

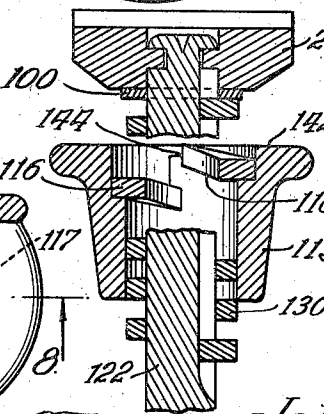
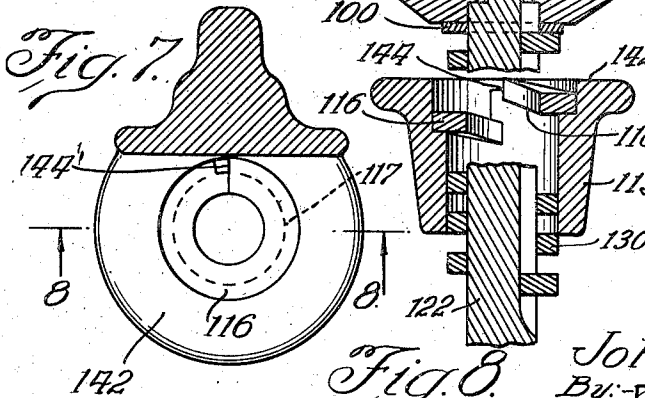
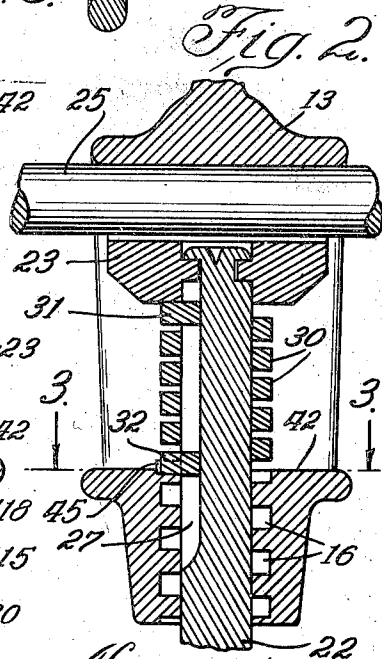
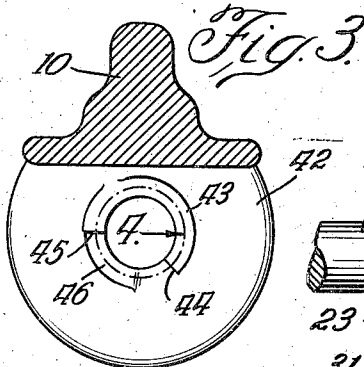
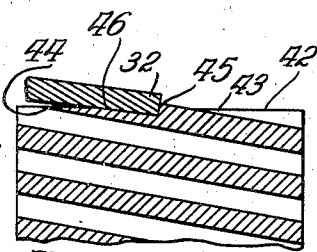
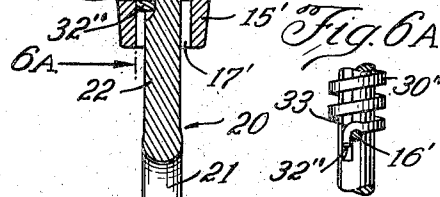
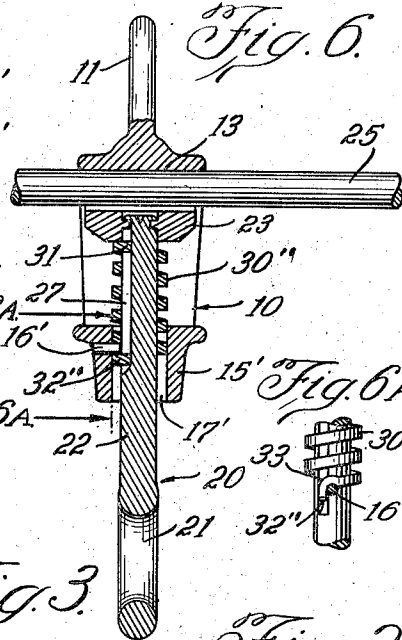
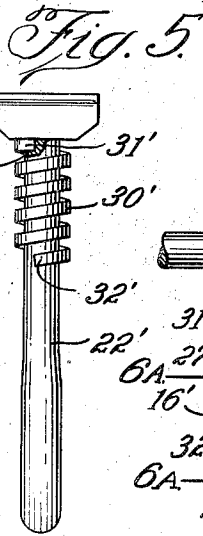
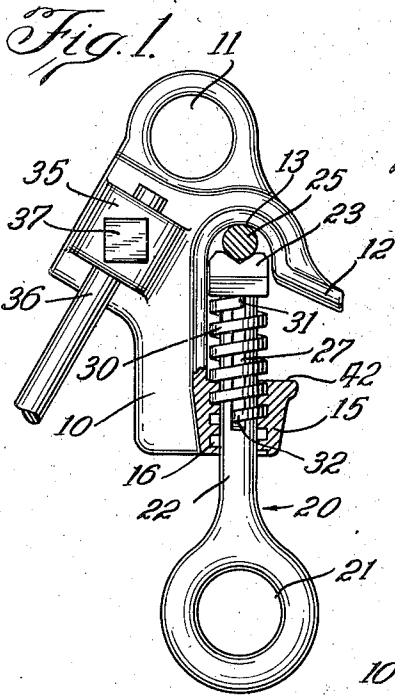
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2,206,653

