

Jan. 25, 1966

M. W. LUTZ

3,230,645

SNOW REMOVAL ATTACHMENT FOR SWEEPING MACHINES

Filed June 26, 1963

4 Sheets-Sheet 1

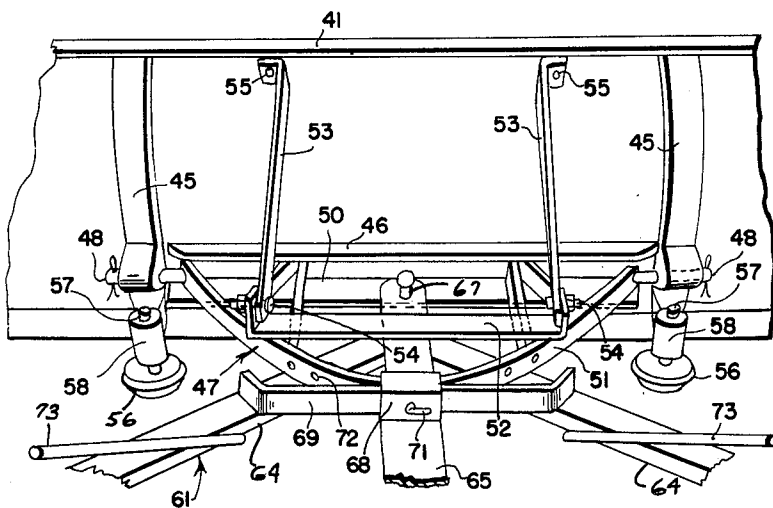
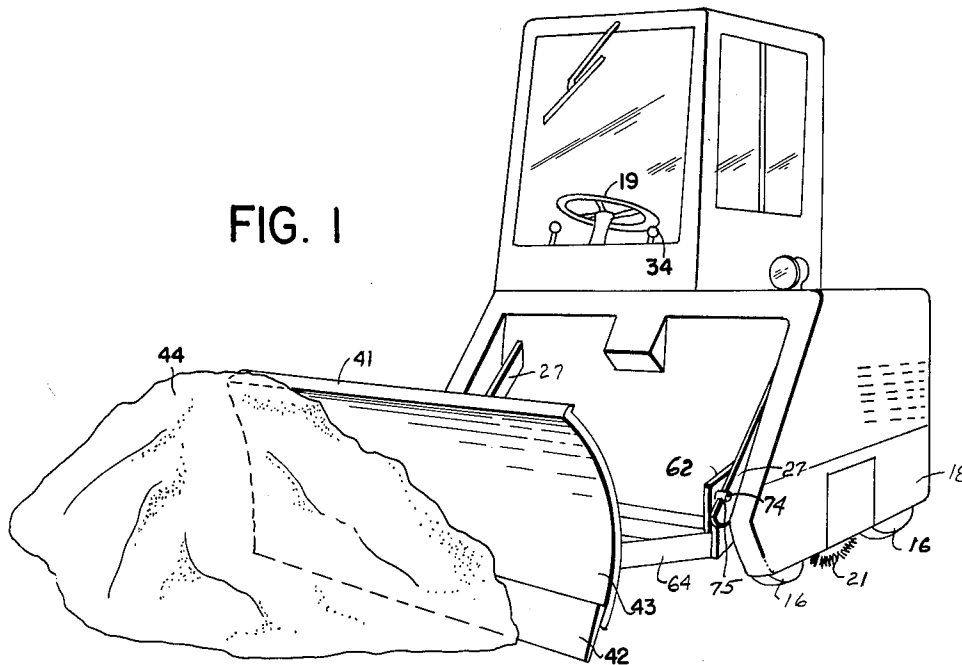


FIG. 2

INVENTOR.

