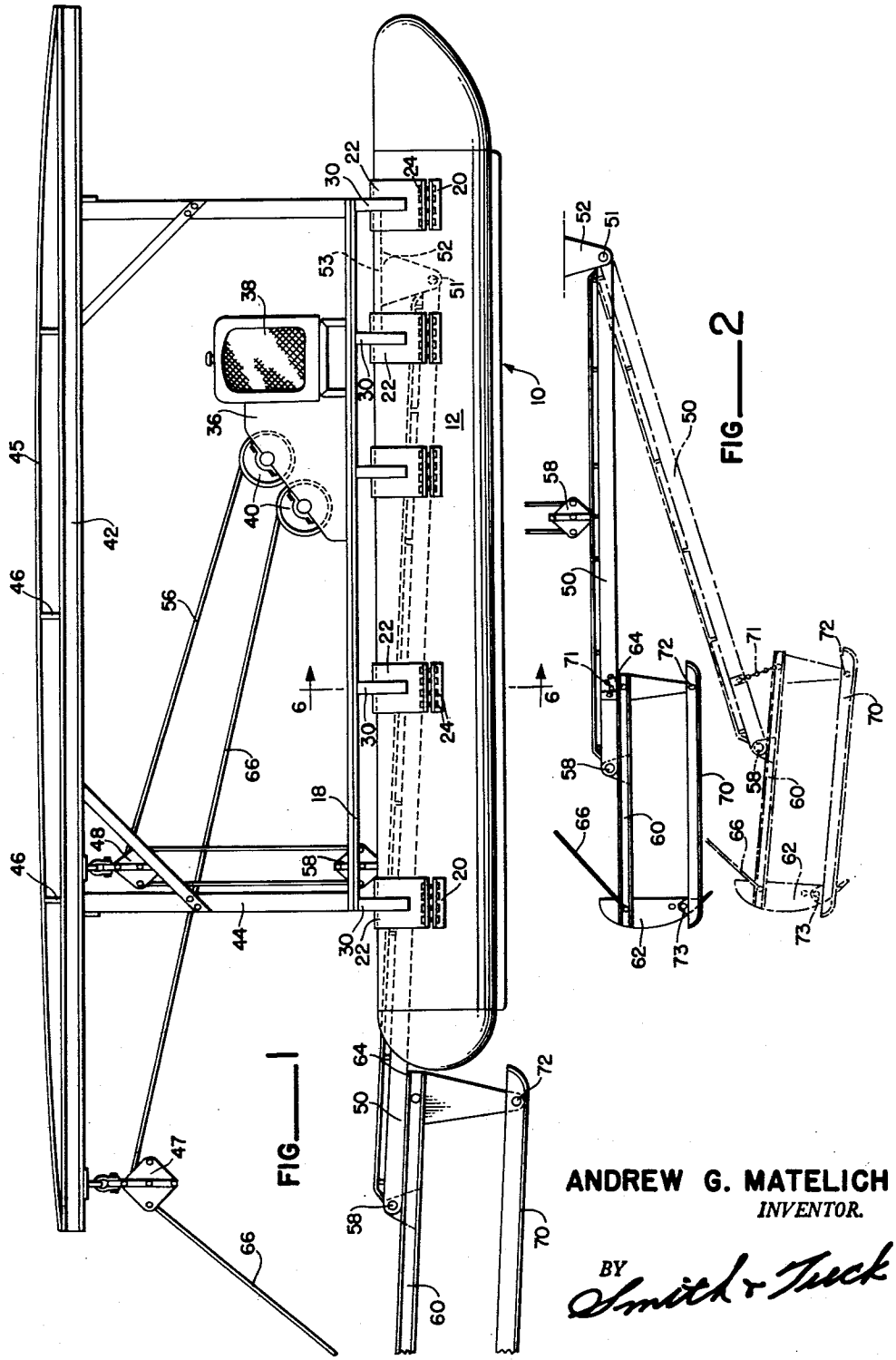
Nov. 28, 1961 A. G. MATELICH 3,010,231

UNDERWATER GRADING MEANS

Filed Nov. 3, 1960 4 Sheets-Sheet 1