LINE CLAMP

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UNITED STATES PATENT OFFICE

2,206,653

LINE CLAMP

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12 Claims. (Cl. 173-273)

This invention relates to a line clamp for use in making a readily detachable contact with a transmission line. In particular, the clamp is adapted for making a connection between a transmission line and some current consuming equipment, such as a transformer.

and which will have no tendency to loosen up due to vibration or other causes.

Referring to the drawing:

Figure 1 shows a side-view of the improved clamp;

Fig. 2 is a sectional view at right angle to Fig. 1 of a portion of the clamp with jaws locked together;

Fig. 3 is a section on line 3-3 of Fig. 2;

Fig. 4 is a development of the threaded portion of the clamp taken between diametral points at the place indicated by the arrow;

Fig. 5 is a view of the movable portion of a clamp showing a modification;

Fig. 6 is a front sectional view of a clamp showing another modification;

Fig. 6A is a sectional detail on line 6A-6A of Fig. 6;

Fig. 7 is a sectional view looking down upon the threaded portion of a clamp showing still another modification; and

Fig. 8 is a section along line 8-8 of Fig. 7.

Referring to Figs. 1 to 4 inclusive, the clamp comprises a clamp body 10 of suitable material such as brass having an eye 11 at one end thereof and a nose 12 leading to a clamping or fixed jaw portion 13. Opposite fixed jaw 13, body 10 is shaped to provide a boss 15 having a coarse thread 16 cut out therein on at least part of the inside surface.

Disposed within boss 15 is an eye-hook 20 having an eye 21 and a stem 22 to which a movable jaw 23 is riveted. Jaw 23 is rotatable on stem 22 and is adapted to cooperate with fixed jaw 13 to clamp a transmission wire 25. Formed lengthwise of stem 22 is a channel or keyway 27. A helical spring 30, preferably formed of rectangular or square wire, although this is not necessary, is disposed around stem 22. The normal untensioned pitch of the spring may be substantially equal to the pitch of thread 16 on boss 15. The ends 31 and 32 of spring 30 are bent inwardly toward stem 22 and engage in keyway 27 so that in effect the spring is rotatably locked to stem 22, while capable of expansion and contraction. Any other locking means may be used.

Wire 25, which is usually rather heavy, is adapted to support the entire clamp. In order to provide a connection from the clamp, a raised portion 35 is provided having a suitable channel therethrough for a connector 36 maintained in position by a bolt 37 threaded into portion 35.

In order to provide a lock against accidental loosening of the clamp, as by vibration, the top face 42 of boss 15 is provided with a slot 43 at

As a rule every transformer or auxiliary equipment is provided with some kind of a fuse between it and the transmission line. In case of repairs on a transformer it has hitherto been the custom to open the circuit between the transformer and the transmission line by pulling out the fuse or other protective device and using that device as a switch. Hence, clamps for establishing a connection between the transformer lead and that transmission line were rarely if ever disturbed after installation so that the ease or difficulty of removing and replacing the clamp was of no great consequence. Within recent years, however, there has been a tendency to enclose the protective apparatus within the transformer casing so that it is not readily accessible and cannot readily be used as a switch to break the circuit connection between the transmission line and transformer. Hence, if any work must be done on a transformer of this type, it is necessary to detach the clamp from the transmission line to break the connection.

Inasmuch as such clamps are at high potentials they must be handled in a suitable manner. Thus, it is customary to manipulate the clamp with a long wooden pole having suitable grips attached thereto. Such manipulation of the clamp is awkward and results in considerable time being wasted as well as some danger due to the long time spent upon clamp removal and positioning.

Generally, clamps of this type have a pair of opposing jaws, one of them being movable and operated by a threaded member. This threaded member is provided with a thread of rather fine gauge. The fineness of the gauge is necessary since such clamps are exposed to considerable vibration which would tend to loosen up any jaw operated by a coarse thread. The fineness of the thread, however, results in considerable time being necessary for the application and removal of the clamp. Furthermore, because of the great leverage action, it is possible to screw the jaws together so tightly as to damage the line wire.

