Nov. 21, 1950 F. V. SLAKER 2,531,003

CABLE CLAMPING DEVICE

Filed July 26, 1946

Fig. 1.

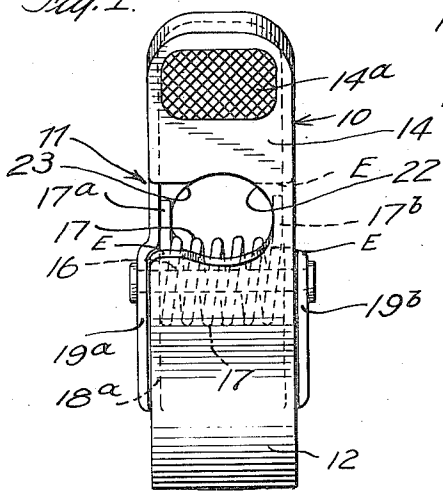


Fig. 2

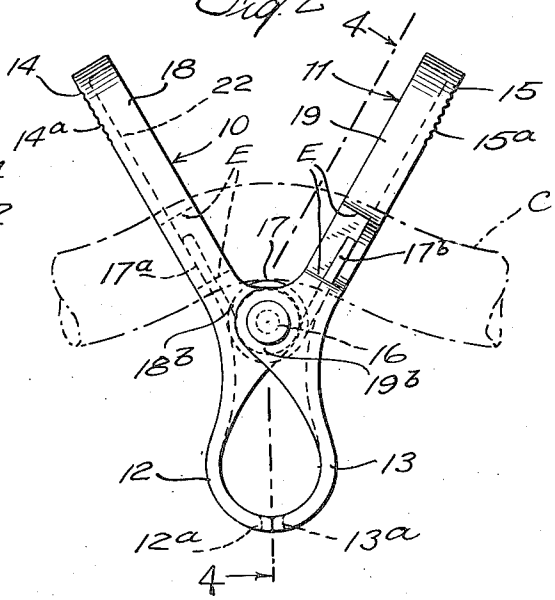


Fig. 3.

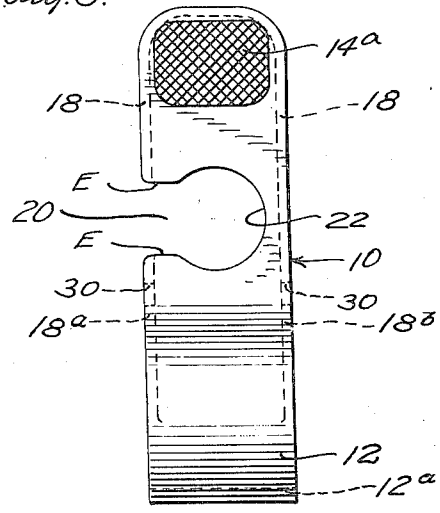
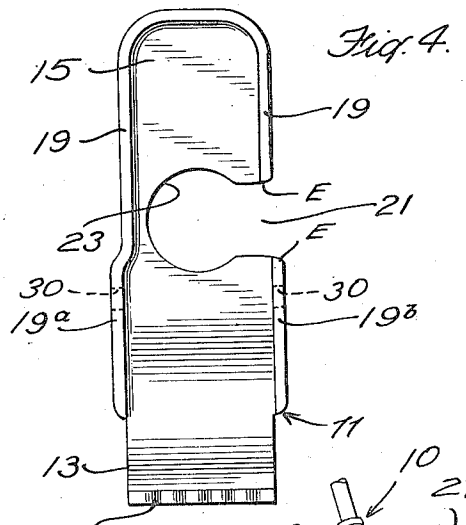


Fig. 4.



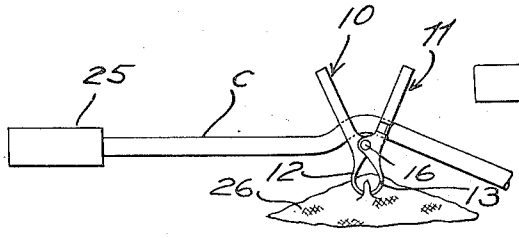


Fig. 5.

