AMENDED SPECIFICATION.

Reprinted as amended in accordance with the decision of the Chief Examiner dated the 13th. day of November 1901.

N° 8896 A.D. 1901

Date of Application, 30th Apr., 1901—Accepted, 8th June, 1901

COMPLETE SPECIFICATION (AMENDED).

"A Toggle Suspending Catch."

I, MURRAY HINCKLEY SPEAR, of 118 Cannon Street, in the City of London, Mechanical Engineer, do hereby declare the nature of this invention and in what manner the same is to be performed to be particularly described and ascertained in and by the following statement:—

My invention relates to a cheap and simple suspending catch which becomes automatically fixed by toggle action between two beams, joints or rafters, as I shall describe referring to the accompanying drawings.

Fig. 1 is a front view and Fig 2 is a plan of a suspending catch according to my invention. Fig 3 is a plan and Fig 4 a transverse section of a modified form of the catch

It consists of two castings each terminating in a serrated segment *a* having teeth such as can be pressed into the side of a wooden beam, joist or rafter, and take a firm hold in the wood. Instead of being merely parallel saw teeth, they may be also cut crosswise or diagonally like the teeth of a coarse file. As shewn in Figs 1 and 2, the one casting has its other end formed as a cylindrical pin *b* which fits into a cylindrical gab *c* of the other casting, there being sufficient freedom in the mouth of the gab to allow of the two castings moving to positions in which they are relatively inclined to each other at various angles like two links of a toggle. The casting which has the gab *c* has under it an eye *d* to receive a rope or hook by which a load can be suspended.

As shewn in Figs 3 and 4, the two castings are alike each made with an arm notched along its upper side. When they are placed side by side, a ring *e* is engaged in their coincident notches, and the load is suspended from this ring.

The two castings being jointed together or engaged together by the ring are placed where desired between a pair of wooden beams, joists or rafters, and their arms being strained down by hand sufficiently to cause the serrations to take a hold in the wood, then, on a load being suspended from the eye *d*, or the ring *e*, the arms are pulled down forcing the serrations more deeply into the wood so as to take a firm hold.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed I am aware that a toggle suspending catch somewhat similar to mine has been described in the Specification of Joseph Everard No. 15245 of 1900 and I make no claim to anything described and claimed therein but, I declare that what I claim is:—

1. A toggle suspending catch constructed and operating substantially as described, with reference to Figs 1 and 2.
2. A modified toggle suspending catch constructed and operating substantially as described with reference to Figs 3 and 4.

A.D. 1901. April 30. N° 8896.
SPEAR'S Amended Specification.

SHEET 1

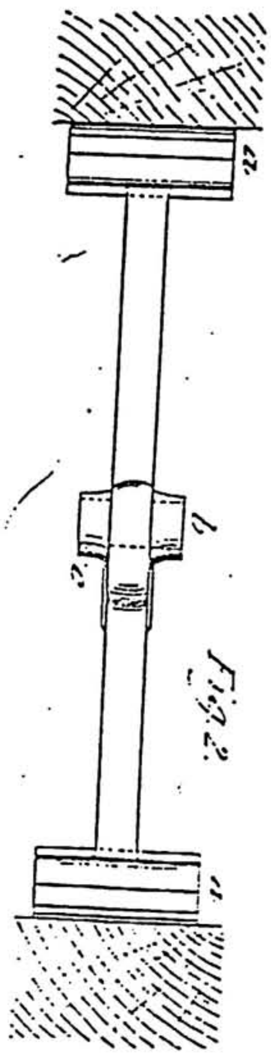


Fig. 2.

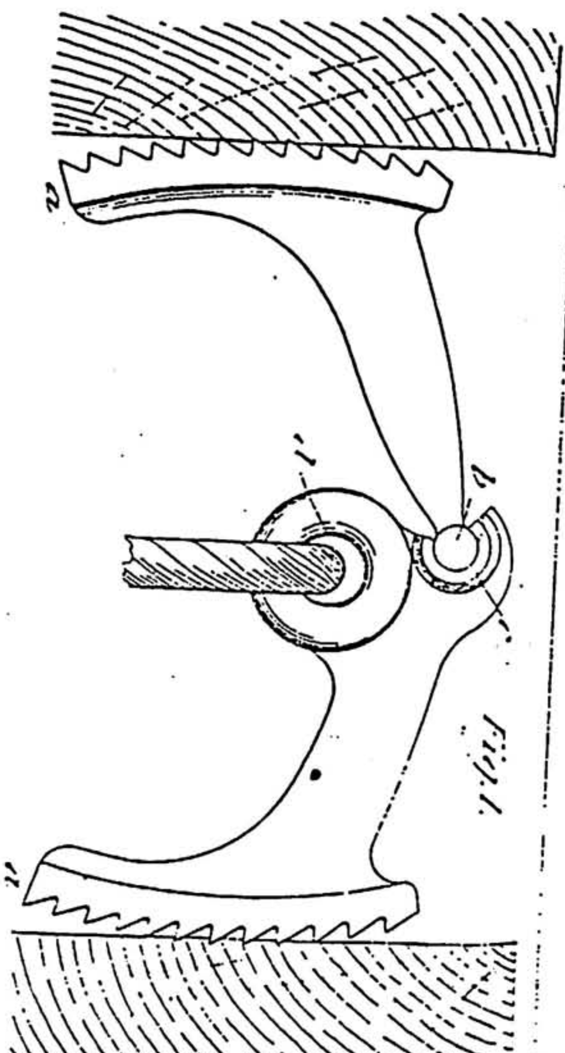


Fig. 1.

Fig. 3.

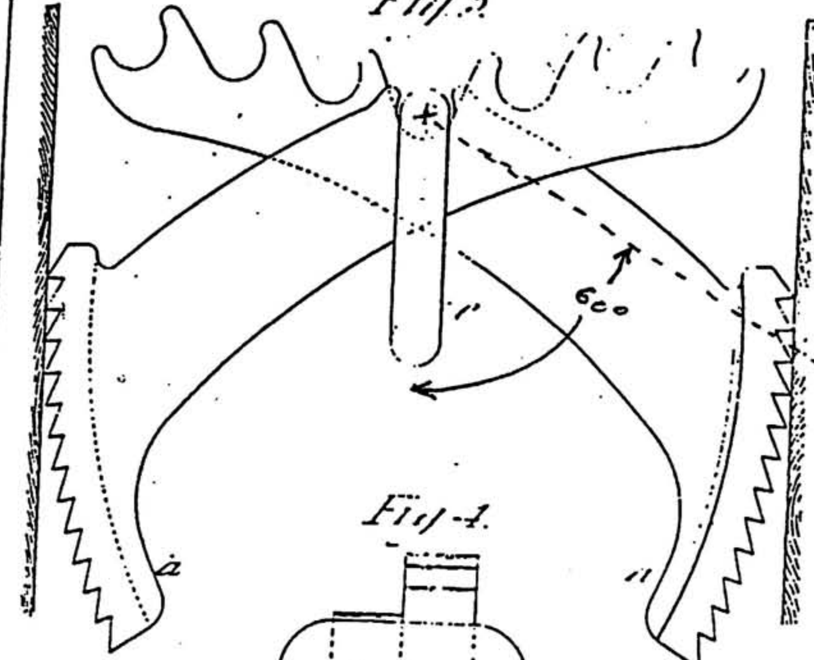
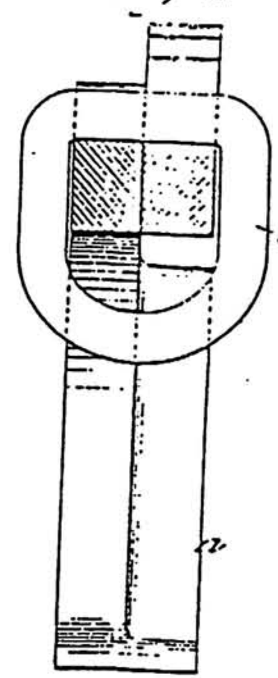


Fig. 4.



(This Drawing is a reproduction of the Original on a reduced scale.)

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A.D. 1901. April 30. N° 8896.
SPEAR'S Amended Specification.

SHEET 1

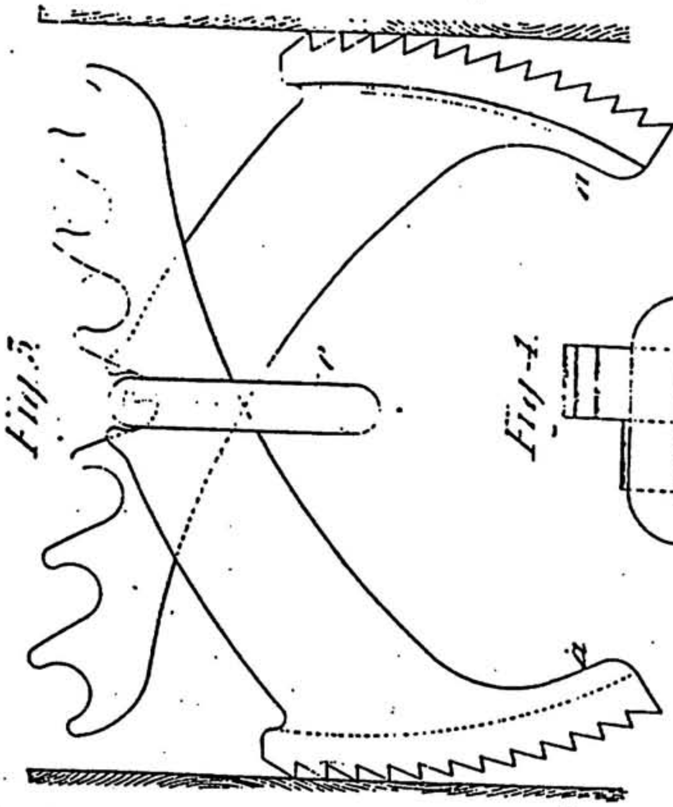


Fig. 3.

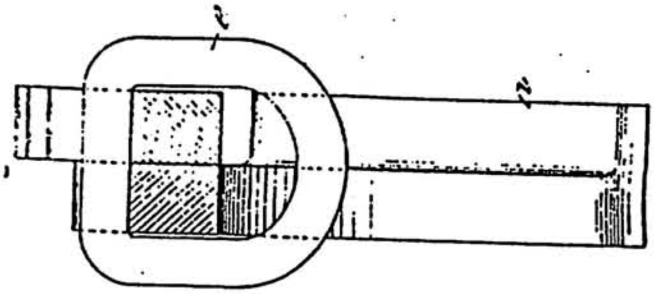


Fig. 4.

