# United States Patent [19]

**Nash**

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[54] **LEVER-RELEASE CAM CLEAT**


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[52] **U.S. Cl.** ..... **24/134 CP,** 24/134 KC, 114/210

[51] **Int. Cl.** ..... **F16g 11/10,** F16g 11/00

[58] **Field of Search** ..... 24/134, 133, 230 AT, 24/132 R, 132 VB; 114/199, 210; 188/65.1, 65.2; 182/192, 5



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*Primary Examiner*—Bernard A. Gelak

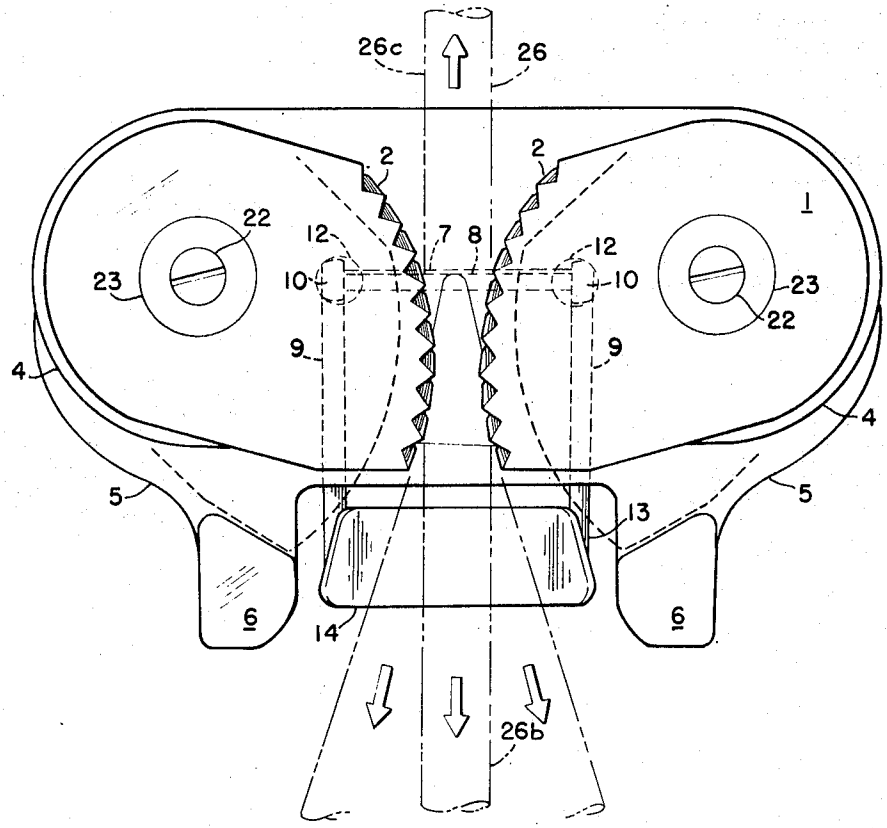
*Attorney*—Grover A. Frater and Harvey C. Nienon



[57] **ABSTRACT**

A rope holding and releasing device especially for use on sailing craft. Opposing serrated cam-type jaws grip taut rope. Release components are operatively connected to the jaw surfaces whereby tension applied from various directions on the otherwise slack end of the rope will release the grip of the jaws, and allow the rope to be eased without removal from between the cams.


