Aug. 13, 1929. E. M. BASSLER 1,724,692

ROTARY SNOWPLOW

Filed April 1, 1925 3 Sheets-Sheet 1

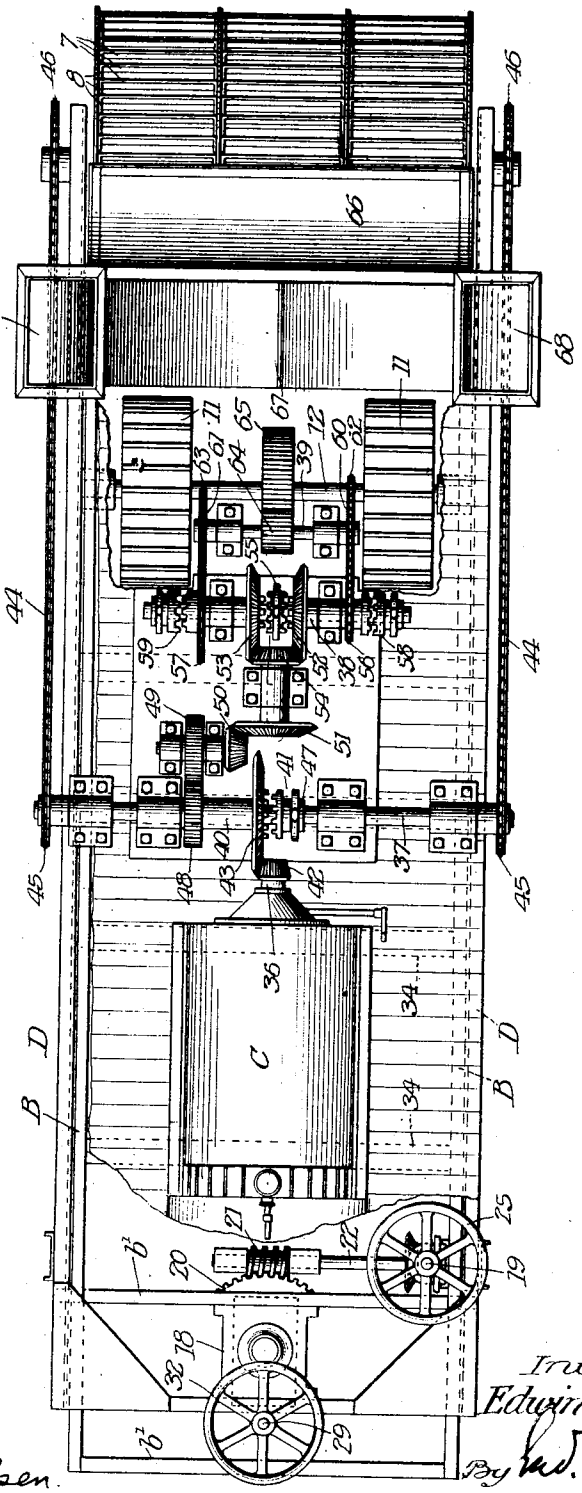


Fig. 1.

Witness
Martin H. Olsen

Inventor
Edwin M. Bassler
By Wm. E. Wheeler
Atty.