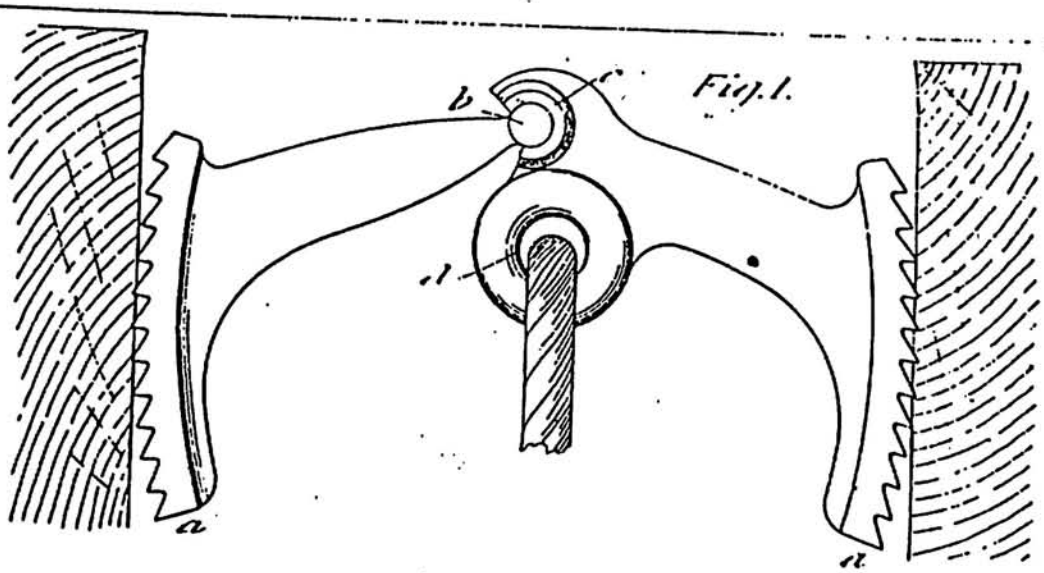


Fig. 1.

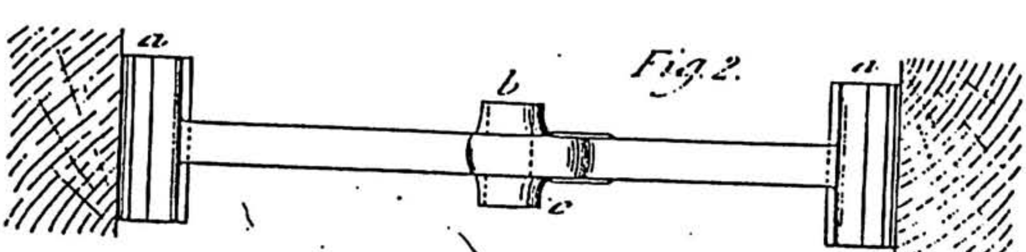
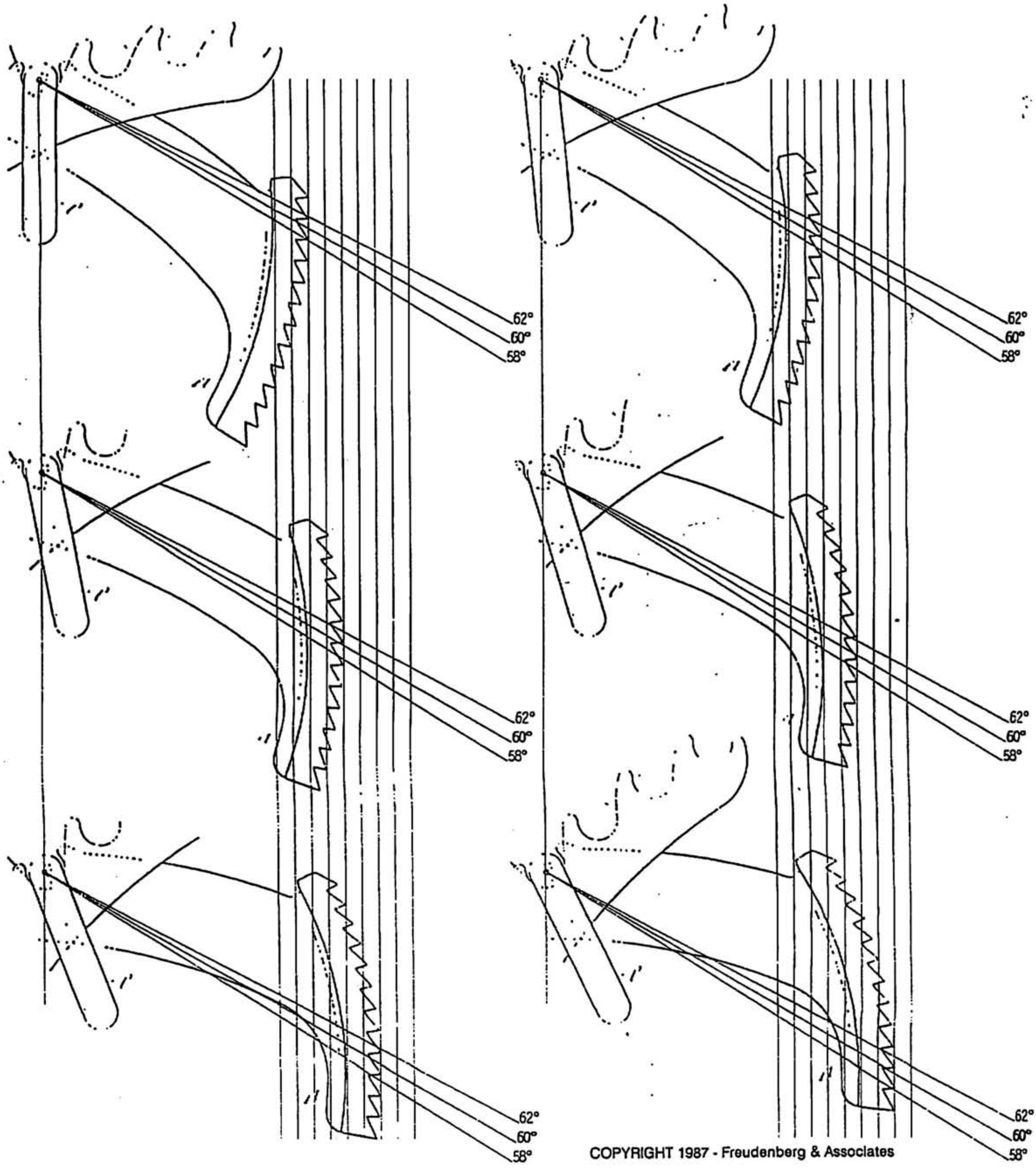


Fig. 2.

British Spear Patent- No. 8896
Fig. 5 - Right Side Camming Member



United States Patent [19] [11] 3,877,679
Lowe [45] Apr. 15, 1975

[54] **ANCHOR DEVICE FOR MOUNTAIN CLIMBERS**

[75] Inventor: **Greg E. Lowe**, Ogden, Utah

[73] Assignee: **Lowe Alpine Systems, Inc.**, Louisville, Colo.

[22] Filed: **Aug. 16, 1973**

[21] Appl. No.: **388,921**

[52] **U.S. Cl.** **254/135**
[51] **Int. Cl.** **B66d 1/58**
[58] **Field of Search**..... 254/135 R, DIG. 14, 185 A, 254/156, 135; 294/95, 96, DIG. 14, 93, 97, 294/89; 85/35; 52/160; 24/248, 139, 115 J, 128 R

[56] **References Cited**

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Primary Examiner—Stanley H. Tollberg
Assistant Examiner—Norman L. Stack, Jr.
Attorney, Agent, or Firm—Clarence A. O'Brien; Harvey B. Jacobson

[57] **ABSTRACT**

An artificial chockstone having at least one main body provided with opposed pairs of tapered walls forming a pair of perpendicular wedges arrangeable in cracks in rock, and the like. The main body is also provided with an arcuate cam surface arranged for presenting a constant intercepting angle with respect to a surface that it abuts. An orientation assembly is pivotally mounted on the main body, and is arranged for selectively orienting the main body, that functions as a levering cam body, between a pair of spaced surfaces such as the walls of a crack in rock, and the like.