MAC W. LUTZ

BY

Duggan, Braddock, Johnson & Westman

ATTORNEYS

Jan. 25, 1966

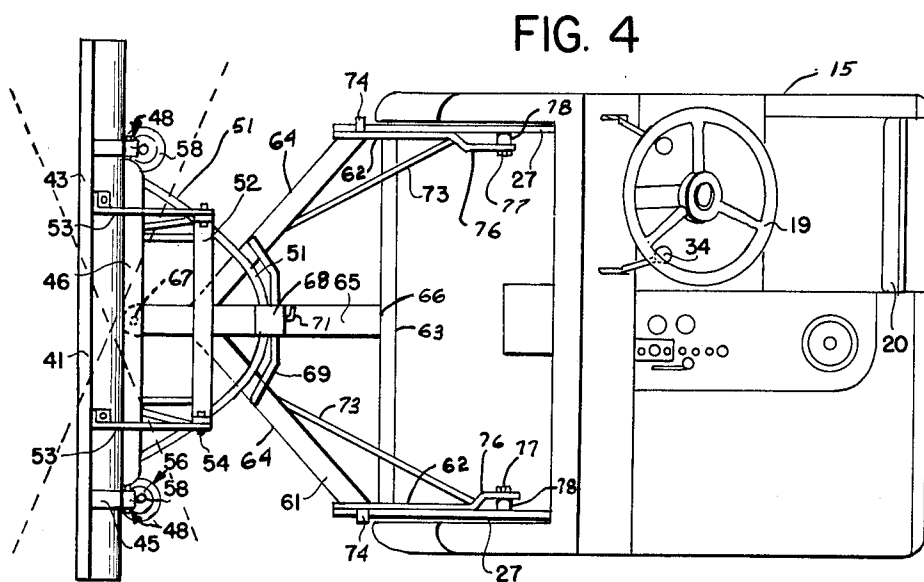
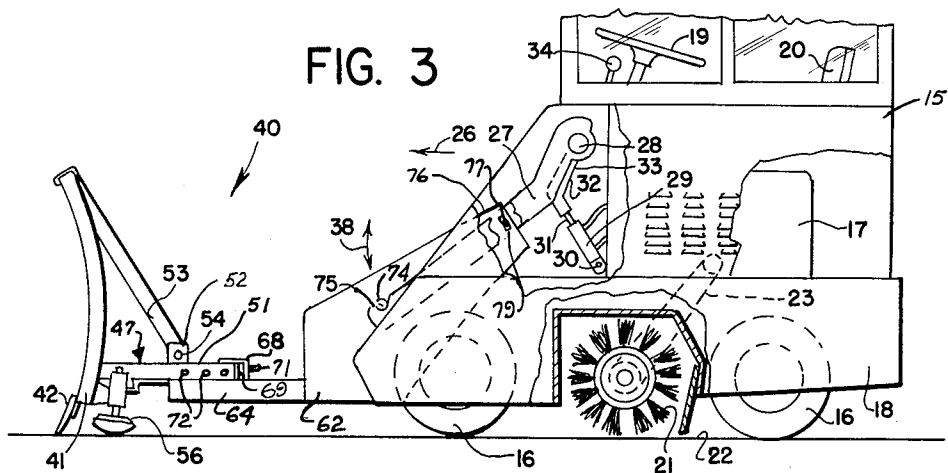
M. W. LUTZ