An object of this invention is to devise a wire clamp which may be taken off or installed quickly, which will be simple, which may be applied in a manner so that damage to the wire is eliminated

some portion of the border of the aperture spaced from the end 44 of thread 16. A protuberance 45 may also be provided at that end of slot 43 which is first encountered by the bottom end 32 of spring 30 upon tightening movements of the clamp. The remote end 46 of slot 43 may be graduated to provide a cam surface to connect with top face 42 of the boss.

Because of the coarseness of the pitch of spring 30 and thread 16 comparatively few turns of stem 22 will be necessary to withdraw jaw 23 and clear nose 12. Furthermore, the maximum compression to which wire 25 may be subjected is determined by the strength of spring 30. As stem 22 is turned to elevate jaw 23 toward the opposing jaw 13, the turns or coils of spring 30 will climb up from boss 15 until finally the last or trailing end 32 of the spring is just above the boss. Thereafter additional turns will cause no increase in pressure since end 32 of the spring will merely idly turn relative to boss 15. It is clear that upper or leading end 31 of the spring will be prevented from moving up along the stem by the bottom of movable jaw 23. Also the lower spring end 32 will tend to wedge against the lower end of keyway 27 and positively move stem 22 downward upon jaw opening movements thereof.

Turning of stem 22 will finally cause spring end 32 to climb over protuberance 45 and fall into slot 43. In that position, spring end 32 is in a stable position from which vibration is not apt to move it. The clamp may be loosened by turning stem 22 so that spring end 32 will be at thread end 44. This may occur whichever way the stem is turned. Normally, the easiest way is to turn stem 22 in a spring compressing direction where spring end 32 will climb up the cam surface 46 of the slot and be on face 42. Then when thread end 44 is reached by spring end 32, reverse movement of the stems will result in normal jaw release action.

Referring to Fig. 5, the stem 22' is provided with spring 30' whose top end 31' is rotatively locked to stem 22' by bending inwardly to engage a slot 27'. Bottom end 32' of the spring is free to turn with respect to stem 22'. This modification may be used instead of movable portion of the clamp shown in Fig. 1 and is somewhat more flexible. Thus a greater departure from pitch equality of thread 16 and spring 30' will be tolerated since the spring end may turn in contracting or expanding. With this modification, the locking means is effective. Thus on reverse movement of stem 22' in locked position, corresponding to Fig. 2, the lower end 32' of the spring will tend to dig into the metal and hold whereas on additional movement, normally tending to increase compression (though not actually doing so), the spring will coil up tighter and pull bottom end 32' up from the slot.

In Figs. 6 and 6A is a modification where boss 15' has a channel 17' of a diameter sufficient to clear spring 30''. At any desired place, a pin 16' is mounted in boss 15' with the inner end of the pin extending into channel 17' up to stem 22. This pin 16' is thick enough to extend between adjacent coils of spring 30'' and function as a thread member. Turning of stem 22 will cause spring 30'' to climb up until bottom end 32'' of the spring just passes pin 16'. In order to lock the clamp, spring 30'' has a curved part 33 adjacent its lower end 32''. When stem 22 is turned sufficiently, pin 16' will engage part 33

and stop any normal further turning in a compressing direction.

In Figs. 7 and 8 is a modification where a spring lock washer may be used for a threaded part. Thus boss 115 has a channel 117 formed there-through, said channel extending up (toward the fixed jaw) to terminate in a helical shoulder or thread 118 having an end 144 at top face 142 of the boss. Into this helical thread 118, a lock washer 116 is threaded and locked in place as by deforming the edge of the boss metal at 144'. Channel 117 is large enough to accommodate both stem 122 and spring 130 while lock washer 116 has its inner edge extending far enough in to engage the coils of spring 130 and assumes the position shown in Fig. 8.

A plain washer 100 of suitably hard metal may be disposed around stem 122 just below movable jaw 123 to act as a stop for the top coil of spring 130. Since the movable jaw is rotatable with respect to the stem, it is clear that the steel spring in turning will tend to cut it.

The modifications shown in Figs. 6 to 8 inclusive are particularly useful when the clamp is to be made of soft metal such as aluminum. Hitherto aluminum for clamps has been impractical due to the inability of the threaded parts to stand up in service. But with the constructions shown, the body of the clamp may be of aluminum while the coil spring, and either pin or lock washer may be of steel. The movable jaw may be of soft metal also in which case a steel washer may be provided.

It is obvious that the modification shown in Fig. 5 may be used in any of the constructions shown. The locking means shown in Figs. 2 to 4 inclusive may also be used in the lock washer construction of Figs. 7 and 8.

