Oct. 13, 1970 E. SCHELLMANN 3,533,589

SPRING CLAMP FOR POT CORES

Filed July 26, 1968

FIG. 1

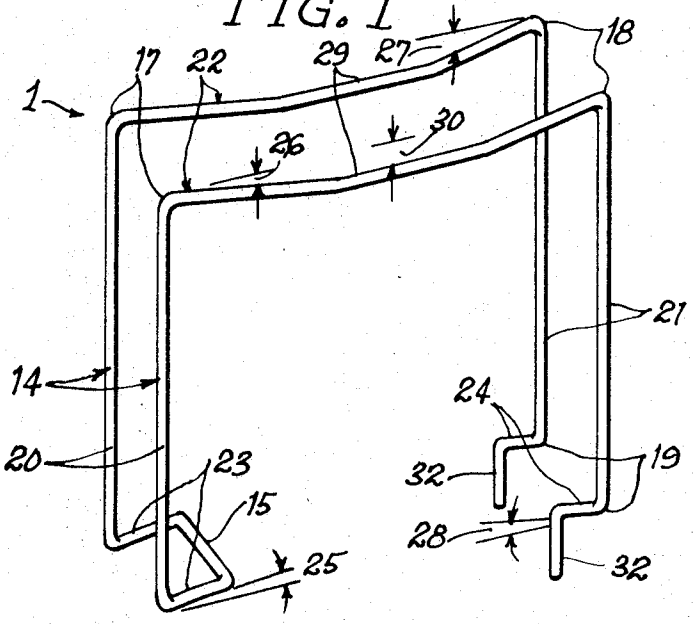


FIG. 2

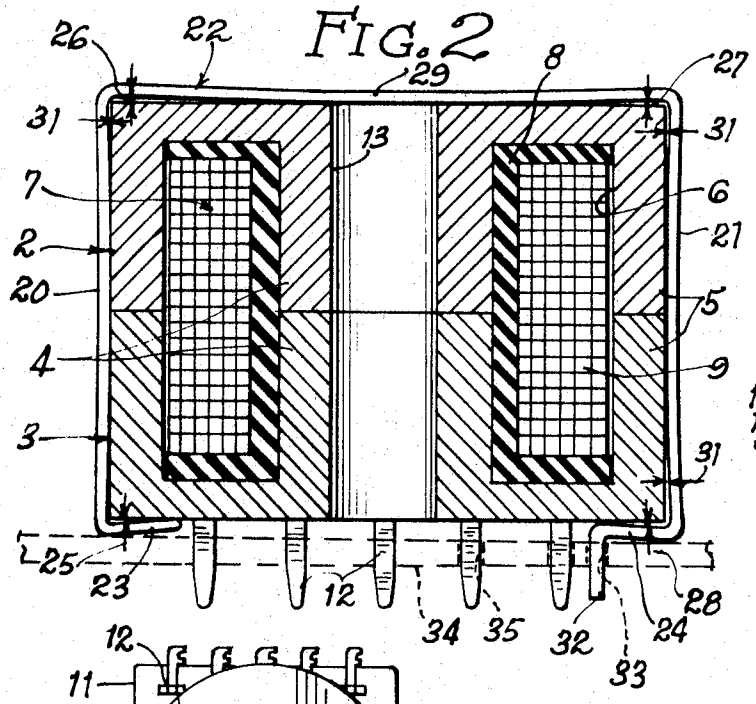
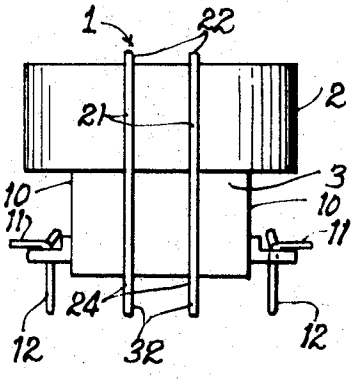


FIG. 3



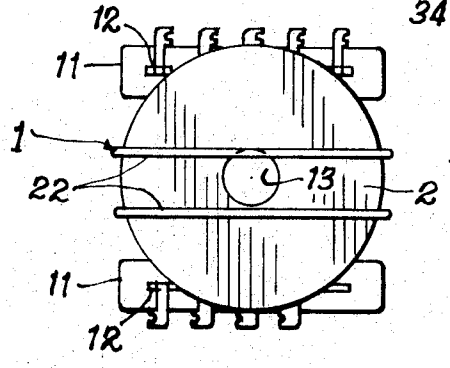


FIG. 4

INVENTOR
Ernest Schellmann
by McDougall, Hersh, Scott
and Ladd Attys

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SPRING CLAMP FOR POT CORES

Ernest Schellmann, Nashville, Tenn., assignor to Aladdin Industries, Incorporated, Chicago, Ill., a corporation of Illinois

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U.S. Cl. 248—309 3 Claims

ABSTRACT OF THE DISCLOSURE

A spring clip for clamping pot cores together, comprising a generally U-shaped wire member having a pair of parallel wire leg portions and a crossbar portion extending therebetween at one end thereof, said leg portions having four generally rectangular bends, whereby said leg portions are bent transversely into a C-shaped form, said wire member thereby having a pair of side portions, a top portion extending therebetween, and a pair of flange portions projecting inwardly therefrom, one of said flange portions being formed by said crossbar portion and the adjacent elements of said leg portions, the other flange portion being formed by the opposite ends of said leg portions, and a pair of prongs bent transversely from said end portions for securing said wire member to a printed circuit board or the like.

