

[54] **SNOW CLEARERS**

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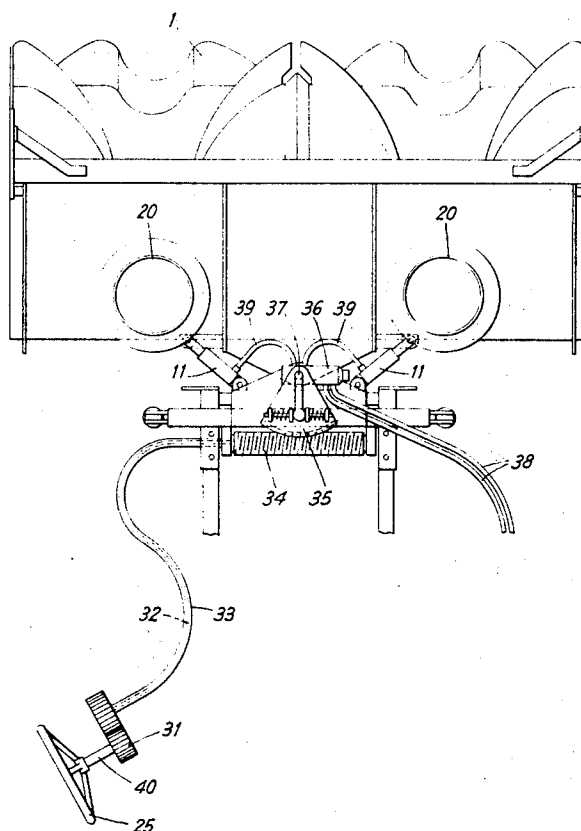
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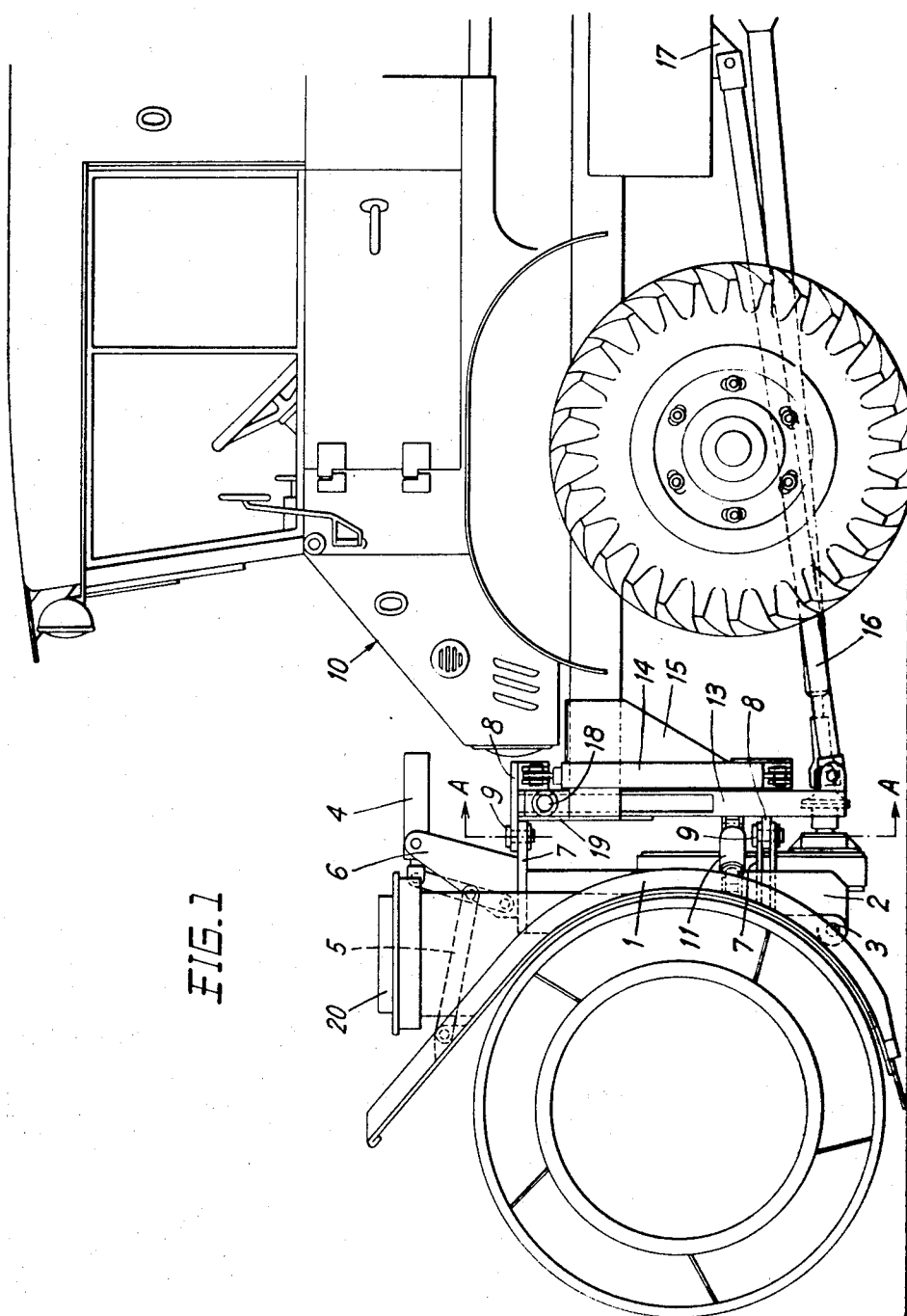
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[57] **ABSTRACT**