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FIG. 3

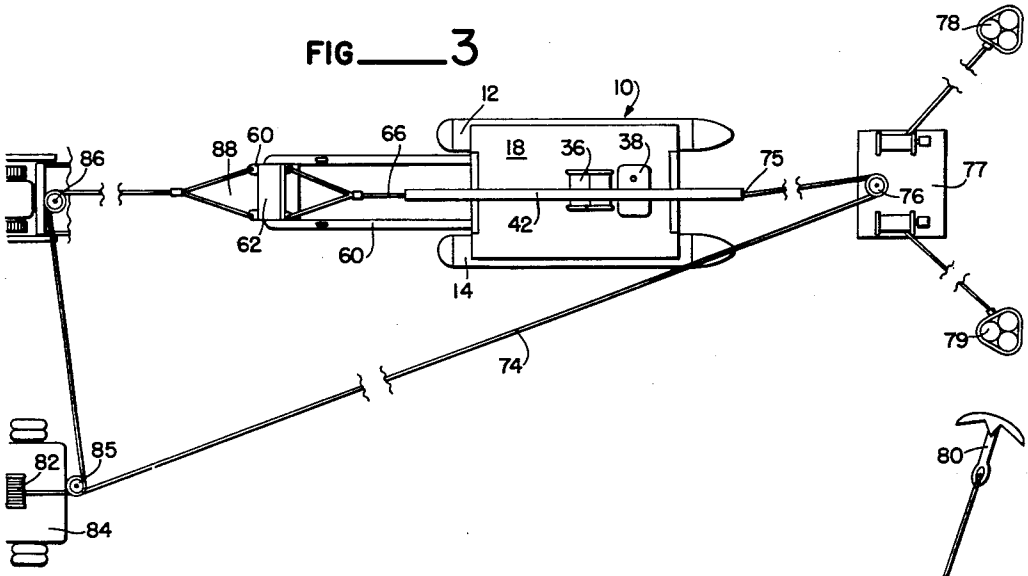
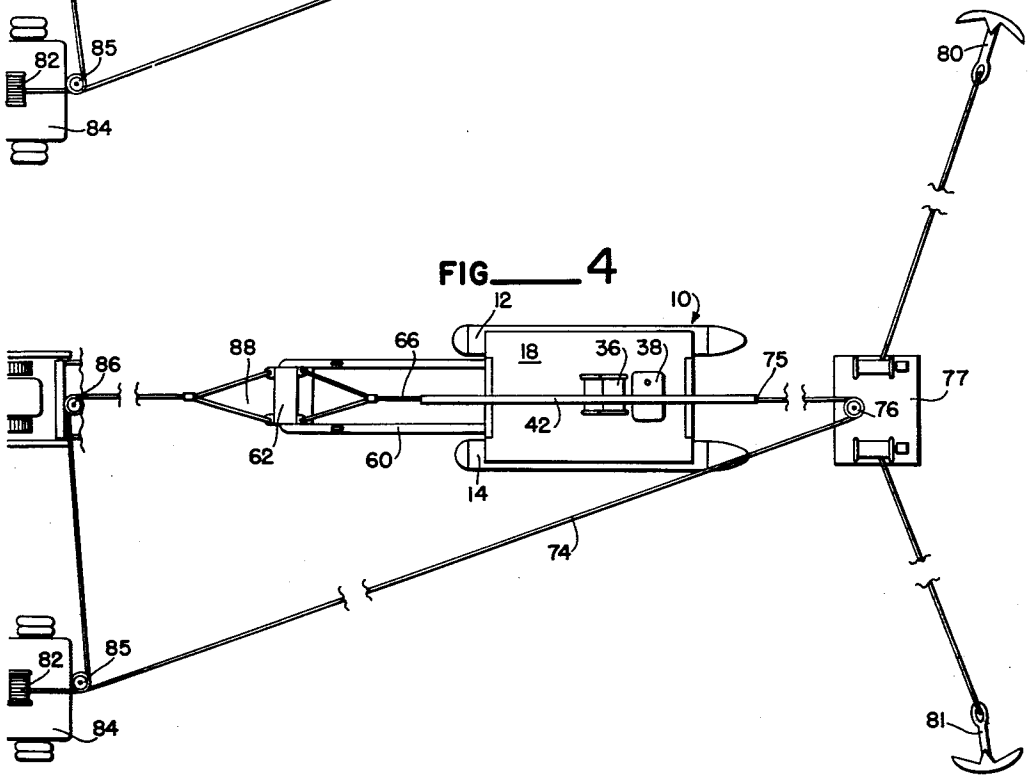


