

Nov. 28, 1967

D. E. HOOVER
ADJUSTABLE CABLE CLAMP

3,354,518

Filed Oct. 7, 1965

2 Sheets-Sheet 1

Fig. 1

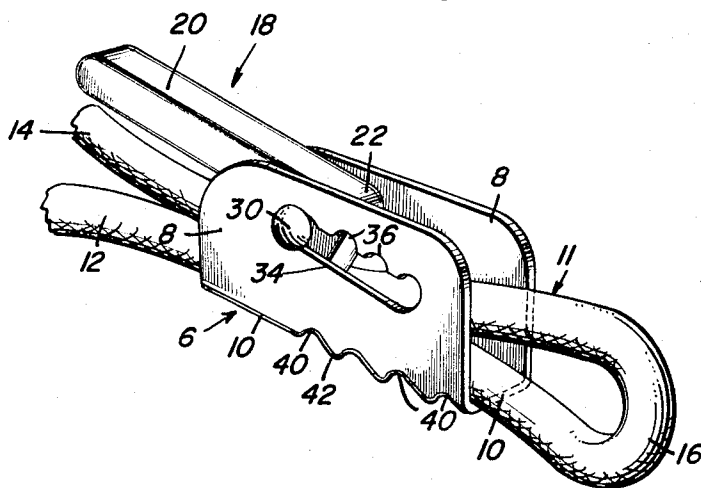


Fig. 2

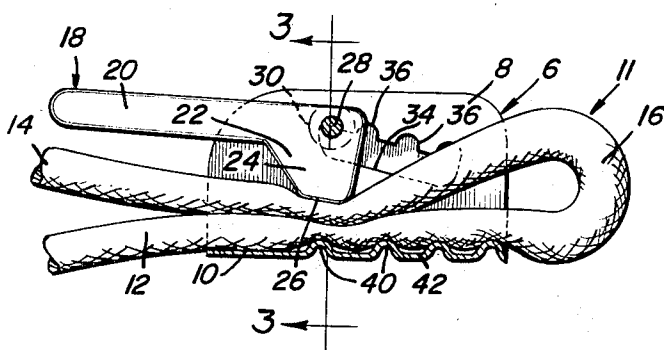


Fig. 3

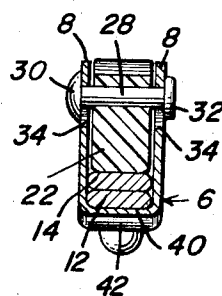
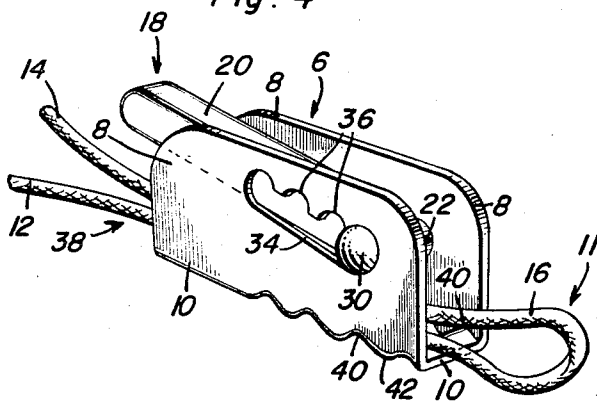


