Jan. 24, 1956 W. F. MILLER 2,731,739

SNOW PLOW

Filed July 18, 1952

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Fig. 3

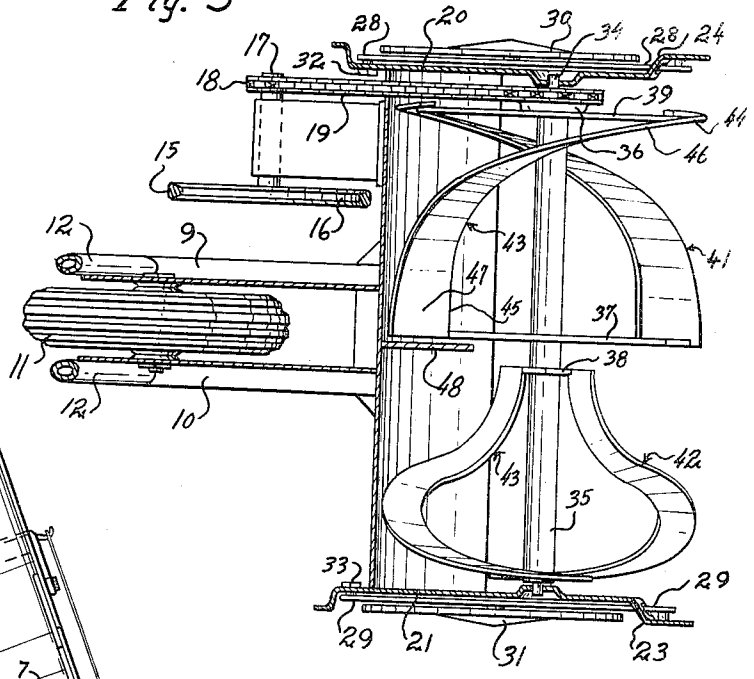


Fig. 1

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Fig. 4

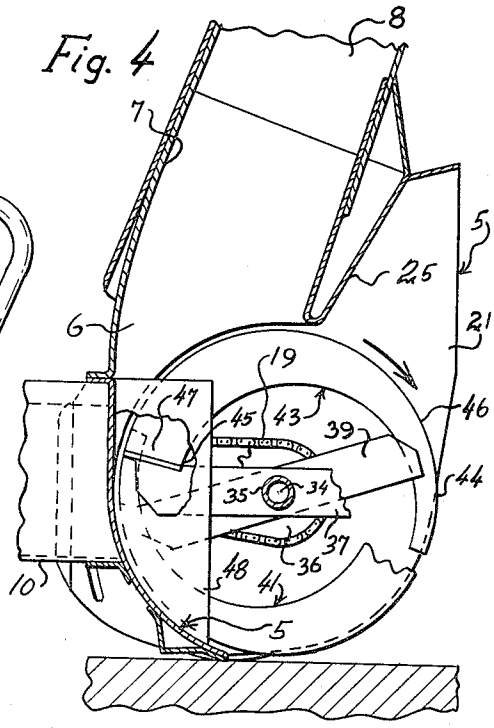
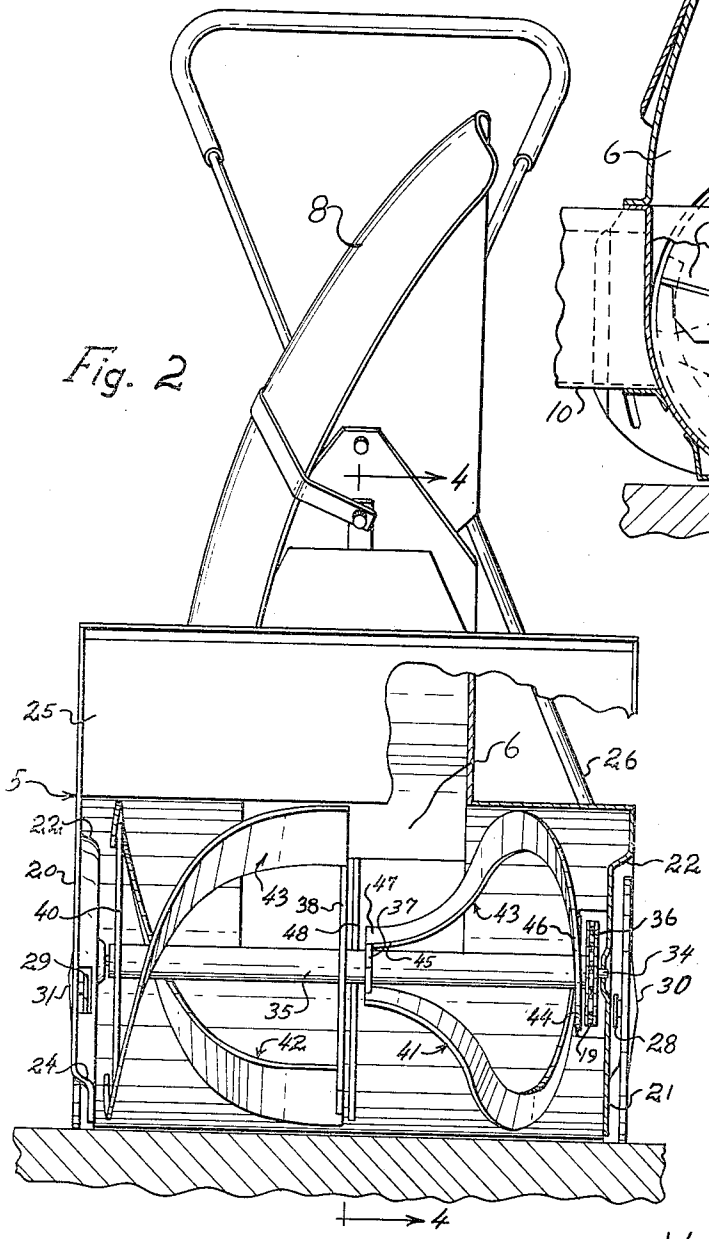


