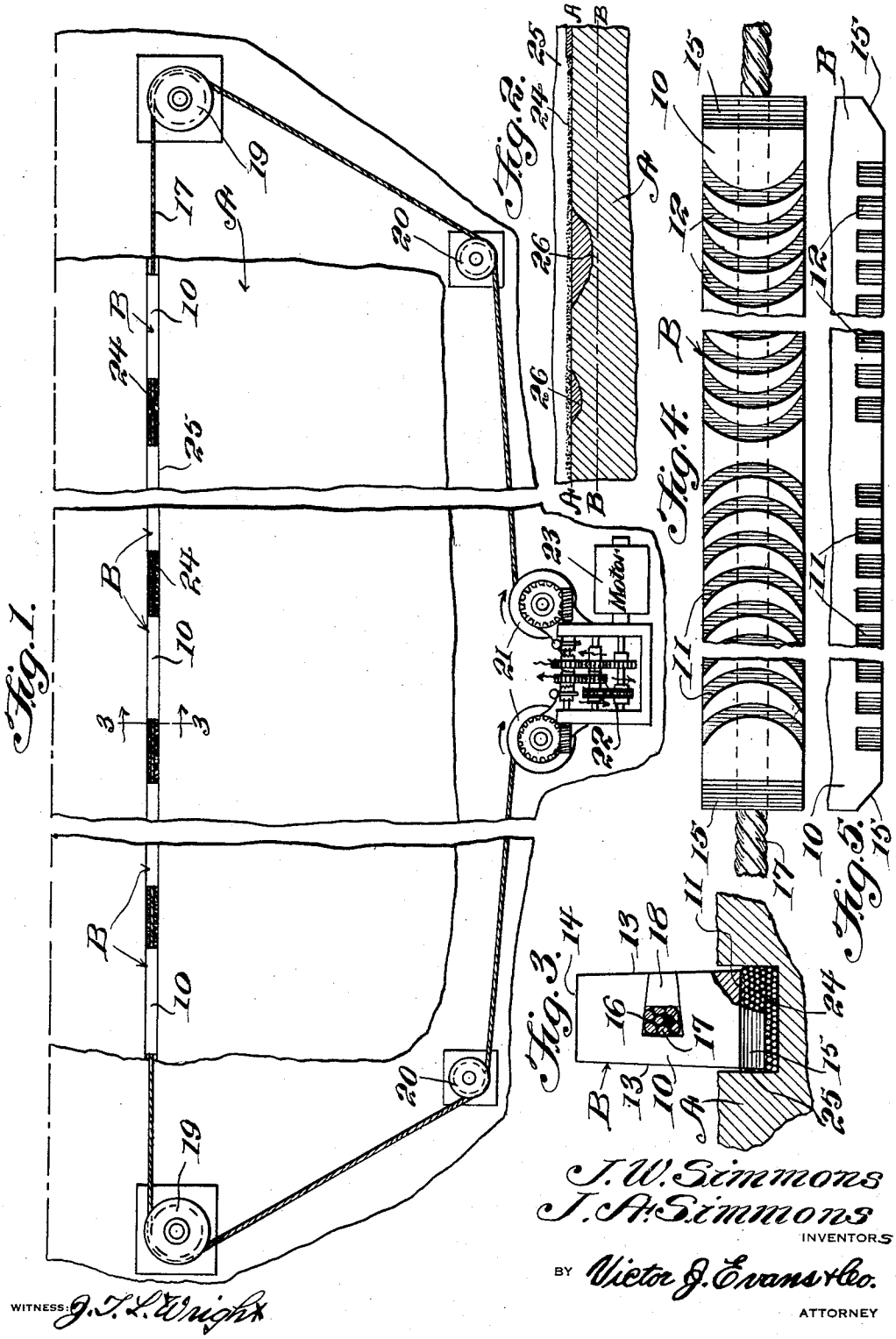
April 11, 1933. J. W. SIMMONS ET AL 1,903,518