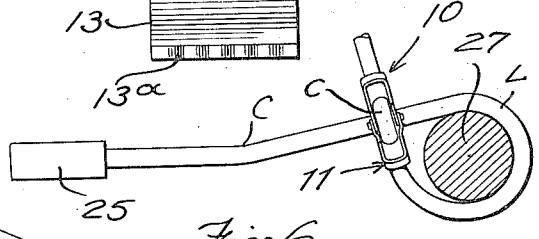


Fig. 6.

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CABLE CLAMPING DEVICE

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6 Claims. (Cl. 24—81)

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This invention relates to cable clamping devices for flexible insulated conductor cable as is employed in hospital signalling systems in which the patient is provided with a signalling switch on the end of a multi-conductor flexible cable.

One of the objects of this invention is to provide a simple inexpensive and efficient device for engaging the cable and for engaging the part, such as the sheeting or covers or other bedclothes to which the cable is to be anchored so as to keep the signalling switch within convenient reach of the patient. Another object is to provide a cable securing device that will be well adapted to do away with present-day use of pins or safety-pins and the damage that the latter cause in fastening the cable or cord to the bedclothes. Another object is to provide a practical and compact device that will be easy and convenient to manipulate and that will permit ease and wide range of shifting or of adjustment as to the point in the cable length at which the cable is to be engaged or secured. Another object is to provide a device of the above-mentioned character that will be capable of wide adaptation or flexibility of use in co-action with the cable so as to permit anchoring of the cable in various ways. Another object is in general to provide an improved cable securing device of the above mentioned kind, and other objects will be in part obvious or in part pointed out hereinafter.

The invention accordingly consists in the features of construction, combinations of elements, and arrangements of parts as will be exemplified in the structure to be hereinafter described and the scope of the application of which will be indicated in the following claims.

In the accompanying drawing in which is shown illustratively one of the various possible embodiments of this invention,

Figure 1 is a front elevation of the cable clamping device;

Figure 2 is an elevation as seen from the right of Figure 1, indicating also the relationship of a flexible cable to the device;

Figure 3 is an elevation of one of the lever elements of the device as it is seen from the left in Figure 4, the remaining parts being omitted;

Figure 4 is an elevation of a companion lever element of the device as seen from the left in Figure 2, as along the line 4—4, the remaining parts being omitted;

Figure 5 is a diametric side elevation showing the device securing the cable in one possible method; and

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Figure 6 is a diametric plan view showing the device in another possible mode of co-action for securing the cable.

Similar reference characters refer to similar parts throughout the several views of the drawing.

The device preferably comprises two lever members 10 and 11 which are preferably levers of the first class, and preferably they are made of suitably heavy sheet metal and conveniently they may be stamped and formed in suitable punch press operations whereby also they may be given the desired shapes and parts for the functions and co-actions later described. For convenience of description, each may be said to comprise a jaw part and a handle or finger piece part. Thus the lever members 10 and 11 are shaped at their lower ends as viewed in Figures 2–4 to have jaw parts 12 and 13 respectively and at their upper ends finger piece or handle parts 14 and 15 respectively. The two lever members 10, 11 are arranged to be secured together pivotally by a pin 16 with respect to which the lever arms represented by the finger grip parts 14 and 15 are of greater length than the effective lever arms of the jaw parts 12 and 13, thereby not only to make for greater ease of manual manipulation of the jaw parts 12 and 13 against the action of a strong helical spring 17, which acts to close the jaw parts together, but also to provide space for the provision of cable engaging parts close to the axis of the pin 16 and embodied in the finger piece parts.

The jaw parts 12 and 13 (Figure 2) are preferably curved and at their engaging end edges may be provided with teeth as indicated at 12a and 13a in Figures 3 and 4 so as to insure a secure grip on such objects as the sheeting, pillow-cases, blankets or any other part or parts usually parts of a bed or adjacent to a bed to which the cable is to be secured or anchored. These teeth can be given any suitable configuration and preferably present suitably curved undulated gripping edges rather than sharp pointed teeth where it is desired to avoid puncturing the material that is to be gripped by them. Preferably the curvature of the jaw parts 12, 13 is such that they together form a circle of a diameter somewhat less than the diameter of the multi-conductor cable which is usually rubber covered, so that the cable itself may be encompassed within the jaw parts and suitably gripped thereby, and this relationship is preferred where it is contemplated or desired, on occasion, so to grip or engage a part of the cable itself, as is later described. An

insulated six-conductor cable may have a diameter on the order of 5/16 or 3/8" or so.