**5 Claims, 7 Drawing Figures**



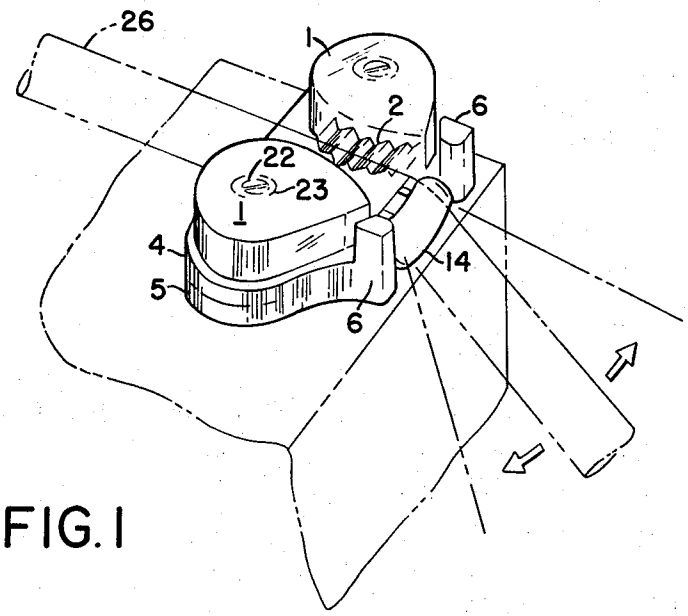

26
1
2
6
22
23
4
5
14
6

FIG. 1

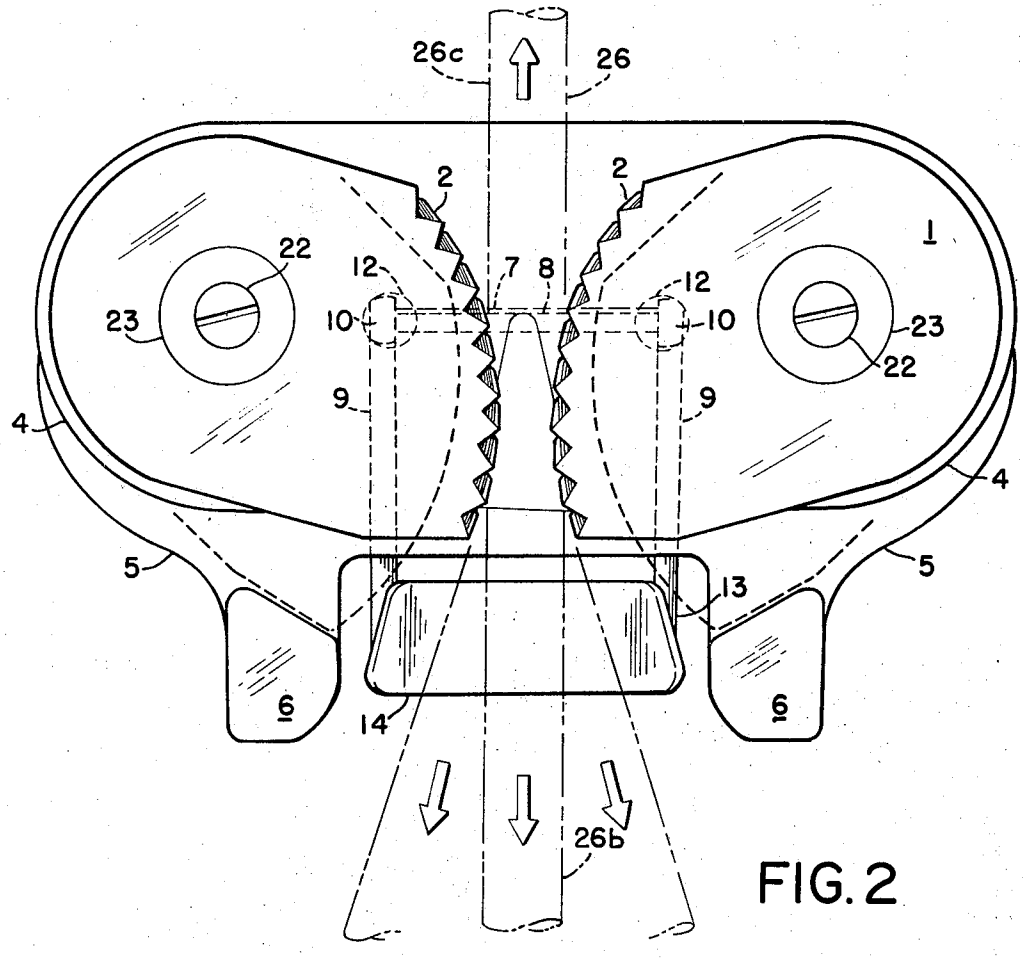

26c
26
2
2
22
12
7
8
12
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23
10
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13
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6
14
26b

