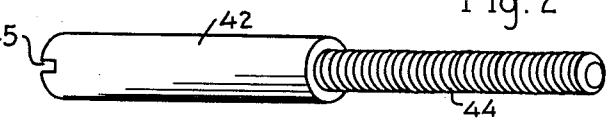


Fig. 3

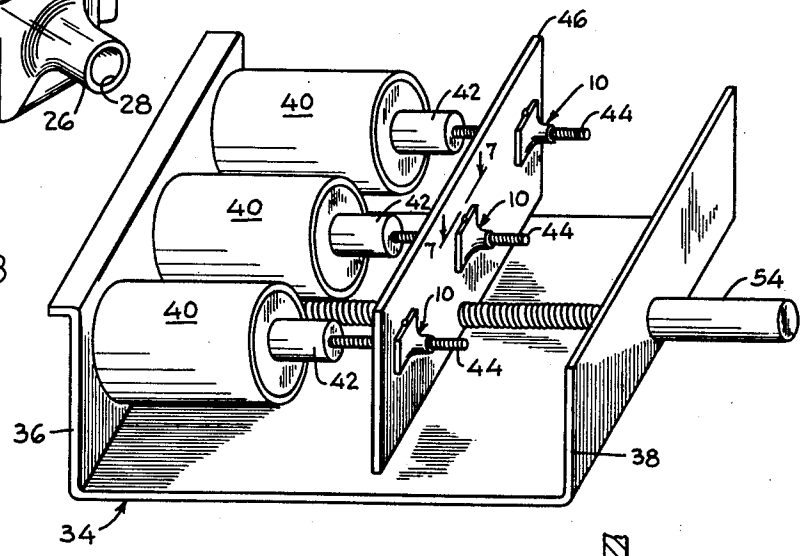


Fig. 5

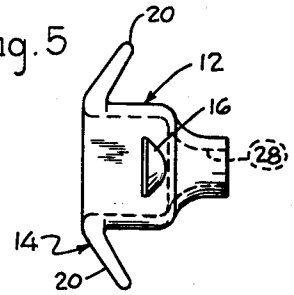


Fig. 7

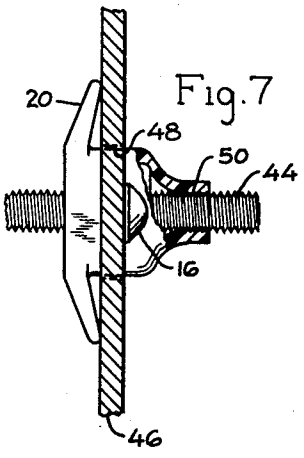


Fig. 4

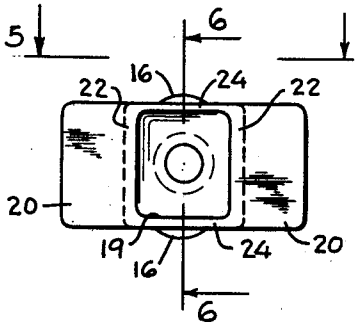
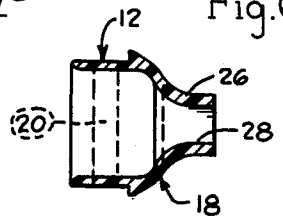


Fig. 6



INVENTOR.
George M. Rapata
BY
Jack R. Halvorsen
ATTY.

United States Patent Office

3,182,544
Patented May 11, 1965

3,182,544

TUNING CORE GROMMET

George Martin Rapata, Park Ridge, Ill., assignor to Illinois Tool Works Inc., Chicago, Ill., a corporation of Delaware

Filed May 3, 1962, Ser. No. 192,191
3 Claims. (Cl. 85—80)

This invention relates to a plastic fastener. More particularly it relates to a fastener for insulative use with a screw threaded member. In the electronics arts, it often is necessary to mount a threaded screw or flexible spring screw in insulated relation to the chassis and other components. This is particularly true in the case of banks of variable inductance tuning coils wherein the individual ferrite cores must be capable of fine individual adjustment while the bank of cores must be capable of simultaneous adjustment en masse.

It is an object of this invention to provide a one piece plastic fastener adapted to accept a screw threaded member for rotary adjustment purposes.

