Feb. 7, 1950 W. J. LEWIS 2,497,030

CLAMPING DEVICE

Filed April 22, 1944

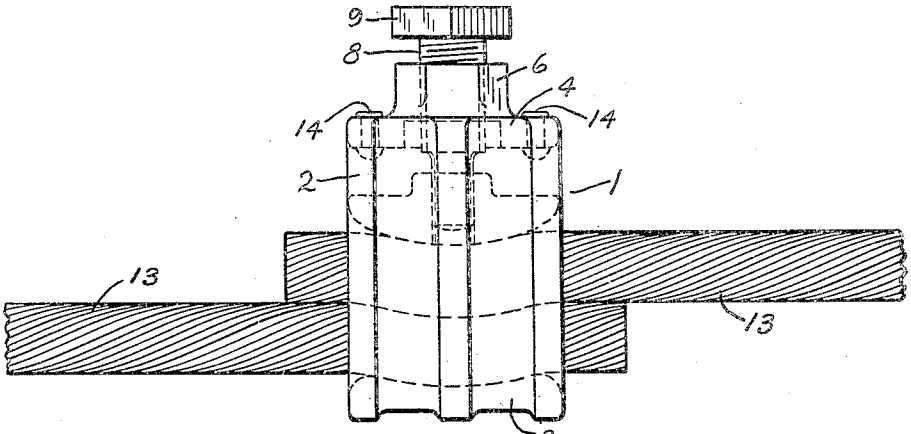


FIG. 1

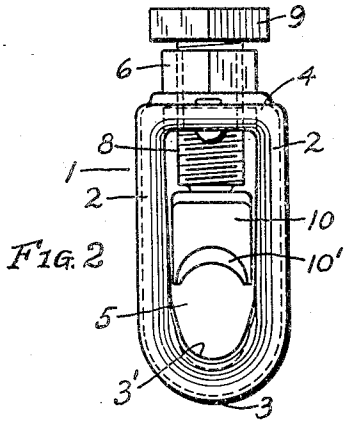


FIG. 2

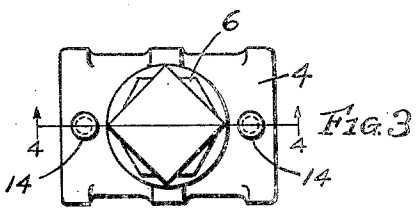


FIG. 3

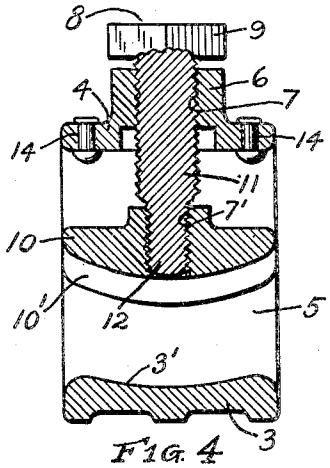


FIG. 4

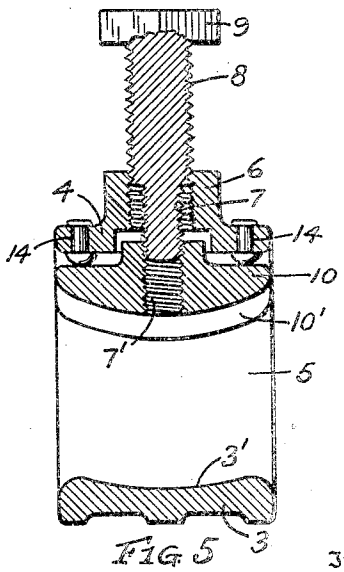


FIG. 5

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CLAMPING DEVICE

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6 Claims. (Cl. 24—135)

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My invention relates to connectors and has particular application to connectors for large stranded cables but may be arranged for connecting small solid conductors.

My improved device is simple in construction and application, of high efficiency both electrically and mechanically, uses a single clamping screw, and the cables are clamped in contact with each other under high pressure.

