

April 23, 1940.

A. VOORDERMAN

2,198,237

SNOW PLOW

Filed Dec. 24, 1937

2 Sheets-Sheet 1

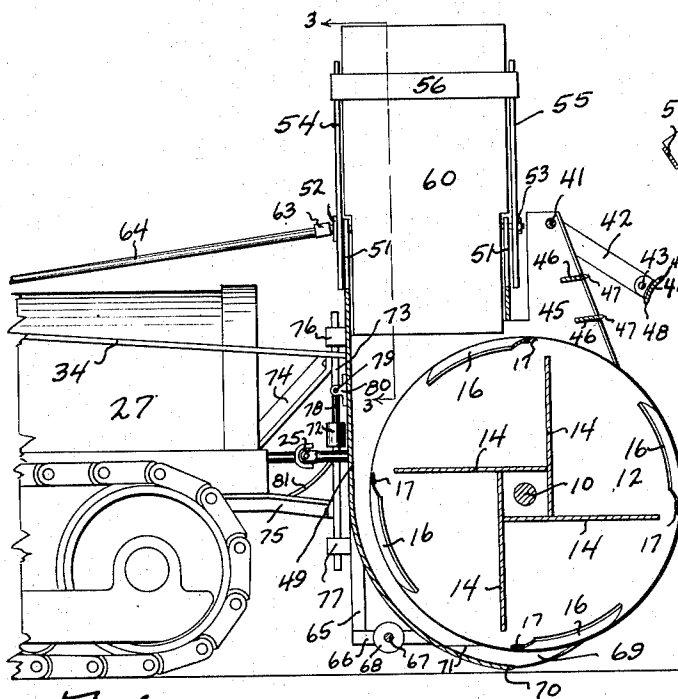


Fig. 1

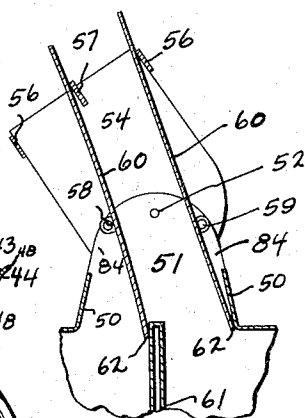


Fig. 3

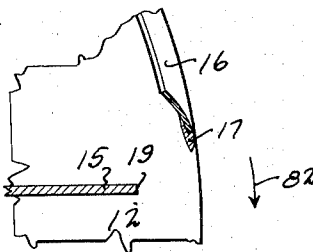


Fig. 4

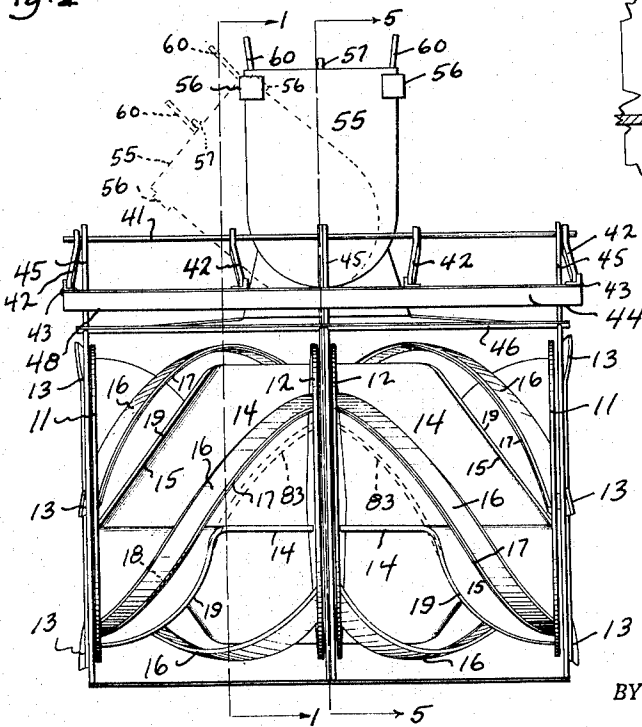


Fig. 2

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2 Sheets-Sheet 2

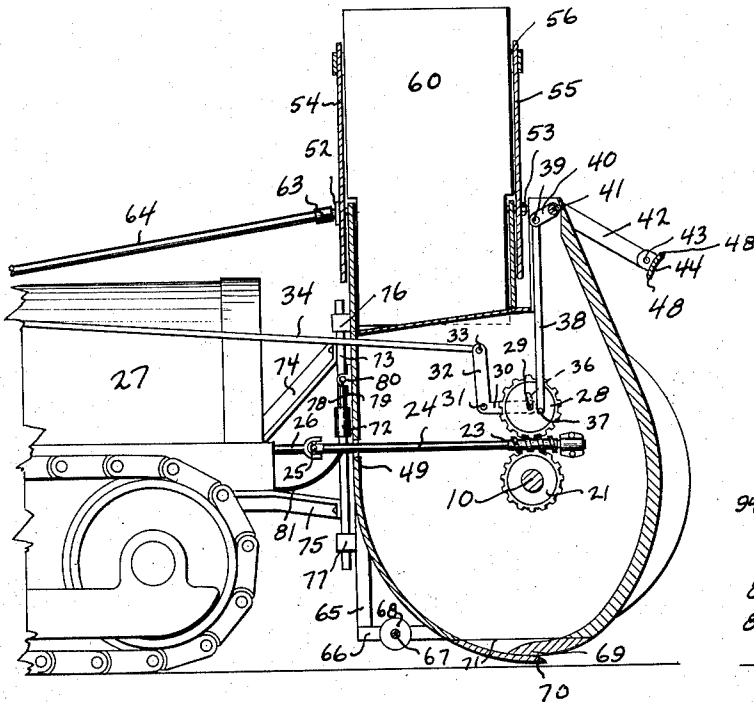


Fig. 5

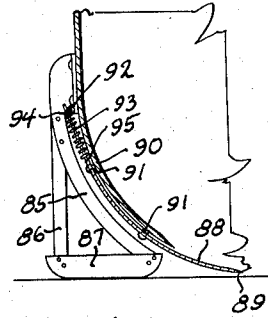


Fig. 6

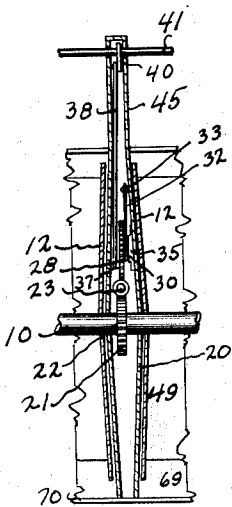


Fig. 7

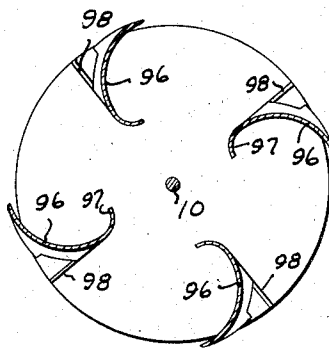


Fig. 8

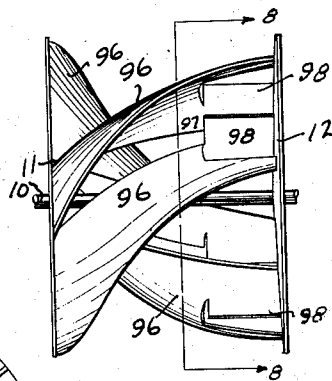


Fig. 9

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2,198,237

SNOW PLOW

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10 Claims. (Cl. 37—43)

My invention relates to a snow plow for use on highways or for other purposes.

An object of my invention is to provide a snow plow which includes positive cutting means which means cut the snow in a positive manner inwardly before conveying the same to the rear.

A further object of my invention is to provide means for cutting down high snow formations with an auxiliary mechanism.

A further object of my invention is to provide means for disengaging such auxiliary mechanism when desired.

A further object of my invention is to provide associated means for cutting and carrying or forcing the snow rearwardly and out of suitable communicating mediums to the side of the roadway.

A further object of my invention is to provide means for swinging the snow deflecting channels from either one side or the other with a simple mechanism.

