ROTARY SNOW THROWER

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Filed: May 29, 1973

Appl. No.: 364,349

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ABSTRACT

The specification discloses an improved rotary snow thrower. The thrower includes a saucer-shaped rotary member having a plurality of blade assemblies on its surface. Snow on the road surface is collected by a mould-board and is delivered to the saucer-shaped rotary member solely by gravity, so that the rotary member provides a constant centrifugal force for throwing the snow away from the thrower. The blade assembly is deflectable when it encounters the free-falling snow from the mould-board to the rotary member. The deflection provides a vibration for shaking any wet snow off the blade such that no snow may freeze on the blade to hamper the operation of the snow thrower.

3 Claims, 4 Drawing Figures
ROTARY SNOW THROWER

BACKGROUND OF THE INVENTION

This invention relates to snow removal equipment and particularly relates to a rotary type snow thrower.

Snow removal equipment is well known. One form of common snow removal equipment comprises of a plow attachment mounted to a powerful tractor. The plow is operative to scrape the snow from the road surface and to pile it in designated areas of the roadway so as to be thawed out by natural process. Such equipment is effective in areas where there is only light snowfall and the weather is not too cold such that the snow may thaw out in warmer periods during winter. Furthermore, the piling of the snow often occupies badly needed spaces in the roadway or in a parking lot. Also, the plow cannot move the snow over unused areas such as a lawn, because the plow may cause irreparable damage to the lawn.

Another type of known snow removal equipment removes the snow and deposits the removed snow to the side of the equipment. The snow may be thrown or blown by the equipment to an unused area away from the roadway, such as a lawn or onto a transporting truck which carries the snow to a remote dumping site away from the heavily populated area. This type of snow removal equipment is referred to as a snow blower or snow thrower.

Common snow throwers have two types of structure. In one type of snow thrower it has a transversely mounted rotating drum. A pattern of cutting ridges are formed on the drum surface which collect the snow from the road surface and carry it upwards to a discharge chute through which the snow is thrown out away from the thrower by the centrifugal force of the rotating drum.

The other type of thrower comprises of a rotating disc mounted vertically in a housing, a mould-board is mounted in the front of the housing, which collects the snow from the road surface when the housing is being pushed forwards. The accumulated snow on the mould-board eventually is pushed onto the vertically mounted rotating disc. Upstanding radial blades are mounted on the disc surface which scoop up the snow from the mould-board. The snow collected on the blades is carried thereby and is thrown away from the thrower by centrifugal force through a discharge chute located on the upper side of the housing.

One drawback of the known snow throwers is that the snow tends to accumulate on the blades. This is particularly the case when the snow is wet. The wet snow freezes on the blades and is not being thrown out of the thrower. The accumulation eventually increases in volume which adds an additional weight to the rotating disc or drum. Thus, the speed of rotation of the disc or drum gradually becomes slower, and the slower speed again promotes further freezing of the wet snow on the blades, and eventually the thrower becomes entirely clogged up. More often the rotating disc or drum is seized by the frozen snow and ice accumulation so that the thrower becomes inoperative. This is due to that the rotating disc or drum is in direct contact with the snow on the mould-board. The blades on the disc or drum must impinge directly on the bulk of the snow on the mould-board. The impact slows down the rotation of the drum or disc.

SUMMARY OF THE INVENTION

It is therefore a principal object of the present invention to provide a snow thrower in which the rotating member of the thrower is not in direct contact with the snow on the mould-board.

It is another object of the present invention to provide a plurality of radial blades on the rotating member of the thrower, the blades have a resilient deflection to shake the snow collected thereon.

It is another object of the present invention to provide detachable blades on the rotating member such that the blades may be conveniently replaced and/or repaired.

The rotary snow thrower according to the present invention comprises a housing having a front opening, a mould-board mounted transversely at the base of said front opening, said mould-board sloping inwardly and upwardly to a transverse upper edge disposed in said housing, a rotatable saucer-shaped rotary member movably mounted within said housing, said rotary member having a recessed circular front surface with a slightly sloping side wall and disposed in a spaced relation to and below said transverse upper edge of said mould-board, a drive shaft for said rotary member, a plurality of deflectable blade assemblies radially mounted on said sloping side wall of said front surface of said rotary member for deflecting any snow falling from said mould-board to said rotary member, and a discharge chute provided in communication with said housing and having an opening therein oriented to the side of said housing to allow said snow to be thrown to the side away from said thrower by centrifugal force of said rotary member.