FIG. 2

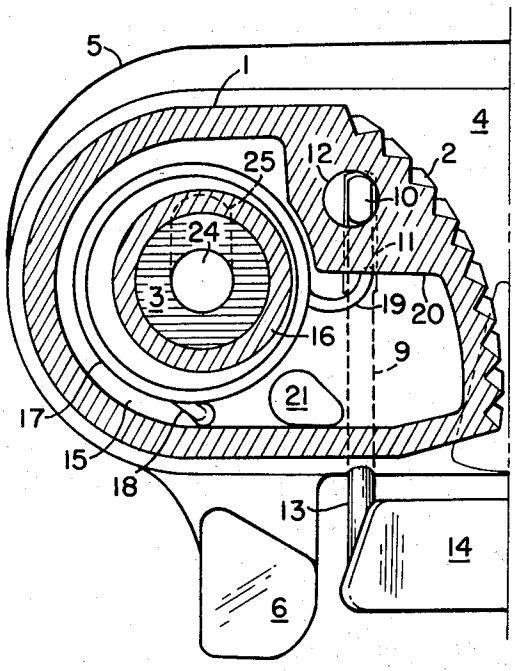



FIG.3

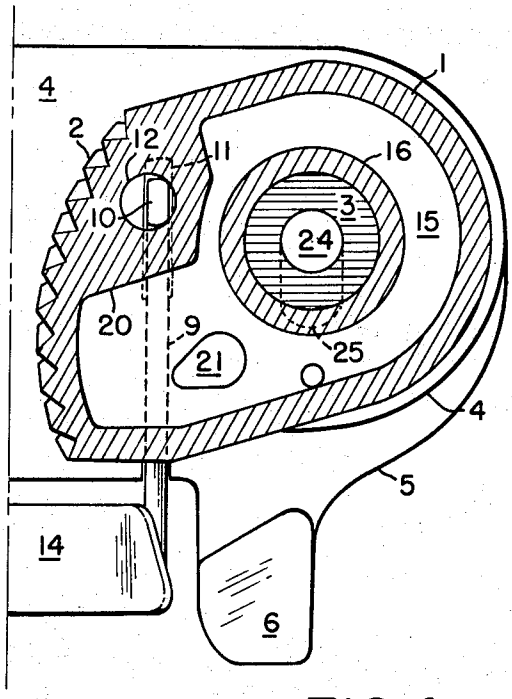



FIG.4

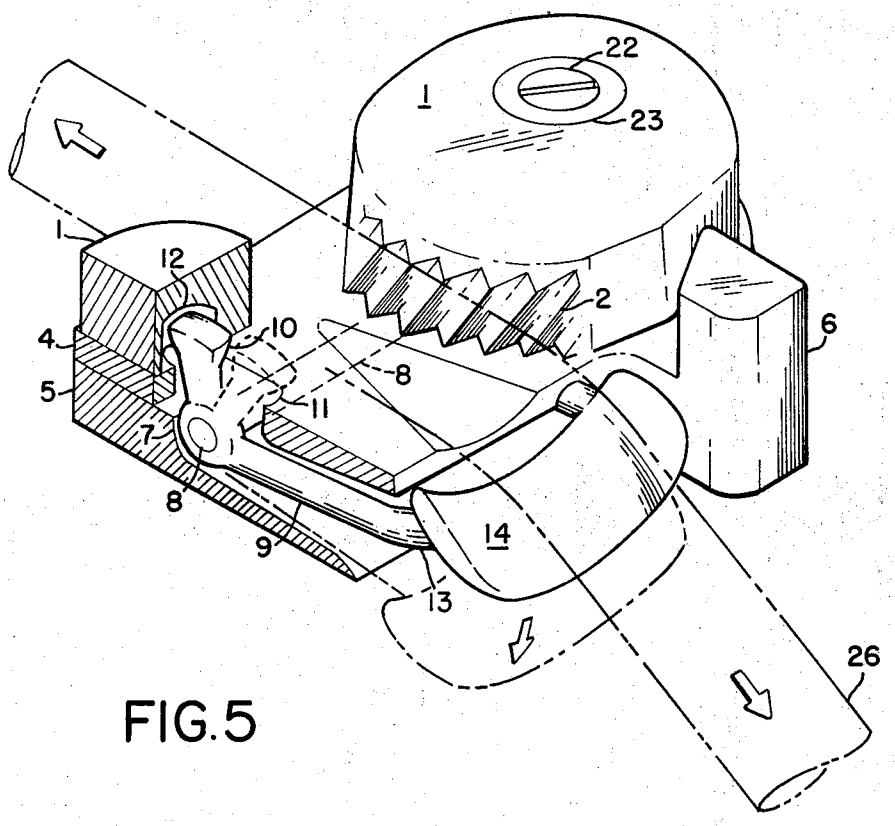



FIG.5

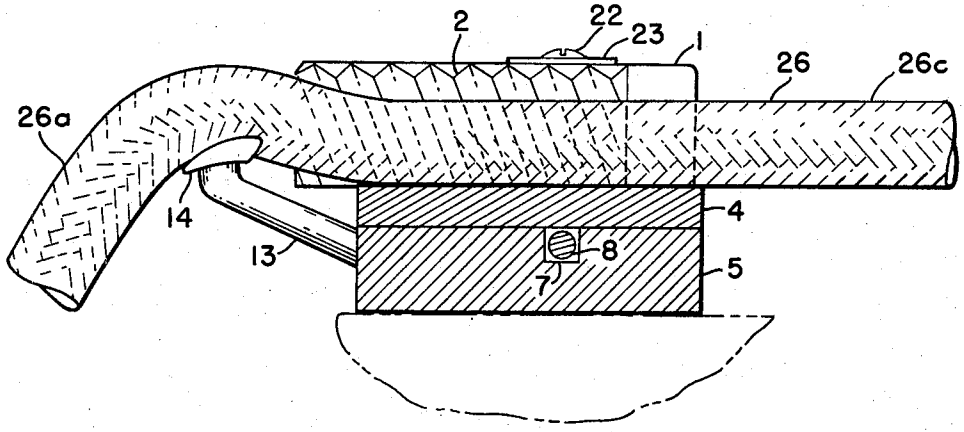



FIG. 6

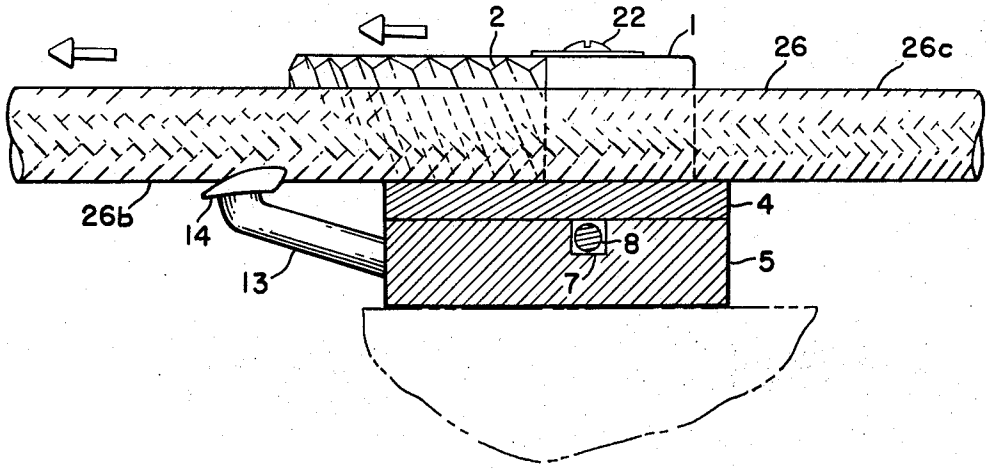



FIG. 7

# LEVER-RELEASE CAM CLEAT

## BACKGROUND OF INVENTION

This invention relates to cleats principally for use on sailing craft for holding ropes such as a sheet; more particularly it relates to cam cleats which have rotating eccentric cams between which a rope can be placed and firmly secured by its own tension, which causes the rotating cams to turn and the gap there between, thus jamming the rope.

