Oct. 14, 1958 J. C. EVANS 2,856,013

SAND CLEANING DEVICE WITH OVERLOAD RELEASE

Filed Oct. 12, 1954 3 Sheets-Sheet 1

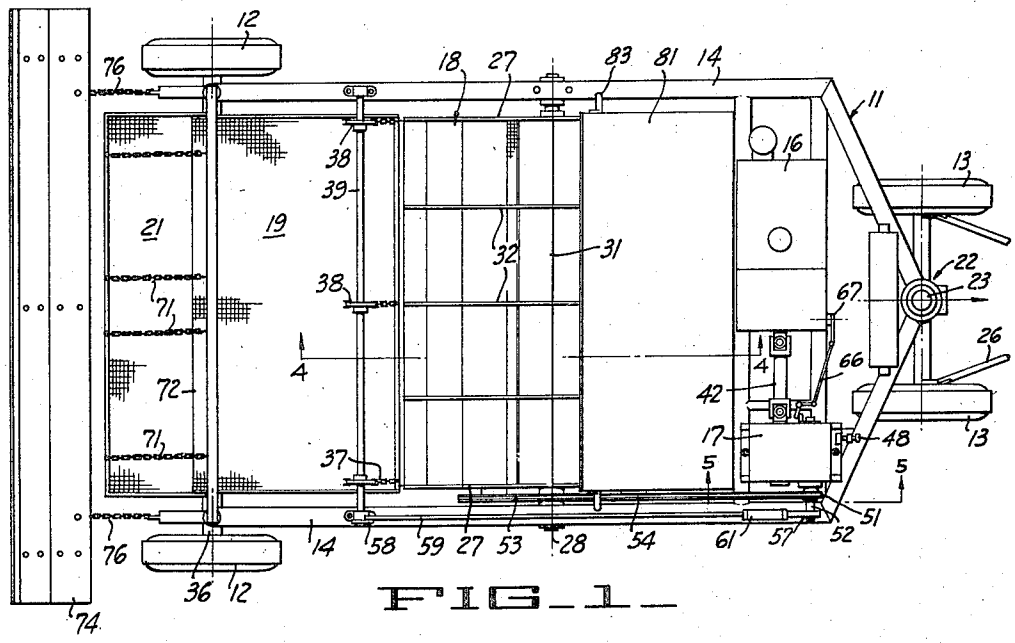
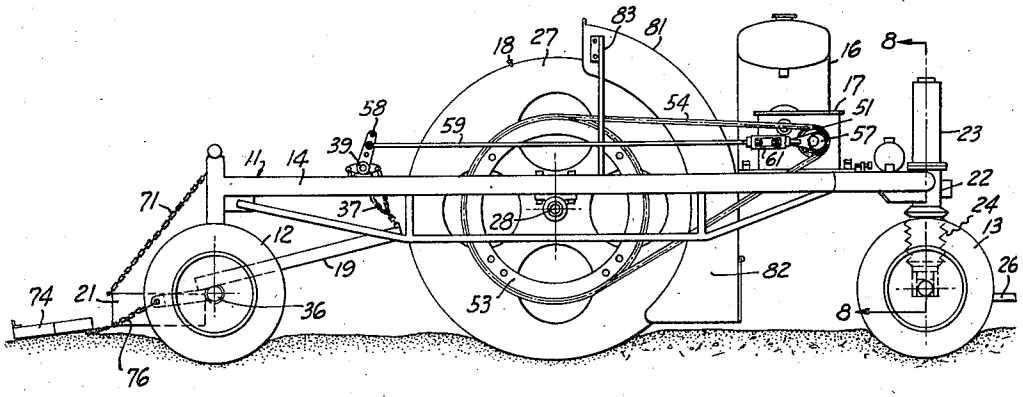