FIG. 4



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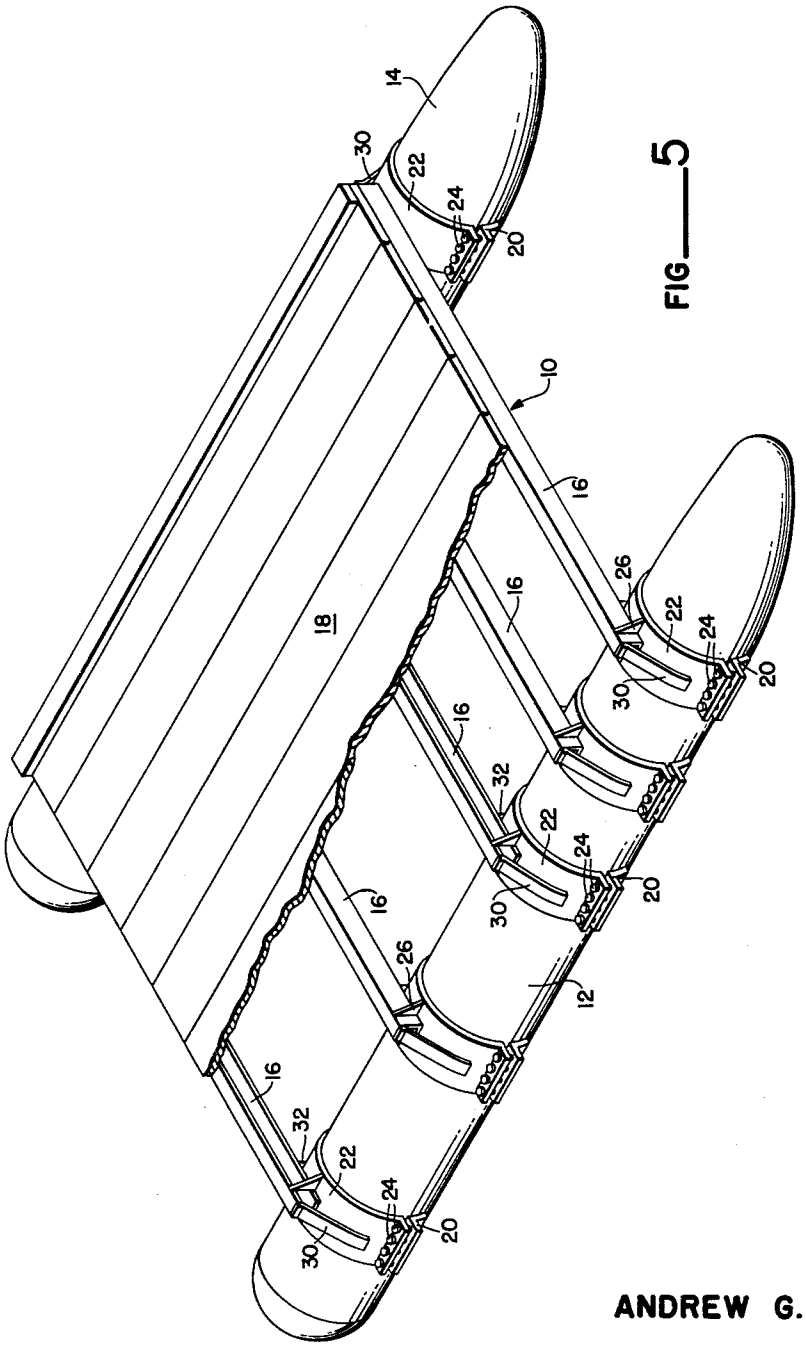


