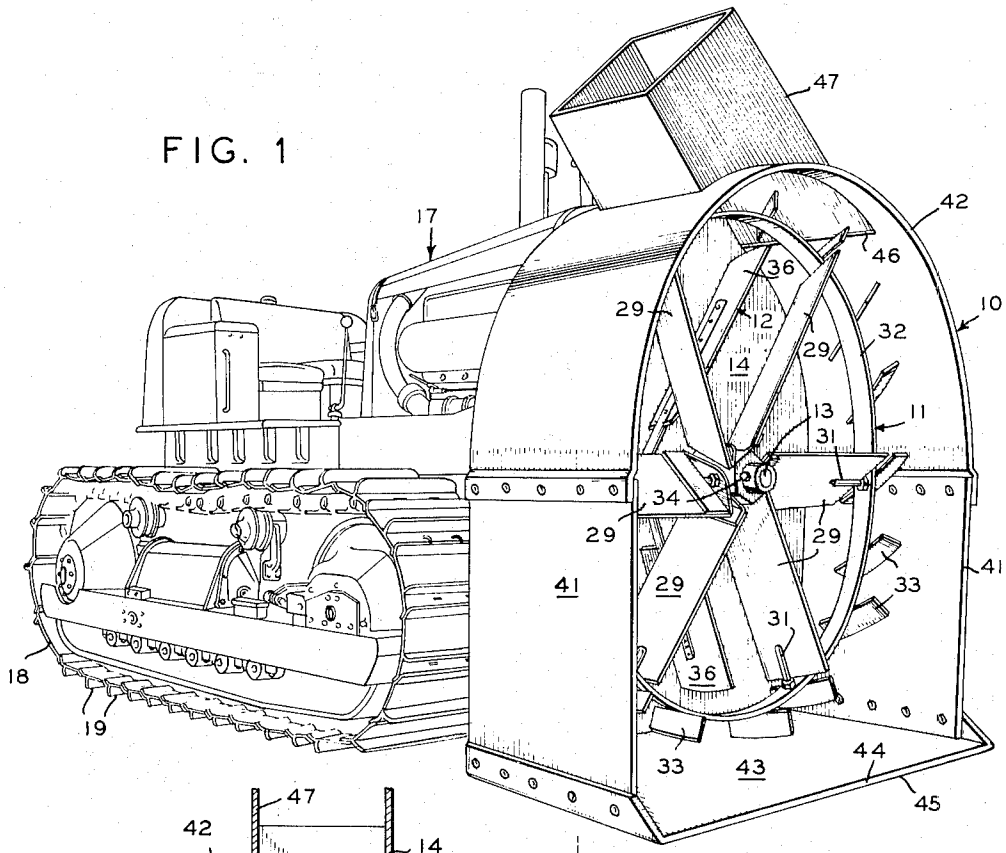
May 1, 1956 F. L. LINZY 2,743,538

SNOW REMOVAL APPARATUS

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FIG. 1



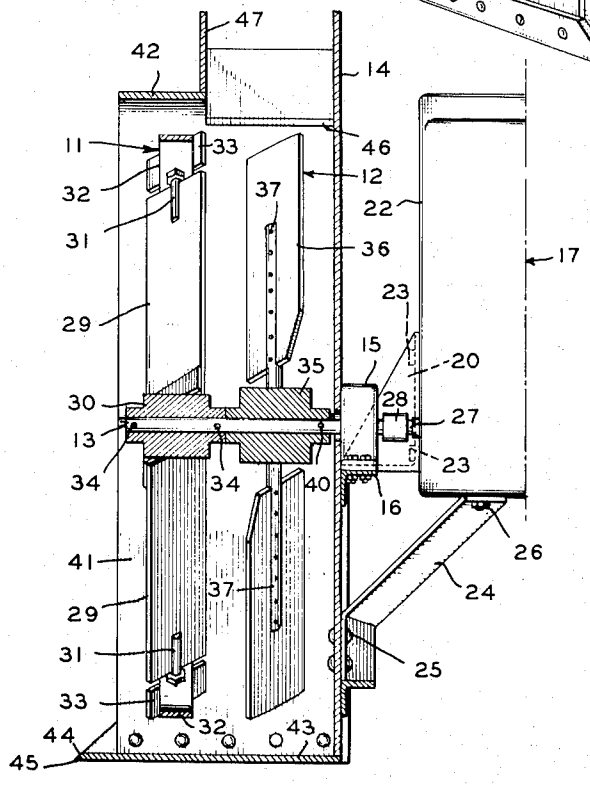