A further object of my invention is to provide an arrangement attachable to the snow plow which will cause breaking up of ice on icy pavements and the like.

A further object of my invention is to provide a blade which automatically rides over obstructions without interfering with the action thereof.

A further object of my invention is to provide the above associated means in a construction of simplicity consistent with the purposes contemplated.

With these and other objects in view, my invention consists in the construction, arrangement and combination of the various parts of my device, whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in my claims, and illustrated in the accompanying drawings, in which:

Figure 1 is a side view taken in section along the lines 1—1 of Figure 2,

Figure 2 is a forward elevation of the plow,

Figure 3 is a detail of the deflecting channels,

Figure 4 is an enlarged detail of one of the blades,

Figure 5 is a side elevation taken in section along the lines 5—5 of Figure 2,

Figure 6 is a modification,

Figure 7 is a sectional view taken along the shaft showing the oscillating mechanism,

Figure 8 is a modification taken along the lines 8—8 of Figure 9, and

Figure 9 is a forward view of Figure 8.

I have used the character 10 to designate the shaft of the cutting members, which shaft ex-

tends transversely through the circular side members 11 and 12, the members 12 being substantially concave to allow room for the various gears etc. necessary for the oscillating members which will be described.

Terminating at the ends of the shaft 10 are the side cutters 13 which are inclined blades attached to the shaft and which can be of any number, the function of which blades is to cut along the sides of the snow in order to relieve the resistance of the snow encountered by the plow. Arranged eccentrically from the shaft 10 are the straight partitions 14, the ends of which join respective sides of succeeding members as shown in Figure 1 and which members 14 terminate in forwardly bent projections 15. Attached to the disks 11 and 12 and spaced peripherally thereabout are the cutting and deflecting members 16 to which are attached the cutting blades 17. If desired the cutting blades can include tooth members 18 as shown in Figure 2. The members 16 follow a spiral contour as shown more clearly in Figure 2 and are spaced from the ends 19 of the members 15. Received within the concave members 12 is a casing 20 which receives the worm gear 21 which is attached medially at 22 to the shaft 10. A worm 23 meshes with the gear 21 and is attached to the further shaft 24 which is connected through the universal joint 25 to the shaft 26 which extends rearwardly to the powering and driving tractor 27.

A further worm gear 28 meshes with the worm 23 and the gear 28 is journaled upon the pin 29 which is attached to the arm 30 which arm 30 is pivoted at 31, and which arm extends into the upright member 32 which is pivoted at 33 to the control rod 34. A bracket 35 (see Figure 7) includes a slot 36 which receives the pin 29. By merely pulling in the rod 24 from the tractor the pivotal action of the arms 30 and 32 upon the pivot 31 will raise the gear 28 within the slot 36 thereby disengaging the gear 28 from the worm 23.

Eccentrically attached to the gear 28 with the pin 37 is the rod 38 which is pivotally attached at 39 to the crank arm 40. The crank arm 40 is attached to the further rod 41 (see Figures 1, 2, 5, and 7). Attached to the rod 41 are the forwardly extending arms 42 to which is pivotally attached at 43 the further cutting member 44 which is arcuate in shape as shown in Figures 1 and 5. Extending side partitions 45 receive the further substantially horizontal blades 46 having the cutting edges 47 along the front edges thereof.

The cutting member 44 also includes the sharp

edges 48 along the edges thereof. It will be noted that the lower blade 46 is set forwardly a greater distance than the upper blade. Extending upwardly from the main housing 49 of the plow are the side partitions 50 (see Figure 3) which extend upwardly a slight distance. The side partitions 50 merge with the forward transverse partitions 51 and pivoted at 52 and 53 to such partitions are the forward pivoting members 54 and 55. The members 54 and 55 include side strips 56 attached therebetween and a medial strip 57. Pivoted at 58 and 59 are the lengthened vertical sheet metal side members 60 which side members are made of suitable thin metal for the purpose intended. The aforesaid concave partitions 12 merge together with the centrally and upwardly disposed partitions 61 which extend slightly above the bottom edges 62 of the members 60. A universal joint can be connected at 63 to the pivotal point at 52 and a further control rod 64 which passes to the tractor or driving member is attached to the joint. A frame work 65 carries the horizontal beams 66 which in turn carry a shaft 67 to which are attached several spaced discs 68 which discs are inclined slightly from the longitudinal direction of travel of the plow.