From the upper portions of the jaw parts 12 and 13 the material of the lever members 10 and 11 extends to form the finger or handle parts 14 and 15 at respective angles to the jaw parts, somewhat as suggested in Figure 2, so that the jaw parts may be opened to a suitable extent, preferably without completely bringing the handle parts 14 and 15 into engagement with each other, and at suitable intermediate points the lever members 10 and 11 are provided with parallel and spaced ears or lugs, 18a and 18b for the lever member 10 and 19a and 19b for the lever member 11, the spacings being such that one pair, such as lugs 18a and 18b neatly and snugly fit in between the lugs 19a and 19b (Figure 1), all of the lugs or ears being provided with a hole 20 which, when aligned, receive therethrough the above-mentioned pivot pin 16 which, in course of assembly, is passed through the turns of the helical spring 17 thus also to assemble the spring to the device. The ends of the wire of the spring 17 are extended as at 17a and 17b to rest flatwise against the inner faces of the finger piece parts 14 and 15 and, being under suitable tension, the spring thereby always urges the finger piece lever arms away from each other and the jaw parts 12 and 13 toward each other.

The above described pivoting lugs or ears are preferably parts of flanges 18 and 19 respectively, these flanges being formed integrally with the finger piece parts 14 and 15 and extending at right angles to the faces of the latter and about the entire periphery thereof as is better shown in Figures 3 and 4, excepting where the flange 18 of lever 10 is cut away or omitted (see Figure 3) to form a mouth 20 for an otherwise general circular recess 22 formed in the sheet-like material of the finger piece part 14, and excepting where the flange 19 (Figure 4) is in a similar manner cut away or omitted to form a mouth 21 for a similar otherwise circular recess 23 in the material of the companion finger piece 15. The recesses 22 and 23 are of a radius of curvature just about equal to that of the cross-section of the cable, though some range of departure from that relationship, in either direction, may be had, due to various co-actions. The mouths 20 and 21 are preferably of a width slightly less than the diameter of the cord, but for similar reasons some range of departure from this relationship may also be had, all as is later described.

Moreover, the entries or mouths of these recesses 22 and 23 are preferably at opposite side edges of the lever members 10 and 11 when the latter are assembled, and as better appears in Figure 1, mouth 20 in the handle lever arm 14 of the lever member 10 is at the left and the mouth 21 in the handle lever arm 15 of the companion lever member 11 is at the right.

In the preferred relationship of the parts also the two recesses are so shaped and positioned, relatively nearer the axis end of the finger piece arms than to the outer ends thereof, that, with the finger piece arms brought into substantial parallelism, the arcuate recesses substantially register in that they are co-axial and together form a closed circle. Preferably also in this relationship of the parts, the turns of the spring 17 may somewhat project into that circle.

Throughout suitable areas in the outer faces of the finger piece arms 14 and 15, they may be knurled as at 14a and 15a, thus to afford more secure or non-slipping grip of the thumb and forefinger thereon for manual manipulation. The right angled peripheral flanges or ribs 18 and 19 reenforce and strengthen the finger piece levers and in being integral with or continuations of the pivoting lugs or ears they contribute to the strength and rigidity of the construction and to ease of manual manipulation. These flanges or ribs 18 and 19 are preferably of a width or depth, in relation to the other parts, that, upon pressing, or swinging the lever arms toward each other, they can act as stops to limit such movement, as by having their edge faces, particularly those portions at the upper ends of the levers, brought into alignment and in face to face engagement, and when so engaged the planes of the recesses 22 and 23 are substantially parallel.

