April 4, 1950 W. A. SCHAPER 2,503,219

RESILIENT NUT FOR THREADED RODS

Filed Sept. 21, 1946

Fig. 1

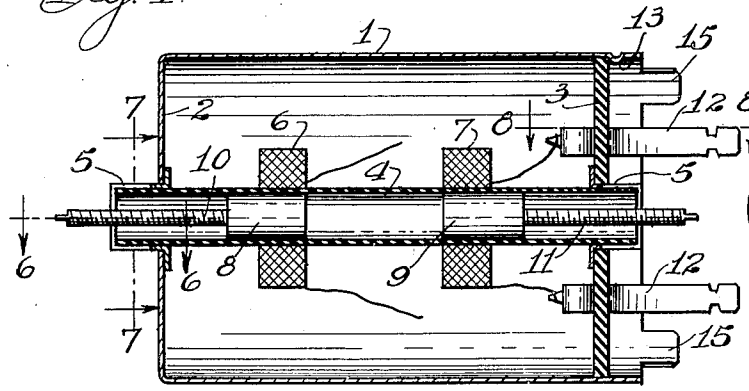


Fig. 10

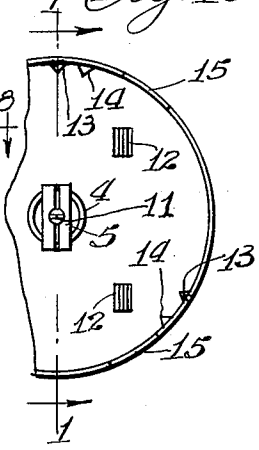


Fig. 2

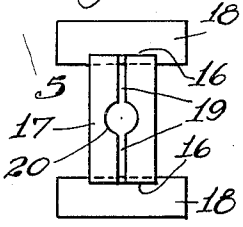


Fig. 3

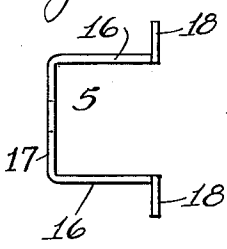
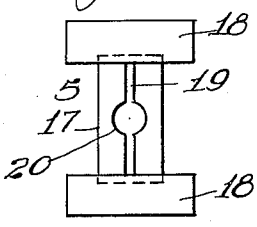


Fig. 4



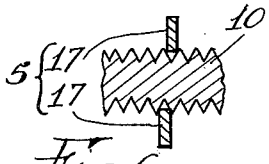


Fig. 6.

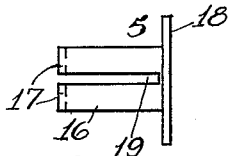


Fig. 5.

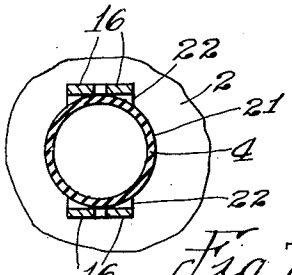


Fig. 7

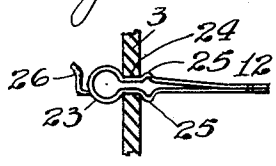


Fig. 8.

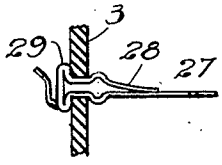


Fig. 9.

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RESILIENT NUT FOR THREADED RODS

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5 Claims. (Cl. 74—424.8)

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The invention pertains to an improved construction of resilient nut for engaging threaded rods so that the action of the nut produces axial movement of the threaded rod when the rod is turned, relatively to the nut, and at the same time exerts sufficient resilient pressure on the threaded rod to hold the rod against turning relatively to the nut, unless positive turning pressure is applied to the rod. More specifically, the invention pertains to a resilient nut construction for use with the ends of tubular coil forms where ferromagnetic cores are mounted in the forms for axial movement relatively thereto for the purpose of changing the permeability of the magnetic paths of inductance coils mounted on the coil forms, the construction being particularly adapted for use in connection with intermediate frequency transformers for use in radio receivers.