One of the main objects of my invention is to provide a clamp type of connector by means of which more than the ordinary pressure may be secured by means of a single screw of the ordinary type and without the application of undue force upon the screw by the operator.

Another object of my invention is to provide a device of the fewest number of parts and which are easy of assembly and which cannot be inadvertently disassembled after proper assembly.

Another object of my invention is to provide a clamp in which the longitudinal movement of the clamping member is relatively slow compared to that of the screw.

Still another object attained by my improved clamp is a reduction of friction as compared to those clamps in which the end face of the operating screw engages with and rotates relative to the clamping member.

Another object of my invention is to provide a device for the purpose described in which a differentially threaded stud is used.

Still another object of my invention is to provide a clamp in which the clamping member is less apt to loosen from vibration than is the case with a single thread screw clamp.

My invention will be more readily understood by making reference to the accompanying drawings, wherein:

Fig. 1 is a side view of my invention as applied to a pair of cable ends.

Fig. 2 is an edge view of Fig. 1 minus the cables.

Fig. 3 is a top view of Fig. 2.

Fig. 4 is a partial section of my invention taken on the line 4—4 of Fig. 3 and shows the stud and clamping member in substantially clamping position as in Fig. 1.

Fig. 5 is a view in partial section corresponding to the view in Fig. 4 except the clamping member and screw are shown in their fully retracted positions.

In the preferred embodiment of my invention I provide a loop shaped member 1 with sides 2 ends 3 and 4 continuous therewith and forming the oblong or elongated opening 5.

The end wall 3 has a concaved bearing surface 3' curved transversely to conform to the diameter of the cables to be connected while the end 4 is flat and provided with a boss 6 and threaded opening 7. The formation of the bearing face 3' aids in gripping the cable.

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Mounted in the opening 7 is stud 8 with a head 9 to receive a wrench or other tool for rotating the stud.

Non-rotatably mounted in the opening 5 is a clamping member 10 arranged to move longitudinally of the member 1 whereby the cables or wires may be either gripped or released. The bearing face 10' of member 10 is grooved to conform to the curvature of the cables and is also curved lengthwise and convexly. This last curvature conforms to the longitudinal concave curvature in the bearing surface of end 3 of member 1.

The stud 8 is provided with two portions, one portion 11 being of relatively large diameter which is threaded through the boss 6 and the other portion 12 which is of smaller diameter and threaded into the threaded opening 7' in the clamping member 10.

The portion 11 is provided with a relatively coarse thread or pitch while the portion 12 is provided with a relatively fine thread or pitch; both threads are of the same character, that is, both are threaded in the same direction, preferably right hand.

The clamping member 10 has means projecting therefrom which engage the side walls of the opening 5 and render it non-rotatable relative to the member 1, therefore when the stud 8 is rotated clockwise, if right threads are used, the portion 11 will cause the stud 8 to advance or move inwardly towards the end 3 of the member 1 and the portion 12 will advance within the threaded opening 7' of the clamping member 10 since the clamping member is non-rotatable, therefore the resultant motion of the clamping member relative to the loop shaped member is in the same direction in which the stud 8 is moving but at a slower rate.

The clamping member 10 moves in the opposite direction to the direction of advance movement of the stud relative to the stud, but still the clamping member advances relative to the looped member in the same direction of movement as the stud since the stud advances faster than the clamping member is retracted and the rate of advance of the clamping member is proportional to the difference in pitch or lead of the two threads.

Just as a concrete example of my invention, I constructed a clamp according to my invention

in which the portion 11 of stud 8 was ¾ inch in diameter and provided with threads of 10 pitch or lead while the portion 12 of the stud 8 was ½ inch in diameter and provided with threads of 20 pitch or lead. Both threads were right hand.

When the stud 8 was rotated clockwise, the stud advanced $\frac{1}{10}$ inch in each revolution and the clamping member was retracted relative to the stud $\frac{1}{20}$ inch per turn of the stud but the final result was an advance of the clamping member in the direction in which the stud was moving of $\frac{1}{10}''-\frac{1}{20}''-.1-.05=.05''$ or the equivalent of a 20 pitch or lead thread.