FIG. 4

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SNOW REMOVAL APPARATUS

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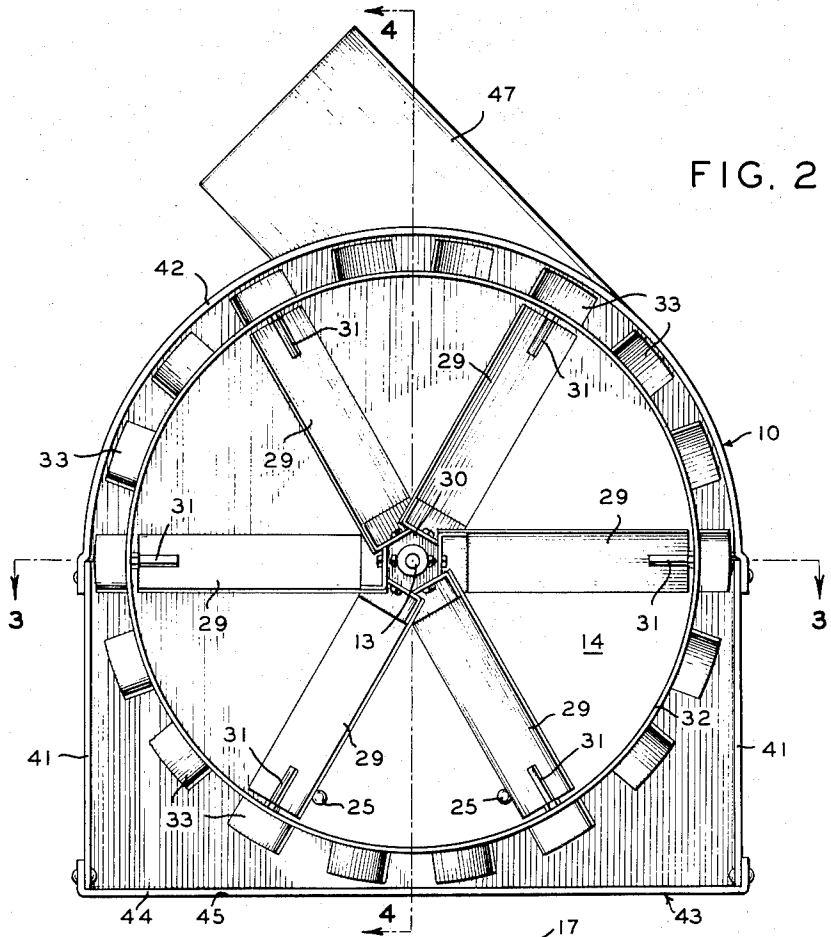


