Dec. 15, 1953 C. DE VILLOTA 2,662,310

AUTOMATICALLY REVERSIBLE CURRENT-DRIVEN CHANNEL CLEANER

Filed Jan. 4, 1951 2 Sheets-Sheet 1

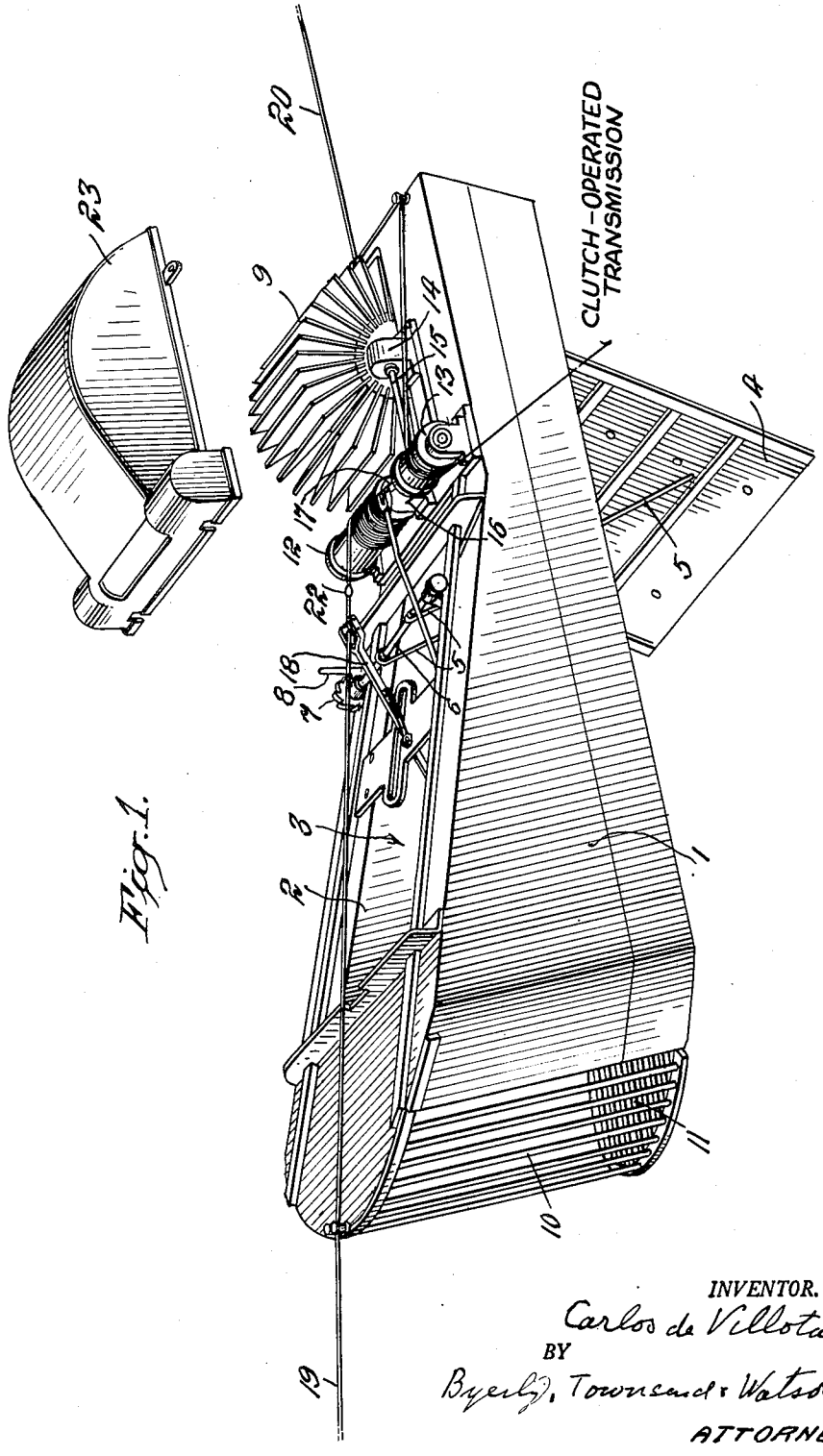


Fig. 1.

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Filed Jan. 4, 1951 2 Sheets-Sheet 2

Fig. 3.