Fig. 2



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SNOW PLOW

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11 Claims. (Cl. 37—43)

This invention relates to snow plows. More particularly, it relates to snow plows of the type wherein a portion of the snow cutting blade is utilized for impelling the snow considerable distances from the plow.

It is a general object of my invention to provide a novel and improved snow plow of cheap and simple construction.

A more specific object is to provide a snow plow of cheap and simple construction which will move a maximum of snow with a minimum of power.

Another object is to provide a novel and improved snow plow of cheap and simple construction which will function in an improved manner.

Another object is to provide a snow plow having snow delivering portions which are self-cleaning to prevent accumulation of snow and ice thereupon and which are at the same time part of the snow-cutting blades.

Another object is to provide a snow plow constructed to move a minimum amount of air and thus reduce fogging to a minimum and at the same time require less power.

Another object is to provide a snow plow constructed to commence the initial movement of the snow at a slow rate and to increase this rate as it progresses toward the snow plow discharge and thereby reduce the amount of power required for operation of the plow.

Another object is to provide a snow plow constructed to provide snow flinging chambers in conjunction with the snow cutting blades without increasing the weight of the blade and hence requiring less power.

These and other objects and advantages of my invention will more fully appear from the following description made in connection with the accompanying drawings, wherein like reference characters refer to the same or similar parts throughout the several views, and in which:

Fig. 1 is a side elevational view of one embodiment of my invention;

Fig. 2 is a front elevational view of the same with a portion thereof broken away;

Fig. 3 is a horizontal sectional view taken approximately along line 3—3 of Fig. 1; and

Fig. 4 is a vertical sectional view taken approximately along line 4—4 of Fig. 2.

One embodiment of my invention may include, as shown in Figs. 1–4, an arcuately formed rotor housing or moldboard indicated generally as 5. As shown, this moldboard 5 is provided with a tangential discharge opening 6 to which is connected a discharge conduit 7 carrying an adjustable deflector hood 8. Extending rearwardly from the arcuately shaped housing 5 is a pair of spaced support panels 9 and 10 between which is journaled a rear wheel 11 and to which is connected an upwardly and rearwardly extending guard 12. Supported by the support panels 9 and 10 is a motor 13 having drive pulley 14 connected by a belt 15 to a second pulley 16 carried by a countershaft 17. The countershaft 17 carries a sprocket 18 which in turn is connected by a link chain 19 to the sprocket on the rotor to be hereinafter described to drive the same.

The moldboard or housing 5 has a pair of end walls 20 and 21 which extend slightly inwardly as at 22 to provide space for the wheels of the plow so that the wheels may at all times pass within the swath of the plow. The housing 5 at its forward portion extends slightly outwardly as at 23 and 24 to guide the snow into the rotor and it also extends upwardly as at 25 to guide snow downwardly into the rotor if the drift is deeper than the diameter of the rotor. A handle member 26 is connected to each side of the housing 5 in a manner best shown in Fig. 1.