FIG. 5

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UNDERWATER GRADING MEANS

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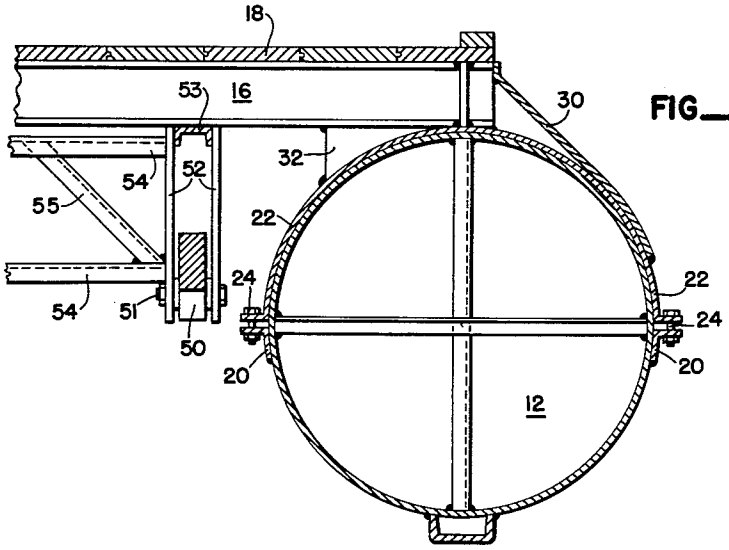


FIG. 6

FIG. 8

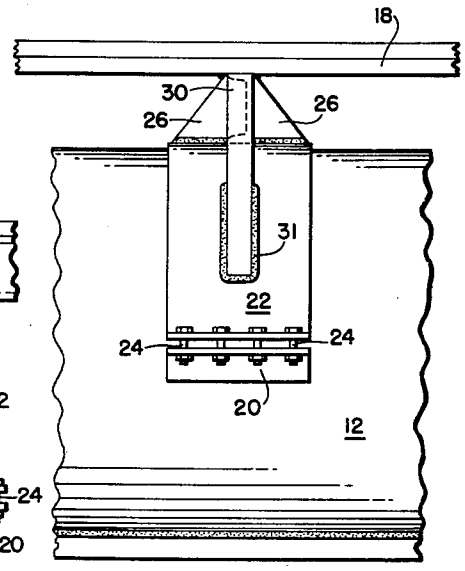
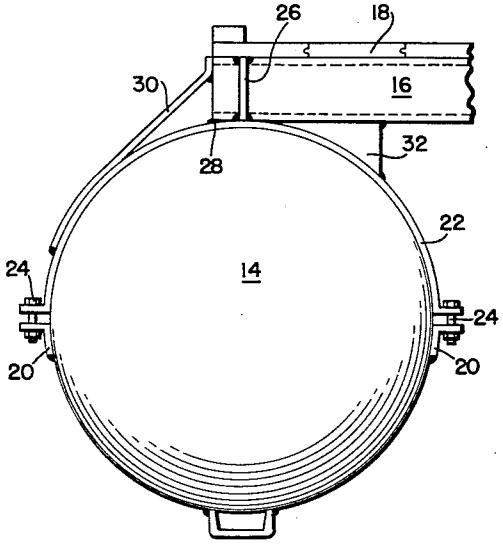


FIG. 7



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United States Patent Office 3,010,231 Patented Nov. 28, 1961

3,010,231
UNDERWATER GRADING MEANS

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7 Claims. (Cl. 37—54)

This present invention relates to grading means of the type employing a vertically adjustable scraper blade and more particularly this invention relates to grading means having a blade similar in many respects to a bulldozer blade which is moved by means of a floating support adjustably coupled to the grading blade and the whole moved back and forth by power operated cables.