Fig. 4



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Fig. 5

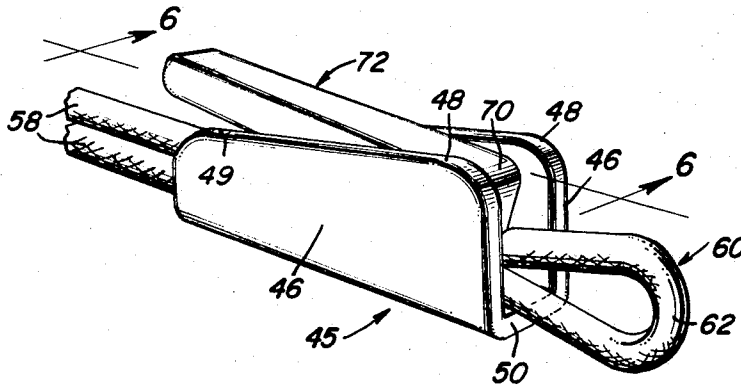


Fig. 6

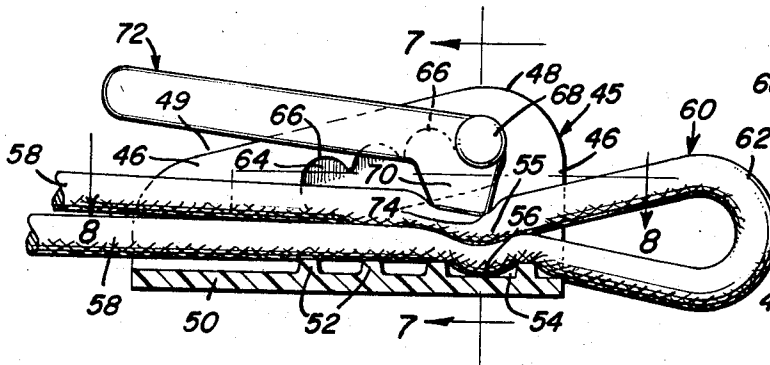


Fig. 7

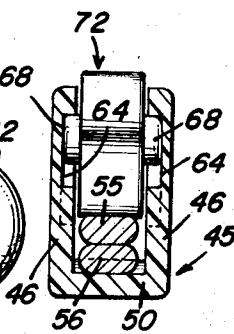


Fig. 8

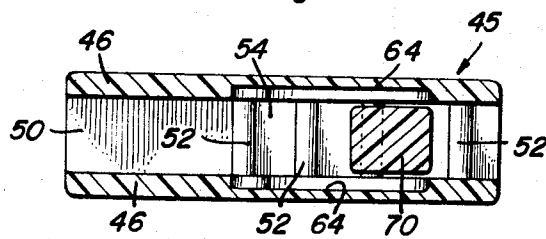
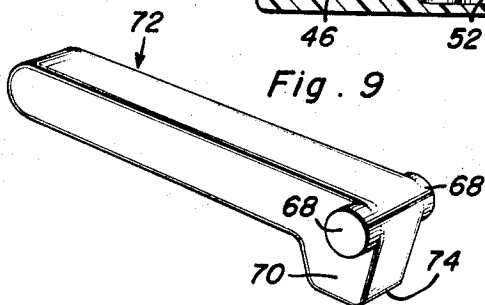


Fig. 9



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3,354,518

ADJUSTABLE CABLE CLAMP

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ABSTRACT OF THE DISCLOSURE

The clamp herein disclosed is designed and adapted for accommodatingly clamping flexible and resilient cable, rope, a line or the like. It is characterized by an open-ended sheath, channel-shaped in cross-section in which the intended portion of the cable (or other element) is adapted to be seated and retentively confined. A manually openable and closable over-center locking lever has a cam-equipped head at one end provided with outstanding lugs or journals which can be selectively and adjustably pivoted in keeper or seating notches provided therefor along upper inclined edges of cooperating recesses. When it is in closed position the locking cam is forward of the pivot point so as to provide a desired over-center locking result and obviates the necessity of forcibly opening the handle of the clamp in order to release the cam.

The present invention relates to certain new and useful improvements in clamps for cables, guy wires, ropes and the like and pertains, more particularly, to a clamp which is unique in that it embodies means which is capable of being readily and manually (1) opened and (2) closed, said means being such that it obviates the need for hand tools and makeshift implements such as are ordinarily required by the user of such a clamp.