FIG_1

FIG_2



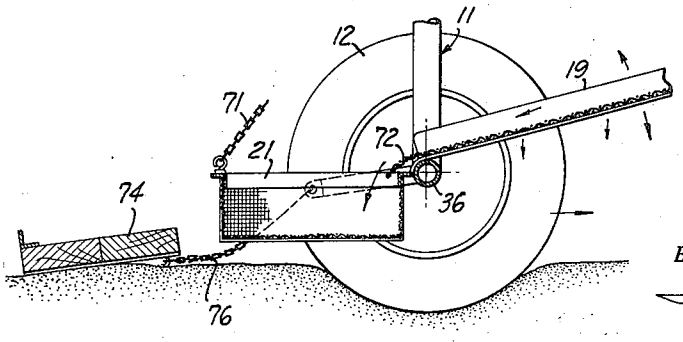


FIG_3

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SAND CLEANING DEVICE WITH OVERLOAD RELEASE

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FIG_4_

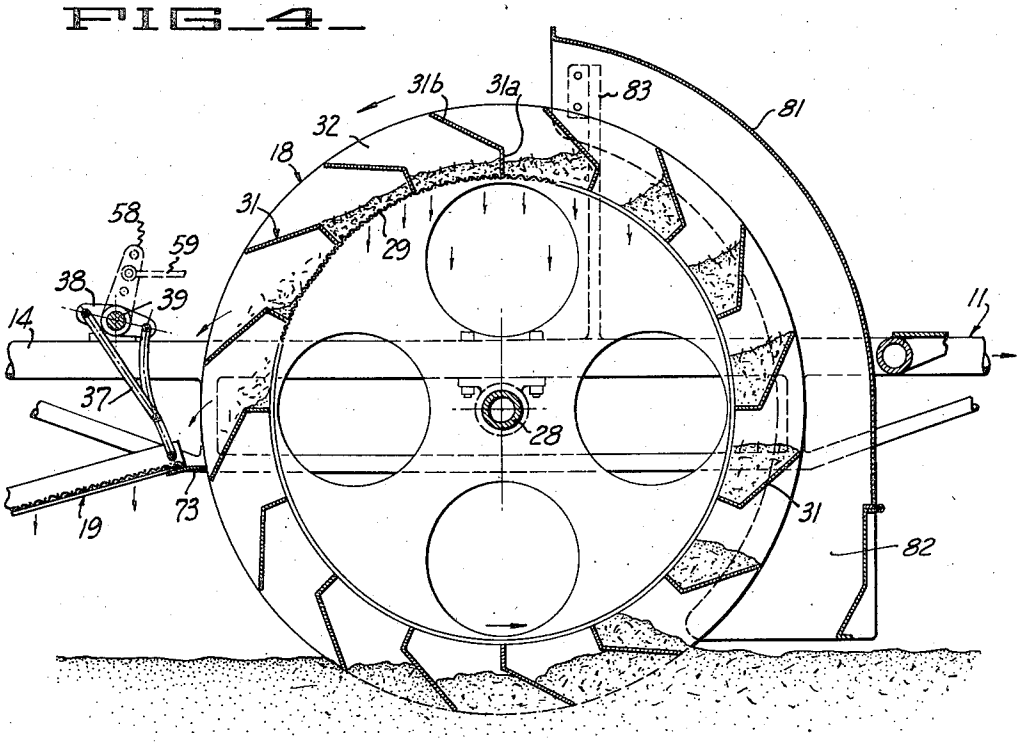


FIG_5_

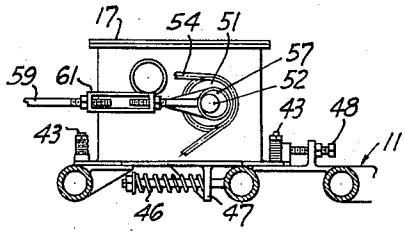
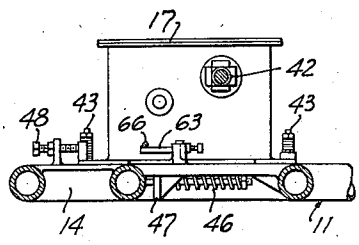