STONE SAW

Filed Oct. 16, 1931 3 Sheets-Sheet 1



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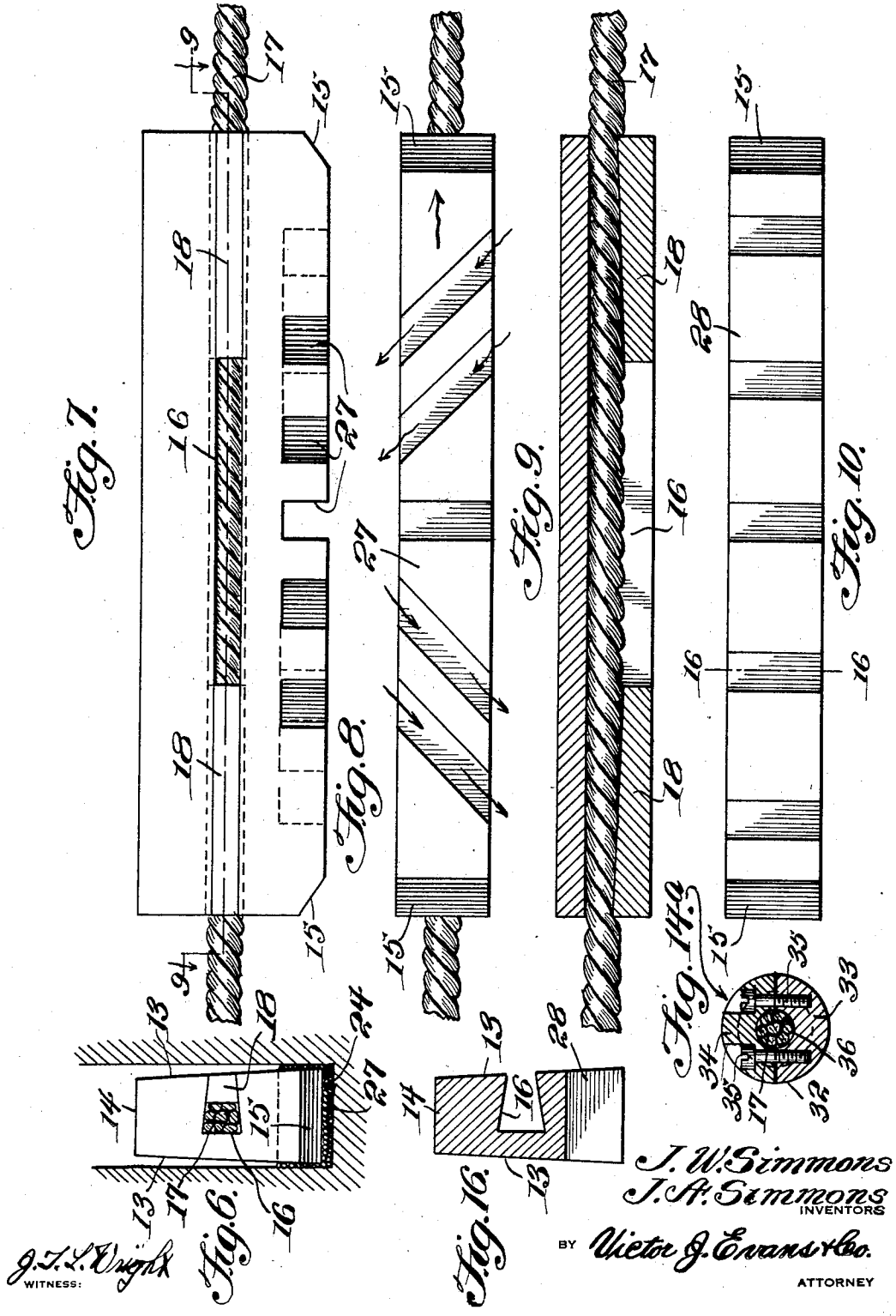
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STONE SAW