The lower portion 69 which includes a forward extending scooping blade 70 is detachable along the line 71. The entire plow can be raised through the agency of the hydraulic cylinder 72 which is attached between the stationary up-rights 73. The uprights 73 are attached by means of suitable brackets 74 and 75 to the tractor frame. Further brackets 76 and 77 support the side members 73. A piston travels within the hydraulic cylinder 72 with the push rod 78 of the piston being attached at 79 to the member 80 which is attached to the rear of the plow. A hose 81 is connected to the hydraulic cylinder 72 and oil can be forced under pressure therein to raise the plow.

Now that the principal structures of my plow have been described, I shall proceed to explain the operation thereof.

The plow is pushed forwardly along the highway or road and during such rotation the shaft 10 drives the side members 11 and 12 in the direction of the arrow 82 (see Figures 1 and 4). During such rotation the deflecting members 16 cut through the snow and it will be particularly noted that the deflecting members 16 are inclined at an angle to the outer surface of the discs and not tangentially thereto. The blades 17 will then cut into the snow at a corresponding angle. The blades can be held as shown at 17 or can be toothed or some other form as shown at 18 for different types of cutting work necessary according to the composition of the snow. The angle at which the cutting blade enters the snow is almost parallel to the curvilinear path of travel with the extreme cutting edge set so it will tend to advance into the snow slightly faster than the forward motion of the plow itself, thus cutting a path so that only the extreme cutting edges contact the snow before it is brought into motion.

The angle of the deflectors 16 causes a gradually increasing speed of the snow toward the center of the throwing fins 14. This is readily apparent from an examination of Figure 4 which illustrates through the curve of the deflector 16 how the snow is brought toward the center at an increasing rate corresponding to the rotation of the cutting units. Since the cutting blades 17 are

always ahead of any portion of the fins 14 and 15, the snow will be conveyed rearwardly and the said members will then throw the snow downwardly around the shaft and thence upwardly through the spout formed between the members 54, 55, and 60. The forwardly bent blades 15 can follow a spiral contour which if desired can follow a continued contour 83 as shown in Figure 2.

Therefore, from the foregoing description it will be seen that the blades efficiently cut with a minimum amount of resistance due to the width thereof and due to the curvature thereof and then the conveying fins 14 and 15 convey the snow rearwardly and out through the spout. The spouts can be deflected from one side of the roadway to the other by merely turning the rod 64 which in turn pivots the member 54 which likewise, through the medium of the side braces 56, correspondingly pivots the further member 55 at the forward end of the plow.

The side partitions 60 which are normally between the side members 56 and the central member 57 which are attached between the members 54 and 55 thereby are deflected and the spout structure is carried either to the left or right as illustrated more clearly in Figure 3 since as shown the side member 56 and the medial member 57 both bear against the upper end of the flexible member 60 thereby bending it in one direction as shown. Conversely the snow can be thrown to the other side of the roadway by merely turning the member 64 in the reverse direction wherein the reverse effect is obtained.

The lower edges 62 contact the central partition 61 thereby providing a complete closure for the members. Correspondingly the other units will throw the snow out through the openings left at 84 (see Figure 3). As the snow is thrown out to the openings the members 54 and 55 will still serve as side members and the member 60 will act as the upper deflecting portion of the spout so that due to this arrangement both elements of the plow will throw the snow in the same direction.

During forward traveling of the plow for high drifts and the like the oscillating arm 42 is driven in a fairly rapid manner through the medium of the gears and crank arm 40 heretofore described, and the same can be disengaged by means of the lever 34 acting through the member 32. During forward motion of the plow the rapid up and down movement of the member 44 will slice down the higher portions of snow and the same will be conveyed downwardly into the rotating structure. The pivotal feature at 43 insures that the sharpened edges 48 permit only the cutting edges to contact the snow while the plow is moving forward.