Another object is to provide a plastic fastener which when mounted in a complementary apertured panel will retain a screw threaded member after it has been axially telescoped into the fastener.

A further object of the invention is to provide an economical insulated fastener adapted for rapid assembly with screw threaded means attached to ferrite tuning cores in electronic apparatus.

Other and more specific objects will become apparent to those skilled in the art when the specification is read in conjunction with the attached drawing wherein:

FIG. 1 is a perspective view of a device embodying the principles of this invention;

FIG. 2 is a perspective view of a ferrite core and its associated screw for use with the embodiment shown in FIG. 1;

FIG. 3 is a perspective view of a bank of variable inductance tuning coils of a type found in electronic equipment;

FIG. 4 is a plan view of the embodiment of the present invention;

FIG. 5 is an elevational view taken along lines 5—5 in FIG. 4;

FIG. 6 is an elevational view in section taken along lines 6—6 of FIG. 4; and

FIG. 7 is an elevational view in partial section showing the illustrated embodiment of this invention in applied form as taken along lines 7—7 of FIG. 3.

Referring now to the drawings wherein similar parts will be designated by similar reference numerals throughout the specification.

The fastener or grommet 10 includes a cup shaped body portion 12, head means 14 adjacent its upper or opened end, protuberances or shoulder means 16 and a funnel shaped base 18. The body 12 is preferably polygonal in shape, to prevent rotation, in the disclosed embodiment it being square, and has open end 19. Head 14, in the illustrative embodiment, includes a pair of integral, laterally extending flange means 20 which extend outwardly and downwardly from opposite sides of the body 12. A pair of shoulders 16 protrude outwardly from the body 12 and are preferably positioned in quadrature to the flanges 20 on the adjacent opposite walls of the body 12. As can be best seen in FIG. 4 the opposed walls 22—22 supporting the flange means 20—20 have a greater transverse thickness than the adjacent opposed walls 24—24 which support shoulder means 16, for reasons best set forth hereinafter.

Extending downwardly from the end of cup shaped body 12, opposite the head end 14, is the funnel shaped base 18. Base 18 blends into the lower extremity of the walls

22—22 and 24—24 and tapers inwardly to a thin walled substantially cylindrical portion 26 which is provided with a through bore 28.

The entire fastener can be fabricated by injection molding from plastic materials of the type commonly known as nylon but can be made from any material which has the characteristics of being relatively rigid in heavier sections while being capable of resilient flexure in thin sections.

As was indicated above, there are several applications for such a device in the electronics field. In the present instance, this device is well suited for use in tuning mechanisms for RF circuits in automobile radios. As schematically exemplified in FIG. 3, a chassis 34 is provided with a pair of opposed wall sections 36 and 38. In the illustrated schematic the opposed walls are flanges bent up from the chassis 34. A plurality of coils 40 are attached in parallel spaced positions along wall 36 in normal relationship thereto. Coils 40 have a hollow bore which is adapted to accept a carbon or ferrite core 42. Many of such cores 42 are fabricated with a screw threaded means 44 projecting axially from one end thereof. The screw means 44 can be a solid screw but may, for reasons of economy in fabrication, be a flexible screw capable of limited lateral movement. Such flexible screws also serve to cushion the cores against external shocks. A movable plate like workpiece 46 is interposed between the opposing wall portions 36 and 38 and transversely of the axes of the bank of coils 40. Plate 46 is provided with a plurality of apertures 48 equal in number to the coils 40 and in coaxial registry therewith. Inserted in each of these apertures 48 is a fastener 10 of the type embodying the principles of this invention. The fasteners are arranged so that the open head end 14 faces the respective coil.