8 Claims, 9 Drawing Figures

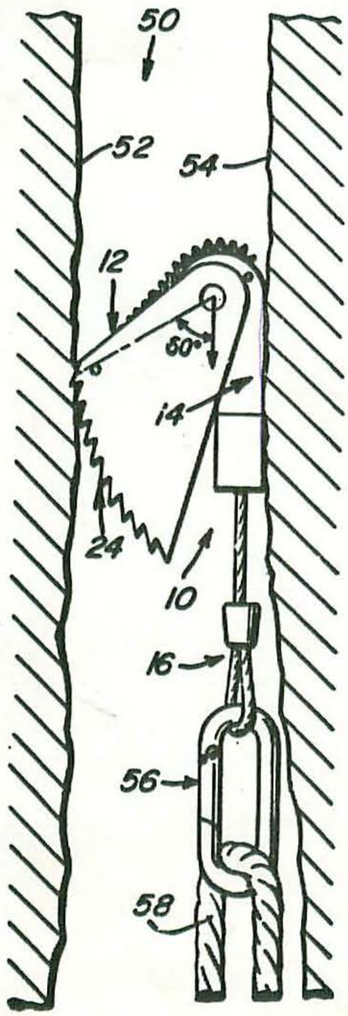


Fig. 1

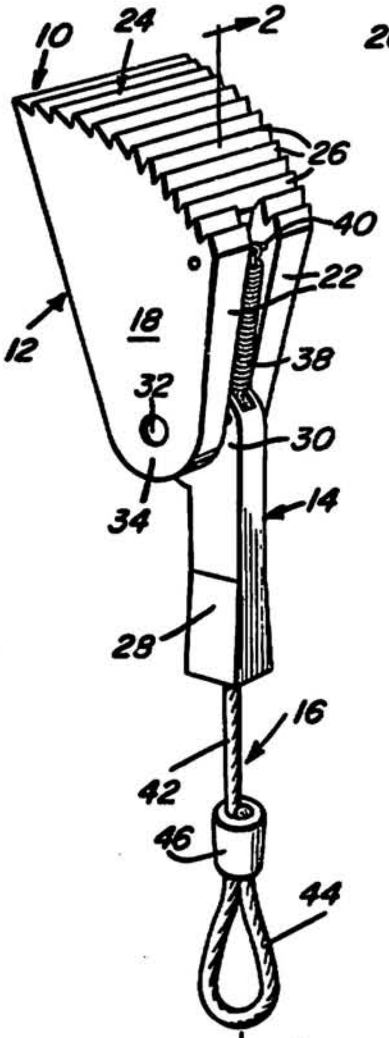


Fig. 2

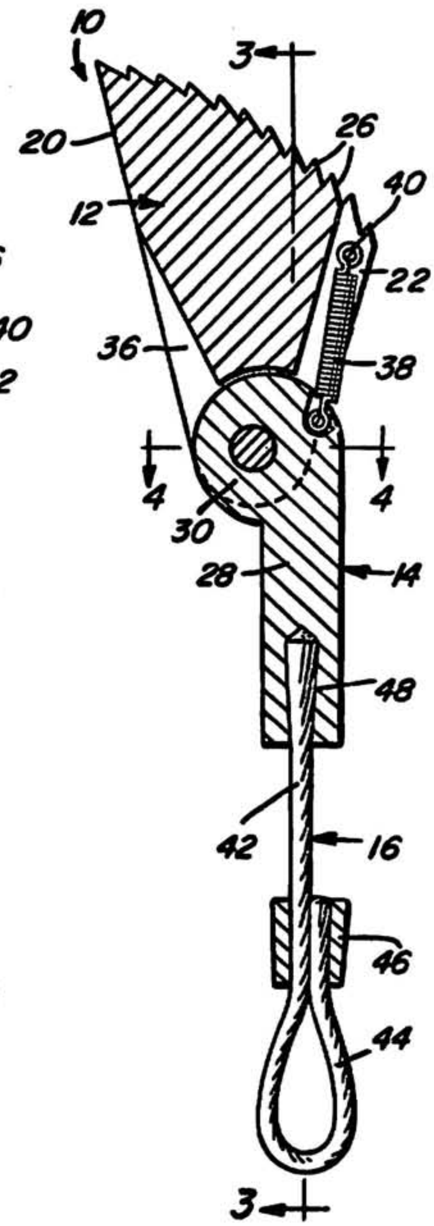


Fig. 3

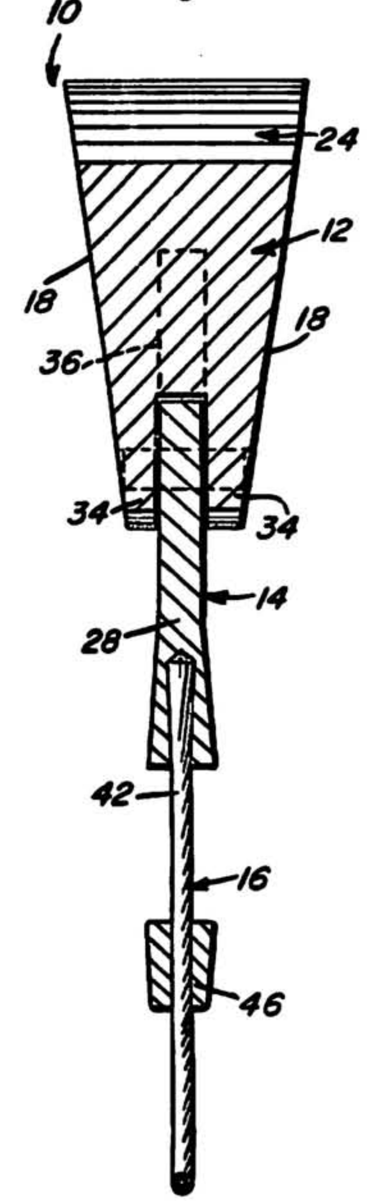
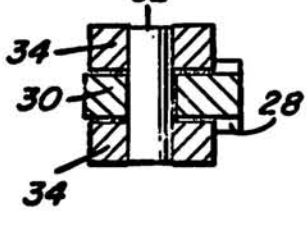


Fig. 4



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SHEET 2 OF 2

Fig. 5

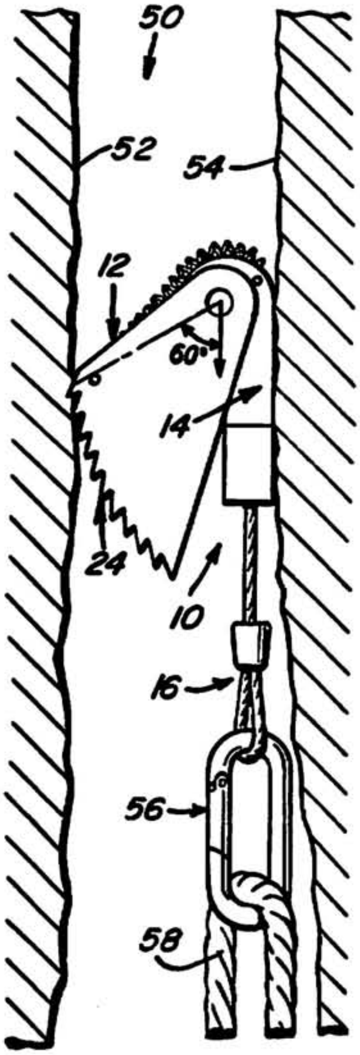


Fig. 6

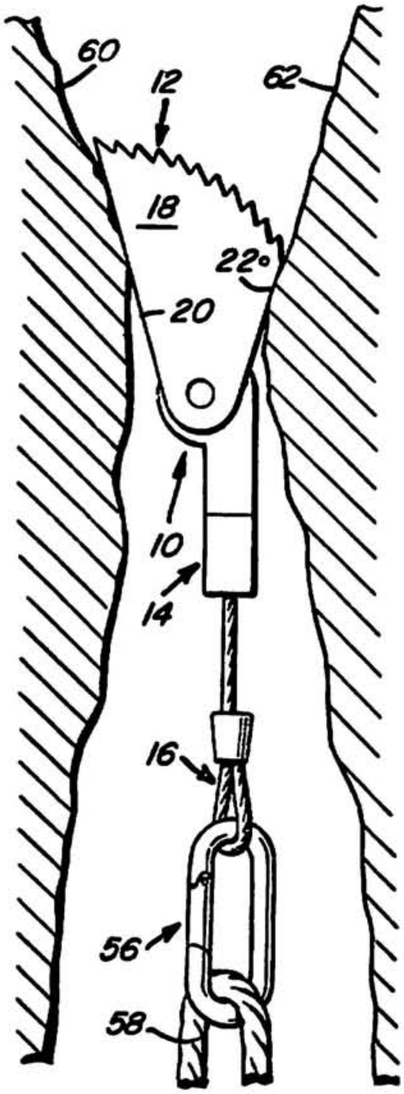


Fig. 7

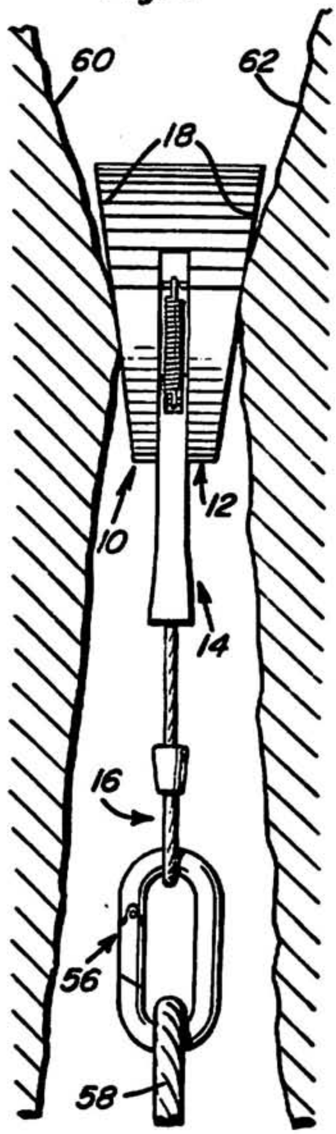


Fig. 8

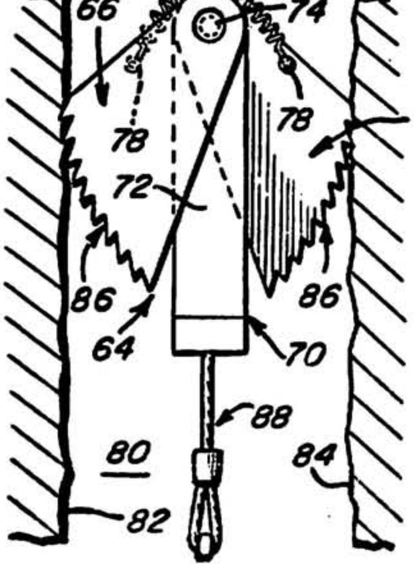
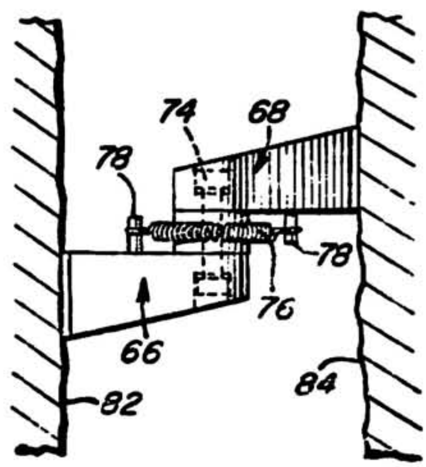


Fig. 9



ANCHOR DEVICE FOR MOUNTAIN CLIMBERS

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates generally to anchor devices, and particularly to mountain climbing fall protecting devices.

2. Description of the Prior Art

Numerous schisms occur in the rocks and other matter forming mountains. These schisms take the form of fissures, clefts, gullies, and the like, while chunks of rock, and the like, wedged in these schisms are usually referred to as chockstones. Mountain climbers frequently use devices which may be called artificial chockstones to facilitate their ascent and descent and to protect themselves against a fall.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide an artificial chockstone which functions as a strong anchor for arresting the fall of a rock climber, and allows a climber to ascend a crack, and the like, while depending on the artificial chockstone for support.

It is another object of the present invention to provide an artificial chockstone which is easily hand placed and removed and causes no damage to a rock surface.

It is yet another object of the present invention to provide an artificial chockstone which is durable, simple, and lent to being produced by mass production methods.

It is still another object of the present invention to provide an artificial chockstone which is able to function in rock cracks having parallel or flaring walls, and in cracks having constricting surfaces, without compromising performance or weight of the device.

It is a still further object of the present invention to provide an artificial chockstone which covers a wider size range of cracks, and the like, than known devices of this kind, permitting a reduction of the number of chockstones and other protective devices needed on a particular climb.

These and other objects are achieved according to the present invention by providing an artificial chockstone having a main body including opposed pairs of tapered walls forming a pair of perpendicular wedges, and an arcuate cam surface arranged for presenting a constant intercepting angle with respect to a surface abutted by the cam surface. The wedges and cam surface are alternately usable for wedging the main body between the surfaces of walls forming a crack, and the like.

A preferred embodiment of a chockstone according to the present invention has an orientation assembly pivotally mounted on the main body and arranged for orienting the main body between a pair of spaced surfaces. In particular, this orientation assembly is used to position the main body when same is being used as a levering cam body and its cam surface is being abutted against a surface of a crack, and the like, in which the main body is being wedged. A load bearing cable or eye assembly is advantageously connected to the orientation assembly for facilitating manipulation of same.

A modified embodiment of a chockstone according to the present invention has a pair of main bodies pivotally connected to one another and to an orientation assembly. Each of these main bodies is provided with a cam surface similar to that cam surface of the single main body of the first mentioned preferred embodiment.

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.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view showing an artificial chockstone according to the present invention.

FIG. 2 is a sectional view taken generally along the line 2—2 of FIG. 1.

FIG. 3 is a sectional view taken generally along the line 3—3 of FIG. 2.

FIG. 4 is a sectional view taken generally along the line 4—4 of FIG. 2.

FIGS. 5, 6, and 7 are fragmentary, schematic, vertical sectional views showing various possible arrangements of an artificial chockstone according to the present invention in a crack in rock, and the like.

FIG. 8 is a fragmentary, vertical sectional view showing a second embodiment of an artificial chockstone according to the present invention arranged in a crack in rock, and the like.

FIG. 9 is a fragmentary, horizontal sectional view showing the artificial chockstone of FIG. 8 in top plan view.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now more specifically to FIGS. 1 to 4 of the drawings, an artificial chockstone 10 according to the present invention has a main body 12 provided with opposed pairs of tapered walls forming a pair of perpendicular wedges. An orientation assembly 14 is pivotally mounted on main body 12 adjacent an apex of the wedges, and is arranged for orienting main body 12 between a pair of spaced surfaces in a manner to be described in detail below. Chockstone 10 further has a load bearing cable or eye assembly 16 connected to orientation assembly 14 for facilitating manipulation of assembly 14 and providing for climbing ropes, and the like, to be connected to chockstone 10.