The stationary transverse cutting bars 46 also serve to cut down the drifts beyond the top of the rotating blades which will also assist in the action. The lower section 69 of the plow can be removed for city use or where ice is encountered allowing the blades to travel closer to the surface of the road.

During such procedure the plow is dropped until the discs 68 rest upon or slightly penetrate the ice surface and the entire weight of the plow can be thereby placed upon such discs if such is desired, and due to the fact that they have sharpened edges they will serve to cut up the ice on the roadway. This effect is materially also increased due to the fact that the blades are at a slight angle to the direction of travel thereby

causing a certain slicing action to be imparted.

Another modification in structure is shown in Figure 6 in which a frame work such as 85 is attached to the further vertical members 86 which carry the runners 87. A further arcuate blade 88 having the further cutting edge 89 is slidably engaged with the stationary portion of the plow 90. Attached to the member 90 are the pins 91 which are received in suitable slots in the blade 88. The upper end of the blade 88 is attached to a rod 92 which is received within a helical compression spring 93, which helical spring bears against the bracket 94 and the blade at 95. As the portion 89 strikes solid obstructions, the blade is thus retracted upwardly through the release of the spring 93 thereby allowing the plow to move ahead and over such obstructions without impeding the action of the plow itself. After passing over the obstructions the blade again assumes its normal position.

A further modification is shown in Figure 8 wherein a similar principle is involved to that of the rotating construction with the exception, however, that the cutting deflectors comprise the arcuate formations 96 which are continuous flanges of the blades terminating in the inwardly projecting portions 97. In this form of structure, the deflectors are thus a continuous strip providing a cutting edge as well as a deflecting surface for cutting and deflecting the snow toward the center. Further radially disposed conveying members are provided at 98 which provide fins for throwing the snow outwardly. The construction shown in Figure 8 thereby cuts the snow in a similar manner and through the medium of the ends 97 and the members 98 conveys the cut snow rearwardly.

It will now be seen that I have provided a snow plow structure which includes positive cutting means, which conveys the same out of the plow structure to either side of the roadway as desired, which includes auxiliary means for cutting down high snow formations, which includes means for disengaging such auxiliary means, which includes an arrangement for first cutting and then efficiently conveying the snow or deflecting the same toward the conveying arrangement, which cuts and gradually carries the snow with increased speed to eliminate objectionable clogging of the rotating structure, which will cause breaking up of ice on icy pavements and the like, which includes a blade structure which will automatically ride over obstructions which will not interfere with the action of the plow, which includes means for providing special blades for different types of snow, which includes means for effecting the greatest economy of power needed and will avoid unnecessary abuse and wear on machinery, and which includes other features efficiently consistent with snow removal, and that I have provided a structure in a construction of simplicity consistent with the purposes contemplated.

Some changes may be made in the construction and arrangement of the parts of my invention without departing from the real spirit and purpose of my invention, and it is my intention to cover by my claims any modified forms of structure or use of mechanical equivalents, which may be reasonably included within their scope.

I claim as my invention:

1. A snow plow comprising a lower cutting member, vertical braces attached above said member, an oscillating arm pivotally attached

to said braces, said arm adapted to oscillate upwardly and downwardly about a horizontal axis, said arm including cutting edges for cutting down high snow formations, and flat transverse horizontal cutting members positioned rearwardly of said oscillating member.

2. A snow plow comprising a casing, substantially cylindrical members rotating in said casing, said members including spirally arranged deflecting and cutting members arranged peripherally about the circumference of said members, conveying fins spaced inwardly from said cutting and deflecting members, said deflecting members being substantially arcuate in shape and inclined at an angle to the peripheral boundaries of said rotating members, a deflecting spout arranged above said rotating members, said deflecting spout including a pair of flexible sides pivoted to the plow casing, a pair of further transverse members including side strips and a medial strip attached thereto pivoted to the plow casing, said flexible sides being deflected through pressure applied thereagainst by one of said side strips and said medial strip when said transverse members are pivoted.