In Figure 2 there is indicated in broken lines at C a cable inter-related to the recesses 22 and 23 whereby the device and the cable are secured together, and the assembly is ready to be fastened to the desired article by way of gripping the latter by the jaws 12—13. The cable C and the device are quickly and easily interrelated to each other. For example, with no manual pressure applied to the finger levers 14, 15 so that the spring 17 holds the jaw parts 12 and 13 closed, the finger levers 14 and 15 make a substantial angle to each other somewhat as indicated in Figure 2, and into the fork which is thus formed is now brought the cable whereupon, by effecting a relative turning movement between the parts about a vertical axis in Figure 2, points spaced lengthwise along the cable and on opposite sides thereof are brought into respective juxtaposition to the mouths 20 and 21. These are of a width preferably somewhat less than the diameter of the cable which is thereupon manually pressed through each mouth, the cable structure resiliently yielding, and thus brought into neat seating in the recesses 22 and 23. As better appears in Figures 1 and 2, the spring 17 projects upwardly beyond the straight line adjoining the lowermost edges of the recesses 22 and 23, thus forcing the cable into a slight bend or curvature and the tendency of the cable to straighten out, the cable usually embodying a substantial quantity of rubber in its construction and particularly in its casing, effects a binding of the walls of the recesses upon the cable to securely hold the cable and device assembled, thus aiding the walls of the narrowed mouth ends of the recesses in resisting any tendency of the cable to disengage itself from the recesses, it being noted that the parallel end edges E in which the flanges or ribs 18 and 19 terminate at the mouths 20 and 21 form elongated restrictions or extensions, parallel to the cable, of the mouth of the recesses.

With the device thus mounted upon or secured to a cable, at the end of which may be, as above pointed out, a suitable signalling switch structure diagrammatically indicated in Figures 5 and 6 at 25, the device may now be manipulated to cause the jaws 12—13 to grasp the part to which the cable is secured, such as a bed-spread, sheet, pillow-case or the like, as indicated at 26 in Figure 5. That operation is, of course, effected by manually pressing the finger piece parts 14 and 15 toward each other to open the jaws 12 and 13, but during such actuation, as well as during releasing movement thereof, disengagement of the cable from the device is guarded against by a number of coactions. For example, any position of the parts that reduces the angle between the finger piece parts 14 and 15 brings the planes of the recesses 22 and 23 closer together to more

effectively cause the closed side (see Figures 3 and 4) part of one recess to close off the open side of the companion recess in the other finger piece part, and if a substantial thickness is clamped between the teeth 12a and 13a of the device the at-rest or securing position of the two lever members 10—11 is such that the angle between the finger piece parts 14 and 15 is less than that shown in Figure 2 and the just-mentioned mutual closing off action is made more effective. Furthermore, the parallel edges E—E of the flanges (see Figure 2) at the upper sides of the two mouths, as seen in Figure 2, are moved or displaced somewhat downwardly by the approaching movement of the finger piece arms 14 and 15, in relation to the reach of cable engaged by the device, in effect moving downwardly at the opposite sides of the cable to increase the effectiveness of restriction of the open mouths. Maintenance of assembly of the device to the cable C, throughout the range of manipulating relative movement effected between one or the other or both of the finger piece arms 14 and 15, and the cable is thus dependably assured, even though the cable is received into the recesses 22 and 23 with some degree of looseness, the final or at-rest position, under the adequate strength of the spring 17, maintaining in turn a binding action of the walls of the two recesses upon the cable that is adequate to hold the cable against sliding axially relative to the device as a whole, for in the at-rest position the planes of the edge walls of the two recesses are always at an angle to the axis of that small portion of the cable that extends through the individual recess, and thereby the walls of each recess have an effective grip upon the cable against such relative movement between the device as a whole and the cable in the direction of the axis of the latter. On the other hand, the cable C may be manually slipped axially relative to the device, as may be desired to adjust the reach of cable between the device and the signalling switch 25 (Figures 5 and 6), and this may be easily done by simply pressing the finger piece lever arms toward each other to lessen the angularity of the planes of the gripping recesses relative to the cable and thus to lessen the grip thereon. Release of the finger piece restores the gripping angularity under the action of the spring 17.