Main body 12, the first of the three interconnected assemblies forming chockstone 10, has its pair of perpendicular wedges formed by a pair of converging side walls 18 and a perpendicular pair of side walls 20 and 22. These side walls 18, 20 and 22 converge toward one another in a common direction for forming the aforementioned pair of perpendicular wedges. Main body 12 is further provided with an arcuate cam surface 24 arranged for presenting a constant intercepting angle with respect to a surface abutted by cam surface 24. This angle may be, for example, 60°. A plurality of parallel ribs or teeth 26 are provided on cam surface 24 for assuring a secure gripping relationship between cam surface 24 and a surface against which it is abutted. These ribs or teeth 26 are arranged extending across cam surface 24 between side walls 18.

Orientation assembly 14 includes a bar 28 having an enlarged portion 30 disposed at one longitudinal end thereof. This enlarged portion 30 is provided with an opening through which a pin 32 is arranged for pivotally mounting bar 28 to main body 12. The latter has a pair of codirectionally extending ears 34 formed by a portion of a recess 36, and it is these ears 34 which are provided with opposed holes arranged for receiving pin 32 that mount pin 32 and bar 28 on main body 12. A conventional helical coiled spring 38, and the like, is advantageously arranged in a groove 40 and arranged with its ends connected to main body 12 and bar 28 for facilitating placement and holding of main body 12 and assembly 14 in the cammed position.

With the orientation assembly 14, the second assembly forming chockstone 10, having been described in detail just above, load bearing suspension cable or eye assembly 16, which forms the third assembly of chockstone 10, will now be treated in a like manner. A cable 42 has a loop or eye 44 formed in one end thereof as by a conventional swage 46. The other end of cable 48 is swaged into a suitable bore or other hole 48 formed in the longitudinal end of bar 28 spaced from that at which enlarged portion 30 is disposed. The insertion of cable 42 into hole 48 may be done in any suitable, known manner, and, therefore, the manner of insertion will not be described in detail herein.

Referring now to FIGS. 5, 6, and 7 of the drawings, it will be appreciated from these Figures and from the above description that the primary function of main body 12 is to serve as an anchor to resist loading forces applied to it through assemblies 14 and 16. This primary function of anchorage is achieved by two different manners of placement. Specifically, main body 12 may be either jammed or cammed into position. The manner of placement used is determined by the kind and size of schism available for placement.

FIG. 5 of the drawings illustrates the use of chockstone 10 when jammed into a crack 50, and the like, that has no constrictions permitting a wedging placement. The cam surface 24 of the lever cam chockstone body, that is body 12, may be bridged against a wall 52 of a suitable size parallel crack 50. Now, if a loading force is applied to the axle or pin 32 end of body 12, the latter tends to slide down inside crack 50 and against wall 54 thereof which opposes wall 52. A conventional snap-link 56 is used to connect eye 44 of cable 42 to a conventional climbing rope 58, and the like. As can be readily appreciated from FIG. 5 of the drawings, as a force is applied to assemblies 14 and 16, body member 12 will be pivoted about a point on cam surface 24 that is abutting wall 52 and wedging body member 12 between walls 52 and 54. More specifically, body member 12 is wedged between the surfaces defined by walls 52 and 54. The arc struck by the loaded pin 32 end encounters the resistance of the rock crack surface. This causes body member 12 of chockstone 10 to bind against the parallel crack surfaces as stated above, and this proportional binding pressure increases the frictional resistance of the contacting surfaces of chockstone 10. This increased friction withstands any holding force up to the structural strength of the rock crack or the cam chockstone. This converging of downward loading force into outward frictional force is dependent on the width of crack 50, which of course must be narrower than the radius of the arcs of cam surface 24 and the surface of bar 28 engaging wall 54. The radii corresponds to the length of chockstone 10 measured from any point on cam surface 24. This proportional friction increase is, in addition, most effective if the main chockstone body 12 is placed in a crack 50 which allows chockstone 10 to lever open to an angle of more than 45°, but less than 9° to the loading force. This is achieved by forming the cam surface to intercept the crack walls at a constant angle such as, for example, 60°, as stated above.

FIGS. 6 and 7 show arrangements of chockstone 10 if a crack is sufficiently narrow and constricting to permit chockstone 10 to be jammed vertically thereinto and wedged in the constricting area of the crack. In FIG. 6, the wider wedge of body 12, specifically the wedge formed by walls 20 and 22, is shown wedged between walls 60 and 62 of a crack, and the like. FIG. 7 shows walls 18 oriented for contacting the same walls 60 and 62 of a crack so that the narrower wedge of main body 12 is used to jam the latter into the crack. When so arranged, chockstone 10 can withstand a considerable loading force through assemblies 14 and 16 because of the physical restriction of the associated crack which jams chockstone 10 in place. If the crack is somewhat larger, than the wedge formed by side walls 18, but is still constricting, body 12 may be jammed between constricting surfaces 60 and 62 by using the wider wedge formed by walls 20 and 22, as is shown in FIG. 6. This provision of the two pairs of wedges of different widths permits chockstone 10 to be used with a wide range of constricting crack widths.

The pivotal mounting or orientation assembly bar 28 to main body 12 allows orientation assembly 14 to swivel and thereby allow chockstone 10 to be placed in the cammed position. Once in the cammed position, orientation assembly 14 serves to swivel the main body 12 under a load until the resistance plane of body 12 is always perpendicular to the loading force. Therefore, if outward pull occurs during a fall, chockstone 10 will swivel until it is 90° to this loading force and thereby resist same. Spring 38 helps body 12 to be placed and held in the cammed position shown in FIG. 5 of the drawings. Assembly 16 connects the loading force through orientation assembly 14 to main body 12, and applies the directional force necessary to direct the orientation assembly 14 to swivel body 12 into a perpendicular plane to the lower or directional force applied to chockstone 10.

FIGS. 8 and 9 of the drawings show a chockstone 64 similar in principle to chockstone 10, but being provided with a pair of main bodies 66 and 68 pivotally connected to one another and to an orientation assembly 70. The latter is formed by a bar 72 pivotally mounted to bodies 66 and 68 as by a pin 74 arranged in a manner similar to pin 32. A spring 76, which may be similar to spring 38, is connected to bodies 66 and 68 as by projecting pins 78. Otherwise, chockstone 64 is constructed in a manner similar to chockstone 10. Further, chockstone 64 functions in a manner similar to that of chockstone 10. As can best be seen from FIG. 8 of the drawings, when chockstone 64 is arranged in a crack 80 formed by surface defining walls 82 and 84, cam surfaces 86 of bodies 66 and 68, these surfaces 86 being similar to surface 24, engage walls 82 and 84 and form a double-pivot toggle-like system which will wedge into place between walls 82 and 84. In essence, chockstone 64 is provided with a pair of lever arms in the form of bodies 66 and 68 which provide a toggle effect. A suspension cable or eye assembly 88, similar to assembly 16, is connected to bar 72 for receiving a, for example, snap-link and permitting a force to be applied to orientation assembly 70 and bodies 66 and 68.

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.

What is claimed as new is as follows:

1. An artificial chockstone, comprising, in combination:

a. a main body provided with an arcuate cam surface formed for intercepting at a constant angle a substantially vertical surface abutted by the cam surface; and

b. means pivotably connected to the main body for orientating the same between a pair of spaced surfaces for camming the main body between the spaced surfaces.

2. A structure as defined in claim 1, wherein the body member is further provided with opposed pairs of tapered walls forming a pair of perpendicular wedges, and the means for orienting includes an orientation assembly pivotally mounted on the main body adjacent an apex of the wedges.

3. An artificial chockstone, comprising, in combination:

a. a main body having an opposed pair of tapered walls converging toward one another in a common direction to form an apex, the walls forming a wedge, and a cam surface extending between the tapered walls; and

b. an orientation assembly pivotably mounted on the main body adjacent the apex of the tapered walls, the wedge being selectively arrangeable wedged between constricting surfaces, and the main body

and orientation assembly cooperating for orientating the main body between a pair of spaced surfaces by action of the orientation assembly camming the main body between the spaced surfaces.

4. A structure as defined in claim 3, wherein the cam surface is an arcuate cam surface arranged for presenting a constant intercepting angle with respect to a surface abutted by the cam surface.

5. A structure as defined in claim 4, wherein there is a pair of main bodies pivotally connected to one another, each main body having an arcuate cam surface arranged for presenting a constant intercepting angle with respect to surfaces abutted by the cam surfaces.

6. A structure as defined in claim 4, wherein the orientation assembly includes a bar having an enlarged portion disposed at one longitudinal end thereof and provided with an opening, a pin arranged through an opening for pivotally mounting the bar to the main body, a pair of codirectionally extending ears provided on the main body for forming a portion of a recess in the main body, the ears provided with opposed holes arranged for receiving the pin, and a spring arranged in a groove provided in the main body, and forming another portion of the recess in the main body, and having ends connected to the main body and the bar for facilitating placement of holding of the main body and the orientation assembly in a cammed position.

7. A structure as defined in claim 6, wherein the chockstone further comprises a load bearing eye assembly connected to the bar of the orientation assembly and arranged for permitting application of a load to the orientation assembly.

8. A structure as defined in claim 7, wherein the main body has two opposed pairs of tapered walls forming a pair of perpendicular wedges.