FIG_7_



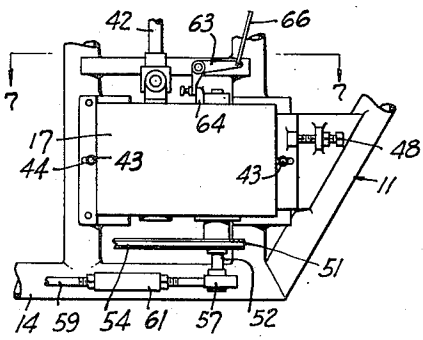


FIG_6_

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SAND CLEANING DEVICE WITH OVERLOAD RELEASE

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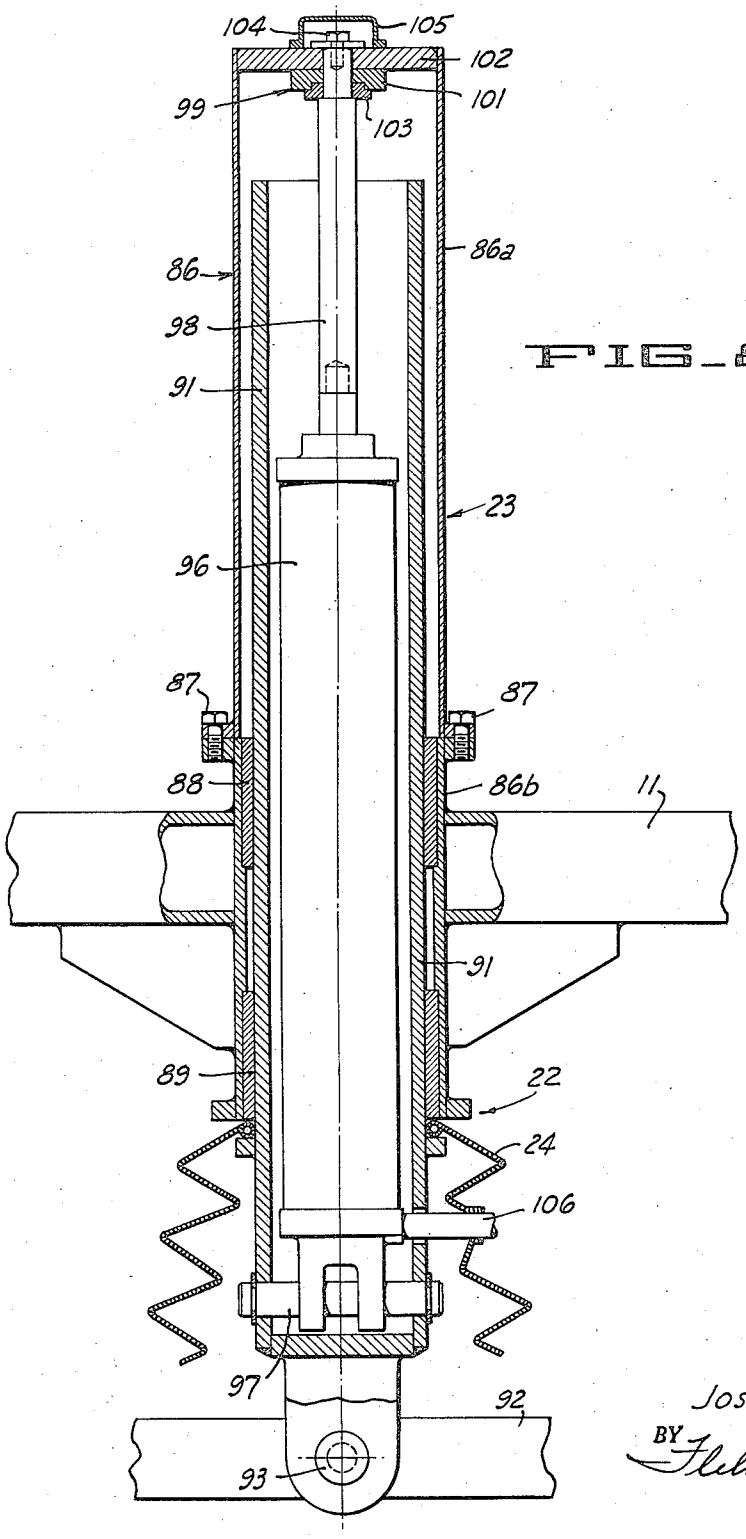


