Dec. 10, 1963 V. M. VUSKOVICH 3,113,389

DREDGING APPARATUS

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Fig. 1.

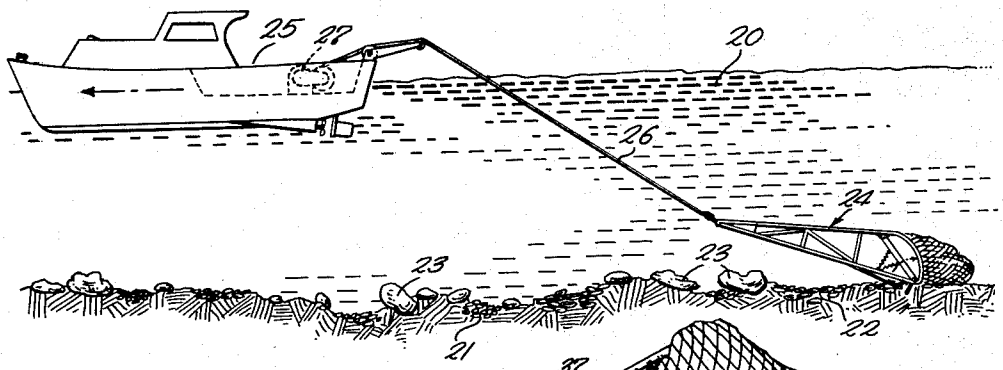


Fig. 2.

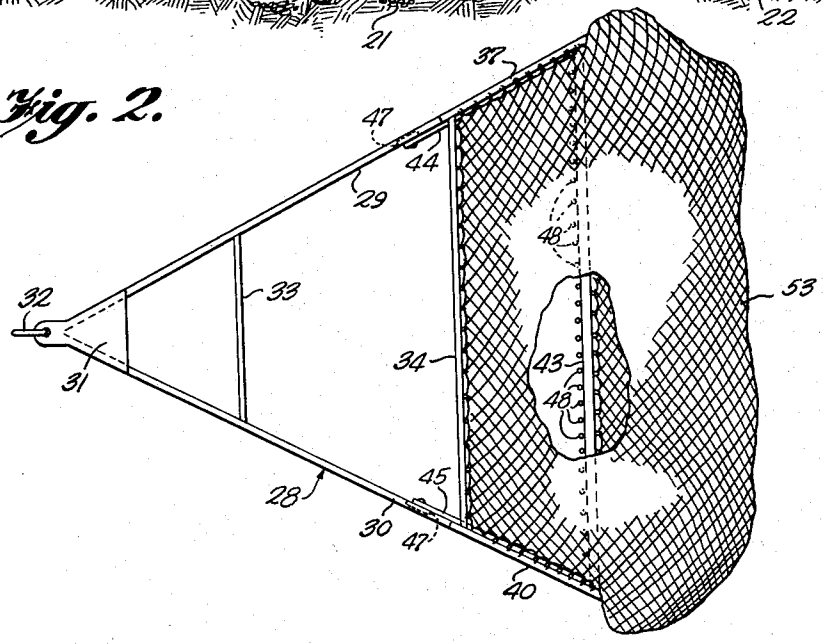
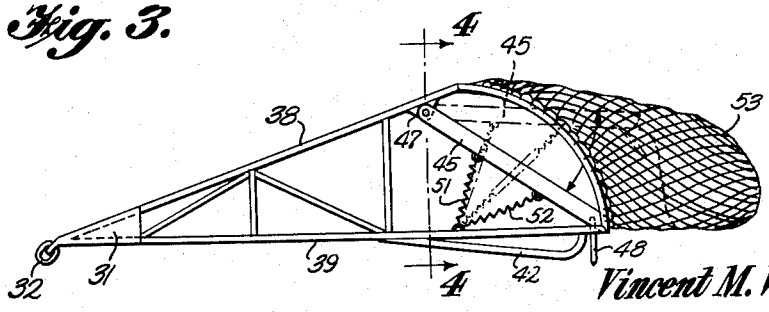


Fig. 3.



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Fig. 4.