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4 Sheets-Sheet 2



INVENTOR.  
MAC W. LUTZ

BY  
*Duggan, Bradlock, Johnson & Westman*

ATTORNEYS

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M. W. LUTZ

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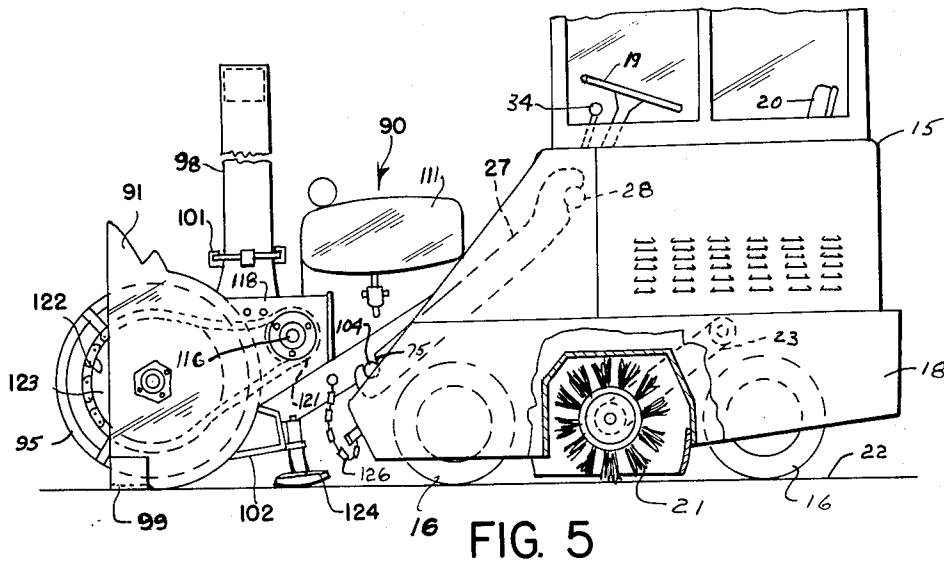


FIG. 5

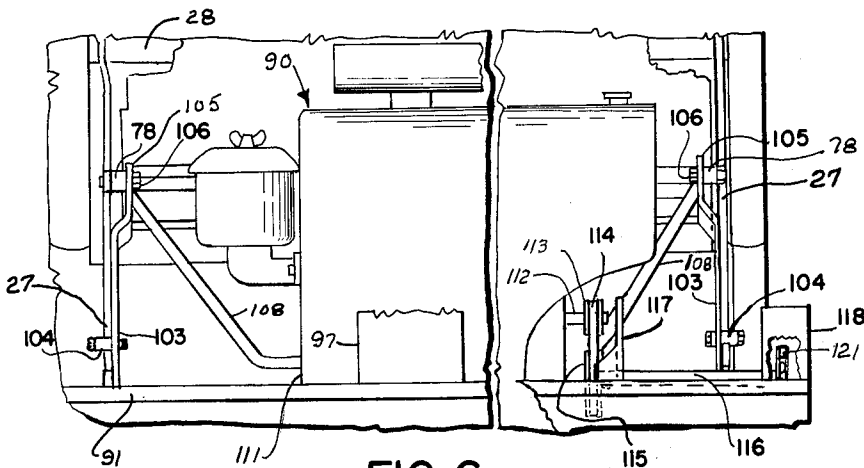


FIG. 6

INVENTOR.