If the thread is of the same pitch on both portions 11 and 12, there will be, of course, no advance or retraction of the clamping member relative to the looped body.

By calculation I find that the pressure of the clamping member upon the cables, using the differentially stud just described, as compared with a ¾ inch stud having a 10 pitch thread with the end face of the stud engaging with and rotating relative to the clamping member, is about 10 percent greater using the differential stud, for the same applied force upon the studs, and taking into account dry friction between the parts.

The class of device I have herein described will probably in most every case be used dry and not lubricated; lubrication would of course reduce the friction in each case.

It will be noted, Fig. 4, that when the clamp 10 is in clamping position, the engagement between the stud and clamping member extends for substantially the entire length of the threaded portion 12; this serves to maintain rigidity, alignment and smooth operation of the clamping member when these properties are most needed, and prevents binding usually associated with a single threaded screw, swivelly engaging the clamping member.

My improved construction lends itself to a simple assembly operation and one in which the assembly is maintained.

After the parts have been prepared, the clamping member 10 is placed in position preferably against the body at the threaded end of the loop shaped member 1 with the threaded openings aligned; the stud 8 is inserted in the threaded opening 7 and rotated into position until the end of the threaded portion 12 enters the threaded opening 7' in the clamping member 10.

Within certain limits, the clamp parts may be assembled so that the space between the bearing surfaces 3' and 10' will vary, and this fact may give one, not acquainted with the proper method of assembly considerable difficulty, therefore I provide means to prevent the parts being disassembled by the user.

To maintain proper assembly, after the parts are assembled as described above, the stud is then further rotated until the clamping member is moved away from the end wall 4 sufficiently to permit the insertion of the rivets 14 into previously drilled openings in the member 1.

These rivets 14 are peened into position and the heads which are engageable by projecting means on the non-rotatable clamping member when the stud is rotated in the proper direction, project a sufficient amount to maintain a limited amount of threaded engagement between the stud and clamping member (Fig. 5) and prevent further reverse movement of the clamping member and its engagement with the wall 4 and coupled with these features and the differential threading of the parts, rotation of the stud tending to release it from the clamping member is prevented.

I find that by using a differentially threaded stud as disclosed, there is less chance of the stud backing off. This is of particular value in cases where the cables or device are subjected to vibrations.

Both threaded portions 11 and 12 for a given stud are provided with hand threads extending in the same direction but I claim no particular advantage in having one portion threaded in one direction and the other portion threaded in the opposite direction.

There may be uses for a differentially threaded stud in which the stud is reversed end for end in the support member, that is, the coarse pitch associated with the clamping member and the fine pitch associated with the support member.

While I have referred in particular to a device having a differentially threaded stud of 10 and 20 pitch or lead threads, it is to be understood that other combinations to meet requirements may be employed, thereby giving varying results as do also studs having varying diameter of the portions 11 and 12.

Although I have shown and described devices of specific structural details, many modifications may be effected therein within the spirit and scope of my invention, and I desire that only such limitations shall be imposed as are indicated in the appended claims.

I claim as my invention:

1. An article of manufacture comprising a body member having a loop shaped opening and a threaded opening therethrough, a clamping member positioned in the loop shaped opening and movable along the major diameter of the said opening, means to render the clamping member non-rotatable relative to the body member, the clamping member having a threaded opening, a screw connecting the two body members and having two threaded portions, one portion cooperating with the said body member and the other threaded portion cooperating with the clamping member, the threads on the portions being of different pitch whereby the relative movement of the two members depends upon the difference in pitch of the two threaded portions and means associated with one of the members to cooperate with means on the other member to check the movement of the clamping member after it has moved away from its clamping position a predetermined amount whereby rotation of the screw is checked due to cooperation of the differential threading and the said non-rotating and non-movable clamping member thereby preventing the separation of the screw and clamping member after assembly of the parts.