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ROTARY SNOWPLOW

Filed April 1, 1925 3 Sheets-Sheet 2

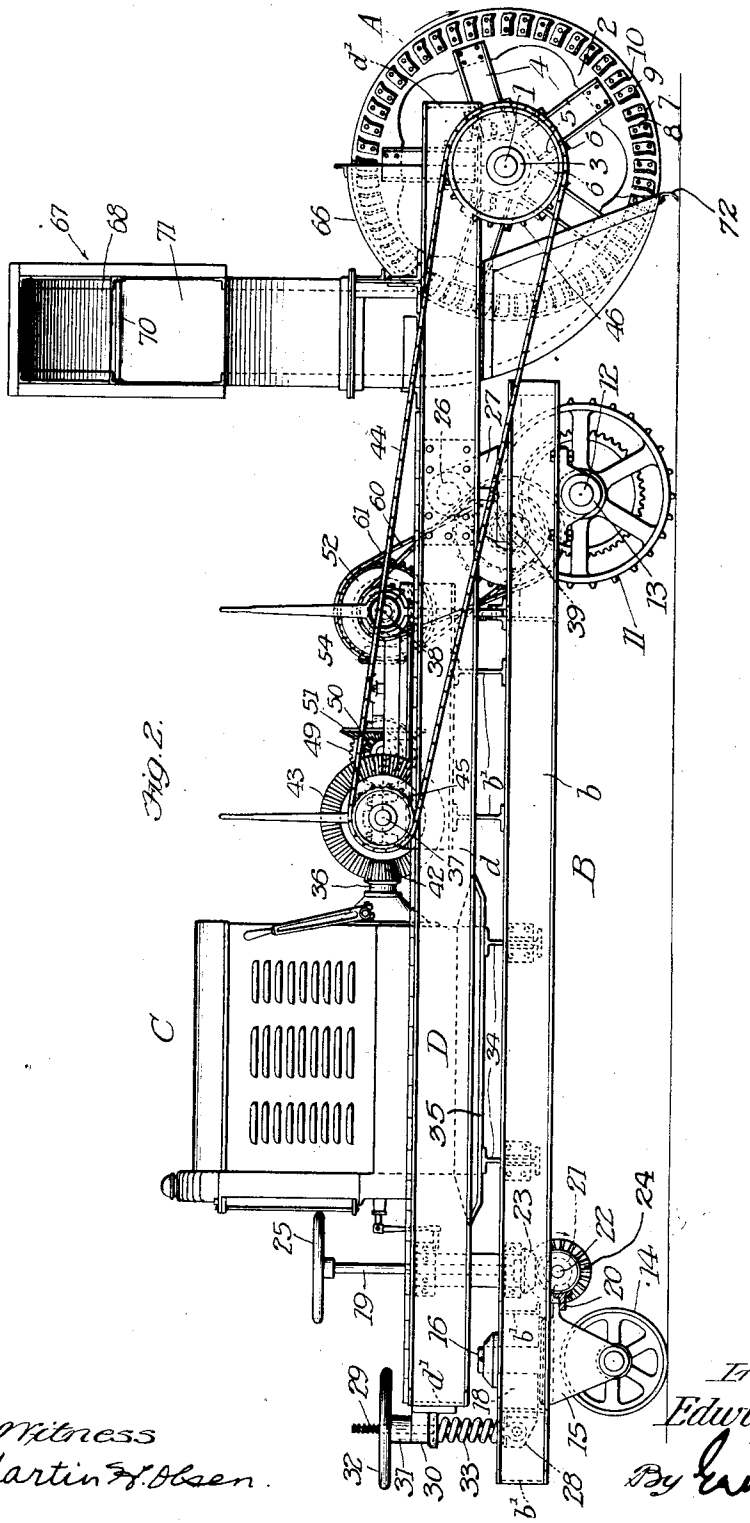


Fig. 2.

Witness
Martin F. Olsen.