MAC W LUTZ

BY

Duggan, Brubaker, Johnson & Westman

ATTORNEYS

Jan. 25, 1966

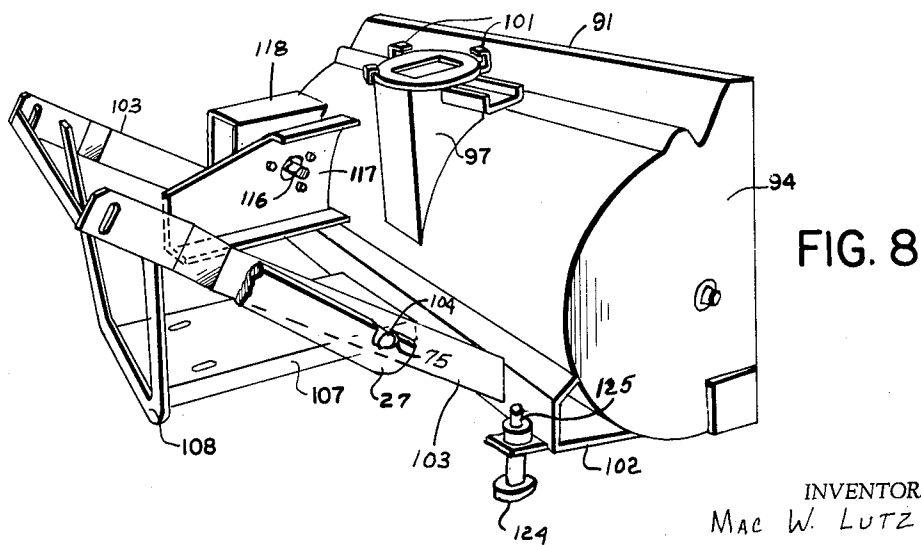
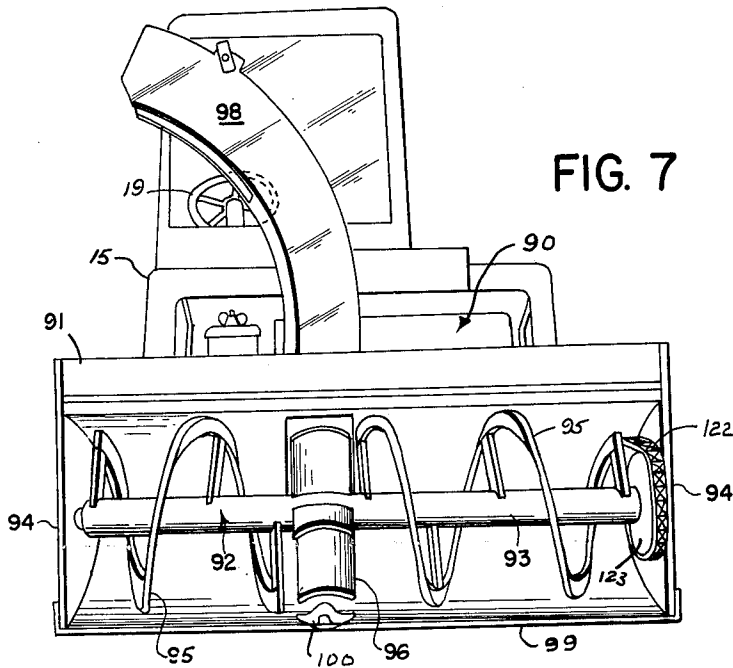
M. W. LUTZ

3,230,645

SNOW REMOVAL ATTACHMENT FOR SWEEPING MACHINES

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4 Sheets-Sheet 4



INVENTOR.  
Mac W. LUTZ

BY  
*Dugger, Braddock, Johnson & Westman*

ATTORNEYS

1

2

3,230,645

## SNOW REMOVAL ATTACHMENT FOR SWEEPING MACHINES

Mac W. Lutz, Minneapolis, Minn., assignor to G. H. Tennant Company, Minneapolis, Minn., a corporation of Minnesota

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5 Claims. (Cl. 37—50)

The present invention has relation to self-propelled sweeping equipment and more particularly to snow removal attachments which can be placed on self-propelled sweeping equipment and utilized for removing snow.

With the advent of self-propelled sweeping equipment, companies have found they have a substantial investment in such equipment. The more uses the basic unit of the sweeper can be put to, maximizes the return from this investment.

In colder portions of our country, where snow falls during the winter time, most industries and businesses which need self-propelled sweeping equipment also have walks, driveways, parking lots and loading docks which must be cleared of snow. The attachments of the present invention permit utilization of the self-propelled sweeping unit to be converted into an item of snow removal equipment. The sweeping broom is left intact on the self-propelled sweeper and can be utilized for clearing residual snow left by the snow removal attachments, if desired. In this way the bulk of the snow can be removed with the mechanical equipment and the remainder swept out of the way.

The self-propelled sweeper, which mounts the snow removal attachment, has a pair of forwardly disposed arms which fit onto provided attachment lugs on the snow removal equipment and in this manner the snow removal equipment is easily attached to the sweeper. The arms are controlled by a hydraulic cylinder which permits the attachments to be raised or lowered as desired.