In conventional cleats the release of the jammed rope is accomplished by pulling the rope back against its own tension and at the same time lifting the rope out of and away from the cams. This releasing action requires not only a force greater than the already existing tension but also a definite direction of pull approximately perpendicular to the cleat and away from it.

The use of ordinary cam cleats arranged on the deck or otherwise of a sailboat is not satisfactory because under certain conditions of sailing when the load on the rope is great and the crewman is not positioned properly with respect to the cam cleat it is difficult to release the rope from the cam cleat in a smooth quick manner so that the rope may be eased out for the purpose of adjusting sail trim and then quickly resecured.

My invention obviates the operational difficulties and limitations of ordinary cam cleats and provides an improved cam cleat whereby any sailor can easily and smoothly release and reset a rope such as a main sheet or jibsheet even though the rope is under heavy load and even though the sailor is some distance from and off to either side of or below the plane of the cam cleat. Usually he need not remove the rope from between the cams of the cleat at anytime. However under very light wind conditions, rope tension may not be sufficient to release cams.

This invention also provides an improved cam cleat which, because of its modular design, can be marketed as several different cleats including a standard cam cleat. It conforms to conventional cam cleat usage, is easy and efficient to use, rugged and long lasting and relatively troublefree.

Heretofore the use of cam cleats has not been satisfactory because to ease the line out it had to be first removed from between the cams of the cleat by a jerking motion of the free end of the line. Under heavy line load, this jerking motion often resulted in a temporary over-release of the line. Uncontrollable easing of the line, was caused by the crewman not being able to maintain sufficient pull on the line to overcome the load tension while jerking the line out of the cams.

In the present invention, the line is usually never taken from between the cams and is always snubbed across the base of the open cams for positive control of load tension. Thus it is less likely that the line will be suddenly jerked out of the grip of the crewman if the force on the line should suddenly increase while the gripping cams of the cam cleat are released. If the crewman should lose his grip on the line, the loss of tension on the free end of the line would allow the cams to snap closed re-gripping the rope.

The use of the conventional cam cleat arranged on the deck or otherwise of a sailboat is not satisfactory because often the line being held is inadvertently overtensioned during the jerk- release, temporarily upsetting sail trim in the opposite sense from that intended by the overall maneuver. In this case the jerk required



for releasing the line from the cams often results in an unwanted jerk along the axis of the line. This causes a sudden jerk of the sail, which for precise control of the aerodynamic flow properties of the wind over the sail is undesirable and should be avoided. The best sail trim adjustments are those made quickly, but smoothly with no jerking motion. With lines under heavy load these desired adjustments sometimes cannot be made.

With my device, a heavily loaded line can be eased out smoothly with essentially micrometer control and with no jerking motion whatsoever.

Before my invention the free end of the line had to be brought above the plane of the cams to jerk the line out of the cams. Unfortunately the crewman often had to move to a higher position relative to the center of gravity of the boat to perform this operation. An unwanted or possibly dangerous weight shift and instability resulted.

In the present invention, a loaded line can be released and re-secured from the cams from a position below the plane of the cams, thus the crewman need not shift his weight to adjust the line.

Ordinary am cleats cannot be both eased out and reset between the cams when the crewman is in a position far off the axis of the cam cleat. Also, the crewman must watch the cleat. To ease the line it must be removed from between the cams and for resetting the line must be pulled down between the cams in a direction parallel to or within a few degrees of the axis of the cam cleat.

In the subject device the line need never be removed from between the cams. No one need look at the cleat, and the crewman can concentrate on watching the sails. The line can be eased out or reset by a crewman whose line of force can be as much as 90° off the axis of the cam cleat in any direction in or below the plain of the cam cleat. As distinguished from all other cleats, my cleat allows this to be accomplished by a crewman who is a great distance from the cleat.