Pivotally connected to each of the end walls 20 and 21 of the housing 5 as best shown in Fig. 1 at 27, is a mounting lever 28, 29 which carries in journaled relation a wheel 30, 31. At the rear ends of the mounting levers 28 and 29 are clamps 32, 33 which slide in slots provided therefor as best shown in Fig. 1. By adjusting the clamps 32, 33 the wheels 30, 31 may be adjusted. Thus the elevation of the housing 5 can be varied as desired in a manner readily understood.

Mounted in the end walls 20, 21 of the housing 5 is a shaft 34, this shaft extending transversely to the housing 5 and centrally thereof. Mounted on the shaft 34 is a tubular member 35 which carries a sprocket 36 at one of its ends and is driven by the link chain 19 in a manner described hereinabove.

Extending radially from the tubular member 35 adjacent its longitudinal midsection is a pair of closely spaced support arms 37 and 38. As best shown in Fig. 3, these support arms extend normally to each other and are spaced from each other along the length of the tubular member a distance of preferably about one inch. Adjacent the opposite ends of the tubular member 35 is another pair of support arms 39 and 40, these arms also being substantially normal to each other. Secured to the outer end portions of these support arms 37, 38, 39 and 40 are two sets of substantially helical blades indicated generally as 41 and 42. These sets of blades are of course spaced from each other since the blades terminate at the support arms 37 and 38, these support arms lying directly ahead of the tangential discharge opening 6. As can best be seen by referring to Fig. 3, the two sets of blades 41 and 42 extend in opposite directions about the rotational axis of the tubular member 35 so that each of the sets of blades will cause the snow to move laterally toward the central portion of the tubular member 35 and to a point directly ahead of the discharge opening 6. For convenience the individual blades will be designated by the numeral 43.

Each of the blades 43, as best shown in Fig. 3, is mounted so that there is an open area between the blade and the tubular member 35. In other words, the blades 43 are spaced radially with respect to the axis of rotation of the tubular member 35. Each of these blades 43 is tapered in width along its length so that it is substantially narrower at its outer end portion as at 44 than it is at its snow delivering portion 45. Each of these blades 43 has a relatively small pitch at its outer end as at 46 and this pitch increases along its length as you proceed toward the snow delivering portion 45 until at the snow delivering portion 45 the pitch is such that the blade extends substantially parallel to the axis of rotation of the tubular member 35 to form a flat snow delivering surface 47 which extends substantially parallel to the length of the tubular member 35.

Mounted within the housing 5 and fixedly connected thereto is a snow-abutting and guiding wall 48 which is shown in the form of a plate. This plate 48 as best shown in Fig. 4, extends upwardly from the lower portion of

the housing 5 and within its confines to a point adjacent the upper limits of the orbits of the blades 43. This snow-abutting and guiding wall 48, as shown, is positioned entirely behind the axis of rotation of the tubular member 35 and is spaced slightly from the extreme ends of the snow delivering portions 45 of each of the blades 43. It is mounted, however, between the rotating snow delivering portions of the two sets 41, 42 of the blades so as to be in position to cooperate with the snow delivering portions 45 of the blades to abut the laterally moving snow and to guide the same upwardly and tangentially through the discharge opening 6.

In operation, the rotor 41 is rotated rapidly by the motor 13 in a direction so that the blades 43 descend ahead of the axis of rotation of the tubular member 35. The outer end portions of the blades 43 are the portions of the blades which engage the snow first. Since these outer end portions are tapered and hence of relatively small width, the amount of snow which is moved by that portion of each blade is small relative to the amount moved by the portions of the blades closer to the discharge opening 6. This is true because the portions which are more close to the discharge openings must engage and carry the snow which lies directly thereahead and must also move laterally the snow which has been moved centrally by the outer portions of each blade. In other words, the more central portions of the blades, in addition to cutting and moving the snow directly thereahead, must also assist in conveying laterally the snow which has been cut by the portions of the blade farther removed from the snow delivering portions 45. In this manner the snow is conveyed centrally to a position directly ahead of the discharge opening 6.