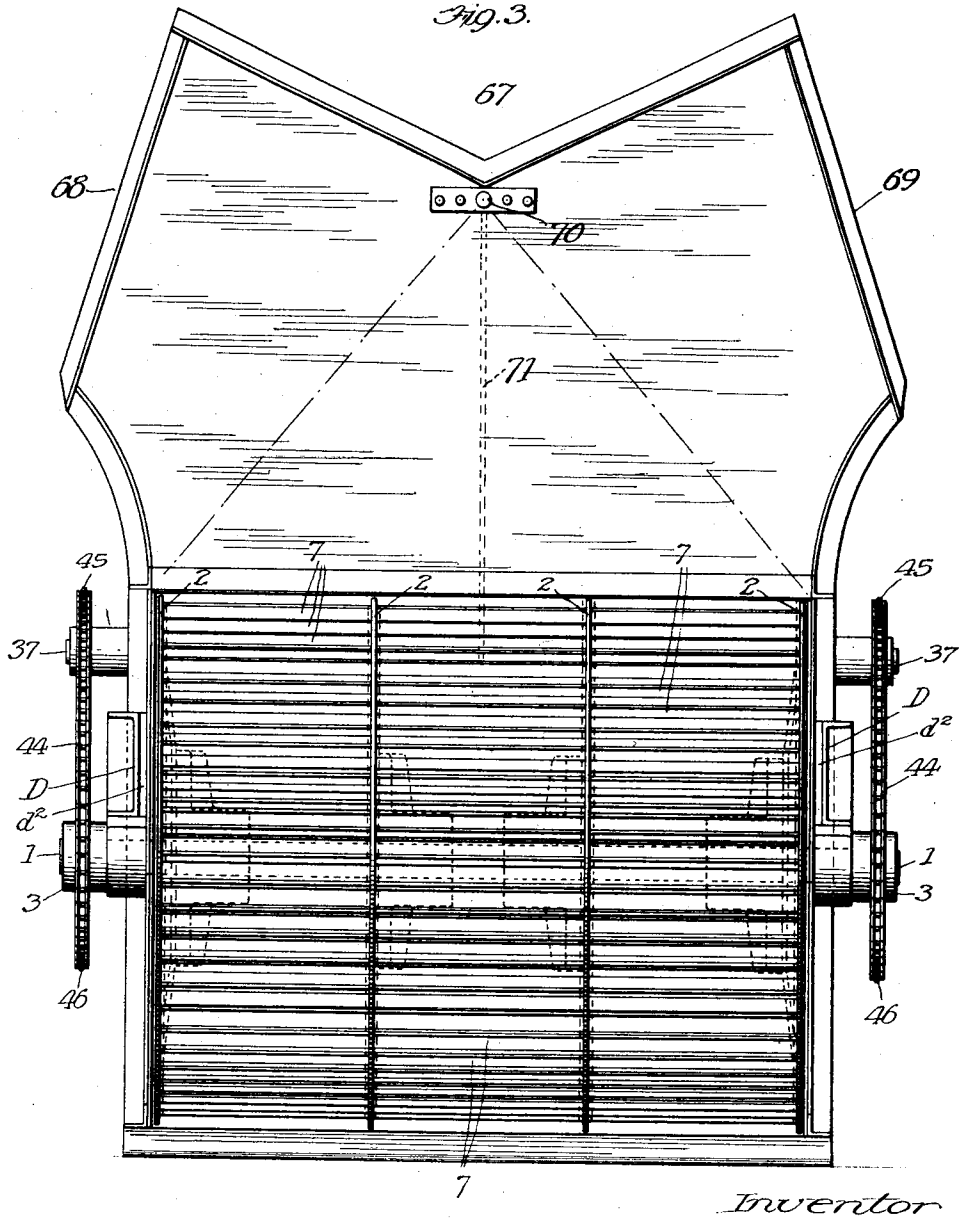
Inventor
Edwin M. Bassler
By E. W. E. Wadsworth
Atty.

Aug. 13, 1929. E. M. BASSLER 1,724,692

ROTARY SNOWPLOW

Filed April 1, 1925 3 Sheets-Sheet 3

Fig. 3.



Witness
Martin H. Olsen.

Inventor
Edwin M. Bassler
By Ed. E. Wales & Co.
Atty.

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UNITED STATES PATENT OFFICE.

EDWIN M. BASSLER, OF WAUSAU, WISCONSIN.

ROTARY SNOWPLOW.

Application filed April 1, 1925. Serial No. 19,790.

This invention relates to rotary snow plows.

The principal object of the invention is to provide a rotary snow plow having large snow handling capacity, comprising a snow-cutting wheel constructed and arranged for removing the snow in the form of what may be described as thin parings or shavings, as the plow advances, without compacting the snow in front of the snow-cutting wheel, thus relieving said wheel from practically all stress and duty in operation, excepting that required for the actual work of slicing the parings or shavings of snow from the face of the body of snow to be removed. This duty will, of course, vary with the depth of snow to be removed, the character of the snow, as regards its fineness, its degree of wetness and also the extent to which it is compacted. In any event, the power required for driving said snow-cutting wheel is very much less than that required for driving the cutting wheel of any other rotary snow plow of which I have any knowledge in performing a comparable amount of work.

To effect the foregoing object, the snow-cutting wheel of a snow plow embodying my invention and improvements, comprises a supporting shaft rotatably mounted in bearings on the frame of a suitable vehicle, transversely to the direction of movement of the vehicle, spaced rings secured to said shaft concentric with its axis of rotation, and a multiplicity of cutting blades secured to and which extend between said rings, the cutting edges of which are inclined frontwards relative to radii of said snow-cutting wheel passing through said cutting edges, respectively, in the direction of rotation of said cutting wheel in operation.