FIG. 8

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United States Patent Office 2,856,013 Patented Oct. 14, 1958

2,856,013

SAND CLEANING DEVICE WITH OVERLOAD RELEASE

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Application October 12, 1954, Serial No. 461,881

6 Claims. (Cl. 171—9)

This invention relates generally to cleaning devices and more particularly to cleaning devices for removing refuse from the sand on beaches.

Conventional sand cleaning devices such as the one disclosed in Patent No. 2,744,739, granted May 8, 1956, have been found to have certain undesirable features. In particular, they have been found to be of limited capacity because the screens became clogged very easily. Conventional machines have been frequently damaged because no safety devices were provided when rocks and other solid devices were encountered. These devices have also been objectionable in that they have been very dusty to operate.

In general, it is an object of the present invention to provide a sand cleaning device of the above character which will be capable of sifting much greater quantities of sand and which at the same time will not become clogged.

Another object of this invention is to provide a sand cleaning device with safety release means to prevent damage to the sand cleaning device when it strikes a solid object.

Other objects and advantages of the invention will appear from the following description taken in conjunction with the accompanying drawing.

Referring to the drawing:

Figure 1 is a top plan view of my improved sand cleaning device.

Figure 2 is a side elevational view of the device as shown in Figure 1.

Figure 3 is an enlarged side elevational view of a portion of my sand cleaning device.

Figure 4 is a cross-sectional view taken along the line 4—4 of Figure 1.

Figure 5 is an enlarged cross-sectional view taken along the line 5—5 of Figure 1.

Figure 6 is an enlarged top plan view of the portion of the device shown in Figure 5.

Figure 7 is a cross-sectional view taken along the line 7—7 of Figure 6.

Figure 8 is a cross-sectional view taken along the line 8—8 of Figure 2.

In general, the present invention consists of a rotating drum which carries the sand from the beach onto a vibrating screen which sifts the sand onto the beach and deposits the refuse in a refuse collector.

The embodiment of my sand cleaning device shown in the drawing consists of a framework 11 supported at the rear by ground-engaging wheels 12 and at the front by ground-engaging wheels 13. The framework 11 is in the form of a yoke having side arms 14 which serve as a mounting for the motor 16, the gear box 17, the rotating drum 18, the screen 19, and the refuse collector 21.

The forward end of the framework 11 is preferably connected to the front ground-engaging wheels 13 by king pin assembly 22 to facilitate easy turning of the device. In addition, hydraulically operated means such as the hydraulic jack 23 may be provided for raising and

lowering the framework to expedite the turning operation and for other purposes hereinafter described. An extensible sleeve 24 is provided to keep the sand from entering the hydraulic jack mechanism 23. The wheels 14 are provided with a suitable drawbar 26 for attaching the device to a tractor (not shown).

The drum 18 can be similar to that illustrated in Patent No. 2,744,739, granted May 8, 1956. Briefly, it includes a pair of end plates 27 fixed to the shaft 28 having its opposite ends journalled to the side arm 14. A screen 29 coaxially aligned with the shaft 28 is fixed to the end plates 27. However, the screen 29 is of a diameter substantially less than the diameter of the end plates 27. A plurality of transverse blades 31 are secured to the end plates 27 and are spaced circumferentially about the axial screen 29. As shown in Figure 4, the blades 31 are formed of two sections, one section 31*a* which is extended radially with respect to the drum 18 and a second offset section 31*b* which is inclined in the direction of rotation of the drum 18. A plurality of supporting members 32, axially spaced between the blades 31, serve to give additional rigidity to the blades 31.