As the snow reaches the area directly ahead of the discharge opening 6 it is engaged by the snow delivering portions 45 of the blades 43. As pointed out above, these snow delivering portions 45 have a snow delivering surface 47 which is substantially parallel to the axis of rotation of the tubular member 35. This snow delivering portion 45 is the broadest portion of the blade and cooperates with the snow-abutting and guiding plate 48 to form in effect a snow conveying chamber, one wall of which is continuously changing because of the relative movement between the snow delivering portion 45 and the wall 48. As the snow delivering portion 45 commences its upward movement, it cooperates with this wall 48 to move the snow upwardly along this wall. The wall 48 serves as an abutment for the snow to prevent it from moving laterally sufficiently far to slip off the snow delivering portion 45 and thus lose the benefit of the centrifugal fling afforded by the snow delivering portion. At the same time the wall 48 guides the snow upwardly so that when the snow delivering portion commences its forward movement past the discharge opening 6, the snow is flung upwardly and tangentially through the discharge opening. The hood 8 guides the flung snow to whichever side is desired.

The slight spacing between the extreme ends of the snow delivering portions 45 and the wall 48 permits the snow to be continuously slipping sidewise relative to the inner ends of the flights of blades to prevent an accumulation of the snow from forming on the snow delivering portion and tending to form a pocket or lump of ice. Such formations would quickly cause excessive wear and unbalanced condition in the rotor and would also require an unnecessarily large amount of power to drive the same. The alternate or staggered arrangement of the snow delivering portions of the blades 43 results in a constant and uniform loading of the rotor so that a smoother action is obtained than would be the case if the snow-conveying chambers were directly opposite each other. It can be readily seen that when the maximum amount of force is required to drive the snow delivering portion of the blade, one of the other blades is barely commencing to convey snow upwardly. By following the movement of the rotor it can be readily seen that as the amount of power required to drive the first mentioned of these blades is decreased the amount of power necessary to drive the second and upwardly moving blade is increased so that there is a substantially constant balance of power required to drive the rotor. Thus the amount of power required at any given point of time may be substantially less than would be required if the snow delivering portions were not so arranged.

Since each blade is tapered and increases in width as you proceed along its length toward the snow delivering portion, the outer end portion 44 of the blade engages and conveys a relatively small amount of snow. One of the important features of this tapered structure is that very little if any air is moved by the outer portion of the blade and hence the condition commonly referred to as "fogging" is substantially reduced or practically eliminated. "Fogging" is the result of a large amount of air being moved at the same time a certain amount of relatively light and dry snow is being moved. By tapering the blades 43 I have eliminated the movement of a large amount of air and hence the tendency to create a cloud of air with many fine particles of snow therewithin is substantially reduced.

Since the amount of snow which must be conveyed laterally increases as you proceed along the length of the blade 43 from its outer end portion toward its snow delivering portion 45, the width of the blade 43 has been increased gradually so that at no time is there a large amount of air being moved in addition to the snow. At the same time the width of the blade is increased sufficiently to handle the required volume of snow at a particular point along its length. Thus it can be readily seen that the blade, by being substantially wider mid-between its ends along its length, is able to handle the larger volume of snow presented to it for cutting and lateral conveying.

Since the pitch of the blades 43 is relatively small at their outer ends and since this pitch increases as you progress along their length toward their snow delivering portions 45, the lateral movement of the snow engaged by the outer end portions of the blade is relatively slow as compared to the rate of lateral movement of the snow by the portions of the blade more closely adjacent to the snow delivering portions 45. Since the pitch is small at the outer ends of the blades, less power is required to move the snow as it is started relatively slowly. This may be compared to commencing the movement of a train, as it is well-recognized that the heavy load of a long train may be moved initially with substantially less power by commencing the movement at a relatively slow rate. After the snow has received its initial impetus the increasing pitch of the blade causes it to progress centrally of the length of the rotor at a more rapid rate until it reaches the snow delivering portion 45 which flings the snow upwardly and tangentially through the discharge opening 6. Thus it can be readily seen that I have provided a rotor which commences the movement of the snow with a minimum of power and thereafter increases its speed of lateral movement so that it is conveyed to the desired point with less power than would be required if the blade had the same pitch throughout, as has been the case in previous snow plow rotors.

By reference to Fig. 4, it can be seen that the snow delivering portion 45 of the blade clears the snow-abutting and guiding wall 48 as it approaches the uppermost portion of its orbit. By the time it has reached this point it has flung the snow upwardly through the discharge opening 6. Any tendency of some of the snow or ice to cling to this snow delivering portion 45 is completely eliminated by the fact that after the snow delivering portion has passed and cleared the wall 48 such snow and ice is free to slip laterally off the end of the snow delivering portion and into the path of the blades of the other set. Thus it can be readily seen that each of the blades is

provided with a self-cleaning feature which will prevent such accumulations of snow and/or ice and thus substantially reduce the amount of power required to drive such a rotor.