The present invention relates to a device for clamping pot cores together, while also providing means for mounting the pot cores on a printed circuit board or some other similar member. Pot cores are employed in various transformers and inductance coils, intended for use in various types of electronic circuits. A pot core is generally in the form of a cylindrical member formed axially within a cup. The pot core is formed in one piece from a low-loss magnetic material, such as a suitable ferrite material, for example. Two such pot cores are fitted together to surround an inductance coil or a set of transformer windings. The coil or windings are disposed around the axial rods and within the cup portions of the pot cores.

Various devices have been employed in the prior art to secure pairs of pot cores together. One such device, made of sheet metal, is disclosed in U.S. Pat. No. 3,197,167, for example.

One object of the present invention is to provide a new and improved spring clamp which is made of a single piece of spring wire, and which may be utilized not only to clamp the pot cores together, but also to mount the pot cores on a printed circuit board or the like. The wire spring clamp of the present invention uses very little material and is easily formed. Thus, it is extremely low in cost.

Preferably, the spring clamp is in the form of a -shaped wire member having parallel leg portions and a crossbar portion extending therebetween. The leg portions are formed into a C-shaped structure by forming four transverse bends therein. Thus, the wire member has a pair of side portions, a top portion extending therebetween, and a pair of flange portions bent inwardly from the side portions. One of the flange portions is formed by the crossbar portion and the adjacent elements of the leg portions. The other flange portion is formed by the opposite end portions of the leg portions. Prongs are preferably bent transversely from the end portions. These prongs may be employed very advantageously to mount the cores on a printed circuit board or the like. Thus, the prongs are adapted to extend through openings in the printed circuit board. The prongs may be soldered or otherwise secured to the prnited circuit board.

Various other objects, advantages and features of the present invention will appear from the following description, taken with the accompanying drawings, in which:

FIG. 1 is a perspective view of a spring wire clamp to be described as an illustrative embodiment of the present invention.

FIG. 2 is a diagrammatic elevational section, showing the spring clamp mounted on a pair of pot cores.

FIG. 3 is an elevational view showing the assembly of FIG. 2 on a smaller scale, the view being at right angles to the direction of FIG. 2.

FIG. 4 is a plan view of the pot core assembly of FIG. 2.

As already indicated, the drawings illustrate a spring clip or clamp **1**, for securing a pair of pot cores **2** and **3** together. It will be seen that the pot cores **2** and **3** are of the usual construction. Thus, each of the illustrated pot cores **2** and **3** comprises an axial member **4**, formed within a cup **5**. The axial members **4** and the cups **5** are preferably cylindrical in shape. It is preferred to form each of the pot cores **2** and **3** as a single piece from a low-loss magnetic material, such as a suitable ferrite material.

The pot cores **2** and **3** are adapted to be assembled, end to end, so as to form an enclosed space **6** within the cups **5** and around the axial members **4**. The space **6** is adapted to receive a coil or winding assembly **7**. As shown, the winding assembly **7** comprises an insulating bobbin or spool **8**, on which one or more coils **9** are wound. In the usual case, there are a plurality of coils to form a transformer. However, in some cases a single inductance coil may be provided. The coil assembly **7** is mounted around the axial members **4**, while being enclosed within the cup members **5**. Thus, the pot cores **2** and **3** form an enclosed magnetic circuit for the coils **9**.

The two pot cores **2** and **3** could be identical in construction, but in this instance the pot core **3** is formed with a pair of notches or cutaway portions **10** to accommodate terminal strips **11**, which preferably extend outwardly from one end of the insulating spool **8**. The terminal strips **11** and the spool **8** are preferably formed in one piece from a suitable plastic, or some other insulating material.

The terminal strips **11** are preferably fitted with a plurality of terminal prongs **12**, to which the end leads of the coils **9** may be connected. The prongs **12** project beyond the pot core **3**, in a direction parallel to the axis of the pot core.

In the illustrated construction, each of the pot cores **2** and **3** is formed with an axial bore **13**, extending within the cylindrical inner member **4**. However, the inner members **4** could be formed of solid magnetic material, without the bore **13**.