This invention concerns a snow clearer comprising an automotive vehicle; a snow clearing device, the snow clearing device being mounted anteriorly of the automotive vehicle, a snow cutter means being mounted on the snow clearing device; swivel means linking the automotive vehicle and the snow clearing device and permitting the snow clearing device to be swivelled about a vertical axis; and remote control urging means for causing the snow clearing device to swivel about said vertical axis.

7 Claims, 9 Drawing Figures





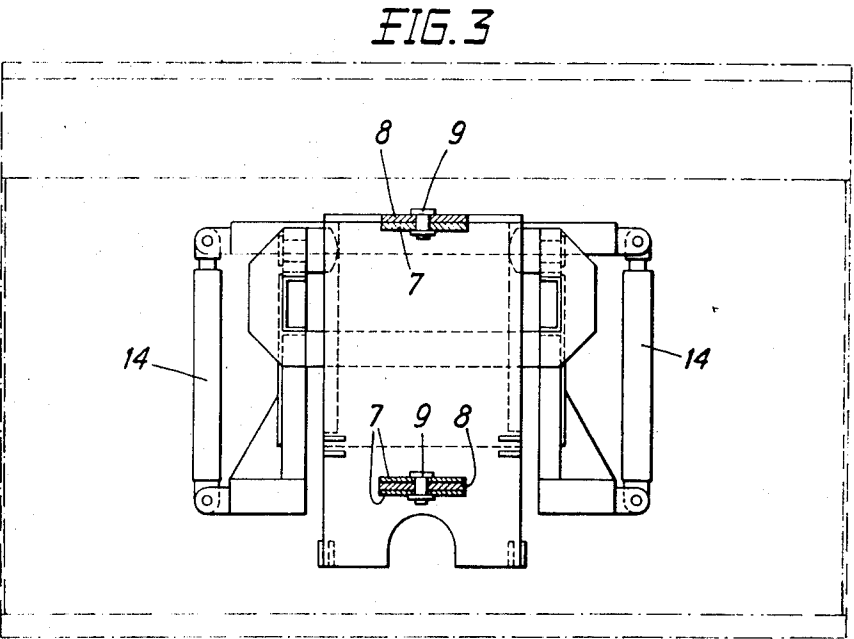
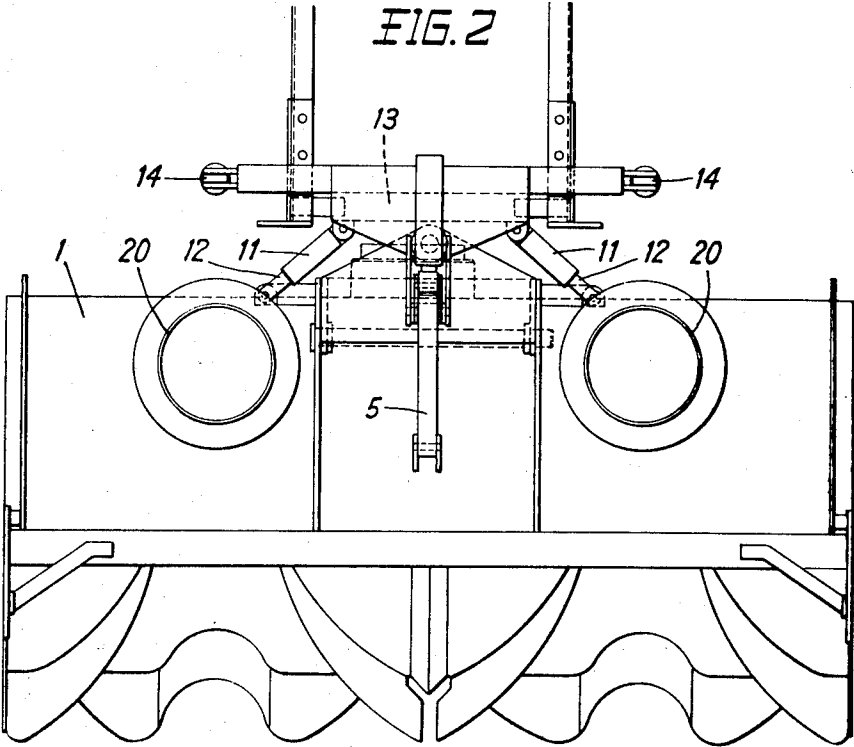