FIG. 2

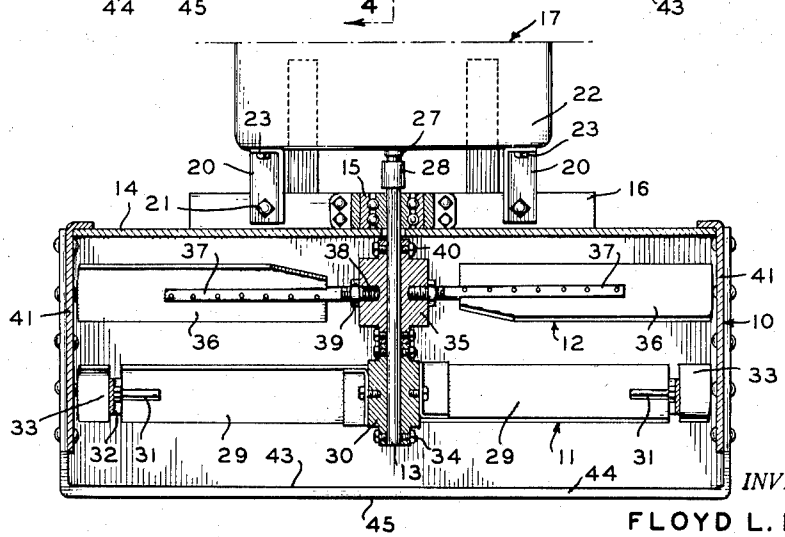


FIG. 3

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SNOW REMOVAL APPARATUS

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Application February 8, 1952, Serial No. 270,597

7 Claims. (Cl. 37—43)

This invention relates to material handling and more particularly to a self propelled device for removing snow from sidewalks, highways or other surfaces where such snow might impede normal activities and is a continuation in part of copending application Serial No. 744,382 filed April 28, 1947, now abandoned.

Heretofore numerous types of snow plows and other devices for removing snow have been developed but many of these were either inadequate to cope with the quantity of snow to be removed or the hardness thereof and others which were designed to handle large quantities of snow were relatively complicated and subject to numerous breakdowns and consequent high maintenance costs. Also many of these prior art devices which were designed to handle relatively large quantities of snow required excessive amounts of power to operate the same and were not suitable for use on relatively small tractors or other vehicles thus precluding use thereof by the ordinary home owner.

It is therefore an object of the invention to provide a self-propelled snow removal device in which relatively large quantities of snow may be handled regardless of whether such snow is of the soft fluffy variety or whether the snow is a relatively hard frozen mass.

Another object of the invention is the provision of a snow removal device which is adapted to remove relatively large quantities of snow from sidewalks, roadways or the like, and in which such snow is projected to one side either onto a pile or into a vehicle to be transported away.

A further object of the invention is the provision of a self-propelled snow removal device in which all of the power for operation of such device is supplied by the propelling vehicle and in which such power requirements are reduced to a minimum.

A still further object of the invention is the provision of a self-propelled snow removal device in which the various parts thereof are easily removable for replacement, thus materially reducing the costs of maintenance and repair.

A further object of the invention is the provision of a self-propelled snow removal device which may be constructed from readily available parts and materials and in which relatively little skilled labor is required in the construction thereof thus bringing the device within the reach of the ordinary home owner.

Further objects and advantages of the invention will become apparent from the following description taken in conjunction with the accompanying drawings wherein:

Fig. 1 is a view in perspective of the snow removal device of this invention attached to a tractor of the endless track type;

Fig. 2, a front elevational view of the snow removal device shown in Fig. 1;

Fig. 3, a fragmentary sectional view on the line 3—3 of Fig. 2; and

Fig. 4, a fragmentary sectional view on the line 4—4 of Fig. 2.

With continued reference to the drawings there is shown in Fig. 1 a snow removal device constructed in accordance with this invention and of the so-called rotary type in which there is provided a casing 10 which may conveniently house a rotor 11 and a second rotor 12 mounted on a central shaft 13. As shown in Figs. 3 and 4 the shaft 13 may extend through the rear wall 14 of the casing 10 and be journalled in antifriction bearings 15 supported on an angle member 16 secured to the rear wall 14.

A propelling vehicle in the form of a tractor 17 may be provided and this tractor may be conventional in all respects being provided with endless treads 18 which may be formed with metallic cleats 19 thereon in order to properly grip the surface over which the apparatus moves or, if desired, in order to protect such surface, cleats 19 may be replaced by blocks of rubber or other suitable resilient material which will provide sufficient friction between treads 18 and the surface over which the vehicle moves in order to provide ample propelling power to force the casing 10 and associated equipment through the snow to be removed.