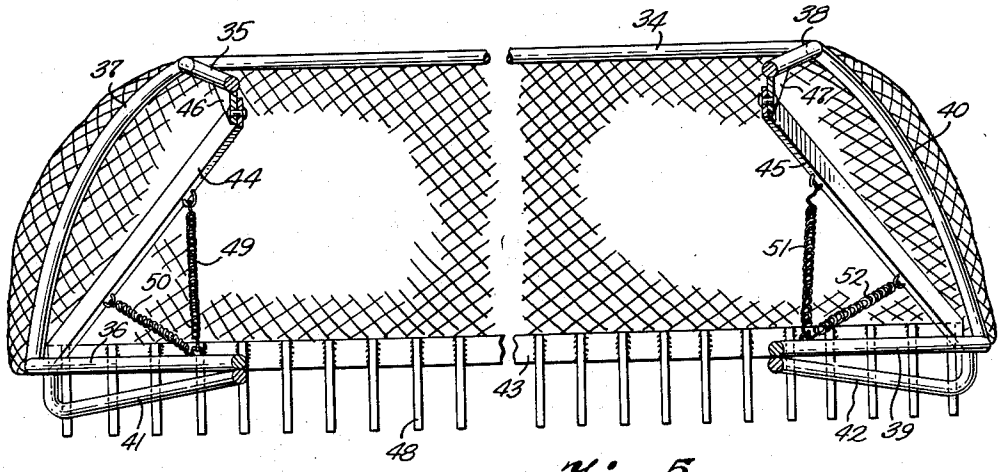
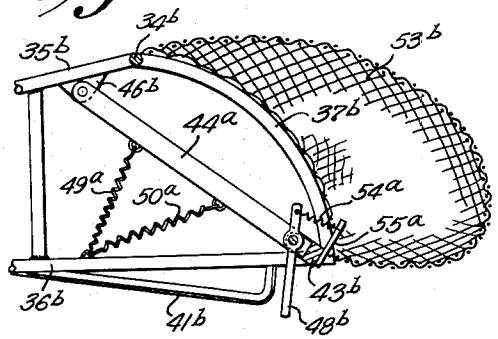


Fig. 5.



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DREDGING APPARATUS

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Fig. 6.

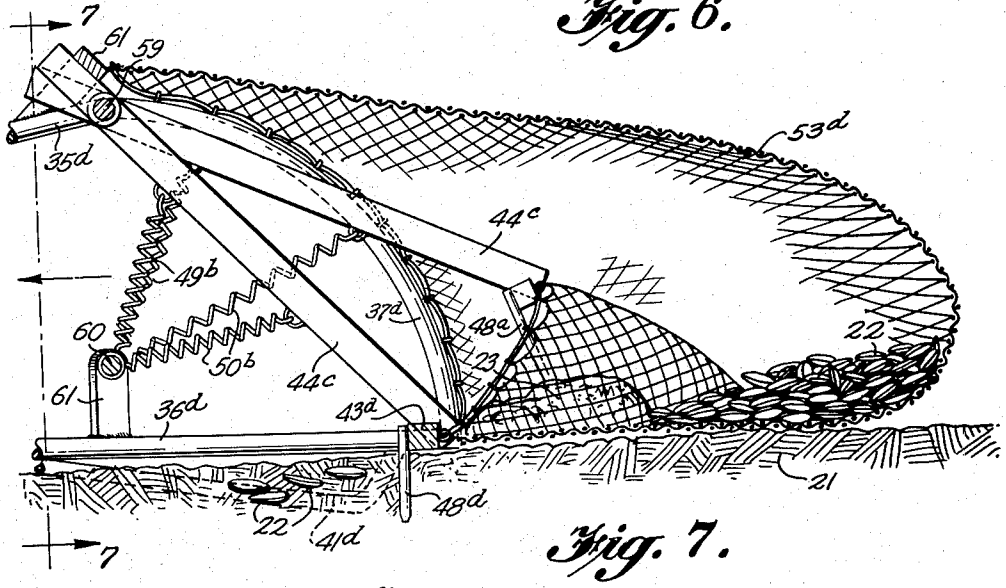


Fig. 7.