By the invention, as applied to coil forms in the manner referred to, a simple and inexpensive resilient nut construction is provided on an end of the coil form, which nut is formed from thin sheet metal of substantial resilience, for example Phosphor bronze, the nut as formed being of U-shape and having its side legs parallel with each other and spaced apart a distance equal to the external diameter of the coil form end, the mid-portion of the U-shaped nut extending diametrically across the open end of the coil form; the ends of the side legs of the U-shaped nut are provided with outwardly extending flange members to reinforce the nut structure and to hold it against movement outwardly through the supporting wall employed to support the coil form. The coil form enters the U-shaped nut so that the end of said form rests against the midportion of the nut, and as a result the coil form and the flanges on the ends of the side legs of the nut, hold the nut against movement axially of the coil form. The supporting wall around the end portion of the coil form, is provided with a circular opening fitting the coil form from which opposite keyway openings extend to fit the side legs of the nut structure The midportion and the greater part of the side legs of the nut are slotted and the mid-portion of the nut is provided with a circular opening of somewhat smaller diameter than the external diameter of the threaded rod with which the nut is used, and the thickness of metal of the nut is somewhat less than the pitch distance of adjacent threads of the said threaded rod. As a result of this construction, when the screw is turned to enter the circular opening in the mid-portion of the nut, the side legs of the nut are spread from each other a small amount

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and the two parts of the mid-portion of the nut are sprung relatively to each other to accommodate opposite parts of the thread of the screw. In this way, the resilient nut serves the same purpose in connection with moving the threaded rod axially, as though it were specially threaded, although the circular opening in the nut is preferably unthreaded, and at the same time, the parts of the nut formed by slotting it, press against the threaded rod with sufficient pressure to prevent accidental turning of the threaded rod relatively to the nut, which holds the threaded rod in any position of adjustment that may be given it. The invention described is not intended for heavy duty, but only for service of the general nature referred to, for example holding ferromagnetic cores in adjusted positions in coil forms, where threaded rods secured to the cores are used to move the cores relatively to the coil forms by the turning of said rods.

The invention will be best understood by reference to the accompanying drawings illustrating a preferred embodiment thereof in which:

Fig. 1 illustrates to an enlarged scale, in vertical, central and longitudinal sectional view, an intermediate frequency transformer equipped with resilient nuts in accordance with the invention, this view being taken along the line 1—1 in Fig. 10,

Figs. 2—5 inclusive are detail views to a further enlarged scale of the resilient nut structure removed from the rest of the construction shown in Fig. 1, Fig. 2 showing the nut in outer end elevation, Fig. 3 showing the nut in side elevation, Fig. 4 showing the nut in inner end elevation, and Fig. 5 showing the nut in top view,

Fig. 6 is a sectional view to a further enlarged scale of a part of the structure shown in Fig. 1, taken along the line 6—6 in Fig. 1, and illustrates the relation of the resilient nut to the threaded rod engaged thereby,

Fig. 7 is a sectional view of a part of the structure shown in Fig. 1 taken along the line 7—7 in Fig. 1, this view being to substantially the scale of Figs. 2–5 inclusive,

Fig. 8 is a sectional view of a part of the structure shown in Fig. 1, taken along the line 8—8 in Fig. 1 to illustrate one form of connection lug employed with the apparatus,

Fig. 9 shows in a view similar to Fig. 8 a modified construction of connection lug, and

Fig. 10 is an end view of the structure shown in Fig. 1.

Similar numerals refer to similar parts throughout the several views.

As shown in Fig. 1, the intermediate frequency transformer illustrated includes a can 1 having an integral end wall 2 and closed at its other end by a disc 3 of insulating material. The wall 2 and disc 3 support a coil form 4 substantially in the axis of the can 1 by means of resilient nuts 5, 5 extending through suitable apertures therefor in the wall 2 and disc 3. The nuts 5 support the end portions of the coil form 4 upon which inductance windings 6 and 7 are mounted. Ferromagnetic cores 8 and 9 are located in the coil form 4 for movement relatively to the windings 6 and 7 respectively, to secure desired inductance effects of said windings, said cores having secured thereto threaded rods 10 and 11 respectively which extend through the resilient nuts 5 so that the rods may be turned from the outside of the structure to adjust the cores 8 and 9 as desired. Connection lugs 12 extend through and are supported by disc 3 to form a convenient means for connecting external circuits to the windings 6 and 7.