BRIEF DESCRIPTION OF THE DRAWINGS

A specific embodiment of the invention by way of example will now be described with reference to the accompanying drawings, in which:

FIG. 1 is a perspective view of the snow thrower according to the present invention;

FIG. 2 is a sectional side elevation of the snow thrower;

FIG. 3 is a partial perspective view of the detachable blade according to the present invention; and

FIG. 4 is a cross-sectional view of the blade taken along X-X of FIG. 3.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings wherein similar characters of reference represent corresponding parts in each of the several views, the thrower has a housing 10. The housing 10 has a front opening 11 bounded by two high side walls 12 and 13 and a top wall 14. The back and bottom sides of the housing 10 are sealingly covered by an integral wall disposed obliquely to the ground and forming a circular bowl-shaped casing within the housing 10. As best shown in the cross-sectional elevation of the housing in FIG. 2, the circular bowl-shaped casing has a back wall 16, a divergent circular side wall 17 which also forms a portion of the base wall 18. An arcuate flange 19 is also formed around the front portion of the base wall 18. The upper portion 20 of the back wall of the housing is tapering to a discharge chute 21 which has a discharge opening 22 oriented to the side of the housing 10 at an oblique
angle. A deflection plate (not shown) may be provided at the opening 22 to direct the snow to a selective distance and/or direction. The side walls 12 and 13 extend to the back of the housing and hitches or connection means (not shown) are provided therein to attach the thrower to a vehicle such as a tractor for pushing the housing over the snow covered surface. Cross braces may be incorporated at the back portion of the side wall to form a structural frame on which the hitches may be alternatively provided.

A reinforcing angle plate 23 is mounted at the front edge of the base wall 18 such that the base portion of the angle plate 23 is in contact with the ground. A mould-board 24 is mounted on top of the angle plate 23 and on the side walls 12 and 13, so that the mould-board is sloping inwardly and upwardly to an arcuate upper edge 25 disposed within the housing 10. The upper edge of the arcuate flange 19 is in contact with the underside of the upper portion of the mould-board 24 to provide an additional reinforcement therein.

A saucer-shaped rotary member 27 has a recessed circular front surface having a slightly sloping side wall sloping in a convergent manner towards the center of the surface. The rotary member is rotatably mounted in the bowl-shaped casing in the housing 10. The diameter of the saucer-shaped rotary member 27 is substantially equal to the diameter of the outermost rim of the divergent side wall 19 of the bowl-shaped casing. The saucer-shaped rotary member is rotatable through a drive shaft 29 which is connected to an external rotating means shown as a belt driven wheel 30 by example. It would be apparent to one skilled in the art that any rotating means such as an electric motor or a reciprocating internal combustion engine may be coupled to the drive shaft 29 to provide the rotating movement therein. As shown in the drawings, the upper edge 25 of the mould-board 24 is disposing at a spaced relation to about the middle portion of the sloping side wall of the front surface of the saucer-shaped rotary member. The slope of the mould-board is preferably parallel to the slope of the sloping side wall of the saucer-shaped rotary member.

Four deflection plate assemblies 35 are detachably and radially mounted on the drive shaft 29 of the saucer-shaped rotary member 27. It can be appreciated that four blade assemblies are shown as an example, but any reasonable number of such blade assemblies may be used. The blade assembly comprises of an L-shaped rod 36 having a longer arm and an upturned portion 37 forming the shorter arm of the L-shaped rod and an attachment portion 38 provided at the end of the longer arm. The attachment portion 38 has a longitudinal knurled periphery insertable into a complementarily knurled bracket 39 formed in the drive shaft 29 of the saucer-shaped rotary member. Two hinge members 40 are mounted on the rod 36 such that the rod 36 forms the pintle of the hinge members. A blade 41 is mounted on one element of the hinge members 40 and the distal corner of the blade 41 is mounted to the upper end of the upturned portion 37 of the L-shaped rod by a U-shaped clamp 42. The L-shaped rod and the blade may be made of steel coated with a rust proof coating. The other element of the hinge members 40 is removably mounted on the sloping side wall of the front surface of the saucer-shaped rotary member 27.

The housing 10 is pushed by a tractor which may also provide the rotating means to the drive shaft 29 through a universal coupling. The mould-board 24 will scoop up the snow from the ground when the housing is pushed forwards. The snow is pushed upwards to the upper edge 25 of the mould-board and will fall by gravity onto the front surface of the rotating saucer-shaped rotary member 27. The free-falling snow will encounter the blades 41 and will be thrown away to the side of the thrower through the discharge chute 21 by the centrifugal force of the saucer-shaped rotary member.