* * * * *

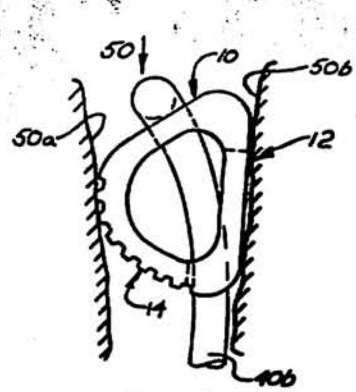


FIG 4

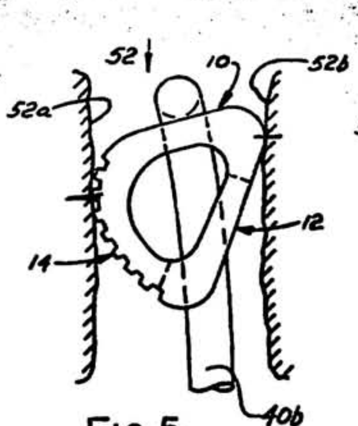


FIG 5

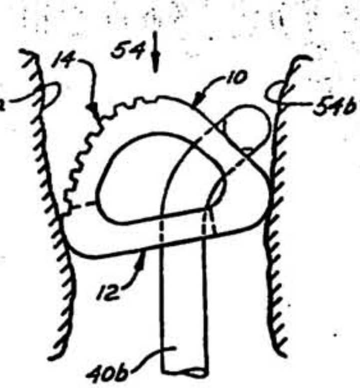


FIG 6

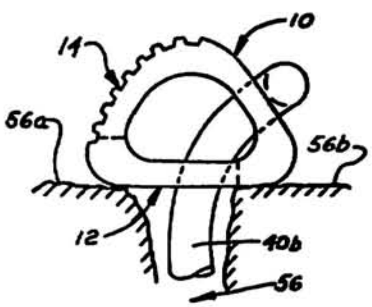


FIG 7

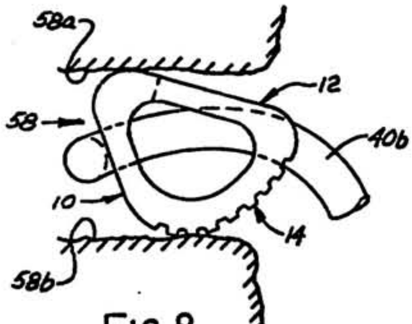


FIG 8

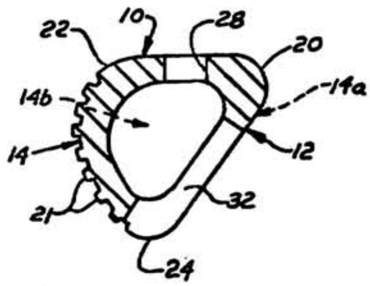


FIG 2

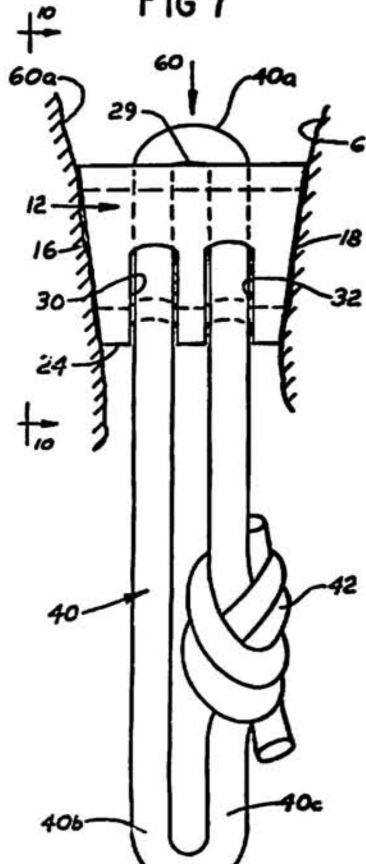


FIG 9

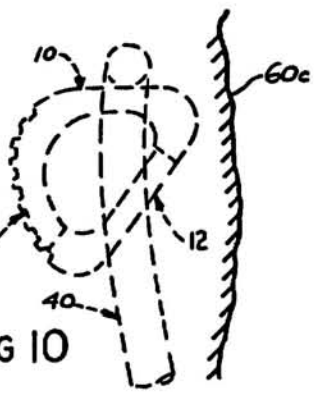


FIG 10

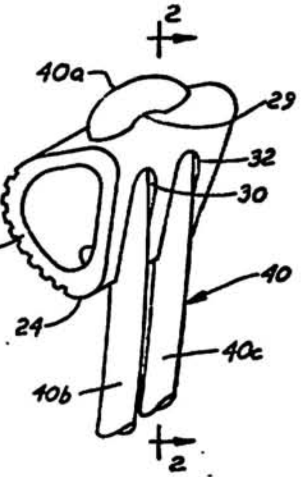


FIG 1

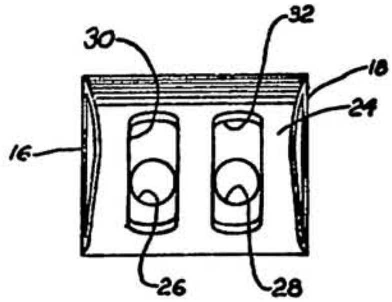


FIG 3

United States Patent [19] [11] 4,184,657
Jardine [45] Jan. 22, 1980

[54] CLIMBING AIDS

[76] Inventor: Raymond D. Jardine, General Delivery, Yosemite National Park, Calif. 95389

[21] Appl. No.: 911,037

[22] Filed: May 30, 1978

[51] Int. Cl.[2] A47G 29/00; B66D 1/00
[52] U.S. Cl. .... 248/1; 254/135 R
[58] Field of Search .... 182/230, 3; 294/86 R, 294/82 R, 89, 93, 95, 92; 254/135 R; 24/115 R, 114.5 R, 115 M; 248/1

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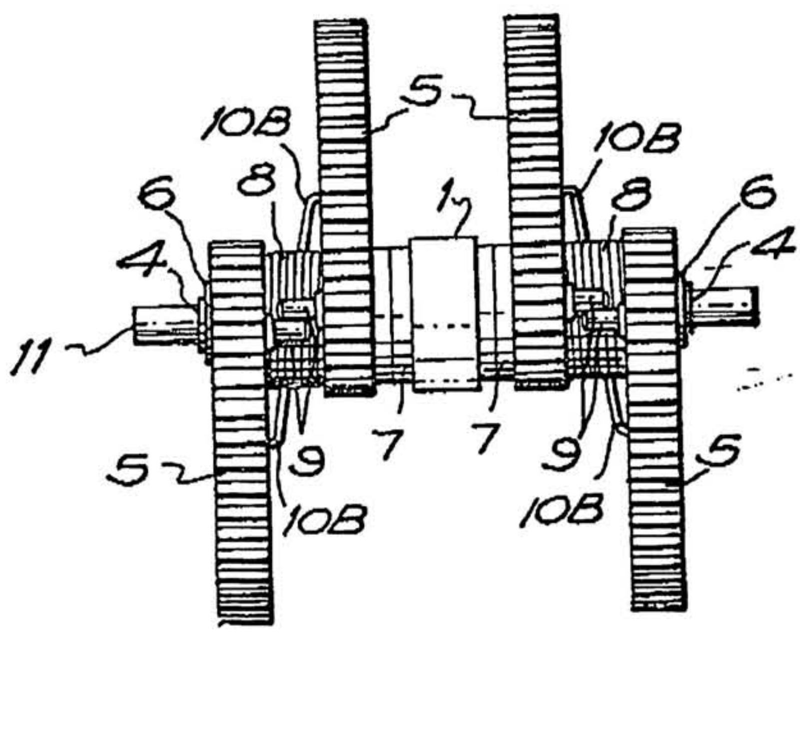
Primary Examiner—Reinaldo P. Machado
Attorney, Agent, or Firm—Lowe, King, Price & Becker

[57] ABSTRACT

A climbing aid having a support bar, a spindle mounted on the support bar, two pairs of cam members pivotally mounted on the spindle adapted for opposite pivotal movement from a "closed" position to an "open" position, and spring members mounted on the spindle between each pair of cam members which act to apply force to each cam member to urge it into its open position. An operating bar is slidably mounted on the support bar and is connected to each cam member, there being at the opposite end of the support bar to the spindle an attachment point for a climbing rope. A downward force on the operating bar puts the cams into the "closed" position so that the climbing aid can be inserted into a crack formed in rock or the like. The bar is then released and the spring members force the cams into their "open" position to lock the climbing aid within the crack. The support bar may also include means to hold the operating bar in a position where the cam members are in the "closed" position.

10 Claims, 4 Drawing Figures



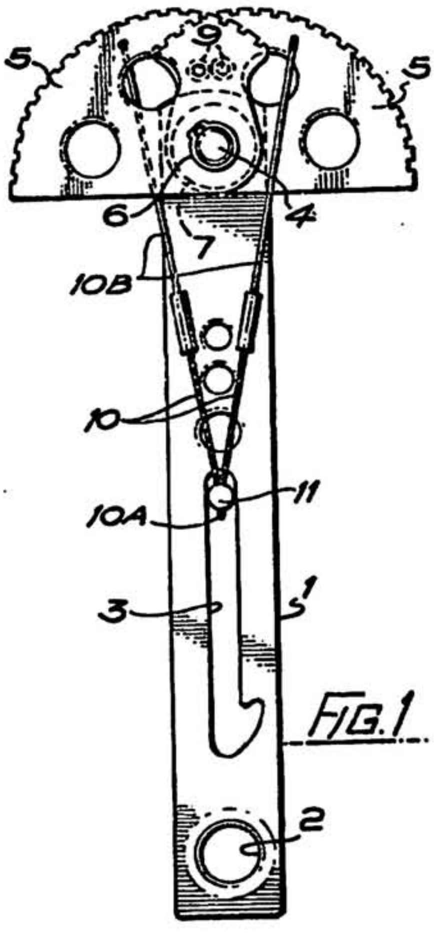


FIG. 1

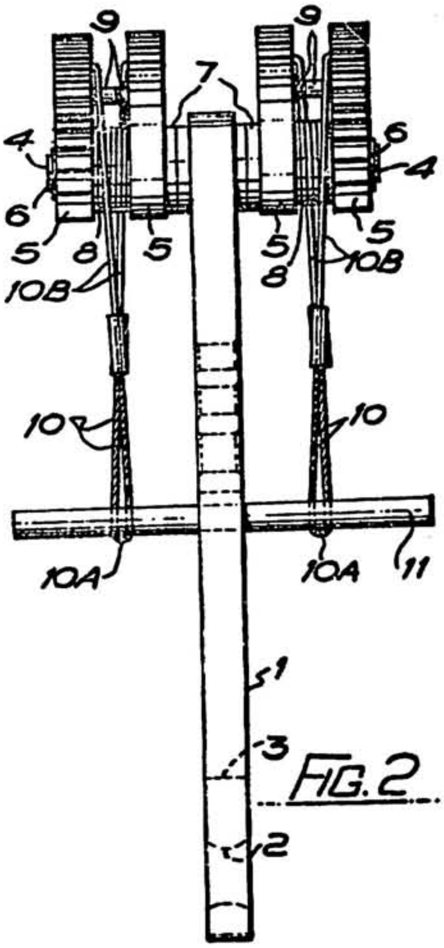


FIG. 2

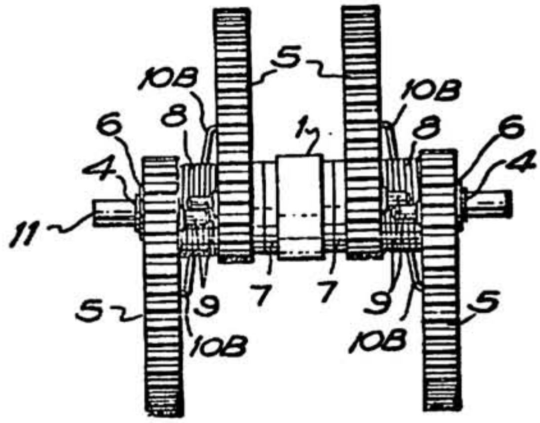


FIG. 3

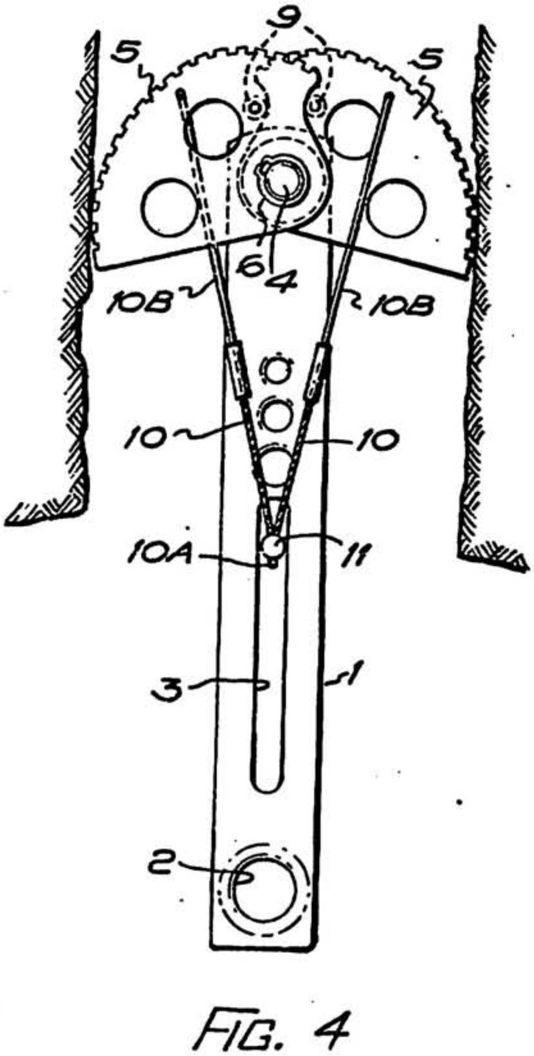


FIG. 4

CLIMBING AIDS

This invention relates to climbing aids and is particularly though not necessarily exclusively concerned to climbing aids for rock climbing and the like.