The screen 19 is pivotally mounted at its rearward end about an axle 36 fixed to the framework 11. The forward end of the screen 19 is supported by chains 37 which are fastened to the opposite ends of arms 38 fixed to a shaft 39 which is journalled onto the side arms 14. The shaft 39 is adapted to be rocked in clockwise and counterclockwise directions by means hereinafter described.

As can be seen from the drawing, the motor 16 is mounted forward of the drum 18 and is connected to a gear box 17 by means of a double universal coupling 42. The gear box 17 may be slidably mounted on the framework 11 by any suitable means such as bolts 43 loosely mounted in slots 44. The gear box 17 is continuously urged in a forward direction by means of a spring 46 engaging abutment 47 fixed to the gear box 17. The extreme forward position of the gear box is adjusted by means of the bolt 48.

The drum 18 is rotated by means of a sprocket wheel 51 which is fixed to the output shaft 52 of the gear box 17. A sprocket wheel 53 is fixed to one of the end plates 27 of drum 18 and is driven by sprocket wheel 51 by means of chain 54.

The screen 19 is vibrated by an eccentric 57 which is also connected to the output shaft 52. The eccentric is connected to a crank arm 58 fixed to shaft 39 by means of a rod 59 and turnbuckle 61.

In constructing my sand cleaning device, I have found it desirable to provide safety release means to prevent damage to the sand cleaning device when the drum 18 strikes a solid object. Any suitable safety release means may be utilized and one that is particularly satisfactory is shown in the drawing. An L crank 63 is pivotally mounted on the framework 11 and is adapted to be engaged by an abutment 64 fixed to the gear box 17. A rod 66 serves to connect the L crank 63 to the clutch lever 67, connected to the clutch mechanism (not shown), in such a manner that when the gear box 17 is pulled to the rear, the clutch lever 67 will cause disengagement of the clutch mechanism. The gear box 17 will normally be held in a forward position by the spring 46 and will only be pulled to the rear when the drum 18 strikes a solid object.

The refuse collector 21 has its forward end pivotally mounted on the shaft 36 and is situated just to the rear of the screen 19. The rearward end of the refuse collector 21 is supported by chains 71 which are fixed to the framework 11. The refuse collector is connected in such a manner that it can be readily detached when it is desired to empty the same. It can be formed of any suitable material but preferably should be formed of

screen so that any sand passing into the collector will pass therethrough.

A lip **72** may be provided to insure that the refuse discharged by the screen **19** will be discharged into the refuse collector **21**. In this instance it has been mounted on the rearward end of the screen **19**. A lip **73** may also be provided on the forward end of the screen **19** to insure that all of the sand and refuse discharged from the drum **18** will fall upon the screen.

If desired, a levelling device may be mounted to the rear of the sand cleaning device. In this instance I have shown a flat horizontal member **74** which is attached to the main frame **11** by means of chains **76**.

When necessary, a dust shield may be placed around the front end of the rotating drum **18**. In this instance I have shown a dust shield **81** having depending side wings **82** connected to supporting rods **83** mounted on the framework **11**. The shield **81** extends downwardly for a substantial distance so that it will be in close proximity with the beach when the sand cleaning device is in operation.

The king pin assembly **22** and the hydraulic jack **23** consists of a housing **86** with an upper part **86*a*** and a lower part **86*b***. The two parts of the housing are secured together by suitable means such as bolts **87**. The lower part **86*b*** is secured to the frame **11** as shown in the drawing. Upper and lower bearings **88** and **89** are mounted within the lower part **86*b*** of the housing and rotatably engage a sleeve-like king pin **91** which extends coaxially of the housing **86** and which has its lower end pivotally secured to an axle **92** by a pin **93**. The front wheels **13** are mounted on the axle **92**.

A hydraulic cylinder **96** is mounted within the sleeve-like king pin **91** and has its lower end pivotally connected to the king pin **91** by a pin **97**. A piston (not shown) mounted within the cylinder **96** is connected to a piston rod **98**. The upper end of the piston rod **98** is connected to a thrust bearing **99** which consists of a bearing member **101** secured to an insert **102** in the upper part of the housing **86*a*** and a bearing member **103** mounted on the piston rod **98**. The piston rod is secured to the upper part of the housing **86*a*** by a screw **104**. A dust cap **105** is mounted over the screw **104**. The hydraulic cylinder **98** is provided with a pipe connection **106** which is adapted to be connected to a source of hydraulic fluid under presure.