Before my innovations, a line once adjusted to the desired setting could not be re-inserted between the locking cams without inadvertently changing the exact setting of the line. To insert the line it had to be used to swing the cams out and back. Then as the cams swing forward the load is transferred to the cams and the line moves forward. This slight back and forth motion is often undesirable where small changes in sail trim can have a great effect on the driving force of sails.

By contrast in my device the line is always between the cams and once the desired line position is obtained, an upward motion of the free end allows the cams to grip the line at that setting.

Still another shortcoming of prior cam cleats is that gripping teeth of their cams can become severely worn. Lines may become frayed by their rubbing against the teeth. Frayed lines are weakened lines. Worn teeth lose some of their gripping power on a line loaded against the cams under heavy sail forces and especially when the lines are wet.

The present invention greatly reduces the amount of abrasion of lines against the cam teeth because the cams can be held open by the line bearing on the release lever as the line is pulled through the cams. The tongue on the release lever in the present invention is a smooth surface which causes no abrasion of the line.

Still another unsatisfactory feature of ordinary cam cleats is that their cams have teeth which are parallel

grooves at right-angle to the line of action of the rope passing through the cleat. As a result the rope can pop out of the cams under certain conditions. Any slight off-axis orientation between the mounted can and load alignment may cause the line to ride up and out of the conventional cam teeth under heavy load.

My device corrects this problem. Here, the cam teeth are inclined to the loading axis of the cleat so that as the load increases the line is forced deeper into the space formed by the cams on each side and the cam base below. This results in the positive non-slip wedge action. The cams are forced together by and according to the amount of load force on the rope. Since the tongue on the actuating lever is forced against the free end of the rope any tendency to lift the rope out of the cams is counteracted by the force of the inclined teeth pulling the rope down into the cams. Because of the forces resolved on the tongue the cams release their grip on the rope by a mere "rearward" pull on the free end of the rope. This arrangement is an important unique feature of my invention.

## SUMMARY

My device teaches a cleat which permits ropes of various sizes to fit between two opposing faces of cam jaws. Inclined teeth on the faces resist release of the rope in direct proportion to the amount of load to be held by the rope. In unique conbination therewith is a release lever whereby force applied to the otherwise slack end of the rope will cause the rope to be released without dislodgment from the jaws.

## BRIEF DESCRIPTION OF THE DRAWINGS

In the accompanying drawings

FIG. 1 is a perspective view of the cleat in use.

FIG. 2 is a top plan view thereof.

FIG. 3 is a top plan view of one half of the cleat set for a rope with a small diameter.

FIG. 4 is a top plan view of the other half of the cleat set for a larger rope.

FIG. 5 is a cut away perspective view of a portion of the device showing the lever release action.

FIG. 6 is a side elevation of one half of the cleat showing the lever position when the free end of the rope is slack.

FIG. 7 is the same as FIG. 6 except it shows the lever position when the free end of the rope is taut.

## DESCRIPTION OF PREFERRED EMBODIMENTS

Referring to the drawings wherein like numerals represent like parts throughout, numerals 1 and 1 represent two cam members that are pivotally mounted. A plurality of inclined parallel serrations 2 are cut into the entire vertical surface of each cam member which is closest to the other member. The members can pivot on posts 3 toward one another in unison and their serrated surfaces are shaped so that the greater their pivoted position is from the rest position, the more distant the surfaces are from each other. The serrations serve as teeth on jaws to hold conventional line or rope 26. Within interior 15 of each cam member 1 and 1 is bushing 16 surrounded by coil spring 17 having one end 18 in cleat plate 4. Its opposite free end 19 bears on inner surface 20 as can best be seen in FIG. 3. Spring tension tends to keep jaws closed. Stop 21 is abutted by a portion of the inner surface to limit pivotal swing of the member. It is mounted on plate 4.