When two or more climbers move over difficult or dangerous ground, it is highly advisable and common practice to utilise a rope to secure the climbers together and to anchor the rope in slidable manner to the face being climbed. It is obviously prudent to obtain a firm anchor to which the rope can be suitably secured. Such anchors can be nautral, i.e. rock spikes, flakes, chockstones jammed in cracks, natural rock threads and the like. With such anchors a separate loop of rope or webbing is attached to the natural anchor and to which the climbing rope is slidably secured. As an alternative to natural anchors, artificial anchors can be utilised. Thus, artificial chockstones or nuts are known of a variety of shapes and sizes and which are inserted into cracks or holes in the face being climbed where they can be made to jam. Pitons are also known, these being steel spike-like members of various shapes and sizes which can be hammered into cracks in the face. Yet again it is known to provide bolts, a modified form of piton and which are designed to be hammered into drilled holes in solid rock.

So far as natural anchors are concerned, these have no inherent disadvantage so long as the rock of the face being climbed is firm and not smooth, however at the start of a climb it is often apparent that there are an insufficient number of natural anchors existing over the whole face. Artificial chockstones provide an efficient anchor especially when placed in an uneven (ragged) crack, but placing the artificial chockstone in place tends to be somewhat difficult and/or time consuming, and even good placements can be dislodged by movement of the climbing rope. When all that is available, where an anchor is needed, is a smooth-sided, parallel-sided crack, placement of the chockstones is difficult both to make and to ensure it is secured. Both pitons and bolts again provide extremely efficient anchors, but with pitons being made from steel they tend to be heavy and can be difficult to place. Also removal of pitons can be extremely difficult and as they tend to scar the rock surface, many climbers are unwilling to use them. Similarly bolts take an appreciable length of time to place and as they form a permanent disfiguration of the rock face, there is again an unwillingness among the climbers to employ them except as a last resort.

According to the present invention, a climbing aid comprises a support bar, a spindle mounted on the support bar, at least two cam members pivotally mounted on the spindle and adapted for opposite pivotal movement from a "closed" position to an "open" position, means to apply a force to each cam member to urge it to its "open" position, an operating bar slidably mounted on the support bar and connected to each cam member, and there being at the opposite end of the support bar to the spindle an attachment point for a climbing rope. If required further means may be provided on the support bar to hold the operating bar in a position where the cam members are in the "closed" position.

Thus, two cam members may be provided at opposite ends of a spindle and lying to opposite sides of the support bar, with spring means provided on the spindle to provide a loading on each cam member to urge it to the "open" position. It is however preferable to mount the

cam members in close proximity and to provide two pairs of cam members one pair to each side of the support bar, mutually spring loaded towards the "open" position by a torsion spring mounted on the spindle between the cam members of each pair, the arms of which are extended into engagement with the mutually inwardly facing edges of the cam members.

The operating bar may simply be a rod extending through a slot in the support bar, the slot extending longitudinally thereof, and if required there may be at the end of the slot remote from the cam members, a slot portion lying at an acute angle to the main direction of the slot and in which the rod can lie to hold the cam members in the "closed" position. The rod may be attached to each cam member by flexible connecting means, for example wire.

Preferably the cam surface is so shaped that when placed in a crack, the point of contact between a cam and a wall of a crack lies to the side of the spindle towards the open end of the crack, and a line through the point of contact and the axis of the spindle is constant for all degrees of "opening" of the cams, and at an angle of not less than 78° to the longitudinal axis of the support bar.

Thus, with the operating bar drawn along the slot in the support bar the cam members are drawn against the action of the spring means such that they lie in a "closed" position. With the cams inserted into an appropriate crack in a face being climbed, the operating bar is then released and when the spring means urge the cam member outwardly towards their "open" position such that the cam surfaces on the cam members contact the side of the crack. Once the cam surfaces are in contact with the sides of a crack whether it be a smooth parallel sided crack or otherwise the spring force on the cam members plus any longitudinal pull on the support bar urging it outwardly from the crack serves to increase the frictional force between the cam members and the walls of the crack. Therefore, in use, any loading on the support bar from a climbing rope preferably slidably secured to the attachment point at the end of the support bar cannot pull the climbing aid out of the slot, it merely jams the climbing aid in the crack to a greater or lesser degree dependant upon the force applied to the support bar.

Irrespective of the force to which the climbing aid has been jammed in a crack, removal of the climbing aid is an extremely simple exercise. By applying a force to the support bar inwardly of the crack, the frictional force between the spring loaded cam members and the walls of the crack is released, and when the operating bar can be pulled along the slot in the support bar to pivot the cam members about the spindle against the spring loading to the "closed" position to release them completely from the walls of the crack.

One embodiment of the invention will now be described with reference to the accompanying drawings, in which:

FIG. 1 is a front elevation of a climbing aid according to the invention;

FIG. 2 is a side elevation of the climbing aid of FIG. 1;

FIG. 3 is a plan view of the climbing aid of FIG. 1; and

FIG. 4 corresponds to FIG. 1 but shows the climbing aid without the auxiliary slot portion lying at an acute angle to the main direction of the slot and with the climbing aid actually inserted in a crack.

In the drawings, a climbing aid is formed by a support bar 1 having an attachment point 2 for a climbing rope, and a longitudinal slot 3. At the opposite end of the bar 1 from the attachment point 2 a spindle 4 is located in a transverse hole in the support bar, there being pivotally mounted on the spindle 4 two pairs of cam members 5, one pair lying to each side of the support bar, with the cams secured to the spindle by spring clips 6. The inner cam of each pair is spaced from the support bar by spacers 7 of low friction material.

Between the cams of each pair, a coil spring 8 is provided surrounding the spindle 4 and with the free ends of the coil spring engaging round abutments 9 provided on the cam side walls, the spring urge being such as to urge the cams towards their open position shown in FIGS. 1 to 3. The abutments 9 also serve as stop means to restrict the "opening" movement of the cams.

Secured to the inside face of the cam 5 of each pair is an operating wire 10 which extends to and is secured to an operating bar 11 passing through the slot 3 in the support bar. Preferably, as shown, each operating wire is a flexible loop 10A passing through spaced holes in the operating bar, joined to each cam 5 by a more rigid wire section 10B.

In use, the operating bar 11 is drawn along the slot 3 to pivot the cams 5 of each pair on the spindle 4 against the action of the respective coil spring 8 and put the cams in a "closed" condition when the climbing aid can be introduced into a crack. On the release of the operating bar, the coil springs 8 urge the cams towards their "open" position and hence urge the cam surfaces 12 into contact with the walls of the crack as is shown in FIG. 4. With a climbing rope suitably secured to the attachment point 2, any loading of the climbing aid in a direction tending to pull the climbing aid out of the crack merely serves to increase the jamming force between the cams 5 and the walls of the crack. To release the climbing aid, a small loading on the support bar inwardly of the crack is sufficient to release the frictional force between the cams 5 and the walls of the crack, and when the operating bar 11 can be pulled rearwardly of the slot 3 to pivot the cams to their "closed" position and allows the climbing aid to be withdrawn.

The cam surfaces of the cams 5 are so shaped that no matter what the width of crack, within of coarse, the maximum and minimum crack widths for which the climbing aid is designed, the contact point on the cam surfaces with the walls of the crack has a constant angular relationship with respect to the longitudinal axis of the support bar. Thus, the line of action through the contact point and the axis of the spindle should always be less than 78° to the longitudinal axis of the support bar. This ensures that the cams can never slip out of the crack so long as the crack width is within the limits for which the climbing aid is designed. The particular angle [illegible] designed to suit different rock materials, but an [illegible] of approximately 76° would allow the climbing [illegible] used on all normal rock structures that a [illegible] [illegible]nably expect to encounter.

[illegible] provides an extremely simple [illegible] which does not rely on [illegible] having rough sided [illegible] of that face.

1. A climbing aid comprising a support bar, a spindle mounted on the support bar, at least two cam members pivotally mounted on the spindle and adapted for opposite pivotal movement from a "closed" position to an "open" position, means to apply a force to each cam member to urge it to its "open" position, an operating bar slidably mounted on the support bar and connected to each cam member and there being at the opposite end of the support bar to the spindle an attachment point for a climbing rope.

2. A climbing aid as in claim 1, wherein further means are provided on the support bar to hold the operating bar in a position where the cam members are in the "closed" position.

3. A climbing aid as in claim 1 or claim 2, wherein two cam members are provided at opposite ends of a spindle and lying to opposite sides of the support bar, with spring means provided on the spindle to provide a loading on each cam member to urge it to the "open" position.

4. A climbing aid as in claim 1 or claim 2, wherein two pairs of cam members are provided, one pair to each side of the support bar mutually spring loaded towards the "open" position by a coil spring mounted on the spindle between the cam members of each pair, the arms of which are extended into engagement with the mutually inwardly facing edges of the cam members.

5. A climbing aid as in any of claim 1, wherein the operating bar is a rod extending through a slot in the support bar, the slot extending longitudinally thereof.

6. A climbing aid as in claim 5, wherein there is, at the end of the slot remote from the cam members, a slot portion lying at an acute angle to the main direction of the slot and in which the rod can lie to hold the cam members in the "closed" position.

7. A climbing aid as in claim 6, wherein the rod is attached to each cam member by flexible connecting means, for example, wire.

8. A climbing aid as in any of claim 1, wherein the cam surface of each cam is so shaped that when placed in a crack, the point of contact between a cam and a wall of a crack lies to the side of the spindle towards the open end of the crack, and a line through the point of contact and the axis of the spindle is constant for all degrees of "opening" of the cams, and at an angle of not greater than 78° to the longitudinal axis of the support bar.

9. A climbing aid as in claim 8, wherein the angle is 76°.

10. A climbing aid comprising a support bar, a spindle mounted on the support bar, two pairs of cam members pivotally mounted on the spindle and adapted for opposite pivotal movement from a "closed" position to an "open" position, one pair of the cam members on each side of the support bar being mutually spring loaded towards the "open" position by a coil spring mounted on the spindle between the cam members of each pair, an operating bar slidably mounted on the support bar and connected to each cam member, means provided on the support bar to hold the operating bar in a position where the cam members are in the "closed" position, and an attachment point for a climbing rope formed at the opposite end of the support bar to the spindle.

