This invention relates to a rotary snow remover, and in particular it relates to such a snow remover which is hand propelled for cleaning sidewalks and other relatively small areas.

The principal object of the invention is to provide a rotary snow remover of improved design and construction which operates efficiently in light snow, and has minimum tendency to clog in heavy wet snow.

Still another object of the invention is to provide a hand propelled rotary snow remover which is very easy to handle in fairly deep snow.

Another object of the invention is to provide a rotary snow remover casing with a discharge hood one wall of which is nearly a straight projection of the rear wall of the casing and extending the entire width of the casing, to present minimum interference to free movement of snow out of the casing.

Another object of the invention is to provide a rotary snow remover casing with a fixed discharge hood, the direction of discharge of snow through the hood being controlled by turning the casing and hood bodily upon their supporting carriage.

A further object of the invention is to provide a snow remover rotor having radial arms near the outer ends of which are longitudinal blades set at a selected positive rake angle which causes the blades to pull the snow into the machine, thus eliminating resistance to forward travel of the machine. The angle is selected to minimize the tendency of the snow to blow out the front of the machine while not interfering with free discharge of snow through the hood. The angle is measured in the direction of movement of the rotor from a radius of the rotor which intersects the blade to the plane of the blade, and the preferred positive rake angle is 27°.

Still a further object of the invention is to provide a snow remover rotor having relatively narrow radial arms which cut into the snow to divide it into a plurality of segments, after which snow propelling bars near the ends of the arms push the snow into the casing and fling it upwardly through the discharge hood.

Yet a further object of the invention is to provide a rotor casing having large openings in its side panels through which the blower action of the rotor draws a substantial amount of secondary air so that the snow in the casing is thoroughly fluided and mixed with air before it is blown through the discharge hood. The influx of secondary air is so great that smoke, pieces of paper, etc. are actually drawn into the casing through the openings. This is particularly valuable in handling wet snow, because flowing air into the snow loosenst it, reduces the ratio of free water to total volume of material, and converts the compact, wet snow into a material that may be blown out by the machine without clogging the discharge hood.

Still another object of the invention is to provide a rotary snow removal device in which there is no tendency to blow fine, dry snow ahead of the rotor and casing, so that all snow is drawn into the casing instead of being blown away.

The invention is illustrated in a preferred embodiment in the accompanying drawings in which:

FIG. 1 is a side elevational view of a rotary snow remover embodying the invention;
FIG. 2 is a top plan view with the snow remover casing illustrated in broken lines in two adjusted positions on the carriage;
FIG. 3 is a front elevational view of the device;
FIG. 4 is a fragmentary section on an enlarged scale taken substantially as illustrated along the line 4-4 of FIG. 3;
FIG. 5 is a section taken substantially as illustrated along the line 5-5 of FIG. 4; and
FIG. 6 is a fragmentary section taken substantially as illustrated along the line 6-6 of FIG. 1.

Referring to the drawings in greater detail, and referring first to FIGS. 1, 2, 3, and 6, the rotary snow remover has two major component parts, one being a carriage indicated generally at 10, and the other being a snow remover casing indicated generally at 11. The carriage is best seen in FIGS. 1, 2, and 6 to have a circular top plate 12 which provides a turntable, and a depending skirt 12a has arms 13 at its sides with aligned apertures at their lower ends to receive an axle 14 at the ends of which are thin, flat metal disc wheels 15. Pivotally secured to the axle 14 flanking the wheels 15 are mounting arms 16 of a handle assembly 17.

The snow remover casing 11 has a supporting plate 18 which overlies the circular top 12 of the carriage and has a circular depending skirt 19 closely embracing the skirt 12a of the carriage; and the plate 18 is rotatably secured to the carriage by an axial bolt 20. The supporting plate 18 is provided with depending side flanges 21 the forward ends of which are of increasing depth as seen in FIG. 1, and said flanges merge into generally annular side panels 22 of a rotor housing. Extending between the side panels 22 is a transverse housing wall 23 which starts at the extreme base of the casing where its forward end is welded to a wall of the plate 18, and extends upwardly around the rear of the casing so that its upper end 25 is secured at the front of supporting plate 18. As best seen in FIG. 4 the transverse wall 23 around the lower rear quadrant 23a is arcuate in the form of a segment of a circle.