Briefly, the concept is characterized by three precision-made components; namely, a simple one-piece channel-shaped sheath which constitutes an elongated open-ended channel, a finger actuatable lever having a suitably designed cable or rope clamping cam at one end, and means pivotally as well as shiftably mounting the cam-equipped end of said lever between the walls or flanges of the sheath and oriented for cooperation with the channel and the cable (or cables) which is nested or saddled and clampingly bound in the channel.

More specifically, but generically speaking, the invention herein disclosed has to do with a channel-shaped sheath which is elongated and includes a pair of spaced parallel flange-like side walls whose corresponding bottom lengthwise edges are joined by a web or bight portion, concaved or not. This channel is open at its ends to receive and retentively seat a manually bendable and clampable portion of a length of compressible cable, rope or the like. The finger-actuated lever has a rigid cable clamping cam at the working end which is pivotally as well as shiftably mounted between the side walls or flanges and is normally sheathed or saddled when in use in the channel. The cable gripping and binding surface of the cam is readily regulable and capable of bodily adjustment toward and from the web to regulate and establish a set distance between the pivoting point, web and the crest of the cam depending, of course, on the cross-section of the cable which is seated and securely clamped. Then, too, the novel clamp features anti-slipping means (alternatively, cable gripping means) which is situated between oriented surfaces of the cam and web (carried either by the cam or the web) said means having the additional function of laterally and forcibly distorting and deforming that portion (or portions) of the cable which is saddled and grippingly clinched between and securely anchored by said surfaces.

Keeping in mind the novel characteristics of the clamp it will be seen that it relates in a manner of speaking to small boating accessories, namely, a facile and feasible

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cable clamp; one which is easy to use, simple in construction and otherwise designed and structurally adapted to serve the needs of the user. The clamp lends itself to use as a highly practical device by way of which the user can transform the end of a bendable plastic coated marine cable (such as is adapted to be used in connection with the steering control system) into an eye-loop of requisite length and retain the loop by simply bending the free terminal end back into the trough or channel portion of the sheath and then swinging the cam downwardly inwardly into the channel to both form and securely retain the thus-formed eye. Accordingly, it follows that quick on-the-spot repairs can be safely and reliably made without a screwdriver, pliers or other similar tools.

As a result of trial and error and extensive experimental use it is now evident that the clamp not only offers safety to the user but, and this is important, retains the safety factor of the cable itself by preventing it from being undesirably chafed; worn or needlessly damaged. With these objectives in view a novel eccentrically pivoted cam is uniquely but reliably oriented with the channel and flanges of the sheath so that the marginal-pressure-impinging-surfaces impose a thrust on the cable and in this manner the engaged cable portion is deformed and as a matter of fact is jammed into a keeper seat or seats provided therefor between rib-like detents provided in the bottom or web. Consequently, slippage of the clamped cable is reliably prevented.

Further, and as will be hereinafter more clearly understood the peripheral surface of the cam does not penetrate or cut the surface of the cable. It simply exerts downward pressure and squeezes or compresses the cable, or cable end portions as the case may be, binding them together in a configuration which effectually secures the cable between the cam and anti-slipping detents, for example, selectively usable spaced ribs to clampingly bind the cable in its intended place.

In addition to the above and as will be later covered in detail (generically as well as specifically) the pivoting and mounting means for the cam-equipped lever is characterized by a hinge pin or equivalent pivoting studs carried by said cam and slidably mounted and supported on the side walls by way of slots, channel-like grooves or the like, whereby the lever with its cam plus said pivoting means can be slidably shifted relative to the sheath and its anti-slipping means and serving to progressively vary the distance between the cam and web and to accommodate and clampingly bind coacting portions and retain cables of varying cross-sectional dimensions within the confines of the channel.