Described generally, said snow-cutting wheel may be said to resemble quite closely in appearance a well known type or form of fan runner.

In practice, said snow-cutting wheel is preferably mounted on the vehicle so as to be adjustable towards and from the road bed to provide for leaving a layer of snow of desired thickness thereon. This is for the purpose of permitting the use of sleighs for hauling materials in the country, where bob and other sleighs are still used to a large extent.

Within practical limits, my invention contemplates the use of a snow-cutting wheel of any desired size, a usual size for general purposes being about six feet long by five feet in diameter, and a usual relation in operation is one in which each cutting blade will slice a paring or shaving from the face of the body of snow into which the snow-cutting wheel is advancing from one-eighth (⅛) of an inch to three-eighths (⅜) of an inch in thickness.

To effect this with a snow-cutting wheel having forty (40) cutting blades the plow will be equipped with variable speed propelling mechanisms, ranging from one (1) to three (3) miles an hour, the speed of the vehicle varying substantially inversely to the work which the plow is to perform. This relation may, however, be varied to meet extreme conditions.

The front side of the snow-cutting wheel is exposed, thus permitting unobstructed access of said wheel to the snow to be removed.

The rear side of the snow-cutting wheel is enclosed by a suitable casing having a discharge stack or spout constructed and arranged for discharging snow delivered into said casing by the snow-cutting wheel at either or both sides of the road on which the snow plow is working.

In accordance with my invention, also, the rings which support the cutting blades extend outwardly beyond the cutting edges of said blades, thus preventing said cutting blades from coming directly into contact with the road bed in ordinary operation.

A snow plow and snow-cutting wheel embodying my invention and improvements comprises the various other features, combinations of features and details of construction, hereinafter described and claimed.

In the accompanying drawings in which my invention is fully illustrated,

Figure 1 is a top plan view of a snow plow embodying my invention and improvements.

Figure 2 is a side view thereof from the left side of Fig. 3; and

Figure 3 is a front view thereof.

Describing my improved snow plow with particular reference to the drawings, A designates the snow-cutting wheel, as a whole, said wheel comprising a shaft 1 secured to which in concentric relation thereto are spaced rings 2. As shown, the means for

supporting said rings on said shaft consists of hubs 3 provided with holes adapted to receive the shaft 1 and which are keyed or otherwise secured to said shaft so as to rotate therewith. Riveted or otherwise secured to said hubs are spokes 4, which conveniently may be made of channel bar sections of suitable length, to the other ends of which the rings 2 are secured, being shown as riveted thereto. In the preferable construction shown, also, the spokes 4 are seated in radial recesses 5 formed in short projections 6 forming a part of the hubs 3.

My improved snow-cutting wheel also comprises cutting blades 7 made of suitable sheet metal, as boiler plate of suitable thickness, say for usual purposes, one-quarter of an inch, said cutting blades being secured to the rings 2 in such relation that they will form a cylindrical series concentric with the axis of the shaft 1.

Said blades may conveniently be secured to the rings 2 by bending the ends thereof at right angles, as shown at 8, and riveting said bent over ends directly to said rings.

As shown, the cutting blades 7 comprise portions 9, on which the cutting edges 10 are formed, which are forward-inclined relative to the direction of rotation of said snow-cutting wheel A in operation, indicated by the arrow in Fig. 2 or said blades may be made flat and set at an angle relative to radii passing through their cutting edges, respectively.

In accordance with my invention, said snow-cutting wheel comprises a multiplicity of cutting blades 7 spaced short distances apart, say for usual purposes from three (3) to five (5) inches.

The snow-cutting wheel A is mounted at the front end of a suitable vehicle with its axis substantially parallel with the axle of the vehicle when in central position, preferably in such manner that it may be adjusted towards and from the surface of the road, to provide for leaving a layer of snow on the road of greater or less thickness as may be desired, for the purpose of providing for the use of sleighs for hauling materials.