Extending upwardly from the rotor housing is a discharge hood, indicated generally at 26, which extends across the entire width of the housing and has a rear wall 27 extending upwardly and forwardly from the upper end 25 of transverse wall 23, and a front wall 28 which is substantially parallel to the rear wall. Extending forwardly from front wall 28 of the discharge hood the rotor housing has a top plate 29 which is coplanar with supporting plate 18 and has a depending front plate 29a.

As best seen in FIGS. 4 and 5, annular side panels 22 of the rotor housing have circular central openings 22a, and extending across said openings are support brackets 30 for a rotor shaft 31 which is parallel to the transverse wall 23 of the housing. Shaft 31 has three sets 32 of narrow radial arms 33 which are spaced along the shaft, and secured on inclined surfaces 33a of the trailing edges of the arms are four flat, transverse snow propelling bars 34. As seen in FIG. 4, the surfaces 33a of the arms are at an angle of about 27° to a radius 25a as measured from the radius in the direction of rotation, so the bars 34 have a 27° positive rake angle. The rotor is driven in the direction indicated by the arrows in FIGS. 1 and 4, and it is apparent from FIG. 4 that the propelling bars 34 pass very close to the arcuate portion 23a of transverse wall 23 during operation of the rotor.

The structures of the rotor housing and the rotor are such that the snow is very thoroughly broken up and beaten by the rotor, and mixed with secondary air which is drawn into the housing through the openings 22a in the two side panels, and the snow thoroughly fluided with air is discharged through the discharge hood 26 in a smooth stream which has very little turbulence and thus almost no tendency to stick any place in the discharge hood. The radial arms 33 of the rotor cut into the snow first,
dividing the snow entering the housing into four segments, and then the snow propelling bars 34 catch the snow and fling it in a smooth arc into the discharge hood 26.

The discharge of snow through hood 26 follows the natural lines of movement imparted to the snow by the centrifugal flinging action of the propelling bars 34, and there is nothing in the construction of the discharge hood to interfere with free outward movement of snow, or to produce any appreciable back pressure in the casing. In order to control the direction of discharge of snow, the entire snow remover casing 11 is rotated bodily on turntable 12 of the carriage so as to change the direction of discharge with respect to the line of travel of the carriage. As seen in FIG. 2, the discharge hood may blow the snow straight forward into the path of travel of the machine, or as indicated by the broken lines the casing may be turned approximately 25° to either side of the line of travel of the carriage to discharge snow to one side or the other.

In order to latch the casing 11 in the desired position, the carriage is provided with a latch assembly, indicated generally at 35. The latch assembly includes a pair of upstanding brackets 36 which extend rearwardly from supporting plate 18 and have a cross pin 37 for a latch lever 38 at the lower end of which is a pivoted latch pin 39. The forward portion of pin 39 extends through an opening in the supporting angle 40 adjacent to the depositing flange 19 of the supporting plate 18, and a spring 41 surrounding pin 39 normally urges the pin inwardly through an opening in flange 19 and into engagement with any one of three index holes 43 in the skirt 12a of the turntable 12. It is apparent from the foregoing description that the casing 11 may be latched in any of the three positions illustrated in FIG. 2.

The rotor is driven by a three horsepower internal combustion engine 44 which is mounted with its drive shaft horizontal, and a sprocket 45 on the drive shaft carries a drive chain 46 which is also trained around a sprocket 47 mounted on the end of rotor shaft 31 outside one of the side panels 22 of the housing. A chain guard 48 surrounds the chain and drive sprocket 45, and partially covers sprocket 47. Preferably a conventional slip clutch is incorporated in the driving connection between motor 44 and the rotor, so that the rotor can be stopped by an independent means without any damage to the machine.

As best seen in FIGS. 1 and 2, sprocket 47 and chain guard 48 are spaced laterally from opening 22a in the adjacent side panel 22, and this provides buffer means which prevents the opening from being obstructed in a deep snow, so that secondary air may always be drawn into the casing through that opening. Furthermore, it is apparent that when the casing 11 is turned to one side or the other, as shown in broken lines in FIG. 2, the opening 22a of the panel on which the opening is turned to is well inside the line of plowed snow and cannot be obstructed by deep snow. Accordingly, when the casing is turned to the left as seen in FIG. 2, both of the openings 22a are open regardless of snow depth, while in the other two positions at least the opening adjacent to the sprocket 47 is open.