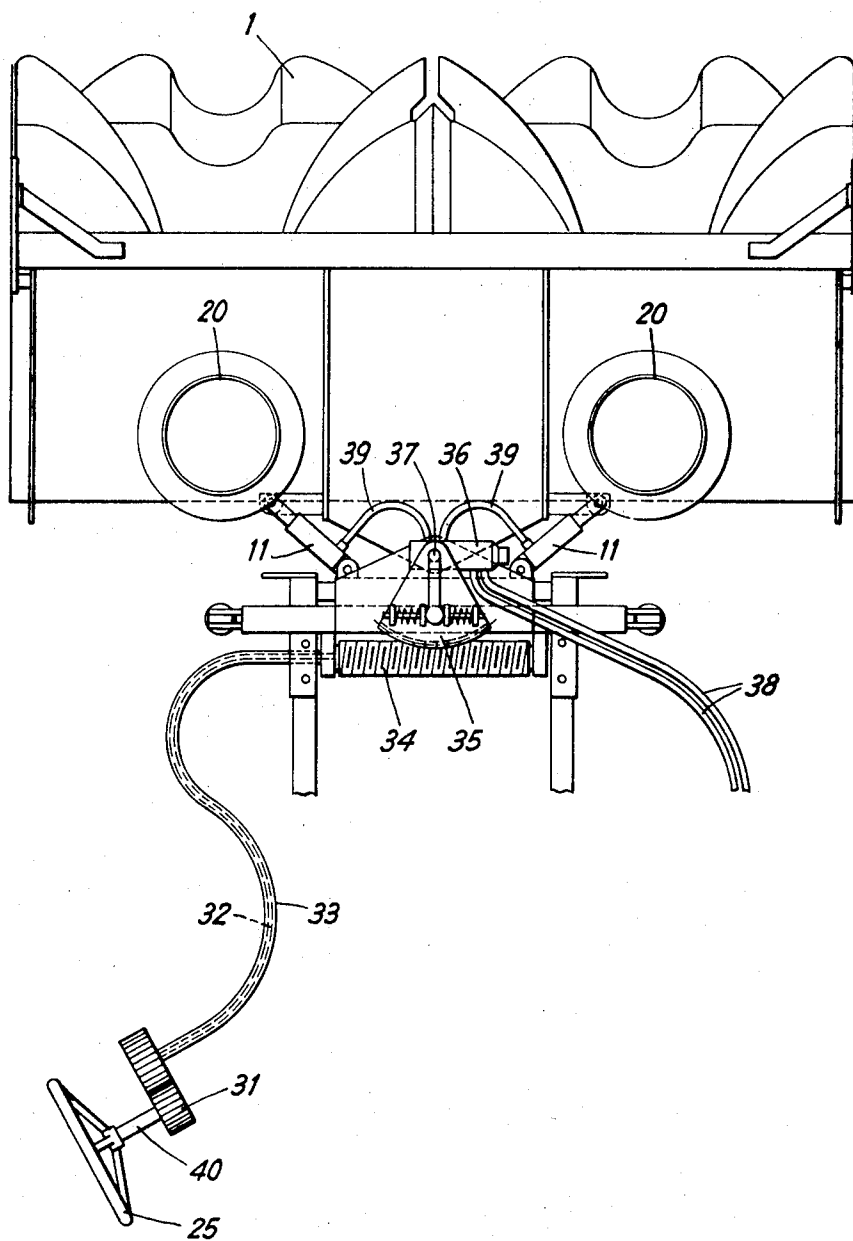
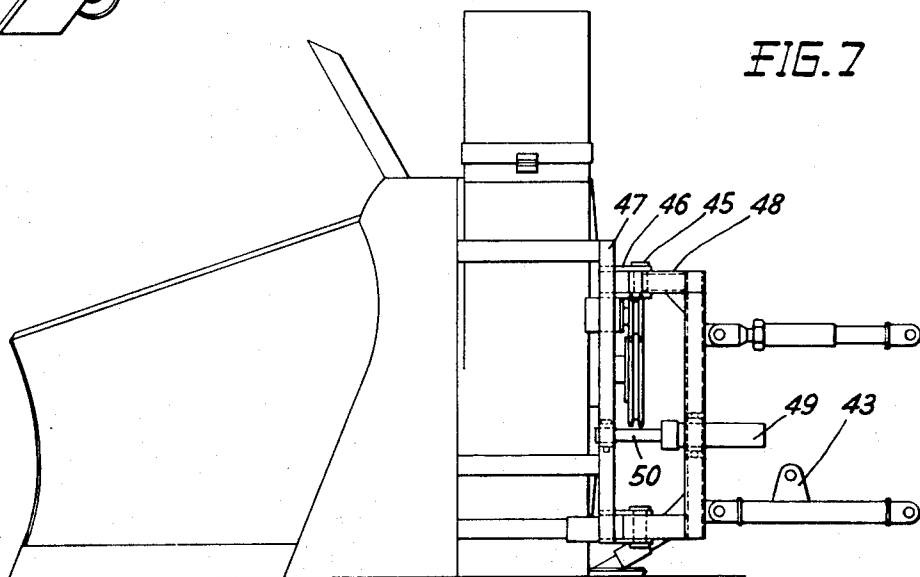
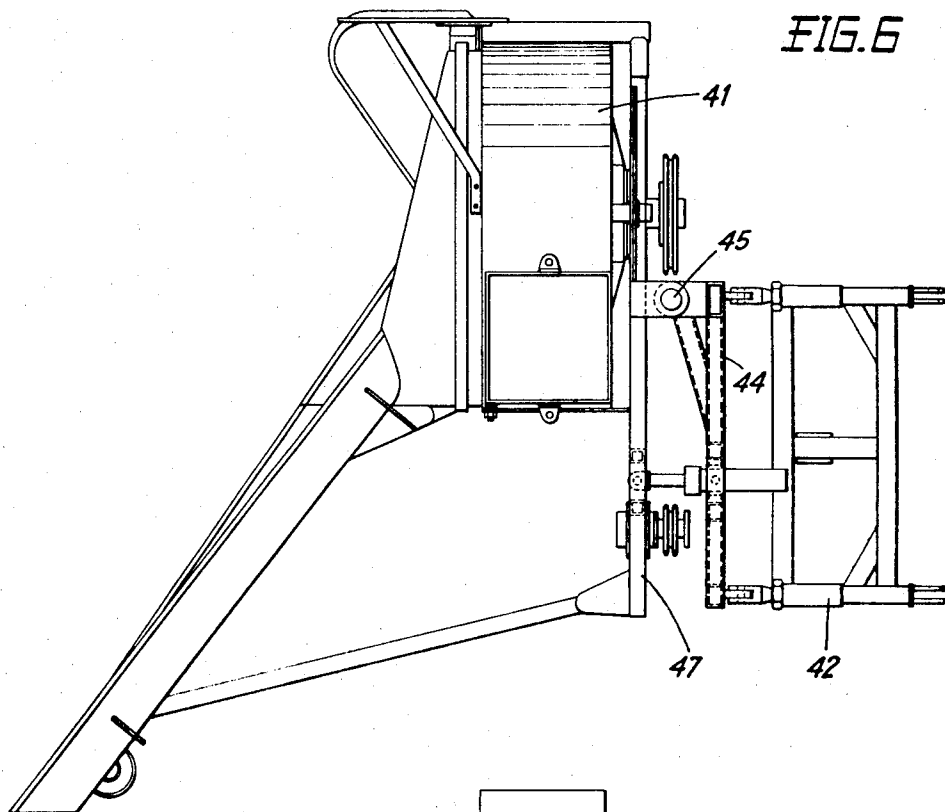
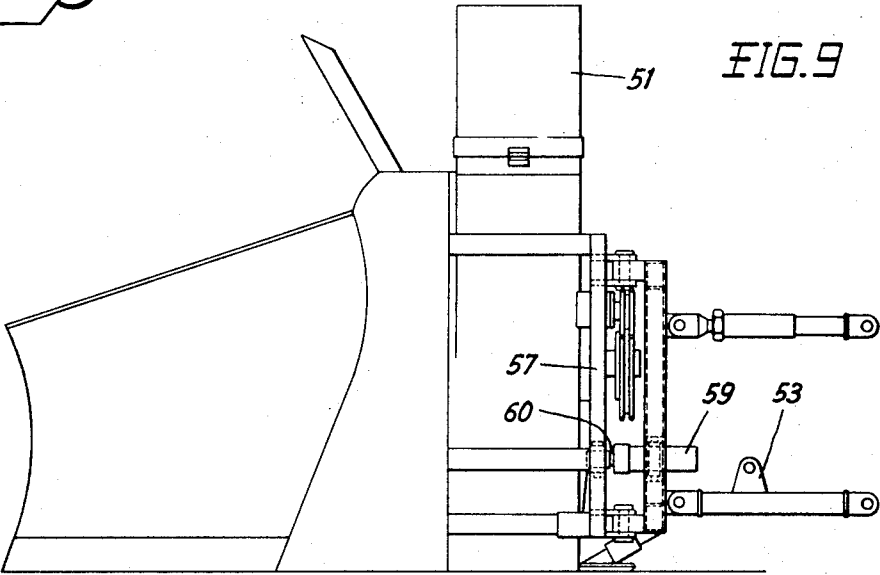
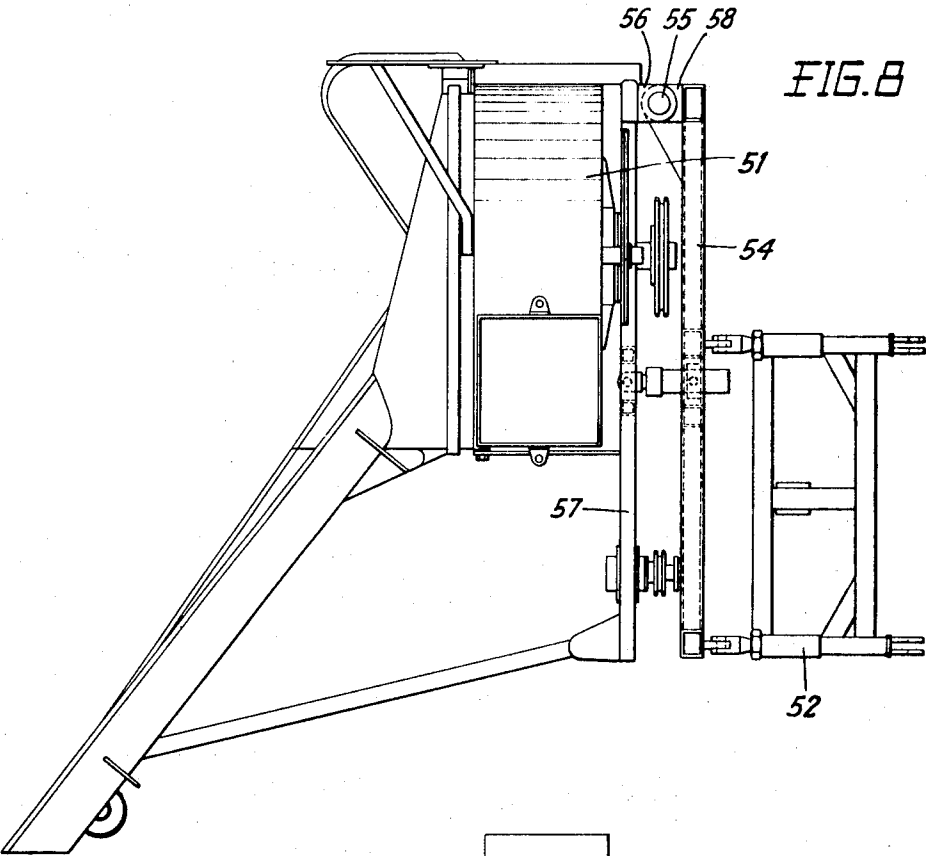


