

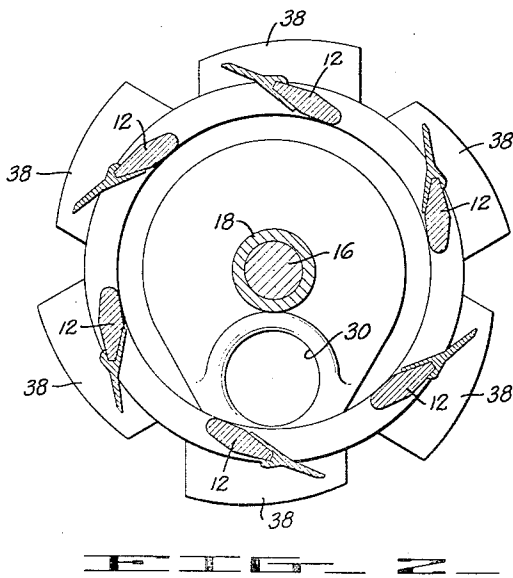
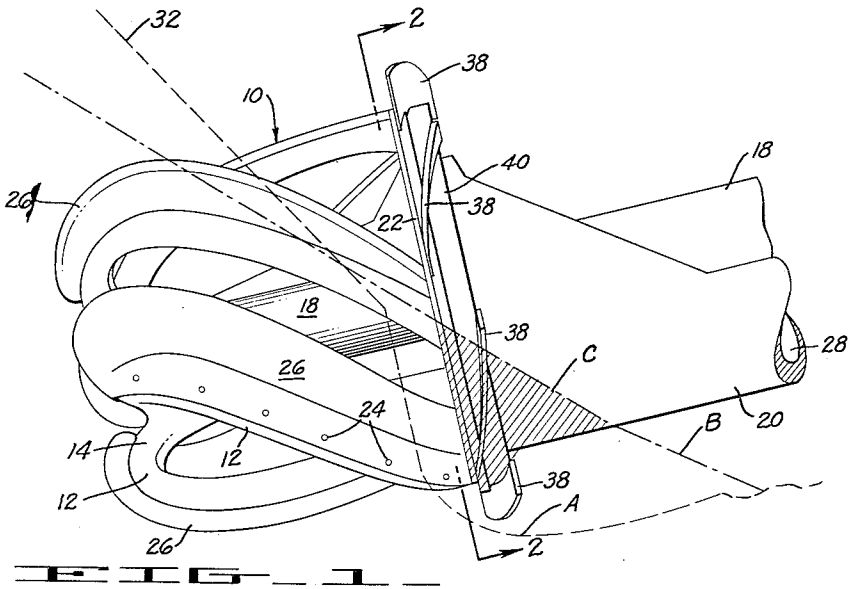
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CUTTER RING BLADE

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CUTTER RING BLADE

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This invention relates to hydraulic dredges, and more specifically to improvements in rotary cutter-heads of the basket type which are commonly employed on hydraulic dredges.

In dredging operations, the dredge ladder is swung in a horizontal arcuate path to take an arcuate cut out of the face of the material to be dredged. After such a cut has been taken, the dredge moves forwardly a distance equal to the length of the cut that is desired to be taken again in the face of the material to be dredged. The ladder and cutter-head are then swung back to take another horizontal arcuate cut. As the material is loosened during this cutting operation, it is immediately removed through the suction line. The dotted outline A in Figure 1 shows a typical profile of a dredging cut. In relation to this particular cut, the cutter-head is shown as being disposed forwardly thereof in a position ready for the taking of the next succeeding cut.

In practice, it may take an interval of time from five to sixty minutes for the cutter-head to be brought back over the same point, but in an advanced position, and during this time interval the profile A of the preceding cut will have sloughed downwardly and rearwardly to assume an angle of repose indicated by the dotted line B. This produces a body of material, indicated in cross-section by the cross-hatched area C, which cannot be removed by the cutter blades during the return movement of the cutter, since such material is disposed rearwardly of the blades. Furthermore, this back-sliding of the cut face of the material brings the material into the path of swing of the ladder, thus severely obstructing the swinging of the ladder across the face of the cut to take the next bite in the material. This condition seriously affects the dredging operation as far as time and dredging production are concerned, because the ladder must be gradually raised to decrease the depth of digging, and the dredge must be frequently set back to clean up the cut to the desired grade, or depth.