Cleat plate 4 is secured to base plate 5, plates are of same rectangular configuration. Base plate 5 has dual bosses 6 extending therefrom. Flat surfaces of plates are held in unison by suitable bolts 22 with washers 23 passing through orifices 24 in posts 3 thereby also retaining members 1 and 1 as illustrated. Items 3 are two parallel posts attached to plate 4 at right angles thereto. Parallel adjustable slots 25 are provided in base plate 5 so that cleat plate 4 with members 1 and 1 can be secured in various positions in respect thereto. This permits maximum accommodation to ropes, regardless of diameter. Unlike prior devices, my device can be adjusted to operate at maximum efficiency with any rope size within a wide range of sizes, e.g., from ropes of one-half inch diameter down to one-eighth inch diameter by simply loosening the mounting screws or bolts and sliding the base plate relative to the cleat plate until, with the release lever tongue fully depressed, the cams open enough to allow clearance for the line to pass freely between the cams.

A further feature of the present invention are bosses 6 which protect the release lever tongue from inadvertent depression. Two bosses are positioned on each side of the tongue. Differences in settings are depicted as differences in space between broken lines and serrations in FIG. 3 and FIG. 4. Said bolts may secure the device to boat for use in sailing.

Attention is directed to FIG. 5 showing release means comprising, in this preferred form, curved tongue 14, dual parallel actuating arms 10, connected to each other by pin 8; dual parallel lever arms 9 and dual angled arms 13. Pin 8 rests in recessed portion 7 of base plate 5. Dual arms 10 extend therefrom through dual apertures 11 in cleat plates into cavity 12 of cam member. Dual arms 9 are joined to ends of cylindrical pin 8.

Arms 9, pin 8 and arms 10 are at right angles to each other. one end of arms 9 are connected to end of 8 and the end of item 9 is secured to end of arms 13 as angled extenions thereof. Other end of arm 13 is secured to tongue 14 whereby the tongue is above the top surface of base plate when free end of rope 26 is slacked as item 26*a* of FIG. 6. When free end is pulled it becomes taut due to resistance of load end 26*c* shown as item 26*b* of FIG. 7. As illustrated, tongue 14 is depressed by the force of the taut rope upon it. Pull in direction of any arrow of FIG. 1 or at bottom of FIG. 2 operates release means. Tongue 14 has an arcuate configuration for maximum efficiency for all directions of force applied to rope. Acting as a linked unit, depression of tongue moves arms 10 to dotted position of FIG. 5. Arms 10 bear on cam members 1 and 1 swinging them open shown as dotted lines in FIG. 2 and shown laterally by comparative positions in FIG. 6 and FIG. 7. This partial opening releases rope from the grip of the cleat. Tension is released rope maintains force against tongue and holds cams open so rope can be eased in direction of arrow at top of FIG. 2.

In marine applications the cleat is mounted with its cleat and base plates relatively horizontal so that the axis of cam rotation is vertical and so that the tongue 14 of the operating means is horizontal at the exit side of the cams between the bosses 6. The relative position of the cleat plate and base plate will have been adjusted so that the initial separation of the cam members results in range of cam separation with cam rotation which will accommodate a rope of the size that is to be

held in the cleat. The tongue is arranged so that downward movement operates to force the cam members in a direction of rotation that releases the rope from the cam jaws. The sailor who works the line will do so from a position at the exit side of the cleat using the free end of the line. The "standing part" of the line is the side under tension. The line on the other side enters the cleat jaws from the "entry side" of the cleat. To insert a line in the cleat, the sailor grasps it at a point on the exit side of the cleat and lays it over the cleat in line with the jaws. The line is pulled taut against the tongue **14** so that the tongue is depressed. Upon depression of the tongue, the lever arms **9** are rotated about the fulcrums which occur at the junction between lever arms **9** and actuating arms **10.** There are two arms **9** and two actuating arms **10,** one for each of the cam members. They are interconnected by a rod **8** in the vicinity of the fulcrum. Also the arms **9** are connected by the tongue **14** so that the arms operate in unison. When the tongue **14** is depressed, both of the actuating arms **10** rotate so that their upper ends move toward the exit side of the cleat. The upper ends of the actuating levers are lodged in holes **12** formed in their respectively associated cam members. Since those holes **12** are displaced from the axis of cam member rotation, pivotal movement of the actuating levers forces the cams to rotate. They rotate in opposite directions and, as they do, separation between their curved cam surfaces is increased whereby the line is permitted to move down between the jaws. Once the line has entered the space between the jaws, pressure on the standing part is released. The bias springs **17** urge the cam members back toward original condition and in doing that they apply a pressure to the actuating arms **10** which causes the operating means to pivot, lifting the lever arms **9** and the tongue **14.** That action proceeds until the return motion of the cam members is impeded by being clamped against the rope. The serrations on the cam member jaws extend toward the plate **4** and they are inclined so that their lower ends are toward the entrance side of the cleat. Consequently, the load on the line tends to pull the line so that it moves down toward and against the plate **4.**