Operation of the sand cleaning device may now be briefly described as follows: As described previously, the sand cleaning device is adapted to be drawn over the areas of beach to be cleaned by any suitable means such as the crawler-type tractor. As the sand cleaning device is being drawn over the beach, the motor **16** serves to rotate the drum **18** in a counterclockwise direction causing the blades **31** to dip into the sand to a predetermined depth and lift the sand with the debris therein onto the vibrating screen **19**. However, as the sand is being lifted from the beach, a substantial portion of the sand will drop back onto the beach through the axial screen **29**. The remainder of the sand and the debris will be passed onto the vibrating screen **19**. The action of the eccentric **57** will cause the screen **19** to be jiggled up and down causing the remainder of the sand to pass upon the beach and the debris to fall into the refuse collector **21**.

It is apparent that the slope of the vibrating screen **19** can be varied when any difficulty is encountered in getting all of the sand to pass upon the beach before the debris enters the refuse collector **21**. The refuse collector **21** is constructed of screen material so that any sand which should happen to pas into the refuse collector will pass onto the beach.

It is possible to vary the depth to which the beach will be cleaned merely by raising and lowering the framework **11** by means of the hydraulic jack **23**. The device can be raised by forcing hydraulic fluid through pipe

106 into the hydraulic cylinder **96** to force the piston upwardly in the cylinder and to thereby raise the device. The device can be lowered merely by allowing fluid to flow from the cylinder **96** through the pipe **106**. The weight of the device itself will cause it to be lowered as fluid passes from the cylinder **96**. It is also apparent that raising of the main frame by means of the hydraulic jack **23** will also facilitate turning of the sand cleaning device.

When the blades **31** of the rotating drum **18** strike a solid object the clutch mechanism will be disengaged in the following manner. The stopping of the rotation of the drum **18** causes a substantial pull on the top section of the chain **54** which in turn causes the gear box **17** to be moved to the rear against the urging of the spring **46**. The rearward movement of the gear box **17** causes the abutment **64** to rotate the L crank **63** which in turn pulls the rod **66** and the clutch lever **67** to disengage the clutch mechanism. Thus, the clutch mechanism is almost instantly disengaged when the drum **18** happens to strike a solid object. To re-establish a driving connection, it is merely necessary to manually engage the clutch by means of the clutch lever **67**.

The dust shield **81** serves to keep any dust which may arise during the sand cleaning operation in close proximity to the drum so that it will not bother the operator on the tractor.

It will be apparent from the foregoing that I have provided an improved sand cleaning device which can be used on beaches. The device is suitable for cleaning sand to various depths and is capable of handling much greater quantities of sand than conventional machines. The safety release means will prevent damage to the sand cleaning device when the blades strike solid objects and the dust shield will serve to keep the dust stirred up by the device in close proximity to the drum.

I claim:

1. In a device for separating refuse from the sand on a beach as the device is moved over the beach, a wheeled frame adapted for movement on the beach, a rotatable drum-like member mounted on the frame so that its axis is perpendicular to the line of movement of the wheeled frame, said drum-like member having mounted thereon a plurality of circumferentially spaced blades adapted to engage and lift sand and refuse from the beach as the drum-like member is rotated, motive means, a clutch mechanism connected to said motive means, gearing means slidably mounted on said frame for rectilinear movement, means connecting said gearing means to said clutch mechanism to permit sliding movement of said gearing means relative to said clutch mechanism, endless non-slipping driving means connecting said gearing means to said drum-like member for causing rotation of said drum-like member, said gearing means being pulled towards said drum-like member by said non-slipping driving means when said drum-like member strikes a solid object or the like, means responsive to sliding movement of said gearing means for disengaging said clutch mechanism, and means yieldably urging said gearing means into its normal position.