* * * * *

United States Patent [19]
Ching

[11] **Patent Number:** **4,491,291**
[45] **Date of Patent:** **Jan. 1, 1985**

[54] **CLIMBING AID FOR MOUNTAIN CLIMBERS**

[76] Inventor: **Paul W. Ching**, 3153 W. Echo La., Phoenix, Ariz. 85021

[21] Appl. No.: **344,619**

[22] Filed: **Feb. 1, 1982**

[51] **Int. Cl.**³ **F16M 13/00**
[52] **U.S. Cl.** **248/1**
[58] **Field of Search** .... 248/1, 205 B; 411/340, 411/341, 342, 343, 344, 345, 346

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FOREIGN PATENT DOCUMENTS

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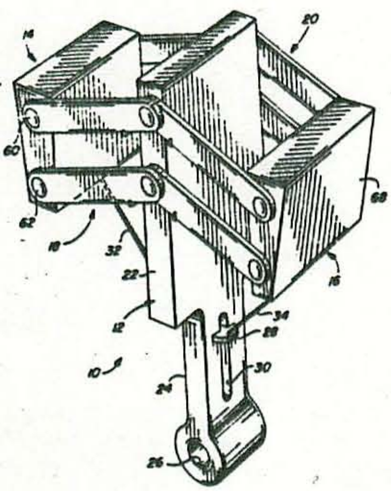
Primary Examiner—William H. Schultz
Attorney, Agent, or Firm—Cahill, Sutton & Thomas

[57] **ABSTRACT**

A pair of opposed laterally extendable chocks of a climbing aid frictionally engage facing surfaces of a crevice to preclude withdrawal from the crevice of a supported load bearing member. A release located on the load bearing member on actuation retracts the chocks to accommodate withdrawal of the climbing aid from within the crevice.

8 Claims, 4 Drawing Figures



United States Patent [19]

Grow

[11] **Patent Number: 4,565,342**

[45] **Date of Patent: Jan. 21, 1986**

[54] **ANCHORING DEVICE FOR ROCK CLIMBING**

[76] Inventor: **Robert D. Grow**, 2708 Green Bay Way, Sacramento, Calif. 95826

[21] Appl. No.: **630,369**

[22] Filed: **Jul. 12, 1984**

[51] **Int. Cl.**[4] **A47G 29/00**
[52] **U.S. Cl.** **248/1**
[58] **Field of Search** 248/1, 544

[56] **References Cited**

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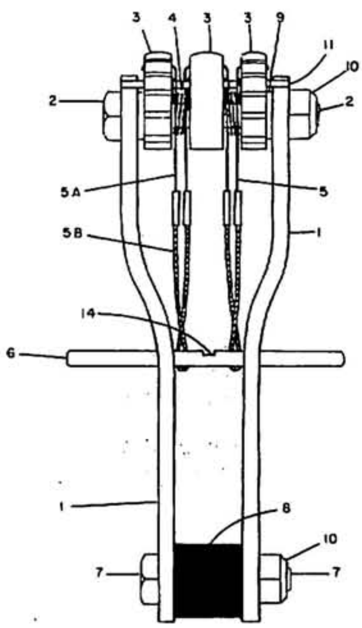
Primary Examiner—Ramon S. Britts
Assistant Examiner—Ramon O. Ramirez

[57] **ABSTRACT**

An anchoring device for rock climbing, mountain climbing and the like employing convex cams pivotally mounted on a spindle that extends between like ends of two longitudinal frame members, the cams being spring-loaded and attached by wires to a slidable operating bar, with a connection between the longitudinal frame members at the end opposite the cams, said connection completing the frame and serving as an attachment point for a rope. The operating bar is notched at the center and mounted in slots in the longitudinal frame members. The contact surfaces of the cams have an arcuate cross section.

4 Claims, 3 Drawing Figures



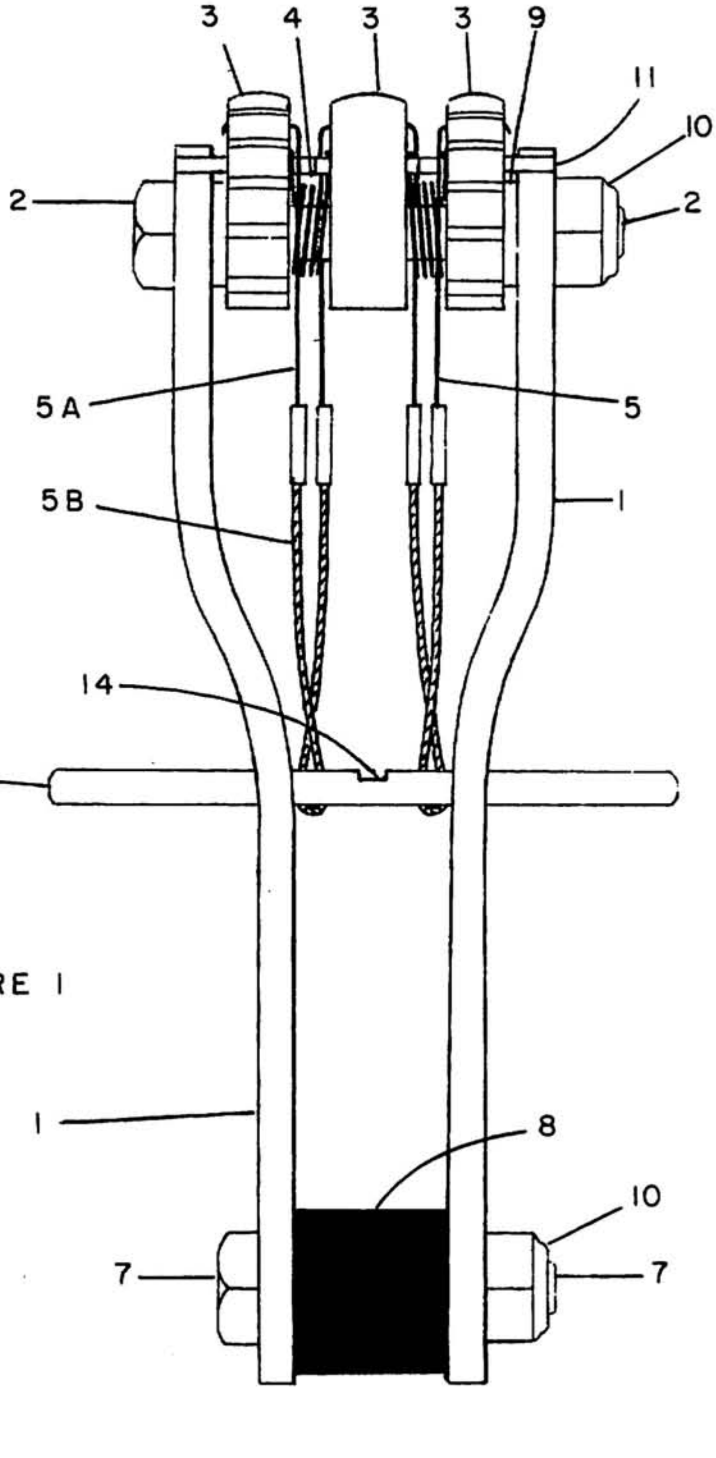


FIGURE 1

United States Patent [19]

Taylor

[11] **Patent Number: 4,575,032**

[45] **Date of Patent: Mar. 11, 1986**

[54] **ROCK CLIMBING ADJUSTABLE CHOCK**

[76] Inventor: **Peter C. Taylor,** 1222 N. DeJoy St., Santa Maria, Calif. 93454

[21] Appl. No.: **719,990**

[22] Filed: **Apr. 4, 1985**

[51] **Int. Cl.**⁴ **A47G 29/00**

[52] **U.S. Cl.** **248/1;** 248/231.2

[58] **Field of Search** .... 248/1, 231.9, 231.2; 294/86.24, 86.25, 86.16, 86 R, 95, 97; 411/913; 52/166; 405/259

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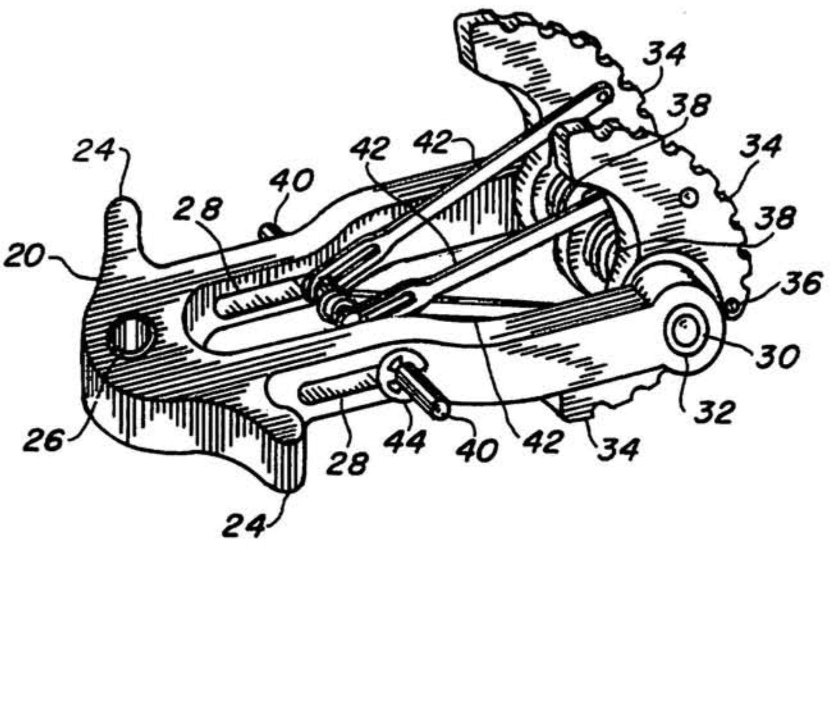
Primary Examiner—J. Franklin Foss

Attorney, Agent, or Firm—Albert O. Cota

[57] **ABSTRACT**

An adjustable chock having a biforcated handle (**20**) with a shaft (**30**) tensionally positioned between the forks in closed loop fashion. Three opposed cams (**34**) with teeth on the periphery are positioned on the shaft (**30**) and spring loaded to rotate to their widest point of separation. A pull rod (**40**) is slideably located within a slot (**28**) in each fork of the handle (**20**) with a connecting link (**42**) pivotally attached on one end to the link and on the other to the cam (**34**). When the pull rod (**40**) is manually retracted, the cams (**34**) are rotated to their minimum width for insertion into a rock fissure and when released spring loadingly return to the open position for gripping the internal surface in a chock like manner.