It will be appreciated that since the upper edge of the mould-board is disposed in a spaced relation to and above the front surface of the saucer-shaped rotary member, the saucer-shaped rotary member is at no time in direct contact with the snow resting on the surface of the mould-board. The snow is free-falling from the mould-board to the front surface of the saucer-shaped rotary member solely by gravity. This structure is much more advantageous than the known rotary snow thrower in which the rotary disc must collect the snow directly from the mould-board. Thus, in known snow throwers, the rotation of the disc is hampered by the snow resting on the mould-board as the blades impinge on the snow. While in the present invention, the blades will only impinge on the free-falling snow dropping over the upper edge of the mould-board. The free-falling snow does not hamper the rotation of the saucer-shaped rotary member. Thus, the saucer-shaped rotary member is rotating in a constant speed to provide an efficient centrifugal force for throwing the snow away from the thrower.

When the blade impinges on the snow falling from the mould-board, the impact tends to pivot the upturned portion 37 of the rod 36, so that blade 35 deflects slightly under the impact as best shown in FIG. 4. Since the rod is made of steel or alternatively other slightly resilient material, it quickly recovers to its original state shortly after the impact, thus deflecting the blade back to its original position. Therefore, the blade 41 is deflecting back and forth with respect to the hinge members 40 as it encounters the free-falling snow. This slight back and forth deflection of the blade provides a vibration for shaking any wet snow off the blade, so that the wet snow cannot accumulate on the blade to impede the proper function of the saucer-shaped rotary member.

It will be appreciated that normally the chance is greater for some snow to accumulate on the blade if a greater amount of snow is encountered by the blade. This is obviated by the present invention since the amount of deflection of the blade is directly proportional to the amount of snow encountered by the blade. Thus, the degree of vibration of the blade is advantageously and inherently greater when it encounters a greater amount of snow so that there is a greater amount of vibration to shake the greater amount of snow off the blade.

An electric motor may alternatively be provided at the back of the housing 10 and adapted to drive the shaft 29 independently from the vehicle. In this way, the vehicle only serves to push the snow thrower over the snow covered surface.

The snow thrower according to the present invention may be built in a portable size in which a handle is provided at the back of the housing 10 so that it may be pushed by hand over the snow covered surface. A por-
table internal combustion engine or an electric motor may be mounted to the back of the housing for providing the driving means for the drive shaft of the saucer-shaped rotary member. It can also be appreciated that due to the removable structure of each plate assembly, it is convenient to repair or replace any broken plate and/or L-shaped rod without having to disassemble the thrower housing.

While the invention has been particularly shown and described with reference to a preferred embodiment thereof, it will be understood by those skilled in the art that various changes in form and detail may be made therein without departing from the spirit and scope of the invention.

What I claim as new and desire to protect by Letters Patent of the United States is:

1. A rotary snow thrower comprising, a housing having a front opening, a mould-board mounted transversely at the base of said front opening, said mould-board sloping inwardly and upwardly to a transverse upper edge disposed in said housing, a rotatable saucer-shaped rotary member movably mounted within said housing, said rotary member having a recessed circular front surface with a slightly sloping side wall and disposed in a spaced relation to and below said transverse upper edge of said mould-board, a drive shaft for said rotary member, a plurality of deflectable blade assemblies radially mounted on the sloping side wall of said front surface of the rotary member for deflecting any snow falling from said mould-board to said rotary member, a discharge chute provided in communication with said housing and having an opening therein oriented to the side of the housing to allow said snow to be thrown to the side away from said thrower by centrifugal force of said rotary member, each of said blade assemblies comprising an L-shaped rod member having a longer arm and a shorter arm and the end of said longer arm being mounted to said drive shaft of said rotary member, and said longer arm forming a pintle of at least a pair of hinge means mounted on said sloping side wall of said rotary member, and a plate mounted to said hinge means and to said shorter arm of said rod member.

2. A rotary snow thrower as claimed in claim 1, wherein each of said hinge means comprises two hinge elements hingedly secured together by said rod, one of said hinge elements being mounted on said front surface of said rotary member, the other hinge element being mounted to said blade so that said plate will vibrate with respect to said hinge means under impact with any snow to shake off the snow collected thereon.

3. A rotary snow thrower as claimed in claim 2, wherein said rotary member is rotatably mounted within said housing and disposed obliquely with respect to ground whereby snow collected on said mould-board is free-falling to said front surface of said rotary member by gravity.

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