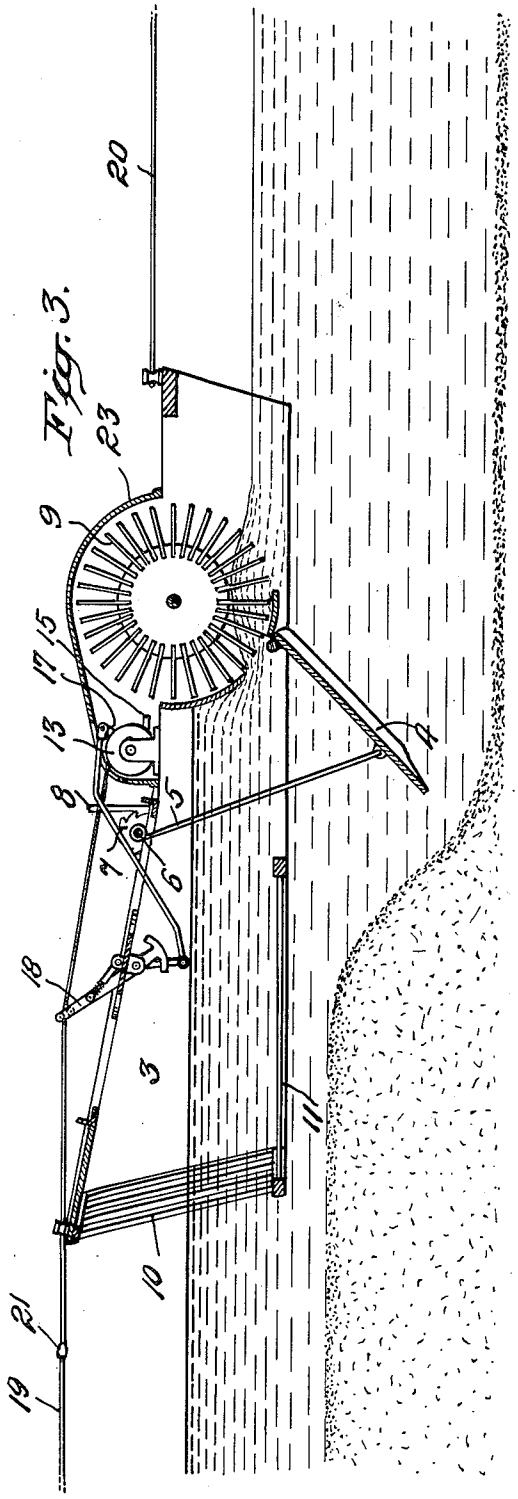
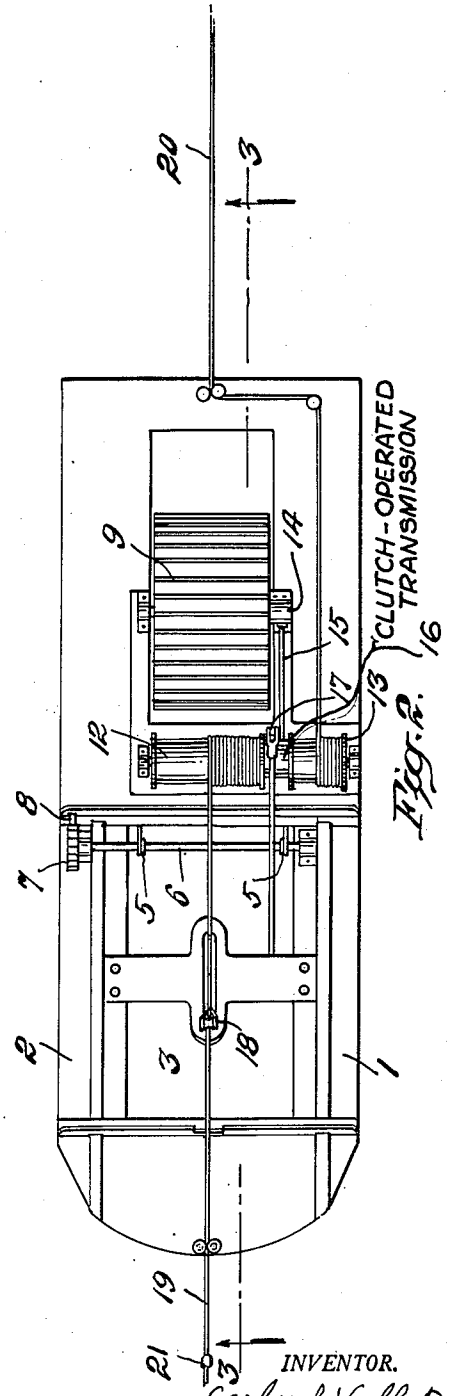


Fig. 2.



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AUTOMATICALLY REVERSIBLE CURRENT-DRIVEN CHANNEL CLEANER

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7 Claims. (Cl. 37—75)

1

This invention relates to a machine for cleaning waterways or channels, and aims to provide a machine which will clean waterways or channels automatically and through the use of no energy other than that which is supplied by the flow of liquid in the waterway or channel.

It has been found that in waterways or channels which rely on natural sources of water for maintaining useful water-levels the useful cross-section of such channels is apt to be reduced by the incrustation, deposition and sedimentation of solid masses of various sizes which are carried downstream from the natural sources, and also from the growth of aquatic plants and the like.