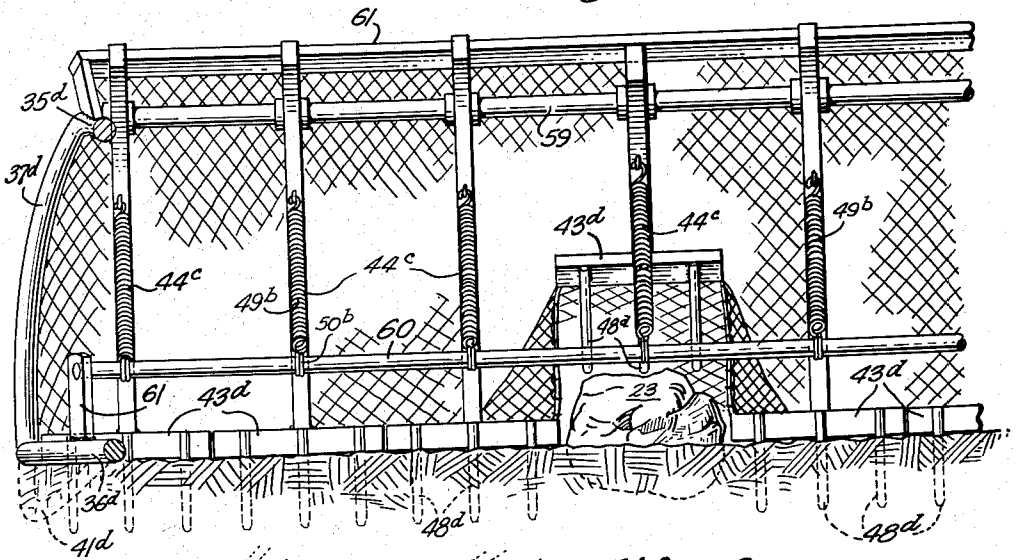
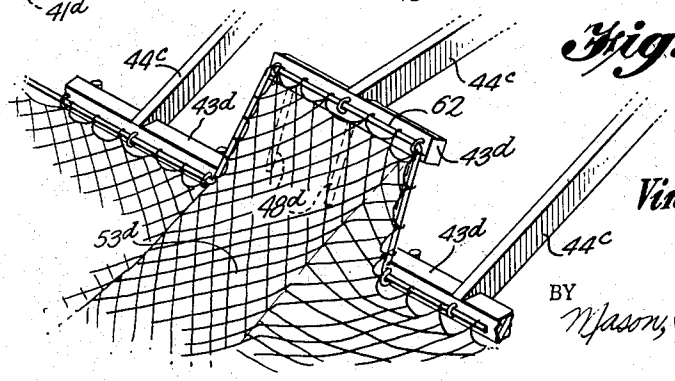


Fig. 8.



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United States Patent Office 3,113,389 Patented Dec. 10, 1963

3,113,389
DREDGING APPARATUS

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Filed Dec. 5, 1962, Ser. No. 242,504
8 Claims. (Cl. 37—119)

This invention relates to a dredging apparatus and more particularly to an apparatus suitable for dredging marine matter deposited or embedded in an irregular bed of a body of water.

In the ground fishing industry it has been found that dredging for marine matter deposited or embedded in the bottoms of rivers, lakes, oceans and the like can be considerably more profitable than conventional commercial fishing methods. Such dredging has been employed with considerable success in those locations where the bottoms of the bodies of water are relatively even and free from various forms of obstructions. However, in the past it has not been feasible and most often not possible to dredge the bottom of a body of water having an irregular surface, with conventional dredging apparatus.

Accordingly, it is the general object of this invention to provide an improved apparatus suitable for dredging marine matter.

Another object of the present invention is to provide an improved apparatus suitable for dredging marine matter deposited on the bottom of a body of water having an irregular surface.

A further object of this invention is to provide an improved apparatus suitable for dredging marine shells and the like at least partially embedded in a soft bottom of a body of water having various immovable obstructions such as boulders, rocks and other debris also embedded therein.

A still further object of this invention is to provide an improved dredging apparatus having novel raking or scraper means for dislodging marine shells embedded in soft mud bottoms of rivers, lakes, oceans and the like having immovable obstructions and also having a trailing perforate receptacle means for collecting the loosened shells wherein snagging or catching of the raking or scraper means and the receptacle means is prevented.

Another object of this invention is to provide an improved dredging apparatus which is inexpensive to manufacture, simple to operate, and requires a minimum amount of maintenance.

