Feb. 7, 1956 G. GAUTHIER ET AL 2,733,904

BEACH CLEANING APPARATUS

Filed Oct. 7, 1952 2 Sheets-Sheet 1

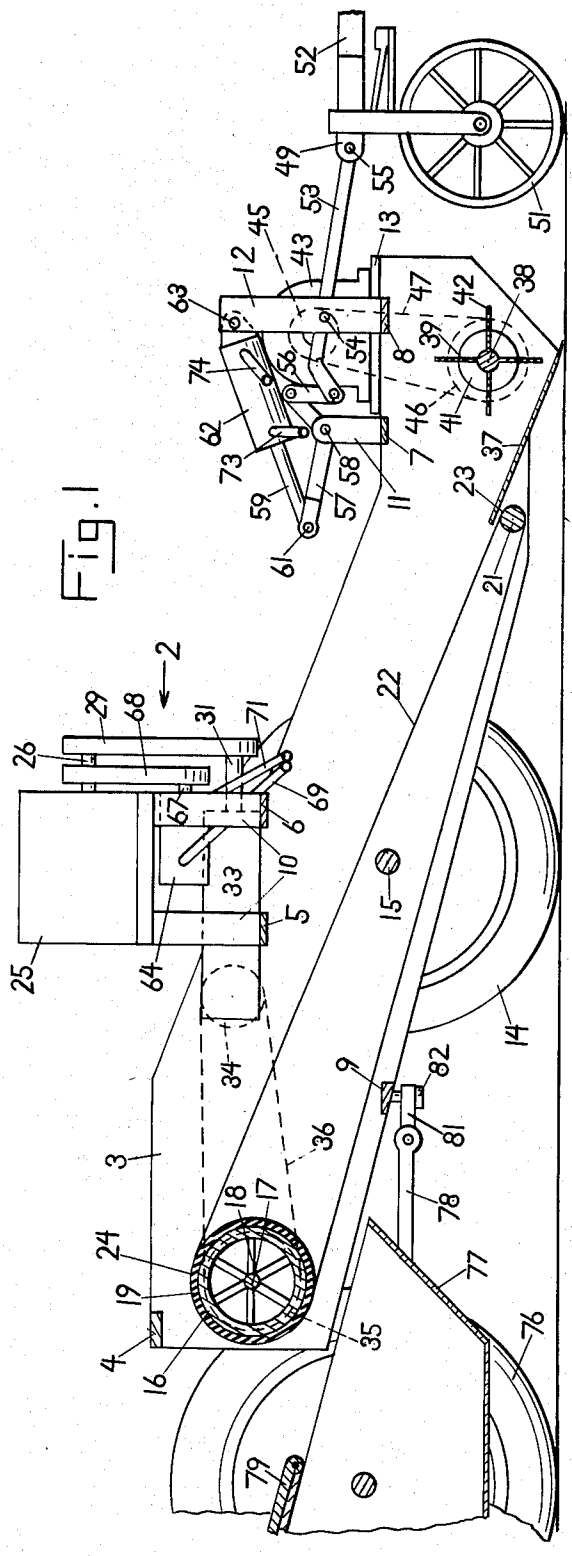


Fig. 1

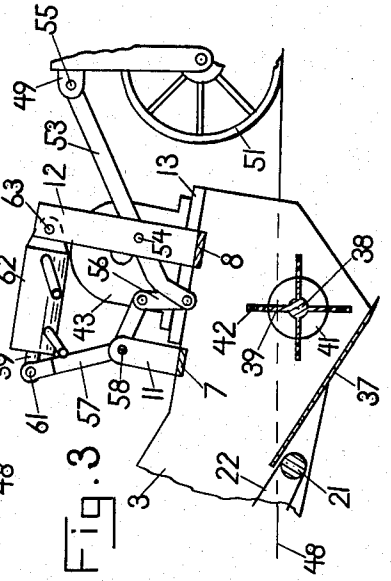


Fig. 3

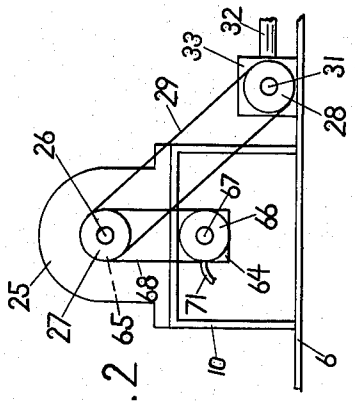


Fig. 2

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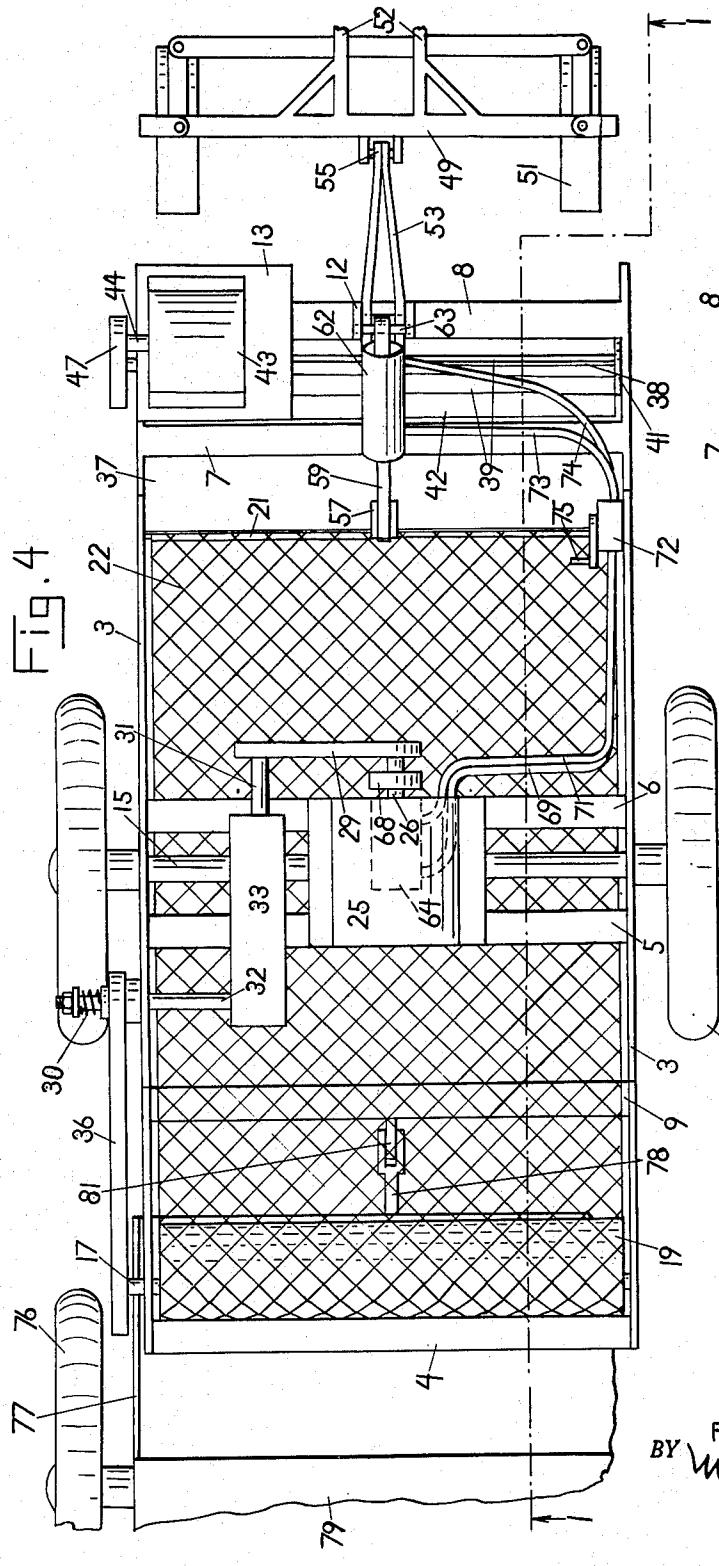


Fig. 4

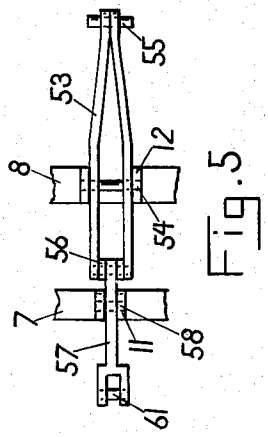


Fig. 5

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BEACH CLEANING APPARATUS

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2 Claims. (Cl. 262—2)

Our invention relates to devices for cleaning beaches or similar sandy tracts by sieving the sand and thereby removing rubbish and litter consisting of pieces larger than the sand particles.