As shown in Figs. 3 and 4, the casing 10 may be attached to the tractor 17 by bracket members 20 which may be secured to the rear wall 14 of the casing 10 by screw threaded fastening means or the like 21 and which may be secured to a forepart 22 of the tractor 17 by screw threaded fastening means or the like 23. Spacing means in the form of struts 24 may also be provided which are secured to the rear wall portion 14 of the casing 10 by rivets or other suitable fastening means 25 and these struts 24 may be secured to the forepart 22 of the tractor 17 by screw threaded fastening means 26. The tractor 17 may be provided with a power take-off shaft 27 projecting from the forward end thereof and this power shaft may be connected to the shaft 13 of the snow removal apparatus by a suitable coupling 28.

Mounted upon the forward end of the shaft 13 for rotation therewith is the rotor 11 which may comprise a plurality of blades 29 secured to a hub 30 by a screw threaded fastening means or the like. Blades 29 may be set at any desired angle and are provided with studs 31 extending from the outer ends thereof which are secured to a shroud ring 32 which serves to further strengthen the rotor 11.

The rotor 11 is further provided with a plurality of relatively small blades 33 secured to the circumference of the shroud ring 32 by welding or the like and hub 30 may be secured to the shaft 13 to preclude relative rotation therebetween by pins or other suitable fastening means 34 extending through the hub 30 and through the shaft 13.

Mounted directly to the rear of rotor 11 on shaft 13 is a rotor 12 which may comprise a hub 35 and radially extending blades 36. Blades 36 may be secured to the hub 35 by studs 37 fixed to the blades 36 by welding or the like, these studs being screw threadedly engaged at 38 in the hub 35 and locked in adjusted position by lock nuts 39. Hub 35 may be fixed against rotation on the shaft 13 by pins or other suitable fastening means 40 extending through the hub 35 and the shaft 13.

Casing 10 may comprise substantially parallel side portions 41, a semi-circular upper portion 42 and a relatively flat bottom portion 43. Bottom portion 43 may extend somewhat forwardly of the forward edge of casing 10 and the edge of bottom portion 43 may be beveled as at 44 to provide a cutting edge 45. The semi-circular portion 42 may be provided with a snow discharge outlet 46 with a conduit 47 extending therefrom, the axis of conduit 47 being substantially tangential to the envelope described by the rotor 12.

As clearly seen from an inspection of the drawing, the casing 10 is entirely open at its forward end and

in operation with the rotors **11** and **12** rotating and the tractor **17** moving forwardly to force the lower edge **45** of casing **10** into the snow to be removed, the blades **29** and **33** of the rotor **11** will cut the snow whether this be a relatively hard frozen mass or whether such snow be of the fluffy variety. The outer blades **33** will cut an annular groove in the snow which will enable the blades **29** to comminute the relatively large mass of snow enclosed within the annular groove cut by the blades **33** and due to the angular relationship of blades **29** this comminuted snow will be forced rearwardly of the casing **10**.

Snow moving rearwardly from the blades **29** within the casing **10** will impinge upon the rotating blades **36** of rotor **12** and due to the arrangement of such blades the snow will be projected outwardly through the opening **46** and conduit **47** much in the manner of a centrifugal pump and such snow may be discharged into a pile along the side of the cleared space or may be discharged into an accompanying vehicle to be transported away.

It is to be noted that both rotors **11** and **12** revolve in the same direction thus materially simplifying the driving mechanism and it is to be further noted that all of the parts comprising the rotors are relatively easy to replace, thus greatly simplifying maintenance of the device. This is extremely important in devices of this nature since it is very common to encounter sticks, stones and other foreign material in snow and contact of this foreign material with the revolving blades of the rotors **11** and **12** might easily cause damage thereto, and were it not possible to conveniently replace these parts relatively long periods of inactivity might be necessitated, thus greatly reducing the efficiency of the apparatus.

Obviously, with the apparatus of this invention relatively large quantities of snow may be handled and completely removed from the cleared space in that it is not necessary to merely push the snow aside with brute force, but the snow is actually picked up and projected a considerable distance from the cleared area. Likewise, all of the power required for this operation is supplied by the propelling vehicle and depending on the size of the snow removal equipment this propelling vehicle may range anywhere from the common power driven lawnmower and small home tractors to larger and more powerful tractors which may be utilized in clearing relatively large areas. The invention further provides a snow removal device which may be easily attached to or removed from a conventional tractor, thus leaving such tractor free to perform normal operations but being available quickly in any emergency in order to be utilized for snow removal purposes.