The can 1 is provided with indentations 13 for holding the disc 3 in place, the insertion of the disc in the end portion of the can 1 being permitted by clearance openings 14 in the edge of said disc, the disc being turned a small amount to hold the parts in the position shown in Fig. 1. The can 1 may also conveniently be provided with end lugs 15 to facilitate mounting the structure on a panel or the like.

The construction of the resilient nut 5 is shown in Figs. 2–5 inclusive, the U-shape of the nut structure being shown in Fig. 3 and including the side legs 16, the mid-portion 17, and flanges 18 extending outwardly from the ends of the legs 16. As indicated in Fig. 1, the flanges 18 hold the nuts 5 on the ends of the coil from 4 and at the same time prevent axial displacement of said coil form relatively to the wall 2 and disc 3.

As shown in Figs. 2, 4 and 5, the mid-portion 17 and the legs 16 are slotted at 19 so that the portions on opposite sides of the slot may be sprung from each other a small amount, depending on the nature of the resilient material of the nut. The mid-portion 17 is also provided with a circular opening 20 of somewhat smaller diameter than the outside diameter of the threaded rod with which the nut is used. When the threaded rod, for example the rod 10, is screwed into the corresponding nut 5 (Fig. 6), the two parts of the mid-portion of the nut are displaced axially of the rod an amount determined by the pitch of the thread on the rod, and at the same time the parts of the mid-portion of the nut 5 are spread from each other a slight amount, as a result of which the spring action of the material of the nut presses the nut parts 17 against the threads on the rod in a manner to restrain the rod from free turning movement relatively to the nut. The result of this is that although the rod may be turned without great effort in adjusting the corresponding core 8, the holding pressure exerted on the rod is sufficient to positively prevent accidental turning of the rod relatively to the nut, and any desired adjustment of the core 8 is thereby maintained.

As shown in Fig. 7, the end wall 2 of the can 1 is provided with a circular opening 21 fitting the coil form 4 and from said circular opening opposite keyway slots 22 extend to fit the side legs 16 of the spring nut. In this manner, the nut is held in position on the end of the coil form 4 and turning of the nut is prevented. The disc 3 is similarly constructed to fit the coil form 4 and to also fit the resilient nut extending through said disc.

As shown in Fig. 8, the connection lug 12 comprises a double thickness of resilient sheet metal formed into a circular head or loop 23 at its mid-portion and continuing from said head with a contracted neck portion 24 in the disc 3, and outside of the contracted portion 24 the thicknesses of the lug are provided with outwardly projecting humps 25 engaging the outer surface of the disc 3 to hold the lug in position. The opening in the disc 3 made to receive the connection lug is of substantially the height of the connection lug, and has a width sufficiently greater than the thickness of the connection lug at its outer end, to permit compressing the portion of the connection lug adjacent the head 23, to insert the humps 25 through the opening in the disc 3, after which the resilient nature of the material of the connection lug expands the head portion thereof so that the humps 25 prevent withdrawing the connection lug from the disc 3 without exerting a large amount of force in so doing. A tongue 26 is conveniently formed to extend from the head 23 to facilitate attaching internal connections of the apparatus to the connection lugs. As shown in Fig. 9, the connection lug 27 is similar in construction to the connection lug illustrated in Fig. 8, the differences being that one of the thicknesses 28 is substantially shorter than the other and extends only far enough from the disc 3 to afford the resilient action described in connection with the connection lug 12, the other difference being that the head is flattened as shown at 29 to lock the connection lug in place in the disc 3, or at least to much more positively secure the connection lug to said disc, than where the head is not flattened, as shown in Fig. 8, the flattened head 29 having the advantage of preventing rocking movement of the lug particularly where small thicknesses of the disc 3 are employed. In other respects the connection lug illustrated in Fig. 9 is similar to and operates in substantially the manner described for the connection lug 12. The construction of the connection lugs described is not claimed in the present application as it constitutes the subject matter of a co-pending application.