Other objects and advantages of the present invention will become apparent to those skilled in the art from the following description when read in conjunction with the accompanying drawings wherein:

FIGURE 1 is an elevational view of a first embodiment of the invention shown in its normal use environment;

FIGURE 2 is an enlarged top view of the embodiment shown in FIGURE 1, having a portion thereof broken away;

FIGURE 3 is an enlarged side view of the embodiment of the invention shown in FIGURE 1, also illustrating the invention in an additional operative position in broken lines;

FIGURE 4 is an enlarged sectional view taken along line 4—4 in FIGURE 3;

FIGURE 5 is a fragmentary view of a second embodiment of the invention;

FIGURE 6 is a fragmentary view of a third embodiment of the invention;

FIGURE 7 is a sectional view taken along line 7—7 of FIGURE 6; and

FIGURE 8 is a fragmentary view in perspective of the embodiment shown in FIGURES 6 and 7.

In accordance with the broad aspects of the present invention there is provided an apparatus suitable for dredging marine shells and the like deposited and embedded in an irregular bed of a body of water comprising a frame, yieldable raking or scraper means mounted on the frame and projecting downwardly therefrom for dislodging the embedded shells and a trailing perforate receptacle means attached to the apparatus for collecting the loosened shells therein. The raking or scraper means is adapted to yield and several lift at least the bottom peripheral segment of the receptacle means upon contact with an immovable obstruction in the line of travel of the apparatus so as to prevent the snagging or catching of either the raking means or receptacle means with the particular obstruction.

Referring to FIGURES 1 through 4, there is shown a body of water 20 having an irregular bottom 21 to be dredged. The irregular bottom 21 has both a deposit of marine shells 22 and various immovable objects designated generally as at 23. The dredging apparatus 24 as shown comprising the preferred embodiment of the invention is adapted to be towed by a suitable surface craft 25 by means of a cable 26 connected to a winch mechanism 27 on the surface craft 25. The dredging apparatus 24 comprises a substantially pyramidally shaped frame 28 on its side comprising a pair of substantially triangularly shaped side sections 29 and 30 joined together at their apices within a terminal housing 31 and spaced apart at the opposite ends thereof having a suitable link 32 for connecting the cable 26 to the apparatus. The side sections 29 and 30 are secured together by upper cross bar members 33 and 34 and similar cross bar members disposed below the upper cross bar members. The side section 29 comprises an upper bar member 35 and a lower bar member 36 joined at their forward ends within the terminal housing 31 having the rearward ends thereof connected by an arcuate bar member 37. Suitable bracing members interconnect the bar members 35 and 36. Similarly, side section 30 comprises an upper bar member 38 and a lower bar member 39 joined at their forward ends within the terminal housing 31 having an arcuate bar member 40 connecting the rearward ends thereof. Suitable bracing members interconnect the bar members 38 and 39, as shown in FIGURE 3. The lower bar members 36 and 39 define a triangular base and are provided with suitable runners 41 and 42 which are disposed on the bottoms thereof and are inclined rearwardly and downwardly therefrom.

Disposed between the end portions of the lower bar members 36 and 39 and extending transversely relative to the centerline of the apparatus is a movable cross bar member 43 carried by a pair of carrier arm members 44 and 45 extending upwardly and inwardly being hingedly attached for pivotal movement in vertical planes to brackets 46 and 47 depending from upper bar members 35 and 38, respectively. The movable cross bar member 43 is provided with a plurality of transversely spaced, rigidly attached raking or scraper teeth 48 which extend downwardly from the plane passing through the lower bar members 36 and 39. Interconnecting the arm members 44 and 45 and the lower bar members 36 and 39 to bias the movable cross bar 43 downwardly or in clockwise direction relative to FIGURE 3, are suitable spring members 49, 50 and 51, 52, respectively. As best shown in FIGURES 2 and 3, there is provided a substantially flexible net 53 of mesh material peripherally secured to the upper cross bar member 34, arcuate bar members 37 and 40 and movable cross bar member 43. It will be appreciated that sufficient material is provided to permit move-

ment of the cross bar member relative to the members of the frame to which the net **53** is secured.