FIG. 5







SNOW CLEARERS

BACKGROUND OF THE INVENTION

1. FIELD OF INVENTION

The present invention relates to snow clearers and specifically to snow clearers comprising an automotive vehicle and an anteriorly mounted snow clearing device thereon.

2. DESCRIPTION OF THE PRIOR ART

Snow clearers comprising an automotive vehicle and an anteriorly mounted snow clearing device thereon are known, examples of snow clearing devices being snow drum cutters, rotary snow cutters in some cases provision being made for lateral ejection of snow. Such clearing devices can be according to the road conditions raised, lowered, cross adjusted or tilted forwardly or backwardly.

In such snow clearers, difficulty is experienced in negotiating and clearing bends especially when the bend is covered with hard or packed snow whereby the forwardly projecting snow clearing device mounted on the automotive vehicle is caused to approach and bull-doze the snow with the lateral, not rotatable and non-snow clearing parts thereof. The difficulty is even more pronounced with bends of smaller radius wherein such large snow resistance is set up that often the snow clearer is shifted sideways. In practice such bends either cannot be cleared or require several sweeps by the snow clearer which is clearly a disadvantage.

It has been proposed to overcome the difficulty by modifying the automotive vehicle by providing rear wheel steering, front and rear wheel steering or central articulation of the vehicle, all of which require an expensive and specialised automotive vehicle and still the difficulty is not completely overcome, because owing to the overhanging part of the snow-clearing device over the chassis a side shifting of the vehicle occurs.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a snow clearer to overcome or substantially to reduce the aforementioned disadvantages so as to enable bends of small radius covered with hard or packed snow to be cleared.

Accordingly, the present invention provides a snow clearer comprising

- a. an automotive vehicle,
- b. a snow clearing device, the snow clearing device being mounted anteriorly of the automotive vehicle, snow cutter means being mounted on said snow clearing device,
- c. swivel means linking the automotive vehicle and the snow clearing device and permitting the snow clearing device to be swivelled about a vertical axis, and
- d. remote control urging means for causing the snow clearing device to swivel about said vertical axis.

Preferably, the remote control urging means comprises at least one double acting piston and cylinder assembly arranged to act on the snow clearing device to cause the snow clearing device to swivel about the vertical axis. The piston and cylinder assembly is conveniently hydraulically operated.

Objects and advantages will appear from the following description of embodiments and modifications of the invention when considered in connection with the

accompanying drawings, and the novel features will be particularly pointed out in the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic side elevation of a snow clearer in accordance with a first embodiment, a part only of the automotive vehicle of the snow clearer being shown,

FIG. 2 is a schematic plan view of part of the snow clearer of FIG. 1,

FIG. 3 is a section along the line A—A of FIG. 1,

FIG. 4 is a schematic plan view of the snow clearer of FIG. 1 with part of the automotive vehicle in cut-away,

FIG. 5 is a schematic plan view of a snow clearer in accordance with a second modification of the first embodiment,

FIG. 6 is a schematic plan view of part of a snow clearer in accordance with a second embodiment, only the snow clearing device thereof being shown,

FIG. 7 is a schematic side elevation of the snow clearer of FIG. 6,

FIG. 8 is a schematic plan view of part of a snow clearer in accordance with a modification of the second embodiment, only the snow clearing device being shown, and

FIG. 9 is a schematic side elevation of FIG. 8.

In accordance with a first embodiment, shown in FIGS. 1 to 4, a snow clearer comprises a snow clearing device anteriorly mounted with respect to an automotive vehicle 10.

The snow clearing device is of the snow drum cutter type and comprises a post 2 which, pivotably mounted about a pivot pin 3, is a drum cutter provided with a housing 1 and snow discharge ducts 20. On top of the post 2 is mounted a yoke 6 in which a piston and cylinder assembly 4 is supported. Connecting members 5 mechanically link the housing 1 of the snow cutter drum and the piston and cylinder assembly 4. From post 2 projects in a horizontal plane a set of three connecting plates 7.

The automotive vehicle comprises a chassis 17 with an anterior chassis projection 15. Connected to anterior chassis projection 15 at their lower ends is a pair of vertically disposed piston and cylinder assemblies 14. The upper ends of the pair of piston and cylinder assemblies 14 are connected to an upper horizontally extending flange 8 of a lifting and lowering plate 13. The lifting and lowering plate 13 is also provided with a lower horizontally extending flange 8, the flanges 8 of the lifting and lowering plate 13 being arranged in vertically aligned relationship. Upper and lower flanges 8 are pivotally connected to connecting plates 7 by means of upper and lower swivel pins 9. The upper and lower swivel pins 9, connection plates 7 and flanges 8 all lie in the median plane of the automotive vehicle. The lifting and lowering plate 13 is provided with vertically extending guides 19 accommodating studs 18 in slidable relationship. In addition struts 16 extend from the chassis 17 of the automotive vehicle to the lifting and lowering plate 13. Pivotably mounted on the lifting and lowering plate 13 is a pair of piston and cylinder assemblies 11 horizontally disposed, which are also pivotably mounted on the post 2 of the snow clearing device.