Said vehicle, designated as a whole B, will preferably be self-propelled, though my invention contemplates a vehicle adapted to be propelled by a tractor or other separate vehicle equipped with power.

As shown, the frame proper of the vehicle consists of side members b and transverse members b', which rigidly connect said side frame members.

The vehicle frame is supported on a wheel comprising front wheels 11 on an axle 12 rotatably mounted in journal boxes 13 secured to the undersides of the side frame members b, and a rear steering wheel 14 mounted at the transverse center of the vehicle frame so as to turn freely about a vertical axis.

The wheels 1, preferably, are an approved form of traction wheel, one thereof being secured to the axle 14 so as to rotate therewith and the other being free to turn thereon, thus permitting the plow to turn freely as the steering wheel is turned to guide it. Rotation is adapted to be imparted to said axle in both directions, to provide for propelling the plow both frontwards and backwards, by suitable driving connection with an engine—preferably an internal combustion engine—indicated at C—mounted on the frame of the vehicle.

As shown, the steering wheel 14 is rotatably mounted in a yoke 15, formed on which is a shank 16 fitted to turn in a bearing formed in a metal block 18 secured between transverse frame members of the frame proper of the vehicle.

Obviously, with the construction described, the vehicle may be steered by turning the wheel 14 in one direction or the other, as the case may be, and to provide for steering the vehicle, means are provided in association with said wheel, for turning the same and for holding it in any desired position. As shown, said steering means consists of gearing which connects a rigid part of the yoke 15 with a steering post 19 mounted to turn freely in bearings on the machine frame. A preferable form of gearing for this purpose comprises a segment of a worm gear indicated at 20 secured to the yoke 15, a worm 21 on a shaft 22 mounted in suitable bearings on the vehicle frame, beveled gears 23 and 24 secured to said worm shaft and the steering post 19, a steering wheel 25 being secured to said steering post to provide for turning the same, in a usual manner.

As shown, the steering post 19 is positioned at the right hand side of the machine, but it may be located in any desired position.

In the construction shown, the snow-cutting wheel A is mounted at the front end of the frame, designated as a whole D, and which is pivoted in bearings 26 formed in journal boxes 27, secured to the side frame members b of the main frame of the plow.

As shown, the oscillating frame D consists of side members d, preferably channel bars, which are rigidly connected by transverse frame members d'.

The oscillating frame D is adapted to be turned pivotally and held in any adjusted pivotal position in the following manner:—Pivotally connected to one of the transverse frame members b' of the main frame B is a bracket 28 pivotally connected to which is a bolt 29 which extends through a hole or opening, in a bracket 30 secured to the rear transverse member d of the oscillating frame D, and threaded to the upper end of said

bolt 29 is a nut 31 which, as shown, is formed integral with a hand wheel 32, providing convenient means for turning said nut.

Inserted between the brackets 28 and 30 on the frames B, D, respectively, and surrounding the bolt 29 as a guide, is a spring 33. Said spring 33 will tend to turn the oscillating frame D pivotally in a direction to depress the snow-cutting wheel A and to maintain said wheel normally at the limit of its depression while, at the same time, permitting said wheel to yield upwardly in case it encounters an obstruction in the road.

As shown, the engine C is supported upon transverse members 34 connected to and which rigidly connect the side frame members of the main frame B of the plow, the support for said engine comprising a pan 35 which will catch oil which drips from the engine.

As previously stated, both the snow-cutting wheel A and the axle 12 are driven by means of suitable connection with the engine shaft 36 comprising shafts 37, 38 and 39, a sleeve 40 mounted in fixed endwise adjustment on the shaft 37 so that it will turn, adapted to be secured to said shaft so as to rotate therewith by means of a suitable clutch 41.

Rotation is adapted to be imparted to the sleeve 40 from the engine shaft by means of bevel gears consisting of a pinion 42 secured to the engine shaft 36 and a gear 43 secured to the sleeve 40.

The shaft 1 of the snow-cutting wheel A is driven directly from the shaft 37 by means of chain belts 44 adjusted to sprocket wheels 45 and 46 secured to the shaft 37 and to the shaft 1 of the snow-cutting wheel, respectively. The clutch 41 comprises a member 47 splined to the shaft 37, affording convenient means for throwing the snow-cutting wheel A into and out of operation, as may be desired.