Furthermore, when the device is used to remove snow in several successive swaths, after the first swath is cut, the operator may always work with the side having the sprocket adjacent the unplowed area, so that the opposite opening 22a is always open to the previously plowed area and thus cannot be obstructed.

Since there is practically no back pressure in the casing, there is no tendency to blow snow out ahead of the machine, nor to blow snow out through the openings 22a in the annular side panels 22. Accordingly, the inherent pumping action of the rotor necessarily draws air in through said openings.

The foregoing detailed description is given for clearness of understanding only and no unnecessary limitations should be understood therefrom, as modifications will be obvious to those skilled in the art.

The height of handle 16 may be adjusted by changing the position of a tie bar 49 on the front of which seats in a bracket 50 on top of discharge hood 26, while the rear of the tie bar may be selectively positioned in any of a plurality of holes 51 in a bracket 52 on the handle.

1. A rotary snow remover comprising: a wheeled carriage; a snow removing casing supported on and extending forwardly from said carriage; said casing having an open front and a continuous transverse wall extending from the extreme base of the casing to the top of the casing at the rear, said wall being arcuate around the lower rear quadrant; a pair of side panels, at least one of which has a central opening therein, to freely admit secondary air to the interior of the casing an integral discharge hood extending across the entire width of the casing, said hood having a rear wall extending upwardly and forwardly from said transverse wall; a front wall substantially parallel to said rear wall, and a generally parallel side wall, a horizontal turntable on a horizontal axis in said casing, said rotor providing a centrifugal blower; and means for driving the rotor.

2. The device of claim 1 in which the casing is provided with a horizontal turntable mounted on a horizontal axis in said casing, said rotor providing a centrifugal blower; and means for driving the rotor.

3. The device of claim 1 in which the rotor has a center shaft, a plurality of sets of thin radial arms spaced along said shaft, and a plurality of transverse propelling bars secured, with their outer edges substantially at the ends of the arms and on the trailing sides of said arms, said bars being cut in the paths of the bars.

4. A rotary snow remover comprising: a carriage having only two wheels, said wheels being in the form of thin, flat metal discs of large diameter; a horizontal turntable on said carriage; a snow remover casing the rear of which is carried on said turntable, said casing having an open front and a continuous transverse wall extending from the extreme base of the casing to the top of the casing at the rear, said wall being arcuate around the lower rear quadrant and substantially obstructed by said opening with central openings therein to provide air openings into the casing; an integral discharge hood extending across the entire width of the casing, said hood having a rear wall extending upwardly and forwardly from said transverse wall, a front wall substantially parallel to said rear wall, and generally parallel side walls providing a substantially unobstructed discharge opening the width of the casing; a snow-throwing rotor having a center shaft parallel to said transverse wall, said rotor including a plurality of sets of narrow radial arms to slice into the snow and a plurality of transverse, propelling bars on the trailing sides of the arms and adjacent their outer ends, said bars passing close to the arcuate portion of the transverse wall during operation of the rotor; means supplied on the carriage for driving the rotor; and a latch associated with the turntable and rear of the casing to releasably secure the casing in any of a plurality of positions with respect to the carriage, so as to change the direction of discharge of the hood with respect to the line of travel of the carriage.

5. In a rotary snow remover, in combination: a snow removing casing having a pair of parallel side panels with central openings therein allowing secondary air inlets, an open front, and a continuous transverse wall extending
from the extreme base of the casing to the top of the casing at the rear, said transverse wall being arcuate around the lower rear quadrant; an upwardly projecting integral discharge hood extending the entire width of the casing and affording an unobstructed discharge opening the width of the casing; a transverse rotor shaft supported between said side panels; a plurality of sets of radial arms spaced along said shaft; a plurality of transverse, planar propelling bars secured adjacent the ends of the arms, said bars passing close to the arcuate portion of the transverse wall when the rotor shaft is rotated; and means for driving the rotor shaft.

6. The device of claim 5 in which the radial arms are thin so as to slice into the snow, and the propelling bars are on the trailing sides of the arms with their outer edges substantially at the ends of the arms.