The attachments are easily installed, quickly removed and operate very efficiently. As shown, the attachment includes a blade and a rotary snowplow, each of which is adapted to do a particular type of job of snow removal.

It is an object of the present invention to present snow removal attachments for mounting onto the front of a self-propelled power sweeper.

It is a further object of the present invention to present snow removal attachments which can be utilized at the same time the main broom for the sweeper is operating.

It is a still further object of the present invention to present snow removal attachments which are easily attached to existing support arms on a power sweeper unit.

It is a still further object of the present invention to present a self-propelled power sweeper which has snow removal equipment mounted on the front thereof and which utilizes existing hydraulic power to raise and lower the snow removal equipment.

Other and further objects are those inherent in the invention herein illustrated, described and claimed and will become apparent as the description proceeds.

To the accomplishment of the foregoing and related ends, this invention then comprises features hereinafter fully described and particularly pointed out in the claims, the following description setting forth in detail certain illustrative embodiments of the invention, these being indicative, however, of but a few of the various ways in which the principles of the invention may be employed.

The invention is illustrated by reference to the drawings in which corresponding numerals refer to the same parts, and in which:

FIG. 1 is a front perspective view of a power sweeping machine having a snow removal blade attached thereto.

FIG. 2 is a fragmentary rear perspective view of the snow removal blade pictured in FIG. 1;

FIG. 3 is a side elevational view of the snow removal machine of FIG. 1;

FIG. 4 is a top plan view of the device of FIG. 1;

FIG. 5 is a side elevational view of a snow removal machine made according to a second form of the present invention showing a rotary snowplow mounted on the power sweeping machine;

FIG. 6 is a fragmentary front perspective view of the device of FIG. 5;

FIG. 7 is a front elevational view of the device of FIG. 5; and

FIG. 8 is a perspective view of the housing and mounting frame of the rotary type snowplow of FIG. 7 removed from the power sweeping machine and with drive parts removed for the sake of clarity.

Referring to FIGS. 1 through 4 and the numerals of reference thereon, a powered, self-propelled sweeping machine is illustrated generally at 15. The machine is mounted on wheels 16, 16 that are powered through suitable mechanism from a motor 17 mounted on the top of a main frame 18.

A steering wheel 19 is utilized by an operator sitting in a seat 20 to steer the vehicle in a conventional manner. A transverse sweeping brush 21 is rotatably mounted adjacent the intermediate sections of the power sweeper and engages a surface 22 to remove material therefrom. The sweeping brush can be powered in any desired manner, for example, a chain and sprocket illustrated in dotted lines at 23. The wheels can be powered to move the sweeping machine in direction as indicated by arrow 26.

A pair of support arms 27, 27 are mounted onto a rock shaft 28 which is pivotally mounted on the frame of the sweeping machine 15. The rock shaft 28 can be pivoted about its axis through the operation of a hydraulic cylinder 29 which is connected as at 30 to the main frame of the sweeping machine and which has a longitudinally extendable rod 31 that is connected as at 32 to a lever 33 drivably mounted onto rock shaft 28. The cylinder 29 is powered from a source of fluid under pressure (not shown) and is controlled through a control lever 34 mounted onto the main frame and positioned so that the operator can use it. By directing fluid under pressure to cylinder 30 the lift arms 27, 27 can be raised or lowered in directions as indicated by double arrow 38.

Typical mechanism for driving the broom is more fully explained in the co-pending application of Joseph G. Kasper, Serial No. 205,243, filed June 26, 1962. Typical propulsion mechanism for the sweeper and control mechanism for the arms is shown more fully in the application of Mac W. Lutz, Serial No. 137,863, filed September 13, 1961.