As clearly shown in FIG. 1, the illustrated clip **1** is made as a single piece or member of spring wire. The wire member or clip **1** is bent into a U-shape, so as to comprise a pair of parallel leg portions **14**, with a crossbar portion **15** extending therebetween. The leg portions **14** are formed with four generally rectangular bends **16**, **17**, **18** and **19**, so as to provide a C-shaped structure. Thus, the wire clip **1** has a pair of side portions **20** and **21**, a top portion **22** extending therebetween, and a pair of flange portions **23** and **24** projecting inwardly from the side portions **20** and **21**.

As shown to best advantage in FIG. 2, the side portions **20** and **21** are adapted to extend longitudinally along the outer cylindrical surfaces of the pot cores **2** and **3**. The top or end portion **22** of the clip **1** is adapted to extend diametrically across the flat end of the pot core **2**. The flanges **23** and **24** are hooked under the flat end of the pot core **3**.

To provide a strong spring clamping effect, the bends **16**, **17**, **18** and **19** are preferably formed at somewhat

less than 90°, by a matter of perhaps a few degrees, as indicated by the small angles **25**, **26**, **27** and **28** in FIG. 1. These angles may vary, but they may amount to about 5°, for example. By virtue of the angles **26** and **27**, the top portion **22** of the C-shaped clip is formed with a central portion **29** which is depressed or offset downwardly, as indicated by the small dimension **30** in FIG. 1. It will be seen from FIG. 2 that the central portion **29** exerts spring pressure against the flat end of the pot core **2**, when the clip **1** is mounted on the pot cores. Similarly, the flange portions **23** and **24** exert spring pressure upon the flat lower side of the pot core **3**.

When the clip **1** is mounted on the pot cores **2** and **3**, the small angles **25**, **26**, **27** and **28** are reduced in magnitude, by virtue of the flexing of the spring clip. Moreover, the side portions **20** and **21** are bowed outwardly at their ends, away from the cylindrical sides of the pot cores **2** and **3**, as indicated by the small clearance dimensions **31** in FIG. 2.

The spring clip or clamp **1** preferably includes means for mounting the pot cores **2** and **3** on a printed circuit board, or some other support. As shown to best advantage in FIG. 2, the spring clip **1** comprises a plurality of prongs **32**, adapted to extend through openings **33** in a printed circuit board **34**. The various terminals **12** are adapted to extend through other openings **35** in the board **34**. The prongs **32** may be soldered or otherwise secured to the board **34**. The solder may be applied to the prongs **32** by a dip soldering or flow soldering operation, at the same time that the terminals **12** are soldered to the printed circuit board.

In the illustrated construction, the prongs **32** are bent transversely from the wire elements which form the flange portion **24** of the clip **1**. Thus, the prongs **32** represent the extreme end portions of the wire clip. It will be seen that the prongs **32** are bent generally at right angles to the flange portion **24**, so as to be generally parallel to the terminals **12**.

The spring clamp **1** may be formed at very low cost from a single piece of spring wire. The amount of materials involved in the spring clamp is very small, so that the cost of the clamp is very low.

The clamp **1** may readily be mounted on the pot cores **2** and **3** by suitably flexing the clamp. When the assembly is to be mounted on the printed circuit board, the prongs **32** are inserted through the openings **33** in the board. At the same time, the terminals **12** are inserted through the openings **35**. The prongs **33** and the terminals **12** may then be dipped in molten solder to secure the spring clamp **1** and the pot core assembly to the printed circuit board.

In addition to its other advantages, the spring clamp **1** is very compact. Due to the provision of the inboard mounting prongs **33**, there are no outboard mounting lugs or the like to take up additional space.

Various other modifications, alternative constructions and equivalents may be employed without departing from the true spirit and scope of the present invention, as described by way of example in the foregoing description.

I claim:

1. A spring clip for clamping a pair of pot cores or the like, said clip being formed from a generally U-shaped member comprising a single length of wire bent to provide a pair of generally parallel wire leg portions and a crossbar portion extending therebetween at one end thereof, said leg portions each having four generally rectangular bends formed transversely therein, whereby said clip is bent into a C-shaped form having a pair of diametrically opposite side portions, a top portion extending therebetween, and a pair of flange portions projecting inwardly therefrom, one of said flange portions being formed by said crossbar portion and adjacent elements of said leg portions, the other flange portion being formed by the extreme ends of said leg portions, and including mounting prong means projecting transversely from at least one of said flange portions, the bends between said side portions and said flange portions, and the bends between said side portions and said top portion being at angles substantially less than 90°.

2. A spring clip according to claim **1** wherein said mounting prong means include a pair of mounting prongs bent transversely from said extreme ends of said leg portions, said mounting prongs extending generally parallel to said side portions but in the opposite direction from the corresponding flange portion.

3. A spring clip according to claim **2**, in which said bends between said mounting prongs and said ends are formed at substantially less than 90°.

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6,505,174 10/1965 Netherlands.

ROY D. FRAZIER, Primary Examiner

J. F. FOSS, Assistant Examiner

U.S. Cl. X.R.

174—35; 336—83.