In order to free the channel of such obstructive matter, and also of the deposits of mud which may be washed down the sides of the channels during rainfalls, such channels are provided with relief sluices at intervals along their length. When one of these relief sluices is opened, there is a strong rush of water from the channel into the sluice which tends to carry away the obstructive matter from that portion of the channel adjoining the sluice, and at the same time it tends to carry away obstructive matter from the more remote upstream portions of the channel after such matter has been loosened by manual labor or other appropriate means.

In order to insure the efficient operation of the channel this more remote obstructive matter must be removed at regular intervals, and this removal of obstructive matter becomes of greater importance during the period when such obstructions are produced. However, ordinary methods for loosening this obstructive matter are expensive, and also require that all dependent installations be shut down during the cleaning process. Also the expense of manual labor for this cleaning operation is increased during the periods when the obstructions are being produced, by virtue of the greater amount of labor required at such times when, furthermore, the water is generally very cold; and if machinery is used in place of manual labor then generally an external power supply must be provided to drive the machinery. Thus as a practical matter the channels cannot be cleaned effectively during the period when the obstructions are produced, or, in view of the expense, often enough by ordinary means to insure the most efficient operation of the channel.

All of these disadvantages are avoided in accordance with the present invention by providing a channel-cleaning machine which utilizes the

2

energy of the liquid flowing in the channel both for the purpose of loosening the obstructive matter in the channel and for the purpose of automatically moving the machine up and down the length of channel to be cleaned as many times as necessary to effect a thorough cleaning of the channel.

A channel cleaning machine embodying my invention in the form which I now consider most desirable, consists of a float, a barrier board attached to the float and automatic traction means operated by the current flowing in the channel for causing the float automatically to move repeatedly upstream and downstream over the channel section being cleaned. Such automatic traction means include an hydraulic motor attached to the float which drives cable-winding drums to which upstream and downstream cables are connected. A limiting mechanism reverses the rotation of the drums at the extreme upstream and downstream ends of the channel section being cleaned.

In order that my invention may be clearly understood, I will describe the specific embodiment of it which is illustrated in the accompanying drawings in which:

Fig. 1 is a perspective view of the machine showing the automatic traction means in a position to move the float downstream.

Fig. 2 is a plan view of the machine showing the automatic traction means in a position to move the float upstream.

Fig. 3 is a cross-section view of the machine on the line 3—3 of Fig. 2.

The machine consists of two main floating sections 1 and 2 which are rigidly fastened together in a parallel relation so as to provide a passage 3 for liquid to pass between the floating sections 1 and 2. Hinged to the bottoms of the floating sections 1 and 2 is a barrier board 4, the depth of projection of which beneath the floating sections 1 and 2 is adjustable by means of the cable 5 which is attached fixedly to the axle 6 of the ratchet wheel 7 which is controlled by lever 8.

An hydraulic motor 9, shown as a paddle wheel, is attached to the floating sections 1 and 2 in a position to receive energy from the liquid flowing through the passage 3 over the barrier board 4. Grating 10 which lies across and perpendicular to the passage 3, and grating 11 which lies across and parallel to the passage 3 are both provided to prevent floating objects from entering the hydraulic motor 9 and doing injury to it. The hydraulic motor 9 drives cable-winding drums

12 and 13 which preferably are positioned so as to have the same axis of rotation. The rotation of the hydraulic motor 9 is transmitted to the cable-winding drums 12 and 13 by a reducing gear train 14 connected to the hydraulic motor 9 and transmitting power to a shaft 15 which is in turn connected with a reversible clutch-operated transmission 16.

The reversible clutch-operated transmission 16 is operated by clutch lever 17 which moves in a plane perpendicular to the axes of the cable-winding drums 12 and 13 in response to the position of catch lever 18 which is connected to clutch lever 17. Upstream cable 19 is attached at one end to cable-winding drum 12 and at the other end to a remote point upstream from the machine. Downstream cable 20 is attached at one end to cable-winding drum 13 and at the other end to a remote point downstream from the machine. The upstream cable 19 is threaded through the catch lever 18 and attached to this upstream cable 19 are two stops, 21 and 22, one near each end of upstream cable 19. The housing 23 fits over and protects the hydraulic motor 9, cable-winding drums 12 and 13, and reversible clutch-operated transmission 16.

The operation of the device is as follows: The machine is placed in the section of channel to be cleaned. The end of the downstream cable 20 is fastened at a point downstream when the catch lever 18 is in a downstream position and the stop 22 is adjacent to catch lever 18 but has not yet forced it to the upstream position. Under these conditions the upstream cable 19 is practically all unwound from its cable-winding drum 12, and thus the upstream cable 19 may be carried upstream until substantially taut and then fastened at a point upstream. Next the barrier board 4 is adjusted to the proper depth to provide the constriction between the bottom of the barrier board 4 and the surface of the obstructive matter in the channel. The machine is then ready to commence its automatic operation.