As the dredging apparatus **24** is towed along the bottom of a body of water as shown in FIGURE 1, it will be noted that the frame **28** will be tilted upwardly at the forward end thereof so that the runners **41** and **42** ride in the soft bottom **21** and barring any obstructions, the movable cross arm member **43** will be urged downwardly or in a clockwise direction relative to FIGURE 3 by means of the spring members **49—52**, so that the raking or scraper teeth **48** project into the soft bottom **21** to rake embedded marine shells and the like which are caused to be moved rearwardly over the movable cross arm member **43** and be collected in the flexible net **53**. Under normal operating conditions the biasing force of the springs is sufficient to urge the movable bar downwardly to project the raking or scraper teeth **48** into the soft bottom **21**. However, whenever the teeth **48** engage an immovable object, the movable bar **43** moves upwardly, counterclockwise relative to FIGURE 3 against the biasing action of the springs **49—52** to lift the bottom portion of the net **53** and also to permit the raking teeth **48** to ride over the obstacle. It will be noted that the yielding movement of the movable cross bar member **43** prevents either the raking teeth **48** or the bottom of the net **53** from becoming snagged or caught on any immovable object which the raking teeth **48** may encounter. After the frame **28** has bypassed the immovable object, the biasing action of the springs **49—52** urge the movable cross bar member **43** downwardly to project the raking teeth **48** into the soft bottom **21** to resume the raking of the marine shells **22** embedded therein.

FIGURE 5 discloses a second embodiment of the present invention which is generally similar to the first embodiment except for the construction of the raking means. As shown, there is provided a movable cross bar member **43*b*** carried by a pair of arm members similar to those described in connection with the embodiment shown in FIGURES 1–4. Mounted on the movable cross bar member **43*b*** for pivotal movement thereon in vertical planes is a plurality of transversely spaced raking teeth **48*b*** which normally project downwardly below the bottom of the dredging apparatus. Each raking tooth **48*b*** is biased for pivotal movement in a clockwise direction relative to FIGURE 5 by a spring **54*a*** which interconnects the upper end portion of the raker tooth **48*b*** with a post member **55*a*** secured to the movable cross bar member **43*b***. Similar to the construction of the embodiment shown in FIGURES 1 through 4, each of the connecting arm members is biased in a clockwise direction by suitable spring members. The flexible net **53*b*** is peripherally attached to the upper cross bar member **34*b***, the movable cross bar member **43*b*** and the arcuate bar members of the side frames. As will be appreciated in the operation of this embodiment, whenever any of the raking teeth **48*b*** encounter a relatively small immovable object embedded in the soft bottom, they will be caused to pivot counterclockwise relative to FIGURE 5, while the remaining unobstructed teeth continue to rake marine shells which are moved rearwardly over the movable cross bar member **43*b*** to be collected by the flexible net **53*b***. As soon as such teeth bypass the particular immovable object, the spring **54*a*** returns the teeth back to the downwardly projecting, raking position. It will be noted that each of the raking teeth **48*b*** operate independently of each other.

Whenever a substantially larger immovable object is encountered by any of the teeth, the engaging teeth will first pivot counterclockwise to the maximum extent of their travel until they contact the movable cross bar member **43*b***, which then is caused to pivot upwardly against the biasing action of the spring members **49*a*—52*a*** to lift at least the bottom portion of the flexible net **53*b***, thus permitting the entire frame to ride over the particular obstruction. It will be obvious that

the apparent advantage of this particular embodiment is that only individual raking teeth will be displaced upon encountering relatively small immovable objects while the remainder of the teeth continue to rake marine shells and cause them to be deposited in the flexible net **53*b***. However, when comparatively larger immovable objects are encountered, the engaging tooth **48*b*** will pivot to its maximum travel and then engage the movable cross bar member **43*b*** to lift the entire assembly.

The embodiment shown in FIGURES 6 through 8 is similar to the embodiment shown in FIGURES 1 through 4, and differs only in that a plurality of independently acting movable cross bar members are provided. Specifically, there is provided a plurality of transversely aligned movable cross bar members **43*d***, each carried by an arm member **44*c***, which is connected to a transversely extending hanger bar **59** for pivotal movement in a vertical plane. The hanger bar **59** is secured to the upper bar members of the side sections. Each of the movable cross bar members **43*d*** is provided with a plurality of raking teeth **48*d*** which depend therefrom and are adapted to project into the soft bottom to be dredged. The arm members **44*c*** are biased for pivotal movement in a clockwise direction relative to FIGURE 6, by means of suitable spring members **49*b*** and **50*b*** which interconnect each of arm members **54*c*** and a transversely extending lower anchor rod **60** supported by suitable bracket members disposed on the lower bar members of the side sections of the frame. The flexible net **53*d*** is peripherally secured to a transversely extending limit bar **61** disposed substantially above the hanger bar **59** and supported by the upper bar members of the side sections of the frame, the arcuate bar members and each of the movable cross bar members **43*d***.