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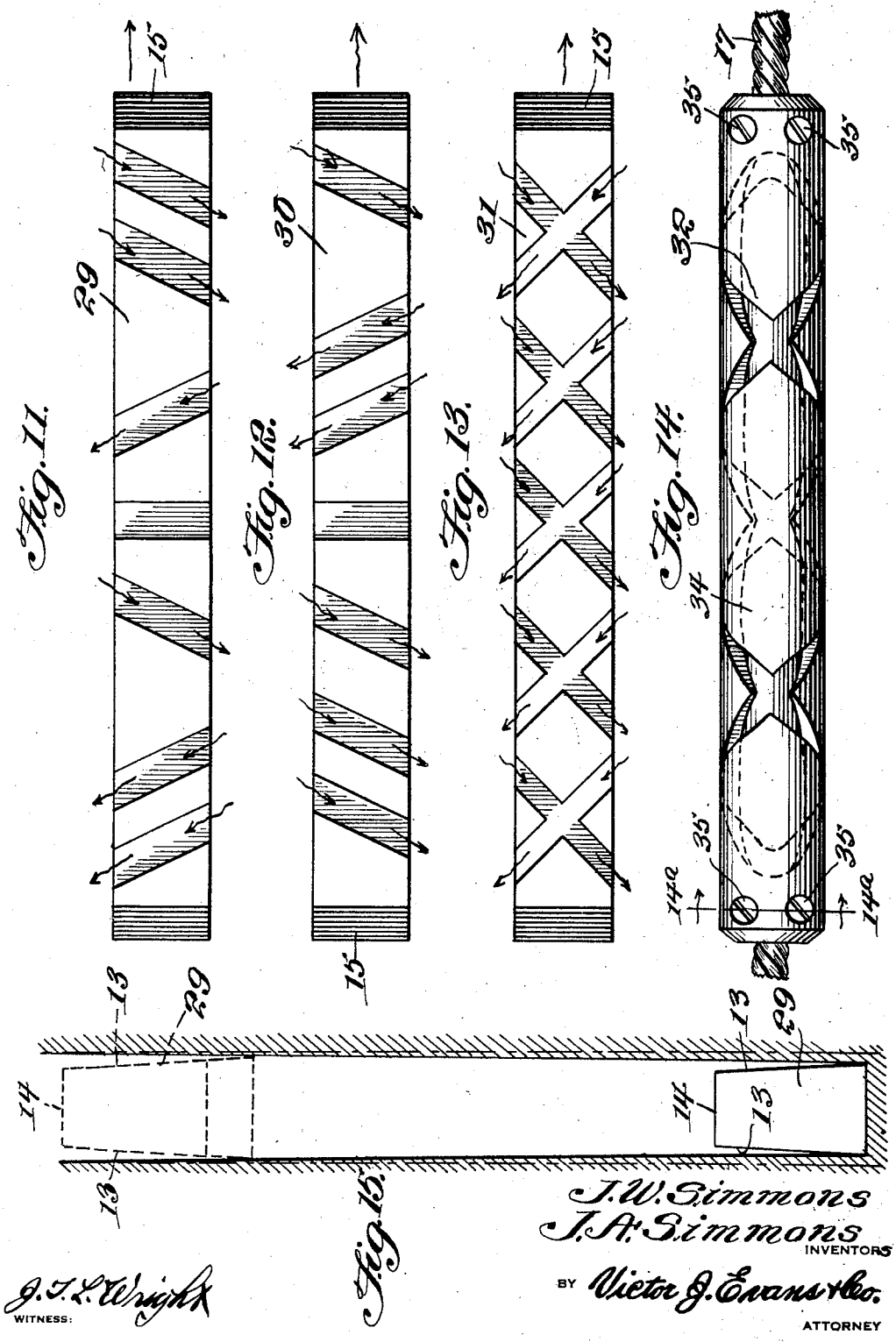
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STONE SAW

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UNITED STATES PATENT OFFICE

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STONE SAW

Application filed October 16, 1931. Serial No. 569,283.

The invention relates to a stone saw, and more especially to a stone cutting rigging for use in quarries or other rock formed areas.