As it moves downstream in the channel, the stop 22 strikes the catch lever 18 and forces it to the upstream position. Catch lever 18 actuates clutch lever 17 and the rotation of the drums 12 and 13 is then reversed, thus causing the upstream cable 19 to be wound onto drum 12 and the downstream cable 20 to be wound off of drum 13, which in turn causes the machine to move upstream against the force of the current. This upstream motion of the machine continues until the upstream cable 19 is wound onto the drum 12 to the point where the stop 21 strikes the catch lever 18 and forces it to the downstream position. Then the downstream cable 20 is wound onto its drum 13, and the upstream cable 19 is wound off of its drum 12 until stop 22 again actuates the catch lever 18, forcing it to the upstream position, and the cycle is again commenced. This to and fro motion of the machine along the channel is continued automatically until the channel is cleaned.

It should be stressed that the hydraulic motor can be coupled to any other device besides the traction mechanism referred to heretofore, by substituting for same a rotary, striking, or other device, or by providing the machine with accesories for the separation of herbs and weeds from the walls of the channel, or any other mechanism applicable to the cleaning of channels.

What I claim is:

1. A channel cleaning machine comprising a float, cleaning means secured to the float, a cable extending longitudinally of the channel and fixed at its upstream end, cable-winding means on the float, an hydraulic motor mounted on the float for operation by the current in the channel, a reversible transmission connecting the hydraulic motor to the cable-winding means, lever means for reversing the transmission, and stops at predetermined points on the cable adapted to actuate said lever means in accordance with the position of said predetermined points on the cable relative to the machine.

2. A channel-cleaning machine comprising a float, a vertically adjustable barrier board hinged to said float, two cables extending longitudinally of the channel and fixed at remote points upstream and downstream, respectively, two cable-winding drums mounted on the float, an hydraulic motor mounted on the float for operation by the current in the channel, a reversible transmission connecting the hydraulic motor with the two cable-winding drums, two stops at predetermined points on the upstream cable, and means for controlling the reversible transmision in accordance with the position of said stops relative to the machine.

3. A channel-cleaning machine comprising a float, cleaning means secured to the float, a cable extending upstream longitudinally of the channel and fixed at its upstream end, a cable-winding drum mounted on the float, an hydraulic motor mounted on the float for operation by the current in the channel, a clutch-operated transmission mechanism connecting the hydraulic motor to the cable-winding drum, a lever means connected to said clutch-operated transmission mechanism for controlling said mechanism, and means at predetermined points on the cable for operating said lever means.

4. A channel-cleaning machine comprising a float, cleaning means secured to the float, a cable extending upstream longitudinally of the channel and fixed at its upstream end, a cable-winding means mounted on the float, an hydraulic motor mounted on the float for operation by the current in the channel, a clutch-operated transmission mechanism connecting the hydraulic motor to the cable-winding means, a clutch lever connected to said clutch-operated transmission mechanism for controlling said mechanism in accordance with the position of the clutch lever, a catch lever connected to said clutch lever for controlling the position of said clutch lever, and two stops on the cable, one near each of the ends thereof and on each side of the catch lever, and adapted to actuate the catch lever in response to the position of the stops relative to the machine.

5. A channel-cleaning machine comprising a float, cleaning means secured to the float, two cables extending longitudinally of the channel and fixed at remote points upstream and downstream, respectively, from the machine, two cable-winding drums mounted on the float, an hydraulic motor mounted on the float for operation by the current in the channel, a clutch-operated transmission mechanism connecting the hydraulic motor to the two cable-winding drums, a clutch lever connected to said clutch-operated transmission mechanism for controlling said mechanism in accordance with the position of the clutch lever, a catch lever connected to said clutch lever for controlling the position of said clutch lever, and two stops on the upstream cable, one near each of the ends thereof and on each side of the catch lever, and adapted to actuate the

catch lever in response to the position of the stops relative to the machine.

6. A channel-cleaning machine comprising a float, cleaning means secured to the float, a cable extending longitudinally of the channel and fixed at its upstream end, cable winding means on the float, an hydraulic motor mounted on the float for operation by the current in the channel, a reducing gear train and a reversible transmission connecting the motor to the winding means, operating lever means on said transmission, and means at predetermined points on the cable for operating the transmission lever means to reverse the same.

7. A channel-cleaning machine comprising a float, cleaning means secured to the float, a channel cable and current-operated means on the float engaging the cable to move the float in either

direction along the cable, and limiting means including stops near the upstream and downstream ends of the cable for reversing the direction of the float so that the current causes alternate upstream and downstream movements of the float.

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