With the greatly increased impetus in water sports of all kinds and particularly with the creation of new bodies of water by dams and the like there is a tremendous increase in the demand for uniformly sloping beaches that can be used safely by persons of all ages. This calls for the grading of underwater portion of the beaches to prevent drop-offs or depressions that have long been hazardous to swimmers, waders and the like. This present invention is provided with all the means required to repeatedly move a bulldozer-like grading blade across a beach and these means are adjustable so that uniform grading can be achieved whether it is on the level, or as is more common, gradually sloping from the waters edge out into deep water. In many localities the lake or river bottoms are not suitable for use as bathing beaches due to the type of bottom encountered. The ideal bottom for recreational purposes is a smooth, sandy beach but these rarely occur on man-made bodies of water. It is more common to encounter rocky beaches, or beaches with large gravel or at the other extreme to find mud bottoms which normally retain sunken objects, especially water-logged wood making a surface to use as beaches that is not only unpleasant but unsafe as well. This present equipment has all the facilities required to remove and lift the mud and debris from a lake bottom and to carry it out into deep water where it can be dissipated. Then a suitable overlay of sand can be uniformly graded over the remaining beach surface so as to convert it into an attractive, sanitary and safe beach.

The principal object of my present invention therefore is to provide an underwater grading means capable of moving earth, gravel and the like under water much as a bulldozer or grader moves the same on dry land.

A further object of this invention is to provide a buoyant, stable platform on which the necessary gear to control a grading blade can be mounted so that it can be adjusted from this platform to accommodate the grade and movement of materials desired.

A further object of this invention is to provide means for moving the buoyant platform so that the grading blade may be used over a large area of underwater beach.

A further object is to provide pontoon means which can be very rigidly secured to a buoyant platform so that the unit of the platform and pontoons can withstand the shock and strain incidental to moving a grader blade under water where it is not normally visible due to the rolling of the water.

Further objects, advantages and capabilities will be apparent from the description and disclosure in the drawings or may be comprehended or are inherent in the device.

FIGURE 1 is a side elevation of my underwater grading device with certain parts broken away.

FIGURE 2 is a side elevation taken in the same sense as FIGURE 1 and showing the cutting blade and the means for adjustably positioning it.

FIGURE 3 illustrates one means for maneuvering my underwater grader.

FIGURE 4 is a view similar to that of FIGURE 3 but showing the employment of anchors, such as the tail anchor for my cable operating means.

FIGURE 5 is a perspective view of a preferred form of buoyant platform with part of the platform broken away to better illustrate the manner in which the pontoons are rigidly secured to the platform members.

FIGURE 6 is a cross-sectional view taken substantially along the line 6—6 of FIGURE 1.

FIGURE 7 is a fragmentary end elevation of one of the pontoons as viewed from the left of FIGURE 1.

FIGURE 8 is a fragmentary side elevation of a pontoon, a section of the platform, and the means employed to secure the platform to the pontoon.

Referring to the drawings, throughout which like reference characters indicate like parts, the numeral **10** designates generally the floating platform which forms the base and supporting means for the underwater grader and the mechanism required to manipulate the same in grading operations. Platform **10** consists of at least two spaced-apart pontoon as **12** and **14**. The two pontoons are held in spaced relationship by the transverse beams **16** which also supply the framework upon which the plank platform **18** is disposed. The details of construction of the pontoons and the anchor means for the transverse tie is illustrated generally in FIGURE 5 and in detail in the fragmentary views of FIGURES 6, 7 and 8. It is to be borne in mind that the load on the scraper is quite comparable to that exerted by the bulldozer on its blade. Many times it may be found impossible to see underground obstructions, thereby placing tremendous shock loading on the pontoons, the platform, and the various associated parts. It therefore follows that the pontoons must be rigidly secured to cross members **16**. Reference is made specifically to FIGURE 8, in which it will be noted that an angle bar **20** is secured, preferably by welding, to the pontoon as **12**, and one of these occurs on opposite sides of the pontoon as will be noted in FIGURES 6 and 7. Adapted to be joined to the diametrically opposed angles **20** is a partially encircling band **22**. This band is preferably not welded to the pontoon but is held in tight frictional engagement with it by the plurality of bolts **24**. Band **22** is fixedly secured to the transverse beams **16** which are preferably structural steel members. As previously noted, due to the shock loading that may be placed upon this equipment in use, beam **16** is very securely anchored to band **22**. This is done by a steel gusset **26** welded at each contact edge. The band is welded to beam **16** as at **28**. Additionally a substantial strap **30** is welded both to beam **16** and band **22**, the weld being well shown at **31** in FIGURE 8. At the opposite side of the pontoon brackets are provided at **32**, preferably one at each transverse beam.