As illustrated in FIGURES 6 through 8, the arm members **44*c*** are normally biased for pivotal movement in a clockwise direction relative to FIGURE 6, causing the raking teeth **48*d*** to project downwardly into the soft bottom to be dredged. As the apparatus is towed along, the raking teeth **48*d*** rake the marine shells **22** embedded in the soft bottom **21**, causing them to be moved rearwardly over the movable cross bar members into the flexible net **53*d***. However, whenever any of the teeth encounter an immovable obstruction, the corresponding movable cross bar member **43*d*** will be caused to pivot counterclockwise against the biasing action of its respective springs **49*b*** and **50*b***, tilting a portion of the net to permit the immovable obstruction **23** to pass thereunder without disturbing the operation of the other movable cross bar members **43*d***. The lower edge of the flexible net **53*d*** is loosely or otherwise suitably attached to permit a portion of the net to be lifted without lifting or otherwise disturbing the adjacent movable cross bar members. As soon as the dredging apparatus has moved sufficiently forward, clear of the obstruction, the spring members **49*b*** and **50*b*** cause the particular displaced movable cross bar member **44*c*** to pivot clockwise back into the raking position in transverse alignment with the other movable cross bar members. It will thus be appreciated that the dredging operation can be continued without interruption with a plurality of independently acting movable cross bar members.

The various embodiments of the invention described herein can be constructed of any suitable material utilizing any conventional construction methods, although a welded construction of hot rolled steel for the frame is preferred. The flexible net for collecting the marine shells can be of any durable material. The net also can be provided with any suitable means for connecting the same to the frame of the dredging apparatus, so that it can be secured both to the fixed and movable members thereof without becoming damaged. In each of the above mentioned embodiments, it will be appreciated that a sufficient amount of net material is provided to permit movement of the raking means relative to the frame.

From the foregoing detailed description, it will be evident that there are a number of changes, adaptations and modifications of the present invention which come within the province of those skilled in the art. However, it is intended that all such variations not departing from the spirit of the invention be considered as within the scope thereof as limited solely by the appended claims.

What I claim is:

1. An apparatus suitable for dredging marine matter deposited or embedded in an irregular bed of a body of water comprising a frame, at least one movable cross bar member operatively connected to said frame for movement relative to said frame in a substantially vertical plane, said cross bar member having a plurality of downwardly projecting raking teeth, a trailing perforate receptacle means having the upper peripheral mouth portion thereof secured to said frame and the lower peripheral mouth portion thereof secured to said movable cross bar member and biasing means mounted on said apparatus for urging said movable bar member downwardly relative to said frame.

2. An apparatus suitable for dredging marine matter deposited or embedded in an irregular bed of a body of water comprising a frame, a movable cross bar member disposed at the rearward end of said frame and pivotally connected to said frame for movement relative thereto in a substantially vertical plane, said cross bar member having a plurality of downwardly projecting raking teeth, a trailing perforate receptacle means having the upper peripheral mouth portion thereof secured to said frame and the lower peripheral mouth portion thereof secured to said movable cross bar member for vertical movement therewith relative to said upper peripheral mouth portion of said receptacle means and biasing means mounted on said apparatus for urging said movable bar member downwardly relative to said frame.

3. An apparatus suitable for dredging marine matter deposited or embedded in an irregular bed of a body of water comprising a frame including a pair of side sections spaced apart at the rearward ends thereof and having a plurality of rigid cross connecting members, a movable cross bar member disposed between said side sections at the lower rearward ends thereof having carrier arms hingedly connected to said side sections for movement thereof relative to said frame in a substantially vertical plane, said movable bar member having a plurality of downwardly projecting raking teeth, a trailing perforate receptacle means having the upper peripheral mouth portion thereof secured to said frame and the lower peripheral mouth portion thereof secured to said movable cross bar member for vertical movement therewith relative to said upper peripheral mouth portion of said receptacle means and springs interconnecting said carrier arms and said frame for urging said movable cross bar member downwardly relative to said frame.