Both forms or embodiments, FIGURES 1-4 on the one hand and FIGURES 5-9 on the other hand, will be set forth generically and also explicitly.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIG. 1 is a view in perspective showing a cable clamp (one embodiment) constructed in accordance with the principles of the invention and wherein an end portion of a steering system cable (used in the small boating field) has a terminal end bent back upon itself or looped to form an eye and wherein the thus formed eye is securely and clampingly sheathed in the channel-shaped sheath or holder.

FIG. 2 is a view based on FIG. 1 showing the sheath or holder in section, the pivot pin in section and other components in elevation and stressing the formation of the eye, and the step of deforming and virtually lock-

ing of the cable portions to each other when interposed between the cam and web of the channel-shaped holder.

FIG. 3 is a section taken on the plane of the line 3—3 of FIG. 2.

FIG. 4 is a view in perspective similar to FIG. 1 and which not only shows the adjustment of the pivot pin from one end to the other of the channel but shows that with this adjustable characteristic cables, ropes, wires or the like of different cross-sections can be clampingly held.

FIG. 5 is a view in perspective similar to FIG. 1 showing the modified form of the invention.

FIG. 6 is a view with parts in section and elevation taken on the plane of the section line 6—6 of FIG. 5.

FIGS. 7 and 8 are sections on the vertical and horizontal section lines 7—7 and 8—8, respectively, of FIG. 6.

FIG. 9 is a view in perspective of the manually adjustable and set lever constructed in accordance with the principles of this embodiment of the invention.

With reference now to FIGS. 1 to 4, it will be noted that the channel-shaped holder or sheath is denoted, generally speaking, by the numeral 6. In practice this sheath has been made from metal of one kind or another as well as moldable synthetic materials, commonly referred to in the trade as commercial plastics. The form here shown is fashioned from bendable sheet metal and the saddle or sheath is approximately the size (full size) shown. The flanges or side walls are of duplicate construction and are denoted each by the numeral 8. These side walls are generally rectangular and flat-faced and having their lower or bottom marginal edges (in relation to the views of the drawing) joined by a bight portion or web 10. This construction provides a saddle for retentively seating the cable 11. The word "cable" is intended to include cables of one type or another, wires or similar flexible elements either plastic (natural or synthetic) coating or covering to provide protection against corrosion or deterioration by exposure to air water or other elements such as, but not limited to, marine cable for use with steering control systems in the pleasure boating field. On the other hand, the cable may be of soft metal or plastic material such as is bendable and compressible and which would under pressure be deformed by the pressure surface of a cam or other squeezing and clamping member. The cable shown comprises the main portion 12 shown in FIGS. 1 and 2 for example and wherein the free or terminal end portion 14 is bent upon itself as at 16 with the bent portion thus transformed into an eye which projects beyond the right-hand end of the channel. To securely hold this thus bent or fashioned eye novel cam means is employed. The means comprises a single rigid unit designated as a lever 18 and comprising a rigid elongated generally rectangular handle or lever portion 20 with the headed end 22 fashioned into a cam 24 whose binding or clinching peripheral surface is denoted at 26.

The means for assembling or joining the lever unit with the channel-shaped sheath unit 6 comprises a simple pivot pin 28 (FIG. 3) which pierces the side walls or flanges 8 and the cam and which has retaining heads 30 and 32 on the ends thereof. Instead of pivotally or hingedly joining the cam to an arbitrary point and suspending the same between the flanges with the cam pointed toward the bight portion 10 it is desired to adjustably and slidably mount the cam and lever. This is done by providing the median portions of the respective flanges with inclined pivot pin accommodating and adjusting slots 34 arranged opposite each other as shown in FIG. 3. The upper edge portions of the slots are provided with selectively usable pin accommodation or keeper seats 36 which makes it possible to adjust the hinged cam in a step-by-step or selectively operable manner. It will be evident that since the slots incline from left to right as shown in FIGS. 1 and 2 in particular, the cam surface 26 is moved closer to or farther from