Disposed above deck **18** is a cable winch **36**. This is normally an internal combustion engine driven winch, having the internal combustion engine shown generally at **38** and a plurality of power driven cable drums **40**. Disposed above platform **18** is an upper framework consisting of a plurality of beams as **42** which in turn are supported by a plurality of posts **44**. A suitable roof **45** may be supported by suitable transverse members **46** so as to protect the equipment and the personnel employed in its use from the weather. A single main beam **42** may be employed but normally a plurality of beams will be used to support the various cable blocks **47**, **48** and the like.

Disposed between pontoons **12** and **14** is the grader supporting beam **50**. This beam is pivotably supported at **51**. This pivot is normally a heavy bolt passing

through two spaced anchors **52**. These are probably best shown in FIGURE 6. Two spaced-apart beams **50** are employed and these are well spaced transversely by horizontal members **54** and a plurality of diagonal members **55** providing a trussed frame to insure a strong fixed support for the pivots **51** which position beams **50**. Intermediate beams **53** are secured to two of said transverse beams to provide a fixed anchorage for said anchor members **52**. Beam **50** is positioned vertically by means of tackle cable **56** which passes through blocks **48** and **58** to provide adequate purchase to support beams **50** and to hold them in various adjusted positions. At the outer ends of beams **50** pivots **58** are provided for the cutting blade supporting framework **60**. A desirable relationship is shown in FIGURE 2 in which it will be noted that there is a preponderantly heavy outer portion of frame **60** and this weight is further increased by the leveling and cutting blade **62**. With such an arrangement frame **60** will normally always engage beams **50** at **64**. Consequently cable **56** and the tackle it serves will lift framework **60** as is illustrated in FIGURE 2.

In order to separately adjust frame **60**, frame adjusting cable **66** is employed passing out through block **47**. It will be evident that reeling in cable **66** can only revolve frame **60** about pivots **58** and will not normally be used to adjust the position of beams **50**.

Cable **66** is employed chiefly to adjust the angle of attack of blade **62** and as beam **50** descends into deeper water at a greater angle, the desirable angle of attack can be controlled by cable **66**. In order to limit the amount that cutting edge **62** can penetrate into the lake bottom a skid bar **70** is provided. This bar preferably has its front end pivoted at **72** and its rear end adjustably positioned at **73**. A check chain **71**, of adjustable length, is secured to beam **50** and to beam **60**.

Maneuvering means for my grading device is illustrated in FIGURES 3 and 4. A main line cable **74** is secured to the offshore end of my buoyant platform as indicated at **75**. This cable, which must be substantial, passes around a sheave or tail-hold block **76** which is in turn mounted on a buoyant platform **77**. Platform **77** must be secured by very strong means to suitable anchors. These may be dolphins made up of a number of piles in a bound-together cluster as indicated at **78** and **79** or in some instances they may consist of suitable heavy anchors as **80** and **81**. The choice of which type to use will normally be determined by the depth of water or the type of bottom encountered. Whichever form of tail-hold is provided it is necessary to be able to move platform **77** in a line generally parallel to the tail-hold means, whether piling or anchors, as this is the only means readily available for changing the swath taken by the cutting blade.

On the shore end cable **74** passes around a power drum **82** or capstan preferably mounted on a heavy wheeled vehicle **84**. After leaving vehicle **84** by passing around dual guide sheaves **85** the cable passes to a guiding sheave **86** which again is mounted upon a movable vehicle which must be of very substantial size and is usually preferably a heavy tractor. Cable **74** after passing around sheave **86** is attached to a bridle **88** which in turn is preferably secured to the cutting edge or blade framework **60**. With such an arrangement cable **74** is moved, first in one direction to move the cutting tool in its cutting stroke and then reversed to bring the blade **62** back in preparation for a second cutting movement. It follows that this same operation is employed whether the grading operation is conducted in forming loose covering or in the initial removal of underwater material.