As noted above, the jaw parts 12—13 are preferably given a configuration so that another reach or portion of the cable C may be received within the curved portions of the jaw parts, in which case it is preferred that the inside faces of the jaw parts have radii of curvature somewhat less than that of the cable C, or if of the same radius, that they be each of lesser extent than 180°, so as to afford a snug grip of the cable after it is passed through the toothed opened ends 12a and 13a. In such case the device may be used to secure together the crossing portions of a loop L (Figure 6) of cable looped around a part 27, which may be, for example, a bed-post, bed-rail or the like, one of the crossing cable portions being engaged to the cable by way of the clamping ratchet-like acting parts 22 and 23 and the lower crossing part of the cable being engaged and gripped by the jaw parts 12, 13. The loop may be made larger or smaller, as may be desired by shifting, in a manner that will now be clear, one or the other or both of the crossing cable parts relative to the clamping parts of the device 10—11, by which they are respectively engaged.

It will thus be seen that there has been provided in this invention a cable securing device in which the various objects above noted, together with many thoroughly practical advantages, are successfully achieved. The device is compact and neat in appearance, avoids puncturing sheeting, pillow-cases and the like, and can thus avoid the material damage heretofore caused by the use of pins and safety-pins, and is simple and easy to manipulate, providing a wide flexibility of adaptation to various and varying circumstances and needs of positioning a signalling switch by way of its insulated cord conductor for the use of the patient.

As many possible embodiments may be made of the above invention and as many changes might be made in the embodiment above set forth, it is to be understood that all matter hereinbefore set forth or shown in the accompanying drawing is to be interpreted as illustrative and not in a limiting sense.

I claim:

1. A clamping device for clamping a cable and for clamping another part comprising two levers of the first class having means pivotally connecting them intermediate their lengths, the opposed portions thereof on one side of the pivoting axis forming clamping jaws, and the opposed portions on the other side of the pivoting axis forming diverging arms comprising cable engaging and finger piece portions, spring means biasing said levers about the pivoting axis in a direction to press the clamping jaws toward one another and to urge said diverging arms away from one another, the said cable engaging portions of said arms being disposed between said pivotal connecting means and said finger piece portions and having recesses therein of a cross section substantially matching that of the cable to be gripped, said arms being respectively slotted in opposite direction from their margins providing laterally extending cutouts connecting with said recesses whereby entry of the cable reach into said recesses is effected from respectively opposite sides of the clamping device.

2. A clamping device for clamping a cable and for clamping another part comprising two levers of the first class having means pivotally connecting them intermediate their lengths, the opposed portions thereof on one side of the pivoting axis forming clamping jaws, and the opposed portions on the other side of the pivoting axis forming diverging arms comprising cable engaging and finger piece portions, spring means biasing said levers about the pivoting axis in a direction to press the clamping jaws toward one another and to urge said diverging jaws away from one another, the said cable engaging portions of said arms being disposed between said pivotal connecting means and said finger piece portions and having recesses therein of a cross section substantially matching that of the cable to be gripped, said arms being respectively slotted in opposite directions from their margins providing laterally extending entry slots connecting with said recesses whereby entry of the cable reach into said recesses respectively is effected from opposite sides of the clamping device, said cable receiving recesses being positioned sufficiently close to the axis of pivoting so that the spreading movement of said arms effects a flexing of the cable reach substantially about the pivoting means as an axis.

3. A clamping device for clamping a cable and for clamping another part comprising two levers of the first class having means pivotally connecting them intermediate their lengths, the opposed

portions thereof on one side of the pivoting axis forming clamping jaws, and the opposed portions on the other side of the pivoting axis forming diverging arms comprising cable engaging and finger piece portions, spring means biasing said levers about the pivoting axis in an action to press the clamping jaws toward one another and to urge said diverging arms away from one another, the said cable engaging portions of said arms being disposed between said pivotal connecting means and said finger piece portions and having recesses therein of a cross section substantially matching that of the cable to be gripped, said arms being respectively slotted in opposite direction from their margins providing lateral cutouts connecting with said recesses whereby entry of the cable reach into said recesses is effected from respectively opposite sides of the clamping device, said pivoting means comprising companion pairs of ears respectively on said two lever members, and a pivoting pin extending through said ears, said spring means comprising a coiled spring about said pivoting pin, a straight line drawn to connect those edges of those cable receiving recesses that are nearest the pivoting axis intersecting said coiled spring when said clamping jaws are pressed toward each other to clamp an extraneous part, whereby the portion of the cable extending from one recess to the other is flexed about said coiled spring as a fulcrum.