With particular reference to FIG. 4, the piston and cylinder assemblies 11 are connected to a source of hy-

draulic power by means of hydraulic pipes 26 and 27. Pipes 26 and 27 are connected one at each end of a double acting piston and cylinder assembly 22 which functions as a pump. A servo piston and cylinder assembly 21 is provided to assist with the steering of the front steerable wheels of the vehicle. This is connected to the steering wheel 25 of the vehicle via a steering box 24 and conventional steering transmission and linkages generally designated 23, and also to the front wheels of the vehicle. Piston and cylinder assemblies 21 and 22 are relatively arranged such that the piston within cylinder 22 duplicates and is fully responsive to the movement of the piston within cylinder 21. The pipes 26 and 27 branch off intermediate their length to a hydraulic fluid reservoir 28. Hydraulic lines (not shown) are also provided for piston and cylinder assemblies 4 and 14, and are of conventional form, leading to hydraulic fluid pump means (not shown) operable from within the cab of the automotive vehicle.

In use of the snow clearer of the first embodiment, when it is desired to negotiate and clear snow from a bend, the steering wheel 25 is manually turned in the required direction. Steering of the steerable wheels follows from actuation of the servo piston and cylinder 21. Corresponding movement of the piston within the cylinder of piston and cylinder assembly 22 ensues responsive to the movement of the piston within servo piston and cylinder 21. Fluid in one end of the cylinder of piston and cylinder assembly 22 is urged along the corresponding hydraulic pipe 26 or 27 actuating the corresponding piston and cylinder assembly 11 and urging the anteriorly mounted snow clearing device to swivel about pins 9 in a horizontal plane. Swivelling of the snow clearing device causes fluid in the other piston cylinder assembly 11 to flow back along the corresponding hydraulic pipe 26 or 27. Should a vacuum tend to occur in either hydraulic pipe or within the piston and cylinder assembly 22, then fluid is driven from fluid reservoir 28.

When it is desired to lift the anteriorly mounted snow clearing device, piston and cylinder assemblies 14 are actuated through their respective hydraulic lines. This causes lifting or lowering plate 13 to be lifted and by means of connecting plates 7, flanges 8 and swivel pins 9, the applied lift is transmitted to the snow clearing device as a whole. Lateral support for the lifting and lowering plate 13 is provided for by means of studs 18 running in guides 19 and struts 16.

When it is desired to forwardly tilt the housing 1 and snow cutter drum, piston and cylinder assembly 4 is actuated through its hydraulic line, force being transmitted from the assembly to the housing via connecting members 5.

A first modification of the first embodiment described above comprises the direct connection of the servo piston and cylinder assembly 21 to steering wheel 25 by electrical means in the form of a servo potentiometer, amplifier and relevant circuitry. In addition or alternatively, a reduction arrangement may be incorporated such that the travel of the piston of piston and cylinder assembly 11 is shorter than that of piston and cylinder 22, allowing greater swivelling power of piston and cylinder assemblies 11.

In a second modification of the first embodiment, shown in detail in FIG. 5 the extent of rotation of the steering wheel 25 is sensed by means of a pair of meshing gears 31, one of which is mounted on the steering

shaft 40 of the steering wheel 25. The other gear is mounted on a flexible shaft 32 arranged within a protective sheath 33. The shaft 32 is connected with a worm 34 mounted on the chassis, meshing with a toothed gear segment 35 pivoted on a pin 37, lying in the vertical axis of pins 9 shown in FIGS. 1, 2 and 3, and spring loaded on either side towards a position corresponding to the direction of travel of the vehicle. The pin 37 passes into and operates a double acting hydraulic valve 36. The valve 36 is connected to each piston and cylinder assembly 11 by hydraulic pipes 39 and is connected with a hydraulic power source in the form of the vehicle hydraulic fluid pump (not shown) by means of hydraulic pipe lines 38.