3. A snow plow comprising a casing, substantially cylindrical members rotating in said casing, said members including spirally arranged deflecting and cutting members arranged peripherally about the circumference of said members, conveying fins spaced inwardly from said cutting and deflecting members, said deflecting members being substantially arcuate in shape and inclined at an angle to the peripheral boundaries of said rotating members, a deflecting spout arranged above said rotating members, said deflecting spout including a pair of flexible sides pivoted to the plow casing, a pair of further transverse members including side strips and a medial strip attached thereto pivoted to the plow casing, said flexible sides being deflected through pressure applied thereagainst by one of said side strips and said medial strip when said transverse members are pivoted, said plow casing having an opening adjacent said flexible members for permitting snow to be thrown therethrough adjacent said flexible members.

4. A snow plow comprising a casing, substantially cylindrical members rotating in said casing, said members including spirally arranged deflecting and cutting members arranged peripherally about the circumference of said members, conveying fins spaced inwardly from said cutting and deflecting members, said deflecting members being substantially arcuate in shape and inclined at an angle to the peripheral boundaries of said rotating members, a deflecting spout arranged above said rotating members, said deflecting spout including a pair of flexible sides pivoted to the plow casing, a pair of further transverse members including side strips and a medial strip attached thereto pivoted to the plow casing, said flexible sides being deflected through pressure applied thereagainst by one of said side strips and said medial strip when said transverse members are pivoted, said plow casing having an opening adjacent said flexible members for permitting snow to be thrown therethrough adjacent said flexible members, said plow including a lower frame work, a plurality of discs journaled to said frame work, said discs having sharpened edges and being positioned at a slight angle to the longitudinal direction of travel of the plow, said

plow including a lower detachable bottom section to allow removal thereof to allow said discs to penetrate into an icy surface.

5. A snow plow comprising a casing, substantially cylindrical members rotating in said casing, said members including spirally arranged deflecting and cutting members arranged peripherally about the circumference of said members, conveying fins spaced inwardly from said cutting and deflecting members, said deflecting members being substantially arcuate in shape and inclined at an angle to the peripheral boundaries of said rotating members, said plow including a lower frame work including a plurality of discs journaled thereto, said discs having sharpened edges and being inclined at a slight angle to the longitudinal direction of motion of the plow.
6. A snow plow comprising a casing, substantially cylindrical members rotating in said casing, said members including spirally arranged deflecting and cutting members arranged peripherally about the circumference of said members, conveying fins spaced inwardly from said cutting and deflecting members, said deflecting members being substantially arcuate in shape and inclined at an angle to the peripheral boundaries of said rotating members, said cylindrical members being positioned transversely horizontal with respect to the motion of the plow, and further side cutting blades attached to said cylindrical members for cutting snow along the sides of said casing.
7. A snow plow comprising a casing, substantially cylindrical members rotating in said casing, said members including deflecting and cutting members arranged peripherally about the circumference of said members, conveying fins spaced inwardly from said deflecting and cutting members, the outer edges of said conveying fins being spaced from said deflecting and cutting members and said

conveying fins being offset from, and parallel to radii of said cylindrical members.

8. A snow plow comprising a casing, means for ejecting snow outwardly from the casing including a deflecting spout arranged above the snow plow, said deflecting spout including a pair of flexible sides pivoted to the plow casing, a pair of further transverse members including side strips and a medial strip attached thereto pivoted to the plow casing, said flexible sides being deflected through pressure applied thereagainst by one of said side strips and said medial strip when said transverse members are pivoted.

9. A snow plow comprising a casing, substantially cylindrical members rotating in said casing, said members including spirally arranged deflecting and cutting members arranged peripherally about the circumference of said members, conveying fins spaced inwardly from said cutting and deflecting members, said deflecting members being inclined at an angle to the peripheral boundaries of the said rotating members, said cylindrical members being positioned transversely horizontal with respect to the motion of the plow, and further cutting blades attached to said cylindrical members for cutting snow along the sides of said casing.

10. A snow plow comprising a lower cutting member, vertical braces attached above said member, an oscillating arm pivotally attached to said braces, said arm adapted to oscillate upwardly and downwardly about a horizontal axis, said arm including cutting edges for cutting down high snow formations, and flat transverse horizontal cutting members positioned rearwardly of said oscillating member, said cutting edges adapted to pivot upon the outer extremities of said arm.

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