2. A device as in claim 1 together with additional sifting means mounted on said frame to the rear of said drum-like member, the additional sifting means being adapted to receive sand and refuse discharged from the rear of the drum-like member, crank means mounted on said frame and connected to the forward end of said screen, an eccentric mounted on said gearing means and means connecting said eccentric to said crank means for imparting rocking motion to said crank means to cause vibratory movement of said additional sifting means.

3. In a device for separating refuse from the sand on a beach as the device is moved over a beach, a wheeled frame adapted for movement on the beach, a rotatable drum-like member mounted on the frame with its axis perpendicular to the line of movement of the wheeled

frame, said drum-like member having mounted thereon a plurality of circumferentially spaced blades adapted to lift the sand and refuse from the beach as the drum is rotated, a motor mounted on said framework, a clutch mechanism connected to said motor, gearing means mounted on the frame for sliding rectilinear movement, means connecting said gearing means to said clutch mechanism to permit relative sliding movement between said clutch mechanism and said gearing means, an endless chain connecting said gearing means to said drum-like member whereby upon operation of said gearing means said drum-like member is rotated, said endless chain serving to cause sliding movement of said gearing means towards said drum-like member when said drum-like member strikes a solid object or the like, means responsive to sliding movement of said gearing means for disengaging said clutch mechanism, and means yieldably urging said gearing means into its normal position.

4. A device as in claim 3 together with additional sifting means mounted on said frame to the rear of said drum-like member, said additional sifting means being adapted to receive sand and refuse discharged from the rear of the drum-like member, crank means pivotally mounted on said frame and having at least two ends, one end being connected to said additional sifting means, eccentric means mounted on said gearing means, and means connecting said eccentric means to the other end of said crank means whereby upon operation of said gearing means said crank means will be rocked to cause vibratory movement of said additional sifting means.

5. In a drive for a device utilized for separating refuse from the sand on a beach, the device being of the type having a rotatably mounted drum-like member, the drum-like member having mounted thereon circumferentially spaced blades adapted to lift sand and refuse from the beach as the drum-like member is rotated by the drive, the drive comprising motive means, a clutch mechanism connected to said motive means, gearing means slidably mounted for rectilinear movement with respect to said frame and said drum-like member, endless non-slipping driving means driven by said gearing means and adapted to drive said drum-like member, means connecting said gearing means to said clutch mechanism to permit sliding movement of said gearing means relative to said clutch mechanism, said gearing means being pulled towards said drum-like member by said non-slipping driving means when said drum-like member strikes a solid object or the like, means responsive to sliding movement of said gearing means toward said drum-like member for disengaging said clutch mechanism, and means yieldably urging said gearing means into its normal position.

6. In a drive for a device utilized for separating refuse from the sand on a beach, the device being of a type having a drum-like member rotatably mounted on a frame, and additional sifting means mounted on the frame to the rear of the drum-like member, the drum-like member having mounted thereon circumferentially spaced blades adapted to lift sand and refuse from the beach and discharge the same into said additional sifting means as the drum is rotated by the drive; the drive comprising motive means, a clutch mechanism connected to said motive means, gearing means slidably mounted for rectilinear movement with respect to said frame and said drum-like member, an endless chain driven by said gearing means and adapted to rotate said drum-like member, means connecting said gearing means to said clutch mechanism to permit sliding movement of said gearing means relative to said clutch mechanism, said gearing means being moved toward said drum-like member by said endless chain when said drum-like member strikes a solid object or the like, means responsive to sliding movement of said gearing means toward said drum-like member for disengaging said clutch mechanism, means yieldably urging said gearing means to its normal position, an eccentric mounted on said gearing means, a crank-like member adapted to be pivotally mounted on said frame and having at least two ends, means connecting one end of said crank means to said eccentric whereby upon operation of said gearing means said crank means will be rocked, and means connecting the other end of said crank means to said additional sifting means whereby upon rocking of said crank arm by said eccentric said additional sifting means will be vibrated.

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