Objects of our invention are to provide a device movable over sandy ground with a shoveling ramp which, during the movement of the device, separates a sand layer from the ground, to adjust the thickness of this layer according to requirements up to considerable depth, to shift this layer rearward on a sieving net, to move this net in rearwardly rising direction while the sand particles fall though the meshes of the net and the remaining rubbish is carried farther, and thereby to separate and remove the rubbish from the sand.

Other objects are to provide a beach cleaning device that can be kept in good working condition for a long time and that is not subject to rapid wear, to avoid the use of chains which have links affixed to the conveyer net and, hence, are exposed to the conveyed sand, and to move this net by means which have no links exposed to the wear by this sand.

Further objects are to operate the conveyor net whether or not the shoveling proceeds and at a speed independent of the progressive movement of the entire device, thereby to make this speed adaptable to the requirements which vary, for example, with the degree of moisture of the sand, and to dispose of all sand accumulated on the net also when the device does not move ahead.

Still other objects are to secure a quick shift of the shoveled sand to the sieving net and to avoid the accumulation of an excessive sand pile on the shoveling ramp even when the sand is wet, to provide rotating plates over the front end of the ramp for this purpose, to make the rotation of these plates independent of the movement of the sieving conveyor and of the movement of the shoveling ramp, thereby to make the operation of these plates adaptable to various requirements and to the accumulation of sand on the ramp and on the sieve, to avoid obstruction of this operation, to rotate the mentioned plates optionally in one or in the opposite direction, thereby to use optionally the upper or the lower way of the rotating plates for the rearward shift, and to lower the rotary axis of the plates under the sand level when this upper way is being used.

Still further objects are to achieve these results with simple and reliable means, and to provide a structure for the mentioned purposes which can be easily made, assembled and maintained.

Still other objects and advantages will appear from the following description of an exemplifying embodiment of our invention, from the appended claims and from the accompanying drawing in which:

Fig. 1 shows a partially sectional side view of an illustrative embodiment of our invention, seen from the line 1—1 in Fig. 4.

Fig. 2 shows a front view of a broken off part of this embodiment, seen in the direction of the arrow 2 in Fig. 1.

Fig. 3 shows a broken off part of Fig. 1, representing parts of the embodiment in a position different from Fig. 1.

Fig. 4 shows a top view of the embodiment shown in Fig. 1.

Fig. 5 shows a top view of some parts which are partly invisible in Fig. 4.

Referring to the drawings, numeral 3 indicates two side walls which are rigidly connected by traverses, for example, by traverses 4 to 9, and which may be stiffened by additional means in known and suitable manner. Bridge-like structures 10 are affixed on top of the traverses 5 and 6. A pair of posts 11 is affixed on top of the traverse 7, and a pair of longer posts 12 is affixed on top of the traverse 8. A platform 13 is affixed on top of the traverse 8 and of the front end of one of the side walls 3. All these parts together form a frame adapted for supporting other parts of the device.

This frame is supported by a pair of wheels 14 connected by a shaft or axle 15 which passes through bores in the walls 3.

A roller 16 which may form a hollow cylinder connected to a shaft 17 by spokes 18 is positioned near the upper rear end of the frame. The shaft 17 extends horizontally into bores of the walls 3 whereby the roller 16 is rotatable. Preferably the roller 16 is covered with a cylindrical sleeve 19 placed on the circumference of the roller tightly and exchangeably. Another, preferably smaller roller 21 is similarly rotatable in bores of the walls 3. The roller 21 is positioned nearer to the front of the frame and lower than the roller 16.

A flexible net 22 is circularly connected to form an endless band slung about the rollers 16 and 21 whereby this band engages these rollers, preferably frictionally, and moves circularly when one of the rollers is rotated. This structure avoids the use of chain links affixed to and moving with the band and exposed to sand carried by the band. Hence, this structure constitutes an important improvement over the prior art in which such chain links have been used and have been subject to rapid wear. The roller 16 or its sleeve 19 has no joints which may be damaged by sand, is positioned at the highest point of the band where the conveyed sand has already dropped through the net, and, when worn, can be easily and inexpensively replaced.