4. An apparatus suitable for dredging marine matter deposited or embedded in an irregular bed of a body of water comprising a frame including a pair of substantially triangularly shaped side sections connected forwardly at the apices thereof and spaced apart at the rearward ends thereof having a plurality of rigid cross connecting members, a movable cross bar member disposed between said side sections at the lower rearward ends thereof having carrier arms hingedly connected to depending brackets on said side sections for movement therewith relative to said frame in a substantially vertical plane, said movable bar member having a plurality of downwardly projecting raking teeth, a trailing receptacle means consisting of a perforate flexible material having the upper peripheral mouth portion thereof secured to a rigid cross member interconnecting the upper rearward ends of said side frames, portions of the said peripheral mouth portions thereof secured to the rearward ends of said side members and the lower peripheral mouth portion thereof secured to said movable cross bar member for vertical movement therewith relative to said upper peripheral mouth portion of said receptacle means, springs interconnecting said carrier arms and said side frames for urging said movable bar member downwardly relative to said frame and said frame having runners disposed on the bottom of each side section thereof.

5. An apparatus suitable for dredging marine matter deposited or embedded in an irregular bed of a body of water comprising a frame, a movable cross bar member disposed at the rearward end of said frame and pivotally connected to said frame for movement relative thereto in a substantially vertical plane, said cross bar member having a plurality of transversely spaced raking teeth mounted thereon for pivotal movement in substantially vertical planes, a trailing perforate receptacle means having the upper peripheral mouth portion thereof secured to said frame and the lower peripheral mouth portion thereof secured to said vertical cross bar member for vertical movement therewith relative to the upper peripheral mouth portion of said receptacle means, first biasing means mounted on said apparatus for urging said movable bar member downwardly relative to said frame and second biasing means disposed on said cross bar member for urging said raking teeth downwardly and forwardly relative to said frame.

6. An apparatus suitable for dredging marine matter deposited or embedded in an irregular bed of a body of water comprising a frame including a pair of side sections spaced apart at the rearward ends thereof and having a plurality of rigid cross connecting members, a movable cross bar member disposed between said side sections at the lower rearward ends thereof having carrier arms hingedly connected to said side sections for movement thereof relative to said frame in a substantially vertical plane, said cross bar member having a plurality of transversely spaced raking teeth mounted thereon for pivotal movement in substantially vertical planes, a trailing perforate receptacle means having the upper peripheral mouth portion thereof secured to said frame and the lower peripheral mouth portion thereof secured to said movable cross bar member for vertical movement therewith relative to said upper peripheral mouth portion of said receptacle means, springs interconnecting said carrier arms and said frame for urging said movable member downwardly relative to said frame and each raking tooth mounted on said cross bar member having biasing means for urging the same downwardly and forwardly relative to said frame.

7. An apparatus suitable for dredging marine matter deposited or embedded in an irregular bed of a body of water comprising a frame, a plurality of movable cross bar members disposed at the rearward end of said frame and pivotally connected to said frame for movement relative thereto in substantially vertical planes and independently relative to each other, said cross bar members each having a plurality of downwardly projecting raking teeth, a trailing perforate receptacle means having the upper peripheral mouth portion thereof secured to said frame and the lower peripheral mouth portion thereof secured to said movable cross bar members for vertical movement therewith relative to said upper peripheral mouth portion of said receptacle means and a plurality of biasing means mounted on said apparatus for urging said movable bar members downwardly relative to said frame.

8. An apparatus suitable for dredging marine matter deposited or embedded in an irregular bed of a body of water comprising a frame including a pair of side sections spaced apart at the rearward ends thereof and having a plurality of rigid cross connecting members, a plurality of movable cross bar members disposed between said side sections at the lower rear ends thereof having carrier arms hingedly connected to a transversely extending hanger bar mounted on said side sections for movement therewith relative to said side frame in substantially ver-

tical planes and independently relative to each other, said cross bar members each having a plurality of downwardly projecting raking teeth, a trailing perforate receptacle means having the upper peripheral mouth portion thereof secured to said frame and the lower perforate mouth portions thereof secured to said movable cross bar members for vertical movement therewith relative to said upper peripheral mouth portion of said receptacle means and a plurality of springs interconnecting said carrier arms and a transversely extending anchor bar mounted on said side sections forwardly of said cross bar members for

urging said cross bar members downwardly relative to said frame.

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