It will be obvious to those skilled in the art that various changes may be made in the invention without departing from the spirit and scope thereof and therefore the invention is not limited by that which is shown in the drawings and described in the specification but only as indicated in the appended claims.

What is claimed is:

1. Snow removal apparatus including an elongated casing open at its forward end and having a discharge opening located rearwardly thereof, a drive shaft disposed axially of said casing, a rotor fixed on said drive shaft within said casing adjacent the forward end thereof, said rotor comprising a hub, a plurality of radially extending blades, means for removably and adjustably securing said blades to said hub, a shroud ring secured to the outer ends of said blades, a plurality of cutting blades secured to the outer periphery of said shroud ring and within the confines of the casing, said cutting blades serving to cut an annular groove in the snow and said radially extending blades serving to cut and comminute the snow inwardly of said groove and move the same rearwardly in said casing, a fan rotor fixed to said shaft rearwardly of said first mentioned rotor and comprising a hub and radially extending fan blades, means for removably and adjustably securing said fan blades to said hub, means on said

casing for removably securing the same to a propelling vehicle and means to couple said shaft to a power take-off shaft on said vehicle whereby upon forward movement of said casing and rotation of said rotors snow will be cut, comminuted and discharged through said discharge opening.

2. Snow removal apparatus including an elongated casing open at its forward end and having a discharge opening located rearwardly thereof, a drive shaft disposed axially of said casing, a rotor fixed on said drive shaft within said casing adjacent the forward end thereof, said rotor comprising a plurality of radially extending blades, means for removably and adjustably securing said blades in relation to said shaft a shroud ring secured to the outer ends of said blades, a plurality of cutting blades secured to the outer periphery of said shroud ring and within the confines of the casing, said cutting blades serving to cut an annular groove in the snow and said radially extending blades serving to cut and comminute the snow inwardly of said groove and move the same rearwardly in said casing, a fan rotor fixed to said shaft rearwardly of said first mentioned rotor and comprising radially extending fan blades, means for removably and adjustably securing said fan blades in relation to said shaft means on said casing for removably securing the same to a propelling vehicle and means to couple said shaft to a power take-off shaft on said vehicle whereby upon forward movement of said casing and rotation of said rotors snow will be cut, comminuted and discharged through said discharge opening.

3. Snow removal apparatus including an elongated casing open at its forward end and having a discharge opening located rearwardly thereof, a drive shaft disposed axially of said casing, a rotor fixed on said drive shaft within said casing adjacent the forward end thereof, said rotor comprising blades, a shroud ring secured to the outer ends of said blades, a plurality of cutting blades secured to the outer periphery of said shroud ring and within the confines of the casing, said cutting blades serving to cut an annular groove in the snow and said radially extending blade serving to cut and comminute the snow inwardly of said groove and move the same rearwardly in said casing, a fan rotor fixed to said shaft rearwardly of said first mentioned rotor and comprising fan blades, the bottom portion of the casing being beveled to provide a cutting edge, means on said casing for removably securing the same to a propelling vehicle and means to couple said shaft to a power take-off shaft on said vehicle whereby upon forward movement of said casing and rotation of said rotors snow will be cut, comminuted and discharged through said discharge opening.

4. A rotary snow plow for support upon a vehicle comprising a bearing, means to support the bearing on a vehicle so that its axis extends horizontally in the direction of movement of the vehicle, a shaft mounted in said bearing for rotation about the axis thereof, a plurality of cutting blades mounted on said shaft and extending radially therefrom, a relatively thin shroud ring surrounding said cutter blades and secured to the outer ends thereof thereby reinforcing said cutter blades with respect to one another, small blades extending radially from the shroud ring and inclined at an oblique angle relative to the plane of the shroud ring so that the leading edge of the small blades cut the snow or ice, said small blades being mounted on and outwardly of said shroud ring, said relatively small blades having their outer ends free whereby said relatively small blades may produce a groove in the material being treated and said cutting blades may remove the bulk of material within the projected outline of said shroud ring, means whereby said cutting blades may be adjustable to any oblique angle with respect to the plane of the shroud ring, and other means for removing the snow loosened by said blades.