As shown, also, the axle 12 is driven by means of suitable gearing connecting said axle with the sleeve 40, constructed and arranged to rotate said axle at variable speeds in either direction.

Said gearing comprises spur gears 48 and 49, bevel gears 50 and 51, a reversing gear comprises gears 52 and 53 which are normally loose on the shaft 38, both of which intermesh with a bevel pinion 54 secured to the shaft of the pinion 51, a clutch adapted for separately connecting the gears 52 and 53 to the shaft 38, said clutch comprising a movable member 55 splined to the shaft 38 between said gears 52 and 53 and adapted to be engaged with one or the other thereof by endwise movement of said movable clutch member on said shaft in opposite directions, whereby said shaft may be rotated in either direction, as may be desired. Said gearing also comprises sprocket wheels 56 and 57 of different diameters, said sprocket wheels being normally loose on said shaft and adapted to be secured thereto so as to rotate therewith, by clutches comprising members 58 and 59 splined to the shaft 38 and adapted to engage corresponding clutch members formed on said sprocket wheels.

The shaft 39 is driven from the shaft 38 by means of chain belts 60 and 61 adjusted, respectively, to the sprocket wheels 56 and 57 and to corresponding sprocket wheels 62 and 63 secured to the shaft 39.

To provide for propelling the snow plow at different speeds, both forwards and backwards, the sizes of the sprocket wheels 56 and 62, and 57 and 63 are so proportioned that when the clutch member 55 is moved to engage the gear 52 with the shaft 39, said shaft will be rotated at one rate of speed, say at a speed corresponding to propulsion of the plow one mile an hour, and when the clutch is shifted to engage the gear 53 with the shaft 39, said shaft will be rotated at a relatively higher rate of speed, say at a speed corresponding to propulsion of the plow at 3 miles an hour.

The axle 12 is driven from the shaft 39 by means of spur gears comprising a pinion 64 secured to the shaft 39 which meshes with a gear 65 secured to the axle 12.

The gearing shown for driving the snow-cutting wheel and also for propelling the vehicle merely exemplifies any desired or approved transmission gearing for the purposes specified and I do not, therefore, desire to limit myself to any particular drive gearing, as my invention contemplates the use of any gearing suitable for the purposes.

As installed for operation, the advancing side of the snow-cutting wheel A is exposed so that it will have unobstructed access to the body of snow into which the plow is advancing, but to provide for discharging the snow at the sides of a road which the plow is traversing in operation, the rear side of said snow-cutting wheel is enclosed by a casing 66, preferably made of sheet metal and which corresponds to the discharge segment of the casing of a centrifugal fan, said casing being supported at the front end of the oscillating frame B and terminating in a discharge spout 67 constructed and arranged for discharging the snow at either or both sides of the road, as may be desired.

As shown, the portion of the casing 67 which forms the discharge spout is bifurcated so as to provide two discharge openings 68 and 69 adapted for discharging snow at opposite sides of the plow.

Pivoted within the casing 67 at 70 is a damper 71 which may be turned into position to close either opening of the discharge spout.

In discharging snow from the casing 66, the snow-cutting wheel acts as a blower,

drawing air into the interior of said snow-cutting wheel through the openings in the rings 2 and discharging it into the casing 66 and outwardly through the discharge openings 68 and 69 in the form of a blast together with the snow removed by said snow-cutting wheel—when in finely subdivided form.

Secured to the lower edge of the casing 66 is a strip 72 of flexible material, which will close the space between the lower edge of said casing and the surface of the road or of the layer of snow thereon.

I claim:—

1. In a snow plow, the combination of a vehicle, a transversely-disposed snow-cutting wheel rotatably mounted at the front end of said vehicle, comprising a shaft rotatably mounted in bearings on the vehicle frame, rings secured to said shaft, a multiplicity of cutting blades secured to and which extend between said rings, said blades being spaced short distances apart, the spaces between said cutting blades opening directly into the interior of the wheel and the blade-supporting rings being provided with openings through which air will have free access to the space within said blades, a housing which encloses the rear side of said wheel leaving the front side thereof exposed so that, in the operation of the machine, the advancing side of the cutting-wheel will be presented directly to the snow to be removed, said housing being provided with a discharge-opening, means for propelling said vehicle, and means for rotating said cutting-wheel at high peripheral velocity, the relation being such that in operation the blades of said cutting-wheel will remove the snow in the form of thin parings and such also that said cutting-wheel will operate as a fan to discharge removed snow from the spaces between the cutting-blades into the housing which encloses the rear side of said cutting-wheel and to expel it through the discharge-opening of said housing.