The cleat holds the load. If it is necessary to free the line it need only be lifted up out of the cleat jaws. That can be done by pulling up on the line on either side of the cleat.

Standard marine cam cleats are arranged so that the cam jaws will yield to a pull on the line in the direction that tends to shorten the standing part. But their primary function is to hold the line against movement in the opposite direction. When it is necessary to lengthen the standing part in a line held in an ordinary cam cleat, a sailor must remove the line from the cleat and take the load himself with or without the assistance of some snub device. He must then pay out an appropriate length of line a little greater than the length he actually wants payed out. The line is then placed across the upper side of the cleat cams and the line is hauled in somewhat so that the cleat jaws are pushed open enough to permit the line to move into position between them. During that operation, the load is held by the sailor. If the load on the line pulls the line away from him, he wlll have lost it. On the other hand, if it is desired to lengthen the standing part of the line when using this cleat, the sailor need only hold the free end taut and move it down, or sidewise and down, so that it engages and depresses the tongue **14.** As he does that, the jaws will open and the load will be transferred to him and at the same time automatically snubbed across the top of the cleat plate and the tongue. The line then can be payed out a desired amount. The line still extends between the jaws and if during this adjustment the load is too heavy or is suddenly increased so that the sailor loses the line, the downward depression of the tongue will end and the jaws will close and the line will be held.

I claim:

**1.** A cleat comprising:

a plate and dual oppositely disposed cam members pivotally mounted on one side of the plate for gripping the rope as an incident to rotation of the cam members toward one another;

release means connected to the cam members including a tongue positioned in such spaced relationship to the free end of a rope in the cleat that rope tension thereon in a direction having a component perpendicular to the plane of cam member rotation will activate the release means whereby said cam members no longer grip the rope; and

a base plate suitable for mounting on a boat, and a cleat plate, positioned between the cam members and base plate,;

the release means being pivotally mounted between the base plate and cleat plate and having one part engageable with a cam and another part positioned for engagement by the rope at the exit side of the cam members whereby tension on the otherwise free end of a rope causes the release means to operate.

**2.** In a cleat suitable for marine use of the type which includes a pair of cam members mounted and biased for relative rotation toward and away from one another in a direction to grip and release, respectively, a rope extending between them against a pulling force on the rope at the entry side of said cleat, the improvement which comprises;

a cam member operator carried on said cleat at the exit side of said cam member and movable in a direction perpendicular to the plane of cam member rotation, said cam member operator being responsive to movement in said direction to cause relative rotation of said cam members in a direction to release the rope;

said cam member operator being a lever and being pivotally mounted on the cleat for rotation about an axis perpendicular to the axis of cam member rotation, said cam member operator including a lever arm connected with a tongue which is positioned across the exit from said cam members and having another actuating arm engageable with at least a rotatable one of said cam members at a point separated from the rotational axis of said rotatable one of said cam members whereby depression of said tongue causes a pivoting of the lever to force rotation of the cam member by pressure applied to said actuating arm-

**3.** The invention defined in claim **2** in which cam member operator comprises a depressable tongue extending across the exit side of said cam members and which is movable to a position above the plane of the lower level of said cam members.

**4.** The invention defined in claim **3** in which said cam members are formed with jaws having serrations which extend over the face of the jaws in the direction of said plate and toward the entry side of said jaws whereby force on the rope from the entry side tends to result in drawing the rope down into the jaws against the plate.

**5.** The invention defined in claim **4** which further comprises a pair of bosses disposed on opposite sides of said tongue.

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