the web 10 in order to accommodate cables and wires of different cross-sectional dimensions as shown for example in FIG. 4 compared with FIG. 1. In FIG. 1 the hinging means is at the upper ends of the slots 34 to accommodate a thick cable or cable portions. In FIG. 4 the hinging means is at the lower ends of the slots and is retained to apply the cam pressure on a smaller electric wire or "cable" denoted at 38. It is to be mentioned here that the only difference in the showings in FIGS. 1 and 4 is the adjustment of the lever cam for the use of different sized cables. Accordingly, these are not modifications but are intended to show the versatile nature of the concept. In order to obtain the result desired the web or bight portion is provided with detent means, that is anti-slipping means for the cable. This means comprises a plurality of longitudinally spaced transversely disposed indentations which are fashioned into ribs 40 which project into the channel and which in turn define accommodation seats or crotch portions 42 between said ribs. It would be within the purview of the invention to provide the ribs on the cam but it has been found from experience that the construction here shown is best suited since the adjustment feature, the slots and hinging pin means, calls for the arrangement of ribs and clearance pockets 42 shown in the views of the drawing.

It will be evident that the invention reveals a complete or self-contained clamping device with no additional part or tool needed for quick and safe clamping of one or more cables or like elements and holding of the same securely against relative movement and capable of being selectively secured to or released from the cables by a single manual tripping operation of the lever cam. As long as the pull of the load is in the direction suggested in the views of the drawing the cam will increase its locking action and will hold securely the cables in the deformed antislipping configuration shown. It is also to be stressed that with the clamp shown the principle is to hold the cable portion together and not the load as is achieved in certain seemingly similar prior art clamps.

With the invention disclosed it will be evident that the necessary facilities are available to securely clamp a plurality of cables or the like and to hold the same positively against relative movement and at the same time to provide for safety to the cable surfaces as well as for the user. The face of the cam is shaped and curved and smooth and therefore it effects no surface penetration damage action on the cable but, instead, gives a smooth downward pressure on the cable or cable portions and compresses the same between the cam and the anti-slipping ribs. This deflection does not cause damage to the cable portions or strands or to the plastic or equivalent coating, soft metal or plastic cables or the like.

It is to be pointed out that the adjustable mounting of the pivot-pin-equipped cam does not necessarily have to be achieved by using slots 34. This is to say, it would be within the purview of the invention to omit the heads 30 and 32 and to simply have the end portions of the hinge pin sliding in grooves, corresponding to the slots 34 and formed in the interior flat faces of the flanges or walls with the grooves also having keeper seats for adjustment needs.

With further reference to the above and to be more specific the embodiment of the invention mentioned above is shown in FIGS. 5 to 9 inclusive wherein it will be noted that the channel-shaped sheath is denoted generally at 45 and is made of an appropriate grade of moldable plastic material and comprises a pair of spaced parallel side walls 46 having upper edge portions sloping downwardly from the high points 48 to the low points at the left as denoted at 49. The lower lengthwise edges of the walls or flanges are connected by an intervening web 50 which as shown in FIG. 6 is provided on its interior or top surface with transverse longitudinally spaced ribs or shoulders 52