4. A clamping device for clamping a cable and for clamping another part comprising two levers of the first class having means connecting them intermediate their lengths for relative pivoting movement, the opposed portions thereof on one side of said connecting means forming clamping jaws and the opposed portions on the other side thereof forming arms that are divergent when said clamping jaws are brought together, each arm having a cable engaging portion and a finger piece portion and the cable engaging and finger piece portions on the two arms being respectively opposed to each other, said cable engaging portions being of a width in the direction of the axis of pivoting movement greater than the thickness of the cable to be gripped and having therein recesses of a shape for snugly receiving therein a reach of the cable when the angle of divergence between said two diverging arms is lessened by actuating them at their finger piece portions, and means adjacent the apex of said angle comprising spring arms biasing said two levers about the pivoting axis in directions to press said clamping jaws toward each other and force said arms away from each other and having a convex portion projecting into said angle and engaged by the reach of cable between said arms to form a fulcrum about which diverging movement of said arms flexes the cable and thereby hold it against material longitudinal movement.

5. A clamping device for clamping a cable and for clamping another part comprising two levers of the first class having means connecting them intermediate their lengths for relative pivoting movement, the opposed portions thereof on one side of said connecting means forming clamping jaws and the opposed portions on the other side thereof forming arms that are divergent when said clamping jaws are brought together, each arm having a cable engaging portion and a finger piece portion and the cable engaging and finger piece portions on the two arms being respectively opposed to each other, said cable engaging portions being of a width in the direction of the axis of pivoting movement greater than the thickness of the cable to be gripped and having therein recesses of a shape presenting two edges spaced from each other in the direction of the length of the arm for receiving therein and between said spaced edges a reach of the cable when the angle of divergence between said two diverging arms is lessened by actuating them at their finger piece portions to move them and the planes of said recesses toward parallelism for ease of cable entry therein, and spring means biasing said two levers about the pivoting axis in directions to force said clamping jaws toward each other and to force said cable engaging portions on said two arms away from each other and out of parallelism to snub said cable at said spaced edges of each of said recesses and flex the cable reach that extends from one arm to the other whereby, as said cable is flexed, said cable engaging portions may move away from each other and relative to said cable reach to avoid detrimentally restricting the approaching movement of said clamping jaws, said spring means having an externally convex portion positioned adjacent the apex of the angle between said diverging arms, the spacing between said convex portion and said juxtaposed recesses being so close that when said clamping jaws are moved toward each other by said spring means and the angle between said diverging arms is thereby increased, the portion of the cable extending from one recess to the other is flexed about said convex spring portion as a fulcrum.

6. A clamping device for clamping a flexible cable and for clamping another part comprising two levers of the first class having means connecting them intermediate their lengths for relative pivoting movement, the opposed portions thereof on one side of said connecting means forming clamping jaws and the opposed portions on the other side thereof forming arms that are divergent when said clamping jaws are brought together, each arm having a cable engaging portion and a finger piece portion and the cable engaging and finger piece portions on the two arms being respectively opposed to each other, said cable engaging portions being of a width in the direction of the axis of pivoting movement greater than the thickness of the cable to be gripped and having therein recesses for receiving a reach of cable that extends from one recess to the other and relative to which said cable engaging portions are movable as the angle of divergence between said two diverging arms is changed by actuating them at their finger piece portions, and means for effecting clamping by said jaws and cable gripping coaction by said cable engaging portions comprising means coacting with said recesses and responsive to increase in the angle of divergence between said two arms and to the resultant movement of said cable engaging portions thereon in an arc away from each other to flex said cable in substantially a similar arc and spring means biasing said two levers about the pivoting axis in directions to force said clamping jaws toward each other and to increase the angle of divergence between said two divergent arms, said diverging arms being provided with slots extending in respectively opposite directions, each from a longitudinal side edge of the arm to the recess therein, to form two entry slots for entering the cable reach into said recesses laterally from respectively opposite sides of the clamping device when the angle of divergence between said diverging arms is large, said slots being sub-

stantially equidistantly spaced from the axis of pivoting movement of said two levers whereby, when said levers are actuated to open said jaws and to bring said diverging arms toward each other, the unslotted side edge of each arm moves into a position to substantially overlap the slot in the other arm to prevent movement of the cable laterally out of either slot.

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