7. In a rotary snow remover, in combination: a snow remover casing having parallel side panels with central openings therein provided secondary air inlets and a continuous transverse wall extending from the extreme base of the casing to the top of the casing at the rear, said transverse wall being arcuate around the lower rear quadrant; a discharge hood mounting the casing, said hood having generally parallel front and rear walls and generally parallel end walls, to provide a discharge opening the full width of the casing; a transverse rotor shaft supported between said side panels; a plurality of sets of radial arms spaced along said shaft; a plurality of transverse propelling bars secured adjacent the ends of the arms, said bars passing close to the arcuate portion of the transverse wall when the rotor shaft is rotated, and said rotor providing a centrifugal blower; and means for driving the rotor shaft.

8. A rotary snow remover comprising: a wheeled carriage; a snow remover casing supported and extending forwardly from said carriage, said casing having an open front end and side panels with central openings therein, and there being an integral discharge hood extending upwardly and forwardly of the casing which has generally parallel front and rear walls and side walls which are planar projections of said side panels to provide a discharge opening the full width of the casing; a snow-throwing rotor on a transverse horizontal axis in said casing, said rotor having a plurality of sets of radial arms and a plurality of transverse propelling bars secured adjacent the ends of the arms; and means for driving the rotor.

9. In a rotary snow remover: a rotor casing which is open at the front and ends and is open to a discharge hood on top, said hood having an unobstructed discharge opening the entire width of the casing; and a rotor mounted in said casing, said rotor having a transverse horizontal shaft, a plurality of radial arms on said shaft, and a plurality of parallel, planar transverse snow propelling bars mounted on and adjacent the ends of the arms, said bars having working faces adapted to contact the snow, said working faces being disposed at a selected positive rake angle with respect to a radius of the rotor along an arm, said angle being selected to substantially eliminate blow-back of snow forward of the machine while permitting free discharge of snow through said hood.

10. The device of claim 9 in which the positive rake angle is about 27°.

11. The device of claim 1 which includes baffle means extending outwardly from one of the side panels of the casing to prevent deep snow from obstructing the entry of secondary air through the adjacent annular side panel.

12. In a rotary snow remover, in combination: a snow remover casing having parallel side panels with central openings therein providing secondary air inlets and a continuous transverse wall extending from the extreme base of the casing to the top of the casing at the rear, said transverse wall being arcuate around the lower rear quadrant; a discharge hood surrounding the casing, said hood having generally parallel end walls to provide a discharge opening the full width of the casing; a snow-throwing rotor on a transverse horizontal shaft in said casing, said rotor being adapted to fling snow rearwardly and upwardly through said hood; means for driving the rotor; and baffle means extending outwardly from one of the side panels of the casing to prevent deep snow from obstructing the entry of secondary air through the adjacent annular side panel.

13. The device of claim 12 in which the means for driving the rotor includes a sprocket on the rotor shaft outside a side panel, and a drive chain on said sprocket, said sprocket and drive chain cooperating to form the baffle means.

14. The device of claim 13 which includes a chain guard overlying the chain and a part of the sprocket, and cooperating therewith to form part of the baffle means.

15. A hand propelled rotary snow remover, comprising: a wheeled carriage; a snow remover casing supported and extending forwardly from said carriage, said casing being open at the front having a pair of side panels at least one of which has a central opening providing a secondary air inlet; an upwardly extending discharge hood of substantially uniform rectangular cross section extending the entire distance between the side panels; a snow-throwing rotor mounted in said casing, said rotor providing a centrifugal blower; means supported on the carriage for driving the rotor; and a guiding handle extending upwardly and rearwardly from the carriage.

16. In a rotary snow remover, in combination: a snow remover casing which is open at the front and has a pair of side panels at least one of which has a large opening providing a secondary air inlet; an upwardly extending discharge hood between the side panels; and a power driven snow throwing rotor mounted in said casing on an axis which extends between the side panels, said rotor providing a centrifugal blower which draws secondary air into the casing through said secondary air inlet, and said discharge hood affording substantially unobstructed egress for snow and air drawn into the casing by said rotor.

17. The combination of claim 16 in which the rotor has radial arms and snow propelling bars mounted on and adjacent the ends of the arms, said bars having working faces adapted to contact the snow, said working faces being disposed at a selected positive rake angle with respect to a radius of the rotor along an arm, said angle being selected to substantially eliminate blow-back of snow forward of the machine while permitting free discharge of snow through said hood.

18. The combination of claim 17 in which the rotor bars are set at a positive rake angle of about 27°.

19. The combination of claim 16 which includes a baffle extending in spaced relationship to the secondary air inlet, said baffle serving to minimize clogging of snow in said inlet.

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