7 Claims, 8 Drawing Figures



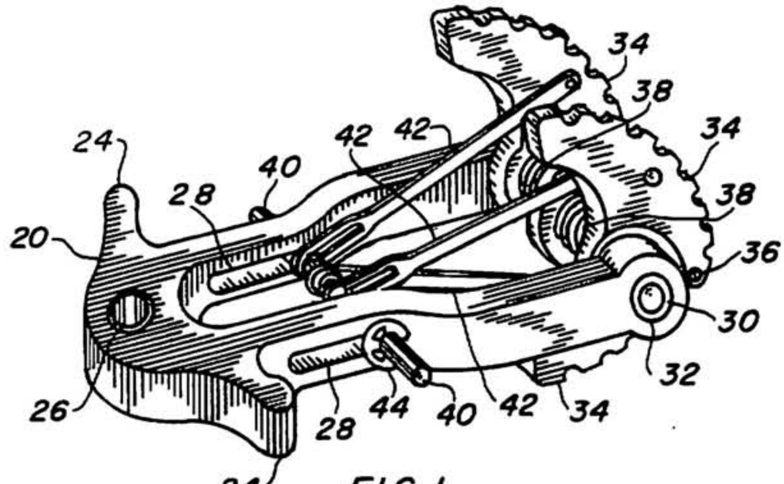


FIG. 1

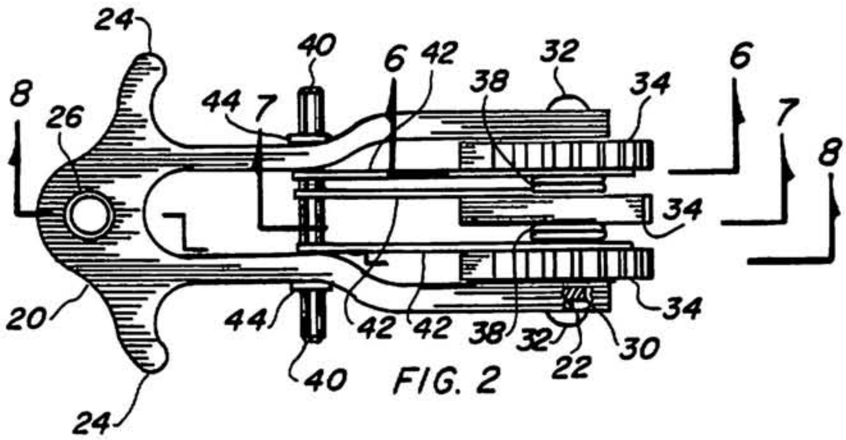


FIG. 2

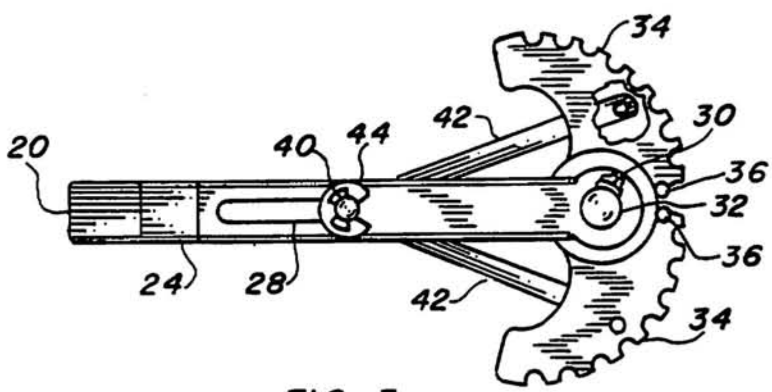


FIG. 3

United States Patent [19]

Cason

[11] **Patent Number: 4,586,686**

[45] **Date of Patent: May 6, 1986**

[54] **SPRING ACTIVATED CAM ANCHOR**

[76] Inventor: **David A. Cason,** Box 297 R.R. 4, Kingston, N.Y. 12401

[21] Appl. No.: **670,989**

[22] Filed: **Nov. 13, 1984**

[51] **Int. Cl.**[4] **B66D 1/54**

[52] **U.S. Cl.** **248/1**

[58] **Field of Search** 248/1; 254/104; 294/94, 294/116; 52/160, 162; 411/21, 22, 340–346; 24/606–608, 453

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4,491,291	1/1985	Ching	248/1

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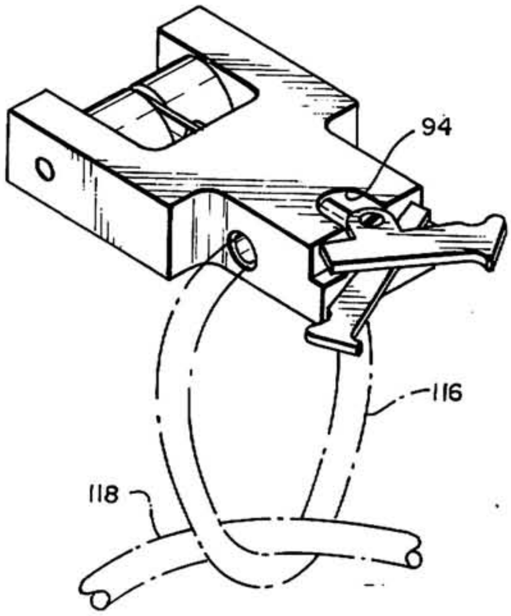
Primary Examiner—J. Franklin Foss
Assistant Examiner—Robert A. Olson
Attorney, Agent, or Firm—Shlesinger, Arkwright, Garvey & Fado

[57] **ABSTRACT**

A spring activated cam anchor has a frame with a forward end and a rearward end and a pair of spaced apart legs that extend from the forward end and each of the legs has a substantially planar upper and lower surface. A shaft is disposed between the legs and a first and second cam are rotatably mounted to the shaft and adapted for rotating in a common direction between an insert position and a withdrawal position. Each of the cams has an engagement portion extending outwardly beyond the upper surface when in the insert position and disposed between the surfaces when in the withdrawal position. A lever actuated assembly is connected to each of the cams for rotating the cams between the insert position and the withdrawal position. The cams further include a lost motion system permitting the cams to independently rotate between the insert position and the withdrawal position when the chockstone is inserted into a fissure in a rock face.

20 Claims, 6 Drawing Figures



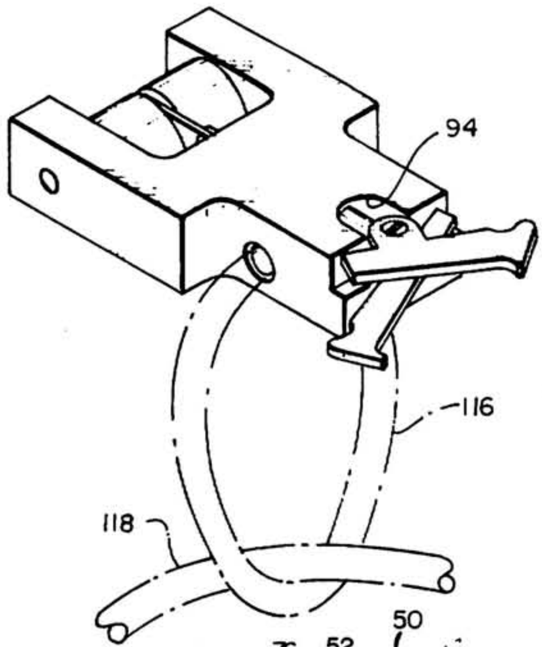

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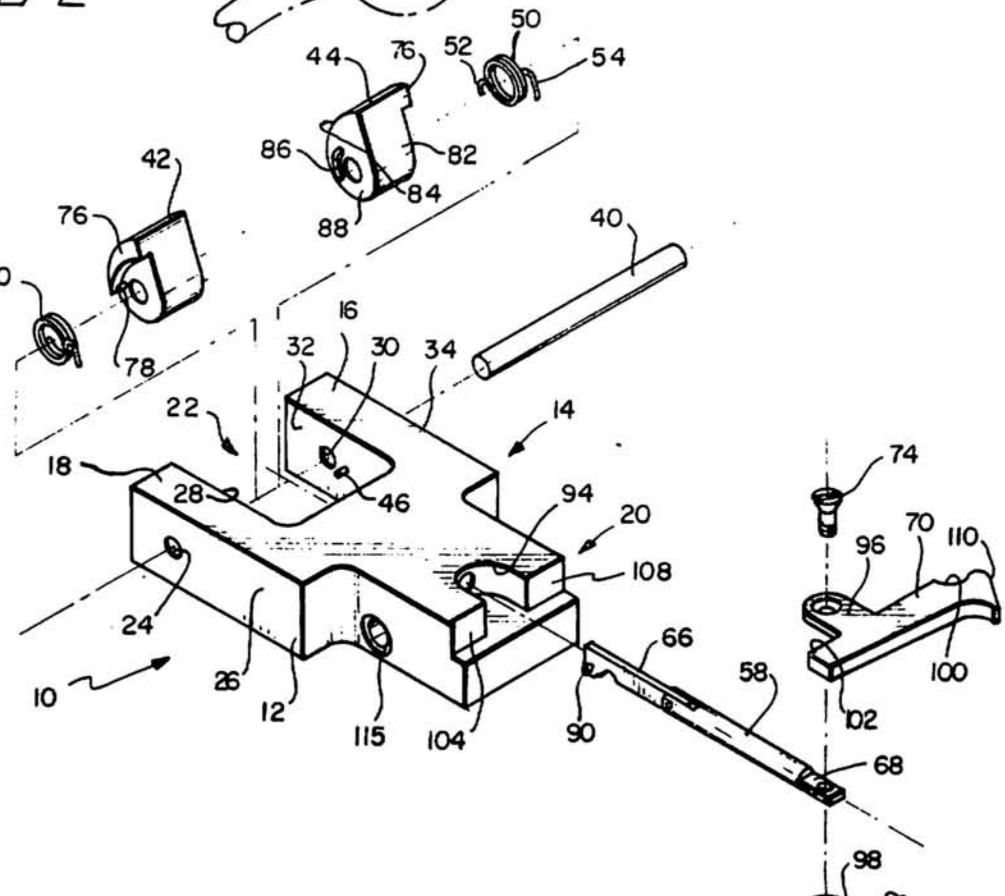
FIG 1

FIG 2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United States Patent [19]

Lowe

[11] Patent Number: 4

[45] Date of Patent: Feb

[54] CAMMING DEVICE FOR CLIMBERS

[75] Inventor: Greg E. Lowe, Boulder, Colo.

[73] Assignee: Lowe Alpine Systems, Inc., Lafayette, Colo.

[21] Appl. No.: 772,623

[22] Filed: Sep. 4, 1985

[51] Int. Cl.[4] A47G 29/00

[52] U.S. Cl. 248/1

[58] Field of Search 248/1, 317, 344; 294/94, 95

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8896 of 1901 United Kingdom .

Primary Examiner—Ramon O. Ramirez
Attorney, Agent, or Firm—Robert E. Harris

[57] ABSTRACT

A camming, or wedging, device is disclosed that is particularly useful in climbing a severely sloping surface, such as, for example, the side of a rock or mountain formation having natural or man-m thereiu and into which the camming de releasably anchored to facilitate climbin ming device includes a support arm havi of interrelated cam members pivotally mou at one end, and a centrally mounted cam nected with the cam members to control the cam members from an extended (open) withdrawn (closed) position. Each cam m serrated arcuate cam surface that is positio to the support arm when the cam member the withdrawn position by the cam actu biased so that the cam surfaces are urged a support arm toward the extended positic being acted upon by the cam actuator, v surfaces of the cam members extending tances from the support arm when in the e tion to thereby allow firm anchoring of device over a broad size range of opening ming device also includes a strap engaging the central portion of the support arm, an gaging member on the end portion oppo members for enabling concurrent or indep a strap and a rope during climbing.

19 Claims, 18 Drawing Figures