Thus it can be seen that I have provided a novel and improved snow plow of cheap and simple construction which will move a maximum of snow with a minimum of power and which functions in an improved manner. Some of the more important features of my invention are the fact that this structures moves substantially less air and thus prevents "fogging," that it starts the snow movement at a relatively slow rate and increases the speed of such movement as it progresses laterally toward the discharge opening, and that less power is required because no ice and/or snow accumulations form on the rotor. In addition, because of the simplicity of the structure, the rotor can be manufactured with a minimum of materials and labor. It is simple in design but highly effective in operation.

While I have shown the preferred embodiment in Figs. 1–4, it should be understood that certain variations to the rotor may be made and still have a satisfactorily operating unit. For example, I have constructed and operated a rotor of the type shown with the exception that the blades 43 have been constructed without being tapered along their length and without having a change in the pitch along the length of the blades with the exception of the snow delivering portions 45. Such a rotor operates in a very satisfactory manner but requires more power than would be the case when a rotor of the type shown in Figs. 1–4 is utilized.

It will of course be understood that various changes may be made in the form, details, arrangement and proportions of the various parts without departing from the scope of my invention.

What is claimed is:

1. In a snow plow, the combination of a moldboard having a tangential discharge opening therein, a rotor mounted transversely of said moldboard and having a plurality of generally helically arranged blades terminating ahead of the discharge opening of said moldboard and feeding snow thereto, and a snow-abutting and guiding wall separate from said blades and fixedly connected to said moldboard and extending upwardly therewithin ahead of said opening and at the end of said blades and across the rear portion only of the area defined by the orbits of said blades and cooperating with said blades to cause the snow to be flung upwardly by said blades through the discharge opening of said moldboard, said wall together with said blades and said moldboard constituting the sole snow-flinging means of the plow.

2. In a snow plow, the combination of a moldboard having a tangential discharge opening formed therein, a rotor mounted transversely of said moldboard and having a plurality of generally helically arranged blades terminating ahead of said discharge opening and feeding snow thereto, and a snow-abutting and guiding wall fixedly connected to said moldboard and positioned entirely behind the axis of said rotor and extending upwardly within said moldboard directly opposite one end of said blades and cooperating therewith to cause the snow to be flung upwardly and tangentially by said blades through the discharge opening of said moldboard.

3. In a snow plow, the combination of a moldboard having a tangential discharge opening formed therein, a rotor mounted transversely of said moldboard and having a plurality of generally helical blades extending transversely of the moldboard in radial spaced relation to the rotational axis of said rotor with an open area between said blades and such axis, said blades terminating ahead of said discharge opening and feeding snow thereto, and a snow-abutting and guiding wall fixedly connected to said moldboard and positioned entirely behind the axis of said rotor and extending upwardly normal to the axis of said rotor within said moldboard opposite one end of

said blades and cooperating therewith to cause the snow to be flung upwardly and tangentially by said blades through the discharge opening of said moldboard, said wall together with said blades and said moldboard constituting the sole snow-flinging means of the snow plow.

4. In a snow plow, the combination of a moldboard having a tangential discharge opening therein, a rotor mounted transversely of said moldboard and having a pair of sets of generally helically arranged blades with axially spaced adjacent ends, one set of said blades being arranged to extend about the rotational axis of said rotor in a direction opposite to that of the other set, the adjacent ends of the blades of each set approaching axially the adjacent ends of the blades of the other set and terminating ahead of the discharge opening of said moldboard and feeding snow thereto, and a snow-abutting and guiding wall fixedly connected to said moldboard and extending upwardly between said two sets of blades ahead of said opening and at the end of said blades and being positioned entirely behind the axis of said rotor and extending upwardly within said moldboard and cooperating with the adjacent end portions of said blades to cause the snow to be flung upwardly and tangentially by said blades through the discharge opening of said moldboard, said wall together with said blades and said moldboard cooperatively constituting the sole snow-flinging means of the snow plow.

5. The structure defined in claim 4, the adjacent end portions of the blades in said sets terminating alternately about the axis of rotation of said rotor.