It will be observed that the resilient nuts described are simple, that they are readily made without the use of expensive tools, and that they cheapen and simplify structures with which they may be used without decreasing the efficiency of said structures as far as the functioning of said nuts is concerned.

While I have shown my invention in the particular embodiment above described, it will be understood that I do not limit myself thereto as I may employ equivalents thereof without departing from the scope of the appended claims.

Having thus described my invention, what I claim is:

1. A resilient nut and relatively rigid tube structure including in combination a tube for receiving a threaded rod, a resilient nut on the end of said tube for engaging the threads on said rod, said nut comprising a U-shaped member of resilient sheet metal including flat side legs adjacent opposite sides of the end portion of said tube and including also a flat mid-portion crossing the end of said tube, said mid-portion having a rod aperture therethrough and having a slot extending from said aperture said slot dividing said mid-portion into two parts pressing against opposite sides of the threads on said rod, the width of said

U-shaped member being substantially less than the external diameter of said tube, and a mounting member of sheet material having a circular opening fitting said tube and thereby laterally supporting said tube with one end portion thereof extending beyond said mounting member, said circular opening having keyway extensions therefrom fitting said side legs, whereby said nut is held in place on the end portion of said tube.

2. A resilient nut and relatively rigid tube structure including in combination a tube for receiving a threaded rod, a resilient nut on the end of said tube for engaging the threads on said rod, said nut comprising a U-shaped member of resilient sheet metal including flat side legs adjacent opposite sides of the end portion of said tube and including also a flat mid-portion crossing the end of said tube, said mid-portion having a rod aperture therethrough and having a slot extending from said aperture, said slot dividing said mid-portion into two parts pressing against opposite sides of the threads on said rod, the width of said U-shaped member being substantially less than the external diameter of said tube, and a mounting member of sheet material having a circular opening fitting said tube and thereby laterally supporting said tube with one end portion thereof extending beyond said mounting member, said circular opening having keyway extensions therefrom fitting said side legs, whereby said nut is held in place on the end portion of said tube, said side legs having flanges extending outwardly from their ends and limiting the extent of insertion of said tube end and said nut through said mounting member.

3. A resilient nut and relatively rigid tube structure including in combination a tube for receiving a threaded rod, a resilient nut on the end of said tube for engaging the threads on said rod, said nut comprising a U-shaped member of resilient sheet metal including flat side legs adjacent opposite sides of the end portion of said tube and including also a flat mid-portion crossing the end of said tube, said mid-portion having a rod aperture therethrough and having a slot extending from said aperture, said slot dividing said mid-portion into two parts pressing against opposite sides of the threads on said rod, the width of said U-shaped member being substantially less than the external diameter of said tube, and a mounting member of sheet material having a circular opening fitting said tube and thereby laterally supporting said tube with one end portion thereof extending beyond said mounting member, said circular opening having keyway extensions therefrom fitting said side legs, whereby said nut is held in place on the end portion of said tube, said side legs having flanges extending outwardly from their ends and limiting the extent of insertion of said tube end and said nut through said mounting member, the slot in said mid-portion extending through said side legs and substantially to said flanges.

4. A resilient nut including a strip of spring sheet metal having a U-shape and comprising a flat mid-portion and flat side legs substantially parallel with each other and extending substantially perpendicularly and in the same direction from said mid-portion, the width of said mid-portion and the width of said side legs being substantially less than the distance between said side legs, said mid-portion having an aperture therethrough for receiving a threaded rod, said mid-portion having a slot extending in opposite directions from said aperture and dividing said mid-portion into two spring parts for pressing against opposite sides of the threads on said rod.

5. A resilient nut including a strip of spring sheet metal having a U-shape and comprising a flat mid-portion and flat side legs substantially parallel with each other and extending substantially perpendicular and in the same direction from said mid-portion, the width of said mid-portion and the width of said legs being substantially less than the distance between said side legs, said mid-portion having an aperture therethrough for receiving a threaded rod, said mid-portion having a slot extending in opposite directions from said aperture and dividing said mid-portion into two spring parts for pressing against opposite sides of the threads on said rod, said side legs having retaining flanges extending from their ends, said slot extending through said side legs substantially to said flanges.

WILLIAM A. SCHAPER.

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