The meshes of the net 22 are shown in Fig. 4 schematically and of exaggerated width for the sake of clear representation. I desire it understood that these meshes may have any desired and suitable shape and a width allowing the passage of sand particles, but retaining pieces of rubbish considerably larger than sand particles. The net 22 has an upper portion extending from a front line 23 on top of the roller 21 in moderately rising direction to a rear line 24 on top of the roller 16 (see Fig. 1). The horizontal width of the net is considerable and extends almost as far as the distance between the walls 3. The sleeve 19 engages the net along its entire width whereby rotation of the roller 16 moves the net reliably and evenly.

The upper portion of the net 22 is moved from line 23 to line 24 by rotating the roller 16 in counter-clockwise direction (Fig. 1). This rotation is derived from a motor 25 carried by the frame whereby operation of the net is independent of movement of the wheels 14 or of progressive movement of the device. This arrangement has important advantages mentioned before in the statement of the objects and, hence, constitutes an important improvement over the prior art in which movement of similar sieving conveyors has been derived from the wheels.

The motor 25 may be of any suitable type, may be mounted on the bridges 10 and may be operatively connected to the roller shaft 17 in the following manner:

The motor 25 has a driven shaft 26 to which a wheel 27 is affixed. This wheel drives another wheel 28 by means of a transmission member 29. The wheel 28 is affixed to a shaft 31 which drives another shaft 32 by means of a gear of known structure contained in a gear box 33. The shaft 32 passes through a bore in a side wall 3 and carries a wheel 34. The wheel 34 may be coupled with the shaft 32 in known manner by the pressure of a spring 30 which releases the coupling when the rotary resistance of the wheel 34 exceeds a predetermined amount. The wheel 34 drives a wheel 35 by means of a transmission member 36. The wheel 35 is affixed to an extension of the shaft 17. The transmission members 29 and 36 may be of any known and suitable structure, for example belts or chains, and the wheels connected by these members may be construed accordingly.

A shoveling ramp 37 is affixed to the bottom of the front end of the frame and extends from one wall 3 to the other. This ramp may be formed by a plate of sheet metal having a sharp front edge. This edge is positioned in front of and lower than the front line 23 of the net 22. The ramp extends from this front edge in a moderately rising direction about parallel to the upper portion of the net 22 to a rear edge positioned rearwardly beyond and higher than the line 23.

A horizontal shaft 38 is rotatable in bores of the side walls 3. Broad plates 39 are affixed to this shaft, are distributed about the same and extend along parallel to its axis and radially thereto. The shaft 38 is positioned over the front end of the ramp 37 at a distance therefrom which is slightly larger than the radial extension of the plates whereby these plates can rotate without contacting the ramp. The plates 39 may comprise stiff portions reinforced by end disks 41, and resilient portions 42 made preferably of rubber and extending radially beyond the disks 41.

The shaft 38 and the plates 39 are rotated preferably by means independent of the progressive movement of the device or of the ramp and independent of the movement of the conveyor net, for example, in the following manner: A motor 43 of any suitable type is mounted on the platform 13 and has a driven shaft 44 provided with a wheel 45 which is connected with a wheel 46 by a transmission member 47 similar to the member 29. The wheel 46 is affixed to an extension of the shaft 38.

Means are provided for rotating the shaft 38 optionally in either of the two rotary directions. For example, the motor 43 may be of a reversible type or a reversible gear may be incorporated in this motor and may allow reversion of the driven shaft 44 in known manner.

The front end of the frame together with the ramp 37 and the rotatable plates 39 can be positioned higher or lower by turning the frame about the axle 15. Fig. 1 shows the latter parts in their highest position in which the lower edge of the ramp is over the level 48 of the ground, this level being substantially identical to the horizontal plane contacted by the lowest points of the wheels 14. Fig. 3 shows the mentioned parts in their lowermost position in which the ramp digs deep into the ground sand and in which the shaft 38 is deeper than the above defined level. The height of the ramp or the inclination of the frame can be adjusted between the highest and lowest position in a manner that will be described in the following.

The frame is held in any of its possible positions by connection with an auxiliary frame 49 which is supported by wheels 51 and has bars 52 shown broken off in Figs. 1 and 4. These bars extend to the front and connect the auxiliary frame with a tractor pulling the auxiliary frame and the entire device. The main frame and the auxiliary frame are connected by a forked lever 53 which is secured in an adjustably inclined position in the following manner:

The lever 53 is pivoted to the posts 12 at 54, has a front end pivoted to the auxiliary frame at 55 and has a rear

end hinged by links 56 to one end of a lever 57. The latter lever is pivoted to the posts 11 at 58 and has another end pivoted to one end of a rod 59 at 61. The rod 59 enters a cylinder 62 pivoted to the post 12 at 63. This cylinder is in well known manner provided with an inner piston affixed to the rod 59 whereby the rod can be moved more or less into the cylinder by hydraulic operation.