2. A snow plow as specified in claim 1, in which the cutting-blades of the snow-cutting wheel comprise portions on which their cutting edges are formed, the advancing sides of which in operation are inclined inwardly and rearwardly relative to radial lines described through the cutting-edges thereof.

3. A snow plow as specified in claim 1, in which the cutting-blades comprise portions on which their cutting-edges are formed which are frontwardly-curved relative to the direction of rotation of said cutting-wheel.

4. A snow plow as specified in claim 1, in which spiders are secured to the shaft of the snow-cutting wheel to which the rings which carry the snow cutting blades are secured.

5. A snow plow as specified in claim 1, which comprises a pivoted frame at the forward end of which the snow-cutting wheel is mounted, means for adjusting said frame pivotally, and for maintaining it in adjusted positions, the relation being such that pivotal movement of said frame in different directions will impart movement to the snow-cutting wheel towards and from the ground.

6. A snow plow as specified in claim 1, which comprises a pivoted frame at the forward end of which the snow-cutting wheel is mounted, means for adjusting said frame pivotally, and for maintaining it in adjusted positions, comprising means to permit said frame to yield in one direction, the relation being such that pivotal movement of said frame in different directions will impart movement to the snow-cutting wheel towards and from the ground and such also that said snow-cutting wheel can yield upwardly.

7. A snow plow as specified in claim 1, which comprises a pivoted frame at the forward end of which the snow-cutting wheel is mounted, means for adjusting said frame pivotally, and for maintaining it in adjusted positions, comprising a bolt anchored to the main frame of the vehicle, which extends through a hole formed in a projection on said pivoted frame, a nut which has screw threaded engagement with said bolt above the projection on said pivoted frame and is adapted to react against said projection, and a spring inserted between rigid parts of said pivoted frame and the main frame of the vehicle.

8. A snow plow as specified in claim 1, which comprises a pivoted frame at the forward end of which the snow-cutting wheel is mounted, means for adjusting said frame pivotally, and for maintaining it in adjusted positions, comprising a bolt anchored to the main frame of the vehicle, which extends through a hole formed in a projection on said pivoted frame, a nut which has screw threaded engagement with said bolt above the projection on said pivoted frame and is adapted to react against said projection, and a coiled spring inserted between the under side of the projection on said pivoted frame and the part of the main vehicle frame to which the anchor bolt is secured and which surrounds said anchor bolt as a guide.

9. A snow-cutting wheel for a snow plow comprising a shaft adapted to be rotatably mounted in bearings in a vehicle frame, rings secured to said shaft, a multiplicity of cutting-blades secured to and which extend between said rings, said blades being spaced short distances apart, the spaces between said cutting-blades opening directly into the interior of the wheel and the blade-supporting rings being provided with openings through which air will have free access

to the space within the cutting-blades, the spaces between said cutting-blades and the interior of the wheel being substantially unobstructed, said cutting-blades being constructed and arranged to remove the snow with a shaving cut and to expel such removed snow from the spaces between said cutting-blades by a fan action.

10. A snow-cutting wheel for a snow plow as specified in claim 9, in which the cutting-blades comprise portions on which thin cutting-edges are formed, the advancing sides of which in operation are inclined inwardly and rearwardly relative to radial lines described through the cutting-edges thereof.

11. A snow-cutting wheel for snow plows as specified in claim 9, in which the cutting-blades comprise portions on which thin cutting-edges are formed which are frontwardly curved relative to the direction of rotation of said cutting-wheel in operation.

12. A snow-cutting wheel for snow plows as specified in claim 9, in which spiders are secured to the shaft of the snow-cutting wheel to which the supporting-rings for the cutting-blades are secured.

In witness that I claim the foregoing as my invention, I affix my signature this 12th day of March, 1925.

E. M. BASSLER.