5. A rotary snow plow for support upon a vehicle comprising a bearing, means to support the bearing on a

vehicle so that its axis extends horizontally in the direction of movement of the vehicle, a shaft mounted in said bearing for rotation about the axis thereof, a plurality of cutting blades mounted on said shaft and extending radially therefrom, a relatively thin shroud ring surrounding said cutter blades and secured to the outer ends thereof thereby reinforcing said cutter blades with respect to one another, small blades extending radially from the shroud ring and inclined at an oblique angle relative to the plane of the shroud ring so that the leading edge of the small blades cut the snow or ice, said small blades being mounted on and outwardly of said shroud ring, said relatively small blades having their outer ends free whereby said relatively small blades may produce a groove in the material being treated and said cutting blades may remove the bulk of material within the projected outline of said shroud ring, and fan blades mounted on said shaft for removing the snow loosened by said blades.

6. A rotary snow plow comprising a shaft for rotation on a horizontal axis, means for rotatably supporting the shaft in front of a vehicle and driving the shaft from power means on the vehicle, a plurality of rotating cutter blades mounted on said shaft adjacent the forward end thereof, means for adjusting the angularity of the blades relative to a plane perpendicular to the shaft whereby the leading edges of the cutting blades may be positioned for most efficient cutting action into a snowbank, a shroud ring surrounding said cutter blades and secured to the outer ends thereof for bracing the blades, a plurality of cutters mounted on said shroud ring outwardly thereof, each of said cutters being arranged with its cutting edge extending at an acute angle to the plane of the shroud ring whereby the cutting blades will produce an annular cut in the snow outwardly of the shroud ring to prevent retarding the forward motion of the vehicle by said shroud ring, a plurality of fan blades mounted on said shaft rearwardly of said cutting blades and means to adjust the angularity of said fan blades relative to said transverse plane whereby the impelling action of said fan blades may be adjusted to obtain the most efficient removal of snow from behind said cutter blades, a casing surrounding said blades and provided with an outlet adjacent the upper portion thereof whereby the snow cut by said blades and cutter blades will be propelled by said fan blades upwardly through said discharge opening out of the path of said snow plow and vehicle operating the same, said casing being provided with a back wall rearwardly of said fan blades whereby the air currents are drawn through the cutter blades and the air and snow is forced out through said upwardly extending opening.

7. A rotary snow plow comprising a shaft for rotation on a horizontal axis, means for rotatably supporting the shaft in front of a vehicle and driving the shaft from power means on the vehicle, a plurality of rotating cutter blades mounted on said shaft adjacent the forward end thereof, a shroud ring surrounding said cutter blades and secured to the outer ends thereof for bracing the blades, a plurality of cutters mounted on said shroud ring outwardly thereof, each of said cutters being arranged with its cutting edge extending at an acute angle to the plane of the shroud ring whereby the cutting blades will produce an annular cut in the snow outwardly of the shroud ring to prevent retarding the forward motion of the vehicle by said shroud ring, a plurality of fan blades mounted on said shaft rearwardly of said cutting blades and means to adjust the angularity of said fan blades relative to said transverse plane whereby the impelling action of said fan blades may be adjusted to obtain the most efficient removal of snow from behind said cutter blades, a casing surrounding said blades and provided with an outlet adjacent the upper portion thereof whereby the snow cut by said blades and cutter blades will be propelled by said fan blades upwardly through said discharge opening out of the path of said snow plow and vehicle operating the same, said casing being provided with a back wall rearwardly of said fan blades whereby the air currents are drawn through the cutter blades and the air and snow is forced out through said upwardly extending opening.

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