6. In a snow plow, the combination of a moldboard having a tangential discharge opening therein, a rotor mounted transversely of said moldboard and having a plurality of generally helical blades terminating directly ahead of said discharge opening and moving the snow laterally toward said discharge opening and feeding the snow thereinto, said blades being spaced radially with respect to the rotational axis of said rotor and having a snow-delivering portion at their ends adjacent said discharge opening, and a snow abutting and guiding wall fixedly connected to said moldboard and positioned substantially entirely behind the axis of said rotor and extending upwardly within said moldboard adjacent and directly opposite the delivering end portions of said blades and cooperating therewith to abut and guide the laterally moving snow upwardly and tangentially through the discharge opening of said moldboard.

7. In a snow plow, the combination of an arcuately formed rotor housing having a tangential discharge opening formed therein, a rotor mounted transversely of said housing and having a pair of sets of generally helical blades with the ends of the blades of one of the sets being adjacent the ends of the other set, one set of said blades being arranged to extend about the rotational axis of said rotor in a direction opposite to that of the other set, the adjacent ends of the blades of each set terminating in spaced vertical planes ahead of the discharge opening of said housing and feeding snow thereinto, and a snow-abutting and guiding wall fixedly connected to said housing and extending upwardly between the adjacent ends of said two sets of blades and being positioned substantially entirely behind the axis of said rotor and directly opposite the adjacent end portions of said blades and cooperatively causing the snow to be flung upwardly and tangentially by said blades through the discharge opening of said housing.

8. In a snow plow, the combination of an arcuately formed rotor housing having a tangential discharge opening formed therein, a rotor mounted transversely of said housing and having a pair of sets of generally helical blades with one end of one of the sets of said blades being adjacent the opposite end of the other set, one set of said blades being arranged to extend about the rotational axis of said rotor in a direction opposite to that of the other set to cause each set to feed snow toward

the adjacent ends of said blades, the adjacent ends of the blades of each set terminating directly ahead of the discharge opening of said housing and feeding snow thereinto, and a snow-abutting and guiding wall fixedly connected to said housing and extending upwardly therewithin between said sets of said blades and in spaced relation to the adjacent ends thereof and being positioned substantially entirely behind the axis of said rotor and directly opposite the adjacent end portions of said blades to abut and guide the laterally moving snow upwardly and tangentially through the discharge opening of said housing.

9. In a snow plow, the combination of an arcuately formed rotor housing having a tangential discharge opening formed therein, a shaft mounted in said housing transversely thereof, a tubular member rotatably and removably mounted on said shaft, said tubular member being adapted to be connected to a source of rotary power, a plurality of generally helical blades mounted on said tubular member in radially spaced relation thereto with an open area therebetween, said blades terminating directly ahead of the discharge opening of said housing and feeding snow thereinto, and a snow-abutting and guiding wall fixedly connected to said housing and extending upwardly therewithin ahead of said housing opening and opposite and adjacent the end of said blades, said wall being positioned substantially entirely behind the axis of rotation of said tubular member and across the adjacent ends of said blades to cooperatively form in effect a snow-propelling chamber and abutting and guiding the snow at the end of said blades to cause the snow to move upwardly and tangentially through the discharge opening of said housing.

10. In a snow plow, the combination of a moldboard having a tangential discharge opening therein, a rotor mounted transversely of said moldboard and having a plurality of generally helically arranged blades rotatable within said moldboard and feeding snow through said discharge opening, and a snow abutting and guiding wall fixedly connected to said moldboard adjacent said discharge opening and extending within said moldboard ahead of said opening relative to the direction of rotation

of said blades and being disposed directly opposite the ends of said blades and cooperating directly with said blades in imparting acceleration to the snow to cause the snow to be flung by said blades outwardly and through said discharge opening of said moldboard.

11. In a snow plow, the combination of an arcuately shaped rotor housing having a tangential discharge opening formed therein, a rotor mounted transversely of said housing and having a pair of sets of generally helical blades with one end of one of the sets of said blades being adjacent to but spaced axially from the opposite end of the other set, one set of said blades being arranged to extend about the rotational axis of said rotor in a direction opposite to that of the other set to cause each set to feed snow toward the adjacent ends of said blades, the adjacent ends of the blades of each set approaching but not meeting the adjacent ends of the blades of the other set, said blades rotating within said housing and feeding snow into the discharge opening thereof, and a snow abutting and guiding wall fixedly connected to said housing and extending therewithin between the adjacent ends of said sets of said blades and in spaced relation thereto and being positioned opposite the adjacent ends of said blades and cooperating therewith to abut and guide the laterally moving snow tangentially through the discharge opening of said housing.

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