The lift arms 27, 27 normally support a receptacle and filter system for catching dust and debris swept thereby by brush 21. However, in this invention the receptacle is removed and a snow removal tool illustrated generally at 40 is installed thereon. In the first form of the invention the snow removal tool is constituted as a snow blade 41 which has a blade cutting edge element 42 that engages the surface 22. As shown in FIG. 1 the blade 41 has a curved forward surface 43 which can engage a pile of snow 44 on the ground surface 22 and push it forwardly as the power sweeping machine is driven forwardly. The blade can be positioned at an angle with respect to the direction of travel, as will be more fully explained later.

The blade 41 has a pair of upright support bars 45, 45 mounted to the back side thereof and a transverse connecting bar 46 extending between the upright bars. A mounting frame assembly 47 is attached to the up-

right bars 45, 45 through pins 48, 48. The mounting frame assembly 47 includes a transverse attachment member 50 and a rearwardly extending substantially semi-circular locking bar 51. The locking bar 51 is fixedly attached to the attachment member 50. A cross member 52 is fixedly attached to the top surface of the locking member 51 and extends in a chord line thereto. A pair of braces 53, 53 are mounted as at 54, 54 to the cross member 52 and extend upwardly and are mounted as at 55, 55 to the rear of the blade 41. The braces 53, 53 hold the blade in a fixed position about its longitudinal axis and prevent it from pivoting about pins 48, 48. The blade also has a pair of guide shoes 56, 56 which are welded to substantially vertical shafts 57, 57 that are rotatably mounted in housings 58, 58 which in turn are fixedly mounted to the blade. The shoes are disc-shaped and will prevent the blade edge member 42 from digging into the surface 22. The shoes will provide guiding regardless of the position of the blade and whether or not the machine is turning.

An attachment frame assembly 61 is utilized to attach the blade and its mounting frame assembly to the power sweeper. The attachment frame assembly 61 comprises a pair of plate members 62, 62 which are joined together with a cross brace 63 and also a pair of braces 64, 64 that form an "A" frame. The braces 64, 64 are welded or otherwise fixedly secured to a tongue 65 which extends rearwardly from the junction between the braces 64, 64 and attaches to cross brace 63 as at 66. The tongue 65 extends forwardly from the junction with forward braces 64, 64 and is pivotally mounted as at 67 to the attachment member 50 of the blade. As can be seen in FIG. 3, the mounting frame assembly is positioned above the attachment frame assembly.

The locking bar 51 is positioned over the tongue 65 and extends underneath a guide 68 attached to the tongue. A cross bar 69 extends between the forwardly directed braces 64, 64 and is attached to the tongue 65 and the guide 68.

A locking pin 71 is positioned through a provided opening in guide 68 and in cross bar 69 and also protrudes through provided openings in locking bar 51. The locking bar 51 is provided with a plurality of openings 72 spaced therearound. By releasing the pin 71 and pivoting the blade 41 about pivot 67 the angular position of the blade with respect to the direction of travel can be changed. The blade can be adjusted to any angle in either direction as desired, within predetermined limits.

A pair of auxiliary braces 73, 73 are also provided and extend from the forwardly directing braces 64, 64 back to the side plates 62, 62.

As can be seen the side plates 62, 62 have lugs 74, 74 fixedly attached thereon. The lugs 74, 74 fit within provided notches 75, 75 at the outer ends of arms 27. The upper ends 76 of the side plates 62 are offset inwardly toward each other as can be seen in FIG. 4. A bolt 77 passes through a provided slot 79 in the upper portion 76 of the plate 62 and through a provided hole in the arms 27, 27 and the plates and arms are fixedly attached together. A spacer 78, 78 is positioned between each of the arms and its associated upper portion 76 of the side plates 62. In this way the offset portions can be clamped tightly against the arms. The slot at the upper end permits adjustment of the blades so that it can be tilted to obtain the correct angle of the cutting edge.

The vertical adjustment of the blade can be controlled through operation of the lever 34 and the hydraulic cylinder 29. Angular adjustment can be controlled by removing pin 71 and rotating the blade about its pivot 67 between tongue 65 and mounting member 50. The angular position can be adjusted in predetermined increments as desired.