defining intervening cable bending seats 54 for the portions 55 and 56 of the overlapped parts or components 58 of the bent plastic or equivalent cable 60. The bent portion of the cable is denoted at 62. It will be observed that instead of having the inclining or diagonal slots extending clear through the walls (as in the form of the invention shown for example in FIGS. 1 and 4) the interior surfaces of the walls here are provided with opposed recesses or grooves 64 which are alike in construction and slope downwardly toward the bight portion, that is in a direction from right to left in FIG. 6 for example. The upper edge portions of these grooves or recesses are provided with selectively usable bearing and seating notches 66. The evident purpose of these notches is to accommodate the oppositely disposed trunnion-like pivoting and adjusting lugs or journals 68 on the opposite side portions of the head 70 of the lever 72. The cam surface of the head is here denoted by the numeral 74 and it serves in the manner already shown and described. In fact in both forms the invention the underlying principles of construction are basically the same and the variation is primarily in the nature of the slots and the flanges as distinguished from the grooves and the molding of the bight portions as distinguished from the bending of the bight portion as shown by comparing FIGS. 2 and 6 with each other.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. A clamp for flexible and resilient cables or the like comprising an open-ended sheath channel-shaped in cross-section and embodying spaced parallel side flanges having lengthwise edge portions joined by a connecting web and defining a cable seating and securing channel in which component portions of a cable are saddled for retention, said side flanges being provided on interior surfaces with opposed correspondingly inclined recesses, said recesses inclining from one end of the sheath to the other end and approaching and sloping toward said web, the upper edges of said recesses having a plurality of longitudinally spaced selectively usable paired and alignable notches constituting keeper seats and also bearings, a lever having a headed end portion arranged in a channel between said flanges, said headed end portion having a cam edge cooperable with said web, said head being provided on opposite sides with outstanding integral assembling adjusting and retaining lugs and said lugs being pivotally and adjustably seatable in selectively usable keeper seats.

2. The structure defined in claim 1 and wherein the interior of said connecting web is provided at longitudinally spaced points with transverse upstanding ribs defining detents and spaces between said detents for bendable portions of the cable ends acted on when said cam is properly adjusted and locked.

3. The clamp defined in and according to claim 2, and wherein said sheath is formed from moldable plastic mate-

rial, and said lever is likewise molded from plastic material, said notches being alike and semi-circular and said lugs being circular in cross-section and having upper half-portions removably selectively seated in coacting notches.

4. A clamp for flexible and resilient cables or the like comprising an open ended sheath, said sheath being channel-shaped in cross-section and embodying spaced parallel side flanges having corresponding lower lengthwise edge portions joined by an intervening and connecting web and defining a cable seating channel in which component portions of an attachable and detachable cable can be positioned and clampingly held, said side flanges being provided on interior surfaces with opposed companion recesses, said recesses being elongated and inclining from one end of the sheath to the other end and sloping gradually toward said web, the upper lengthwise edges of the respective recesses having a plurality of longitudinally spaced selectively usable cooperatively paired notches, said notches constituting keeper seats for hinging lugs, the interior surface of said connecting web being provided at longitudinally spaced points with a plurality of upstanding transverse ribs, the spaces between said ribs defining pockets and said ribs and pockets being aligned and coordinating with their respectively cooperable notches, and said pockets being adapted to receive and retentively seat the intended distorted portion or portions of said cable, and an over-center cable bending, friction clamping and locking lever having a manually openable and closable handle portion and an integral terminal headed end portion, said lever being confined and located for operation in the channel between said flanges, said headed end portion having axially aligned outstanding mounting and adjusting lugs capable of being pivotally and adjustably seated at will in selected ones of said keeper seats, said head having a camming surface dimensioned and shaped to bend and distort a coacting portion of said cable by forcibly clamping and pressing said portion in a given pocket without cutting or damaging the distorted portion and serving to anchor and prevent slippage of the thus locked cable, and said cam portion being shaped so that the leading end, when in its closed position, is forward of the pivot point, whereby to provide the over-center locking result and making it necessary to forcibly open the handle in order to release the cam and consequently the clampingly retained portion of said cable.

References Cited

UNITED STATES PATENTS

50	1,079,080	11/1913	Ward	24—170
	1,496,603	6/1924	Rothenberger.	
	1,498,699	6/1924	Smith	24—134 X
	1,619,846	3/1927	Arnzen	24—134
	2,053,018	9/1936	Bell.	
55	2,238,386	4/1941	Frank	24—134
	2,804,092	8/1957	Aitchison	24—134 X

FOREIGN PATENTS

60	1,112,561	8/1961	Germany.
	176,812	10/1961	Sweden.

BERNARD A. GELAK, *Primary Examiner*.