What is claimed is:

1. A wire clamp comprising a body having a stationary jaw and an apertured portion, a member disposed in said apertured portion and carrying a movable jaw for cooperation with said stationary jaw, said member being movable in jaw-opening and closing directions, a helical spring disposed around said member, means for locking at least one end of said spring against rotation with respect to said member, means on said body for threadedly cooperating with the coils of said spring upon turning movements of said member to force said spring to move axially and means for transmitting said spring force to said member for jaw-opening and closing movements.

2. A wire clamp comprising a body having a stationary jaw and an apertured portion, a member disposed in said portion and carrying a movable jaw for cooperation with said stationary jaw, said member being movable in jaw-opening and closing directions, a helical spring disposed around said member, means for locking at least one end of said spring against rotation with respect to said member, means at said apertured portion for threadedly engaging the coils of said spring to force said spring to move axially upon turning movements of said member, said spring having a leading end which first engages said engaging means upon jaw-closing movement, and means for transmitting the axial force of said leading spring end to said movable jaw upon turning movement of said member tending to close the jaws.

3. The structure of claim 2 wherein said locking means consists of a key-way lengthwise in

said member with at least one end of the spring turned in to engage in said key-way.

4. A wire clamp comprising a body having a stationary jaw and an apertured portion having a thread part, a member disposed in said portion and movable therein, a movable jaw carried by said member and movable therewith in respect to said stationary jaw in jaw-opening and closing directions, a helical spring disposed around said member, means for locking at least one end of said spring against rotation with respect to said member, said spring and thread part adapted to cooperate to move said spring axially with respect to said portion upon member turning movements and means for transmitting the axial force of said spring to said movable jaw.

5. The structure of claim 4 wherein said locking means consists of a key-way lengthwise on said member and wherein both ends of said spring are returned to engage in said key-way.

6. The clamp of claim 4 wherein the thread part has an end face where the thread terminates with respect to jaw-closing direction and wherein said end face has a slot at the periphery of the aperture and removed from the thread end into which the trailing end of the spring during jaw-closing movement may fall for locking.

7. The clamp of claim 4 wherein the thread part has an end face where the thread terminates in a jaw-closing direction and wherein said end face has a slot at the periphery of the aperture and removed from the thread end, said slot having a steep fall and gradual rise at the ends thereof encountered by the trailing end of the spring in the order indicated with respect to jaw-closing movement.

8. A wire clamp comprising a body having a stationary jaw and an apertured portion having a thread part, a member disposed in said portion and movable therein, a movable jaw carried by said member and movable therewith in respect to said stationary jaw in jaw-opening and closing directions, a helical spring disposed around said member, said member having a key-way lengthwise thereof and said spring having the ends thereof formed to engage in said key-way and lock both ends of said spring against rotation with respect to said member, said spring and thread part adapted to cooperate to move said spring axially with respect to said portion upon member turning movements, said thread part having an end face where the thread terminates with respect to jaw-closing directions, said end face having a slot therein at the periphery of the aperture and removed from the thread

end and means for transmitting the axial force of said spring to said jaw for jaw moving purposes.

9. A wire clamp comprising a body having a stationary jaw and an apertured portion, a member disposed in said portion and movable therein, a movable jaw carried by said member and movable therewith in respect to said stationary jaw in jaw-opening and closing directions, a helical spring disposed around said member, means for locking at least one end of said spring against rotation with respect to said member, at least one pin carried by said apertured portion and having an end projecting into the path of said spring with respect to longitudinal travel of said spring, said pin end being adapted to engage adjacent spring coils whereby upon turning movement of said member said spring is moved axially with respect to said pin and means for transmitting the axial force of said spring to said movable jaw.

10. The structure of claim 9 wherein the lagging end of the spring in a jaw compressing direction is shaped to provide a notched portion engaging said pin for locking purposes when said member has been turned to a position of maximum jaw closing.

11. The structure of claim 9 wherein both ends of the spring are locked to the member against rotation with the locking means consisting of a key-way in the member and the spring ends bent in to engage the key-way and wherein the lagging end of the spring in a jaw compressing direction is shaped to provide a notched portion and an abutment whereby when said member is turned to close the jaws in an extreme position where said pin engages the notched portion for locking and the abutment prevents additional turning movement in the same direction.

12. A wire clamp comprising a body having a stationary jaw and an apertured portion, a member disposed in said portion and movable therein, a movable jaw carried by said member and movable therewith with respect to said stationary jaw in jaw-opening and closing directions, a helical spring disposed around said member, means for locking at least one end of said spring against rotation with respect to said member, and a split spring washer carried by said portion and forming a thread for cooperation with said spring to move said spring axially upon member turning movement, and means for transmitting the axial force of said spring to said movable jaw.

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