As can be best seen in FIG. 7, the fastener 10 is applied through the aperture 48 by an axial telescoping therethrough. The opposed thinner wall portion 34 will collapse laterally inwardly until the shoulder means 16 has passed beyond the opposite side of the panel 46 whence they expand laterally outwardly and underlie the panel whilst the head 14 engages the opposite side of the panel. The flexible flange means 20 are adapted to provide take up so as to be capable of accepting a variety of panel thicknesses within the spaced limits of the transverse planes passing through the flanges 20 and shoulders 16. The threaded means 44 is then axially telescoped through the cup shaped body 12 and through the cylindrical tube 28 preferably by a straight axial thrust. The wall thickness of section 28 is controlled by design to be sufficiently resilient to laterally expand during the axial thrust of the screw means 44. After the screw means 44 has assumed a given inserted position, the wall portion of the tube will attempt to return to its initial position and in so doing, will impress a threaded form 50 on its inner wall. As can be seen in FIG. 7, this threaded form is imposed due to the fact that the bore 28 through the cylinder 26 has an internal diameter less than the major diameter but greater than the minor diameter of the screw. The thread 50 formed in bore 28, shown in FIG. 7, normally does not extend to the root or minor diameter of the screw 44. This self-imposed thread forming is sufficient, however, to permit fine axial adjustment of the cores 42 within the coil 40 by rotation of the screw 44. Such rotation is normally accomplished by inserting a suitable tool into the coil, from the left hand side as seen in FIG. 3, and engaging the kerf 45 in the end of the core 42. Similarly, the thread form 50 prevents the threaded means 44 from being axially withdrawn in a linear fashion without the application of an excessive amount of force.

In the schematic arrangement shown in FIG. 3, a tuning operator means 54 is provided to extend from plate 38

through plate 46. Movement of operator 54 will adjust the position of the movable plate 46 whereby all of the cores are moved en masse as a bank. Adjustment of the cores within the plurality of coils 40 permits the tuning of the radio frequency RF circuits. Other forms of tuners will be apparent to those skilled in the art, such as the more sophisticated push button tuners.

Thus, the present invention, exemplified by the disclosed embodiment, envisions a simple one piece plastic device which can be economically fabricated. It serves to maintain a threaded member in rotatable insulated relationship relative to a supporting component. Lastly, the ease with which it is assembled both to the workpiece and the screw threaded member facilitates rapid assembly techniques and, hence, reduces production costs. Other embodiments will be apparent to those skilled in the art but it is intended that I be limited only by the scope of the appended claims.

I claim:

1. A plastic fastener in combination with an apertured sheet material workpiece and a male threaded member, said fastener including a continuous noncircular cup shaped body having walls with an axial extent substantially greater than the thickness of said workpiece, flange means integral with said body and extending laterally outwardly from one end of said body, means integral with and protruding outwardly from said body forming discrete shoulders axially spaced from and in opposed relation to said flanges, an integral circumferentially continuous resilient funnel shaped base means converging downwardly from the end of said body opposite the end carrying said flanges, said funnel shaped base means at its lowest extremity forming a cylinder having a through bore with a transverse dimension less than the major diameter of said threaded member, the aperture in said workpiece being complementary to said body in size and shape, said body being positioned in said aperture with said flange means

engaging one side of said workpiece while said shoulders engage the opposite side of said workpiece, said threaded member being initially nonrotatably axially telescoped into said resilient funnel shaped base means with said cylinder of said base means laterally expanding to accept said threaded member and then returning to substantially its initial position and partially imposing the screw thread form on its inner wall, said threaded member after insertion within said cylinder of said base means being radially spaced from the walls of said body.

2. A device of the type claimed in claim 1 wherein said cup shaped body portion is substantially square in transverse section and said laterally extending flange means are two in number and extend outwardly from adjacent the end of opposite side walls of said body and said shoulders being positioned on walls adjacent to said opposite walls from which said flange means extend.

3. A device of the type claimed in claim 2 wherein said cup shaped body has varying wall thicknesses in adjacent sides with the side walls supporting said shoulders being thinner in section than the side walls supporting said laterally extending flanges, said flanges extending outwardly and downwardly toward a plane passing through said shoulders whereby insertion of the fastener in the workpiece will afford tight opposed engagement of the workpiece between the flanges and shoulders through a wide variation in thicknesses of workpieces.

References Cited by the Examiner

UNITED STATES PATENTS

1,800,578	4/31	Webb	174—152
2,820,954	1/58	Fay	336—136 X
2,836,215	5/58	Rapata	151—41.75

LARAMIE E. ASKIN, *Primary Examiner.*

JOHN F. BURNS, *Examiner.*