If desired, the braces 53, 53 can be replaced with springs so that the blade will give slightly if the blade

edge member hits an obstruction during the plowing operation.

The unit can be operated by the power sweeper and used to clear walks, driveways, parking areas or whatever needs to be cleared of snow. The brush 21 can be operated at the same time as the snow removal so that the heaviest portions of the snow will be scraped away or windrowed by the blade and the brush will remove the final coat on the surface 22. The brush will throw the snow ahead of it and when the end of the run has been reached, or when accumulation behind the blade becomes large, the blade can be raised to clear the pile of snow, and the machine backed up to pick up accumulation when the blade is dropped again. If desired, the blade can be positioned at an angle with respect to the direction of travel of the machine and leave a windrow. The windrow could then be picked upon the next round and in this way the parking lot can be cleared of snow and all the snow thoroughly removed.

#### *Second form of invention*

In the second form of the invention the snow removal attachment is comprised as a rotary snowplow illustrated generally at 90. The power sweeping machine 15 is the same and utilizes the same arms 27 and lifting mechanism as before. Brush 21 is likewise driven the same as before.

The rotary snowplow comprises a housing 91 having a snow feeding auger assembly 92 rotatably mounted therein. The auger assembly includes a center shaft 93 mounted at opposite ends thereof in suitable bearings in end plates 94, 94 of the housing. The shaft 93 has fixedly attached auger flights 95 attached thereto which feed the snow into a center blower 96 which in turn discharges the snow out through a duct 97 and a curved discharge chute 98. The chute 98 is rotatably mounted about the duct 97 through suitable brackets 101.

The rotary snowplow attachment 90 is carried by the arms 27, 27. The housing 91 has a transversely extending mounting brackets 102 attached to the rear surface thereof.

A pair of arms 103, 103 are attached to the mounting bracket and extend rearwardly therefrom. The arms 103 have lugs 104, 104 thereon which fit within the notches 75 on the lift arms 27. The arms 103, 103 have upper offset portions 105, 105 and a bolt 106 is utilized for attaching these offset portions to the lift arms 27. Spacers or stops 78 are also provided on lift arms 27 as in the previous form of the invention.

The arms 103 are thus fixedly attached to lift arms 27. The transverse bracket 102 also has a motor mounting plate 107 attached thereto. The motor mounting plate is further placed back to arms 103, 103 with a U-shaped brace 108.

An auxiliary motor 111 is mounted on motor bracket 107 and has a driven powered output shaft 112. The output shaft 112 has a sheave 113 drivably mounted thereon. A belt 114 extends up to a driven sheave 115 which is drivably mounted onto a jack shaft 116. The jack shaft 116 is rotatably mounted on a bracket 117 and a rearwardly extending portion 118 of the adjacent end plate 94. A sprocket 121 is mounted onto jack shaft 116 adjacent portion 118 and a drive chain 122 is driven by the sprocket 121 and drives a sprocket 123 that is drivably mounted onto shaft 93 for the snow feeding auger. The motor 111 can have a conventional clutch mechanism mounted thereon so that the snow feeding auger can be engaged and disengaged even with the motor running. The snow feeding auger or rotary snowplow attachment is driven through the auxiliary motor 111 and the forward propulsion is through the drive system of the sweeping machine 15. The rotary snowplow attachment also has guide shoes 124, 124 mounted to vertical shafts 125, 125. The guide shoes 124 aid in keeping a cutting element 99 attached to the bottom forward

edge of the housing 91 spaced the correct distance above the surface 22 that is being cleared of snow. A rock guard 100 is provided on the cutting element ahead of the fan to protect it.

As in the first form of the invention the rotary broom 21 can be driven at the same time that the machine is moving forwardly and that the rotary snowplow is working. In this way, the plow can blow the snow through chute 98 and the broom 21 can sweep away the residue left by the rotary snowplow. The snowplow can be raised and lowered through actuation of cylinder 29 moving lift arms 27 to any desired height. A safety chain 126 is provided between each of the arms 103, 103 and extends back to the frame of the power sweeper to prevent the unit from being lifted excessively high.