2. A clamping device comprising in combination, a body member having a bearing surface, a clamping member positioned in a loop-shaped opening in the body member and having a bearing surface oppositely disposed to the first bearing surface, the clamping member having means to engage the side walls of the loop-shaped opening to prevent its rotation relative to the body member, the body member and the clamping member each provided with aligned threaded openings, a stud mounted in the threaded openings and having differentially threaded portions cooperating with the threaded openings in the body and clamping members, all threads being in the same direction, the pitch of the threads on the clamping member being less than that of the threads on the body member whereby the rate of movement

of the clamping member will be less than that of the stud when the stud is rotated in either direction, projecting means on the body member adjacent the threaded opening on the body engageable by the clamping member to check the movement of the clamping member away from its clamping position whereby the disengagement of the stud from the clamping member is checked and rotation of the stud in one direction automatically prevented.

3. A cable clamp to connect a pair of cables comprising in combination, a body having a loop-shaped opening to receive the cables, a cable clamp mounted in the opening and movable into engagement with one of the cables, one end of the body having a threaded opening and the clamp having a threaded opening, a differentially threaded stud having a threaded portion cooperating with the threaded opening in the body and a threaded portion cooperating with the threaded opening in the clamp, projecting means on the clamp to engage the side walls of the loop-shaped opening whereby rotation of the clamp is prevented, the said stud and clamp being so constructed and arranged relative to the body that the stud may be rotated and assembled and disassembled relative to the clamping member when the clamp is in contact with the end of the body provided with the threaded opening therein, the body having openings therein adjacent the threaded opening and means secured in the said openings after said assembly of the clamp and stud to be engaged by the said projecting means on the clamp to prevent the clamp contacting the end of the body provided with the threaded opening whereby rotation of the stud and disassembly of the clamp and stud are prevented.

4. A conductor clamp comprising a body member provided with a conductor receiving opening and a threaded opening, a threaded stud member positioned in the threaded opening of the body member and having a differentially threaded end portion projecting into the said receiving opening, a conductor clamping member mounted in the said receiving opening and threadably attached to the differentially threaded end of the stud member whereby the stud may rotate relative to the body and clamping members and move the clamping member toward and away from the conductor, means secured to a part of one of the said members after assembly of the aforesaid members and forming a fixed part of the said one member to be engaged by the other said member after assembly whereby the movement of the clamping member away from its clamping position is checked while the stud has threaded engagement with the clamping member and means on the clamping member to engage the body member to prevent relative rotation thereof whereby the rotation of the stud is checked and the disassembly of the parts prevented.

5. A clamping device comprising a body member having a receiving opening and a threaded opening, a non-rotatable clamping member having a threaded opening and positioned in the receiving opening and movable therein in either a clamping or a retracting direction, a differentially threaded stud having one threaded portion positioned in the threaded opening in the body member and the other threaded portion positioned in the threaded opening in the clamping member and rotatable in both directions, the threaded portions of the stud being so constructed and arranged relative to the threaded openings on the body and the clamping members that the longitudinal movement of the clamping member relative to the stud is less than the longitudinal movement of the stud relative to the body member, means on one member engageable by the other member to check the retracting movement of the clamping member before the threaded engagement of the stud therewith has been severed whereby the differential threading of the stud prevents further rotation of the stud thereby preventing disengagement of the stud from the clamping member.

6. A clamping device comprising in combination a body member having a bearing surface, a non-rotatable clamping member having a bearing surface oppositely disposed to the first bearing surface, the body member and the clamping member each having aligned threaded openings, a stud mounted in the threaded openings and having differentially threaded portions cooperating with the threaded openings whereby the spacing between the bearing surfaces may be changed when the stud is rotated in either of its two directions, and projecting means on one member engageable with means on the other member to check the movement of the clamping member in a direction away from the bearing surface on the body member whereby the disassembly of the stud from the clamping member is prevented after the stud and body and clamping member have been assembled.

WARREN J. LEWIS.

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