This hydraulic operation may be derived from a pump 64 operated by the motor 25 by means of a wheel 65 affixed to the motor shaft 26, a wheel 66 affixed to the pump shaft 67, and a transmission member 68 connecting the wheels 65 and 66. The pump 64 is connected by pipes 69 and 71 with a hydraulic control housing 72 which, in turn, is connected with the cylinder 62 by pipes 73 and 74. The housing 72 is provided with a handle 75 which allows, in known manner, to supply either side of the cylinder with hydraulic pressure or to maintain the existing pressure whereby the position of the rod 59 relatively to the cylinder can be fixed or varied. Hence, the rod and the cylinder together form an arm of adjustable length. Variation of this length adjusts the inclination of the lever 53 and, thereby, adjusts the height of the ramp and of the shaft 38 relatively to the level 48.

When the sand is very wet or when for other reasons only a relatively thin layer shall be cleaned at a time, the ramp 37 is lowered less deep than in other cases. Then the plates 39 are preferably operated in that direction which is clockwise in Fig. 1. But, when an especially large obstacle should be caught between these plates and the ramp, the obstruction may be quickly removed by reversing the turning direction. When the sand is not very wet, it is possible to clean a deep layer with a far lowered ramp. In this case, the plates 39 are preferably rotated in that direction which is counter-clockwise in Fig. 1, and even large obstacles can not obstruct their rotation. In any case, the sand layer separated from the ground moves on the ramp to the rear partly because of the progressive movement of the ramp and partly by the additional impulse exerted by the rotating plates.

The sand drops over the rear edge of the ramp on the net 22 which conveys the sand farther rearward. During this transportation, the sand is sieved and drops through the meshes of the net. This sieving operation is improved by the resilient vibrations of the moving net so that all sand has dropped from the net when the same reached its highest line 24, even if the sand is wet.

The rubbish remaining on the net drops beyond the roller 16 into a suitable receptacle. This receptacle may be incorporated in a cart shown broken off in Figs. 1 and 4 and comprising a pair of wheels 76 supporting a case 77 which extends to the front under the roller 16. The case 77 is affixed to a beam 78 which is hinged to the traverse 9 by members 81 and 82. The top of the front portion of the case 77 is open and can be closed by turning a cover 79 when the cart is detached from the cleaning device.

It may be noted that the transmission members 29, 36, 47 and 68 are well spaced from the sand transported in the device whereby they are protected from wear by this sand. These members may be additionally protected by casings (not shown) of well known structure.

We desire it understood that our invention is not confined to the particular embodiment shown and described, the same being merely illustrative, and that our invention may be carried out in other ways within the scope of the appended claims without departing from the spirit of our invention as it is obvious that the particular embodiment shown and described is only one of the many that may be employed to attain the objects of our invention.

Having described the nature of our invention, what we claim and desire to protect by Letters Patent is:

1. In a beach cleaning vehicle, a sand conveying device comprising two side walls; a movable sieving device including an endless sieving net extending between said

walls from a lower front end to a higher rear end; means for moving said sieving device; a shoveling ramp extending from an edge positioned in front of and lower than said net's front end to an edge positioned in rear of and higher than said net's front end, a horizontal shaft rotatably supported and extending over said ramp across the moving direction of said sieving net, transport plates affixed to said shaft and extending axially and radially thereto between said walls, and means for rotating said shaft, said means being geared for rotation of said shaft in the direction in which said plates move rearward when they are higher than said shaft.

2. In a beach cleaning vehicle, a sand conveying device comprising two side walls; a movable sieving device including an endless sieving net extending between said walls from a lower front end to a higher rear end; means for moving said sieving device; a shoveling ramp extending from an edge positioned in front of and lower than said net's front end to an edge positioned in rear of and higher than said net's front end, a horizontal shaft rotatably supported and extending over said ramp across the moving direction of said sieving net, transport plates affixed to said shaft and extending axially and radially

thereto between said walls, and means for rotating said shaft, said means being reversible whereby said plates can be optionally moved rearward when they are lower or when they are higher than said shaft.

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