Thus it can be seen through the use of mechanical snow removal attachments on a power sweeper, snow can be removed expeditiously and completely from any desired surface. The units are quick to attach upon removal of the normal receptacles for catching dust from the broom 21 and the broom 21 will continue to function to clean the surface over which the machine is traveling.

Units utilizing the blade attachment have been operated to remove material from the holds of ships. The blade will push the major portion of the material into a windrow and the brush will remove the remaining material. The brush can be lifted at the end of the run to leave the material pushed ahead of it. Mechanism for raising and lowering a brush such as that shown herein is more fully illustrated typically in the applications of Joseph G. Kasper and the application of Mac W. Lutz. Previously mentioned, both of these applications are assigned to the same assignee as this application.

As many widely varying and apparently different modifications can be made without departing from the spirit of this invention, the invention is limited only by the scope of the appended claims.

What is claimed is:

1. The combination with a self-propelled power sweeper having a main frame, means for moving said power sweeper and frame along a supporting surface, a powered rotary brush mounted on said frame and extending generally transverse to the direction of movement of said frame, said brush being mounted between the front and rear portions of said frame, of: a pair of arms mounted adjacent the forward portions of said frame, said arms being movable between raised and lowered positions, an attachment frame mounted between said arms, said attachment frame including a pair of lugs that fit within a provided notch on each of said arms, slotted adjustment means at the upper end of said attachment frame adjustably connecting said frame and said arms for limited pivotal movement of the frame about the lugs with respect to the arms, power means for moving said arms between their raised and lowered positions, and a mechanical snow removal implement mounted on said attachment frame and extending forwardly from said main frame, said mechanical snow removal implement being adapted to clear a path of snow through which said power sweeping machine may move.

2. The combination as specified in claim 1 wherein said snow removal implement is a blade, said attachment frame mounted on said arms having a tongue for pivotally mounting said blade about a substantially upright axis,

and means on said blade cooperating with mounting means on said frame to permit angular adjustment of said blade with respect to the direction of travel of the powered sweeping machine.

3. The combination with a self-propelled power sweeper having a main frame, means for moving said power sweeper and frame along a supporting surface, a powered rotary brush mounted on said frame and extending generally transverse to the direction of movement of said frame, said broom being mounted between the front and rear portions of said frame, of: a pair of arms mounted adjacent the forward portions of said frame, said arms being movable between raised and lowered positions, an attachment frame mounted between said arms, said attachment frame including a pair of lugs that fit within a provided notch on each end of said arms, a pair of adjustment slots at the upper ends of said frame, a pair of bolts, one passing through each adjustment slot and fastening said frame to said arms, power means for moving said arms between their raised and lowered positions, a transverse blade member, a mounting frame on rear portions of said blade, said mounting frame being pivotally mounted to said attachment frame about an upright axis, and releasable means cooperating between said mounting frame and said attachment frame to permit positioning of said blade at an acute angle with respect to the axis normal to the direction of travel of said sweeping machine and holding said blade at said acute angle.

4. The combination as specified in claim 3 wherein said releasable means for positioning said blade at an angle with respect to the direction of travel of said frame includes an arcuate locking bar on said mounting frame, and a guide on said attachment frame positioned adjacent said arcuate locking bar, said guide having an opening there-through, a locking pin in said opening in said guide, said arcuate locking bar having a plurality of openings there-through, each positioned so that it is aligned with the opening of the guide as the blade is positioned at different angles with respect to the direction of travel of said frame.

5. The combination as specified in claim 1 wherein the snow removal implement is a rotary snow plow.

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ABRAHAM G. STONE, *Primary Examiner*.

BENJAMIN HERSH, *Examiner*.

G. T. MOLLER, *Assistant Examiner*.