It is believed that it will be clearly apparent from the above description and the disclosure in the drawings that the invention comprehends a novel construction of underwater grading means.

Having thus disclosed my invention,

I claim:

1. An underwater grading means, comprising: a floating platform supported by parallel disposed and spaced apart pontoons; means for securing said pontoons in fixed relationship to each other; a plurality of grader supporting means pivotably supported at one end between said pontoons; a tackle cable for adjustably supporting said grader supporting beams; a power driven winch drum for controlling said tackle cable; a blade supporting framework; pivots at the opposite end of said grader supporting beams for pivotably supporting said framework; said framework having a preponderance of weight on the outwardly disposed end of said framework causing it to tend to revolve about said pivots and the inner end of said framework normally caused to engage the underside of said supporting beams; a framework adjusting cable secured to the outwardly disposed end of said framework for changing the angular relationship between the grader supporting beams and the blade supporting framework; a leveling and cutting blade disposed transversely of said blade supporting framework and pivoted at each of its ends to said framework; skid bars disposed directly below said framework and pivoted in spaced relationship therefrom at their front ends and adjustably secured to said blade at their rear ends and means for maneuvering said floating platform.

2. The subject matter of claim 1 in which said means for securing said pontoons in fixed relationship to each other, comprising: a plurality of transverse beams disposed across the tops of said pontoons; short angle bars secured on each side of said pontoons and under said transverse beams; a metal band fixedly secured to the underside of each of said beams and terminating at each end in angularly disposed ends adapted to overlay said angle bars and a plurality of bolts securing said bands and said angle bars together.

3. The subject matter of claim 1 in which each of said grader supporting beams are pivoted between two spaced anchor members of triangular outline; longitudinally disposed intermediate beams secured to said transverse beams and providing fixed anchorage for said anchor members; truss means composed of horizontally and diagonally disposed members fixedly secured between the spaced pairs of anchor members.

4. An underwater grading means, comprising: a floating platform supported by parallel disposed and spaced apart pontoons; means for securing said pontoons in fixed relationship to each other; a plurality of grader supporting beams pivotably supported at one end between said pontoons; a tackle cable for adjustably supporting said grader supporting beams; a power driven winch drum for controlling said tackle cable; a blade supporting framework, pivots at the opposite end of said grader supporting beams for pivotably supporting said framework, said framework having a preponderance of weight on the outwardly disposed end of said framework and the inner end of said framework normally engaging the underside of said supporting beams; a frame adjusting cable secured to the outwardly disposed end of said frame for changing the angular relationship between the grader supporting beams and the blade supporting framework; an upper framework disposed on said floating platform having a plurality of vertical posts, longitudinal beams secured thereto and transverse beams secured to said longitudinal beams to provide an upper framework; a leveling and cutting blade disposed transversely of said blade supporting framework and pivoted at each of its ends to said framework; skid bars disposed directly below said framework and pivoted in spaced relationship therefrom at their front ends and adjustably secured to said blade at their rear ends and means for maneuvering said floating platform.

5. The subject matter of claim 4 in which said tackle cable is provided with a fixed cable block supported from said upper framework and a movable cable block secured to said grader supporting beams.

6. The subject matter of claim 4 in which said frame adjusting cable is secured to the outer end of said blade supporting framework and led through a cable block supported by said upper framework and a cable winch on said floating platform having a power driven drum on which said frame adjusting cable is spooled to provide a means for adjusting the angle of attack of said blade.

7. The subject matter of claim 4 in which said means for maneuvering said floating platform, comprises: a buoyant platform and spaced mooring means to which said platform is adjustably secured; a tail-hold cable block secured to said floating platform; a vehicle having a power drum and dual cable guide means and said vehicle capable of moving along the shoreland of an area to be worked by said grading means; a second vehicle capable of moving along the said shoreland and having a guiding sheave; a main line cable operatively engaging said tail-hold block, said power drum and guide means and said guiding sheave, connected at one end to the offshore end of said floating platform and at its other end to the shore end of said blade supporting framework.

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