The primary object of the invention is the provision of an equipment of this character wherein interchangeable working elements in association with steel shot will serve to cut stones when motion is imparted to such elements whereby the shot acted upon thereby will cut into and grind a way or channel in the rock formation, such for example as granite in a quarry and such cutting being effected in an easy manner and with dispatch, thereby eliminating the necessity of blasting or the use of pneumatic cutters, such as drills or the like.

Another object of the invention is the provision of an equipment of this character wherein by the use of a cable a selected series of channeled or grooved weighted elements can be attached and associating with these elements shots of steel, so that on reciprocation of the cables the elements when working in a given path will maintain the shot in motion and in working relation to the bed of such path as may be formed in rock for the cutting of the rock in saw fashion so that blocks of such rock may be cut or the rock formation severed accordingly to the requirement desired and in this manner eliminating hand labor and the use of hand tools or implements for rock cutting purposes.

A further object of the invention is the provision of an equipment of this character wherein the associated elements and shot in their cooperation will positively cut into rock for the severing thereof and the kerf or channel as produced under the cutting operation will have the bed and walls thereof smooth and uniform without unevenness or irregularities in the cut, the shot being maintained in motion by the elements when the same are reciprocated or moved under the working of a motor or other power unit and in the working of such elements a shot and sawing action of a continuous character is maintained.

A still further object of the invention is the provision of an equipment of this character, wherein the working elements are selective accordingly to the desired cut to be made in rock formation as in a quarry or other rock bearing area and the shot agitated or rendered in motion for action upon the rock to cut the same uniformly and with dispatch, the rigging being of novel form and the manner of association of the disturbing elements for the shot therewith and also the shot being likewise novel in form.

A still further object of the invention is the provision of an equipment of this character, which is comparatively simple in construction, thoroughly reliable and efficient in its purpose, positive in its cutting operation, readily and easily set up and adjustable accordingly to the needs thereof, and also inexpensive in the manufacture, working and installation of the same.

With these and other objects in view, the invention consists in the features of construction, combination and arrangement of parts as will be hereinafter more fully described in detail, illustrated in the accompanying drawings, which disclose the preferred embodiment of the invention, and pointed out in the claims hereunto appended.

In the accompanying drawings:—

Figure 1 is a fragmentary plan view of a rock area, showing the equipment constructed in accordance with the invention in position for the cutting of the rock area.

Figure 2 is a fragmentary longitudinal sectional view through the kerf or cut in the rock area showing by the lines A—A the initial cutting depth in the rock as produced manually for the guiding and proper positioning of the rigging for the automatic sawing of the rock or the cutting of the same thereby and also on the line B—B the second step in the cutting of the rock and this taken care of by a selected group of cutters of the equipment.

Figure 3 is a fragmentary transverse sectional view on the line 3—3 of Figure 1.

Figure 4 is a bottom plan view of one of the cutters which is the initial cutter usable in the equipment.

Figure 5 is a fragmentary side elevation thereof.

Figure 6 is a view similar to Figure 3 showing a cutter deep in the rock and the re-

lated position of the shot when the cutter at its sides has become partly worn.

Figure 7 is a side elevation of another form of cutter employed with the equipment and mounted upon the power cable thereof.

Figure 8 is a bottom plan view of the cutter shown in Figure 7.

Figure 9 is a sectional view on the line 9—9 of Figure 6.

Figures 10, 11, 12, 13 and 14 are bottom plan views illustrative of other forms of cutters for use in the equipment.

Figure 14*a* is a sectional view on the line 14*a*—14*a* of Figure 14 looking in the direction of the arrows.

Figure 15 is a vertical sectional elevation diagrammatically shown to illustrate the path of the cutter of the equipment and the formation of the kerf or cut as the cutter progresses and wear occurs thereon without liability of choking or binding of the cutter during operation.

Figure 16 is a sectional view on the line 16—16 of Figure 10.

Similar reference characters indicate corresponding parts throughout the several views in the drawings.