It is the essential object of this invention to provide cutter-borne means to reduce the body of obstructing material C to a minimum so that the full weight of the dredging ladder may be utilized within the bounds of the power available to operate the swing lines for the dredge to provide for continuous operation of the dredge at the required grade depth without necessitating a setting back of the dredge for clean-up purposes and without decreasing the production rate of the dredge. The means for accomplishing this comprises essentially a plurality of auxiliary power-operated scooping blades movable through the sloughed-back material to propel a substantial portion of such material into the area in which it may be sucked into the suction line.

Additional objects and advantages of the invention will be made clear in the following description of a preferred structure and mode of operation of the cutter-head embodying the invention.

In the drawings, forming part of this specification:

Figure 1 is a view in side elevation of a basket type cutter-head embodying the invention and the lower or terminal portion of the digging ladder of the dredge; and

Figure 2 is a sectional view taken along lines 2-2 of Figure 1.

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A basket type rotary cutting head, indicated generally at 10, is comprised of six helically formed arms 12 having inturned forward ends 14 merging into a hub to which a power rotatable shaft 16 is fixedly connected.

The shaft 16 is carried for rotation within sleeve 18 which is mounted on the upper side of a digging ladder 20. The ends of the arms 12 disposed in the direction of the digging ladder 20 are mutually interconnected by a supporting cutter ring 22. Secured to the arms 12, as by bolts 24, are helical cutter blades 26 operable, upon rotation of shaft 16 in a counterclockwise direction, as viewed in Figure 2, to cut the material to be dredged and urge the loosened material in the direction of the ladder 20. Ladder 20 is provided with a suction conduit 28 having an intake 30 adjacent the cutter ring 22. Water and the material loosened by the cutter is drawn through the suction line 28 by a suitable pumping system, not shown. The structure thus far described is conventional in the hydraulic dredging art.

Secured to the rearward face of the cutter ring 22 are a plurality of scoop blades 38, also called rim-scoops, having their rearward ends mutually connected for reinforcement purposes to a ring 40. Preferably, a scoop blade 38 is provided for each of the cutter blades 26. The pitch of the scoop blades 38 is opposite to that of the cutter blades 26 in order that the scoop blades 38 may move a substantial portion of the material C forwardly toward the suction line intake 30 during rotation of shaft 16. Efficient forward propulsion of the material C has been obtained when the included angle between the scoop blades 38 and the rearward face of the cutter ring 22 has been of the order of 26° 40'.

When the scoop blades 38 are disposed in this manner, it has been found that they will directly remove about one-half of the cross-section of obstructing material C and will positively force this removed material into the area from which it will be removed through the suction line 28. Removal of approximately half of this material leaves a void into which an additional portion of the obstructing material falls. In effect, therefore, approximately 70-75% of the total obstructing material is removed from blocking relation to the path of swing of the ladder. The removal of this amount of obstructing material results in a substantial decrease of the obstructing force offered to the swinging of the ladder.

Having thus described the subject invention, what is desired to be secured by Letters Patent is:

1. In a hydraulic dredge, the combination, with a ladder-supported and rotatable basket type cutter-head having a plurality of digging blades and a backing ring therefor, of a plurality of scoop blades carried by said head directed rearwardly from said backing ring and extending beyond the peripheral edge of said ring, said scoop blades having a pitch reverse to that of said digging blades.

2. In a hydraulic dredge, the combination set forth in claim 1 wherein said digging and scoop blades are equal in number, and wherein the included angle between said scoop blades and ring is approximately 26-27°.

3. In a hydraulic dredge having a ladder, a multi-blade basket type cutter-head disposed at the forward end thereof, a suction line carried by said ladder and having an intake at the rearward end of said head, and a backing ring mutually interconnecting the rearward ends of the blades of said head, the provision of a plurality of scoop blades carried at the rearward side of said ring rearwardly of said intake and extending beyond the peripheral edge of said ring, said scoop blades having a pitch reverse to that of said head blades.

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