In use turning of steering wheel 25 transmits drive through the shaft 32 to the worm 34 to cause the gear segment 35 to pivot about and turn pin 37. Turning of pin 37 operates the valve 36 to allow high pressure hydraulic fluid to pass through one of the pipes 39 and actuate the corresponding piston and cylinder assembly 11, the direction and degree of turn of pin 37 determining which piston and cylinder assembly is actuated and the extent of actuation. Fluid compressed in the other piston and cylinder assembly 11 not actuated is caused to flow through the valve to the vehicle hydraulic pump. In this manner, the snow clearing device is caused to swivel about swivel pins 9, the direction and extent of which being determined by the movement of the steering wheel 25.

In a second embodiment shown in FIGS. 6 and 7, a snow clearing device comprises a rotary snow cutter and side ejector 41. The snow clearing device is mounted anteriorly of an automotive vehicle (not shown), the median plane of the snow clearing device being displaced transversely of the median plane of the automotive vehicle. The rotary snow cutter 41 is mounted on a support frame 42 which forms a parallelogram and is connected to a chassis extension (not shown) of the automotive vehicle. Lifting and lowering means (not shown) are provided connected with a flange 43 of the support frame 42. Cross member 44 of the support frame 42 is pivotally connected to an ejector frame 47 of the rotary snow cutter 41 by means of swivel pins 45 passing through and connecting horizontally projecting connecting members 46 mounted on the ejector frame 47, and connecting members 48 mounted on the support frame 42. The swivel pins 45 are vertically aligned and lie approximately in the median plane of the rotary snow cutter. A piston and cylinder assembly 49 is mounted between the support frame 42 and ejector frame 47. Hydraulic lines (not shown) are provided for the piston and cylinder assembly 49, which are analogous to those described in the first embodiment and shown in FIG. 4.

In use of the snow clearer of the second embodiment described above, when it is desired to negotiate and clear snow from a bend, the steering wheel (not shown) of the automotive vehicle (not shown) is turned causing the piston and cylinder assembly 49 to be actuated. The piston and cylinder assembly 49 urges the ejector frame 47 to swivel about the swivel pin 45 and present the cutting area of the rotary cutter to the snow to be cleared. It will be appreciated that the anteriorly mounted rotary snow cutter and side ejector of this embodiment may only swivel in one direction beyond the plane normal to the direction of travel, which with this

type of snow clearing device is found in practice to give satisfactory results.

In a snow clearer of a modification of the second embodiment shown in FIGS. 8 and 9, like parts with respect to the snow clearer of the second embodiment are represented by numbers greater by an amount 10. Generally the construction and operation of the snow clearer of this embodiment is identical with that of the second embodiment. However, in this embodiment instead of swivel pin, now 55, being located in the median plane of the snow clearing device, it is located at a point adjacent the nearside of the snow device.

Whilst preferred forms of the present invention have been described, changes and modifications may be made therein within the scope of the appended claims without departing from the spirit and scope of the invention.

What is claimed is:

1. A snow clearer comprising:

an automotive vehicle, a snow clearing device mounted on the anterior of said vehicle, a snow cutting means mounted on said snow clearing device, swivel means linking said automotive vehicle and said snow clearing device for permitting swivelling movement of said snow clearing device, relative to said vehicle, about a vertical axis, remote control urging means carried by said snow clearer for causing said snow clearing device to swivel about said vertical axis; said automotive vehicle further including a steering wheel, a worm means, a flexible steering shaft connecting said steering wheel and said worm means, valve means, valve

opening and closing means connected to said valve means and operably engaging said worm means, said valve means being hydraulically connected to an hydraulic fluid pump and to said urging means so that responsive to turning of said steering wheel, said valve opening and closing means opens and closes said valve to selectively admit fluid from said pump, through said valve means, to said urging means whereby said urging means causes swivelling movement of said snow clearing device about said vertical axis.

2. A snow clearer as defined in claim 1 wherein said vertical axis is displaced from the median plane of the automotive vehicle in the direction of travel to the right.

3. The snow clearer of claim 1 wherein said snow cutting means comprises a snow drum cutter.

4. The snow clearer of claim 1 wherein said snow cutting means comprises a rotary snow cutter.

5. The snow clearer of claim 3 wherein said vertical axis lies in the median plane of the automotive vehicle in the direction of travel thereof.

6. The snow clearer of claim 4 wherein said vertical axis is displaced from the median plane of the automotive vehicle in the direction of travel thereof and is disposed adjacent the rotary snow cutter.

7. The snow clearer of claim 1 wherein the swivelling angle of the snow clearing device about said vertical axis, relative to said automotive vehicle, is defined by the kind and number of worm pitches of said worm means.

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