Referring to the drawings in detail, and particularly Figures 1 to 6 inclusive, A designates generally the rock area or formation which is disclosed diagrammatically in Figure 1 and to be cut by the equipment which comprises a series of any desirable number of cutters B each in the form of an elongated body 10 preferably made of highly tempered steel and of a size to possess considerable weight, the body being formed in its bottom face with series of cross ways 11 and 12 respectively, the series of the ways 11 being spaced apart the required distance and are curved, their curvatures being reverse to the curvatures of the series of ways 12 which latter are correspondingly spaced apart and of a like curvature to the ways 11 while the opposite side faces 13 of the body are inclined or angularly disposed in upwardly convergent relation to each other so as to have the top 14 of the body 10 narrower than its bottom working surface or face. The lowermost end edges of the body 10 are reversely beveled at 15 while in one side face 13 of said body 10 and longitudinally disposed throughout the length thereof is a dovetail-shaped recess 16 which opens through opposite ends of the body and is adapted to accommodate therein a cable 17, the recess 16 in the portions thereof opening through the ends of the body 10 being adapted to receive wedging keys 18 which serve to make secure the cable 17 in the recess 16 and also are of a kind to exert reverse wedging action so that the cable 17 can not slip in the recess 16 on resistance being imposed upon the body 10 at either end thereof and in this manner the series of cutters B are made firmly secure upon the cable 17 and are preferably spaced an equidistance apart when secured to the cable. The cable 17 is adapted to be trained over guide pulleys 19 and 20 respectively, these being of a kind for stationary mounting in the rock area A to present the series of cutters B for a determined stretch in a straight course. The ends of the cables 17 are adapted to be attached respectively to a pair of winding and unwinding windlasses or drums 21 operable through suitable reversing mechanism 22 from a motor 23 of any preferred construction so that when in operation reciprocatory movement will be imparted to the cable 17 and likewise the series of cutters B similarly movable therewith, the reversing mechanism 22 being preferably manually controlled so that when the cable at one end portion is being wound upon one windlass 21 the other end portion of such cable will unwind from the other windlass 21, it being understood of course that the windlasses 21 when operated by the motor will be driven in the same direction simultaneously and the cable ends being so connected therewith that one cable end when wound upon one windlass the other cable end will unwind from the other windlass and vice versa.

Adapted to be associated with the series of cutters B is a mass of ball shot or steel balls 24, these being adaptable to fill the ways 11 and 12 when the cutters B are engaged in a suitable guide channel 25 formed in the rock area A and this channel 25 in the initial starting thereof in the rock area is cut by hand implements such as drills or other hand tools, the initial depth or hand cutting thereof being identified at the line A—A in Figure 2 of the drawings and to have the series of cutters with the balls 24 operate successfully in the channel 25 after initial cutting thereof it becomes necessary to fill in as at 26 any relatively deep cavities or indentations presented to the bed or floor of the initial cut by hand as indicated by the line A—A in Figure 2 and this filling in is desirable by the use of a plastic composition and such will avoid the loss of the balls 24 from the ways 11 and 12 in the cutters B from action thereof upon the balls for the positive cutting operation at the bed or floor of the channel 25 on reciprocation of the series of cutters B under which action the balls are set into motion and the weight of the cutters B thereon will cause the balls to grind away the rock formation for the cutting of the groove 25 to a depth as may be required. The tapered formation of the bodies 10 of the series of cutters B will avoid any choking or binding action of these cutters on reciprocation in the channel 25 as formed thereby under the working of the equipment.

Of course as the depth of the channel 25 increases it is necessary that the pulleys 19

and 20 and likewise the location of the windlasses 21 and the connected motor 23 therewith be altered in their rest plane accordingly to the plane of the bottom of the channel 25 as formed by the cutters B so that such cutters will positively confront the bed or floor of the channel 25 in their association with the balls 24 for cutting action upon the bed or floor of said channel for the severing of the rock area A as should be apparent.

The beveled lower end 15 of the body 10 of the cutters B will avoid any possibility of spiking action of such cutters during reciprocation as any obstruction encountered the cutters B will ride thereon and the obstruction obliterated by the balls 24 set in motion in the ways 11 and 12 of such cutters. The formation of the ways 11 and 12 act to centralize the balls 24 within the cutters B on reciprocation of the latter and the weight of these cutters B will constantly bear the balls 24 in working relation to the bed or floor of the channel 25 for depth cutting of the same.

In Figures 3, 4 and 5 of the drawings the cutter having the body 10 and the ways 11 and 12 therein as constituted serves as an initial cutter in the use of the equipment for the formation of the channel 25 from the designated line A—A to the line B—B in the rock formed area as shown in Figure 2 of the drawings.

In Figures 7 to 14 inclusive of the drawings there is shown a variety of way formed cutting bottoms or faces 27, 28, 29, 30, 31 and 32 respectively for each cutter of the series to be used in conjunction with the balls 24 for the severing of the rock area A and these types of cutters are selectively adopted in lieu of the series of cutter bodies 10 which are the initial cutters for the continued or finishing cutting operation of the equipment.

With reference to Figure 14*a* of the drawings it will be observed that the cutter with the bottom facing 32 as shown in Figure 14 involves the sections 33 and 34 respectively, these being detachably joined together through the medium of fasteners 35 located near opposite ends thereof, the section 33 having the facing 32. The sections 33 and 34 clamp therebetween the cable 17 in companion seats 36 matching each other longitudinally of said sections and formed respectively therein.

In the working of the equipment as the adopted cutters designed in the channel 25 as being formed by the coaction of such cutters in their series with the balls 24 and the side walls 13 of the cutters become worn the tapered characteristics of each cutter will compensate for the degree of wear so as to eliminate the possibility of choking or binding action of the series of cutters in the channel or groove 25 and consequently the formation of such channel 25 gradually alters consistently with the wearing away of the series of cutters whereby as the channel deepens it gradually narrows in the direction of the lowermost point or the floor or bed thereof and the dispersement of the balls 24 in the ways of the cutters may crowd into gaps as may exist at opposite sides of these series of cutters but by the motion of such balls under the action of the cutters the same will gradually gravitate into the spaces between the cutters of the series B and fall into the ways in the working faces of the cutters for further grinding or cutting action upon the bed or floor of the channel 25 for depending the same and the severance of the rocky area A.

The cutters as selected can be readily interchanged upon the cable 17 by removal and replacement of the wedges 18 in the recesses 16 in one side of each cutter.

By the use of the equipment particularly the cutters with the balls 24 the rock formation can be readily cut with dispatch and it is to be understood that the mode of application of power and the nature thereof for the reciprocation of the cutters and the balls associated therewith may be varied, altered or changed at the option of the user of the same and therefore the equipment excluding the cutters and the balls as shown and described in this application must not be construed as an essential or the essence of the invention, the latter being in the cutters and the balls in association therewith as well as a power medium of any selected kind for operating the same.

From the foregoing it is thought that the construction and manner of working of the invention will be clearly understood and therefore a more extended explanation has been omitted.

What is claimed is:—

1. In a rigging of the character described, a flexible cable movably mounted with a stretch thereof for travel in a straight path, a plurality of cutting elements, each having a wedge-shaped groove in one side for receiving the cable and also having in its working face distributing channels disposed lateral to the direction of travel of said elements, a securing wedge engaged in the groove in each element to make fast the latter upon the cable without creeping of said element thereon, and spherical members movably confined in the grooves in the elements for cutting action upon a foundation.

2. In a rigging of the character described, a flexible cable movably mounted with a stretch thereof for travel in a straight path, a plurality of cutting elements, each having a wedge-shaped groove in one side for receiving the cable and also having in its working face distributing channels disposed lateral to the direction of travel of said elements, a securing wedge engaged in the groove in each element to make fast the latter upon the cable without creeping of said element there-

on, and spherical members movably confined in the grooves in the elements for cutting action upon a foundation, each element having reversely inclined opposite sides, whereby the working face of said element will be considerably greater than the remaining portion of the element.

In testimony whereof we affix our signatures.

JOSEPH W. SIMMONS.
JOHN A. SIMMONS.