

Feb. 28, 1956

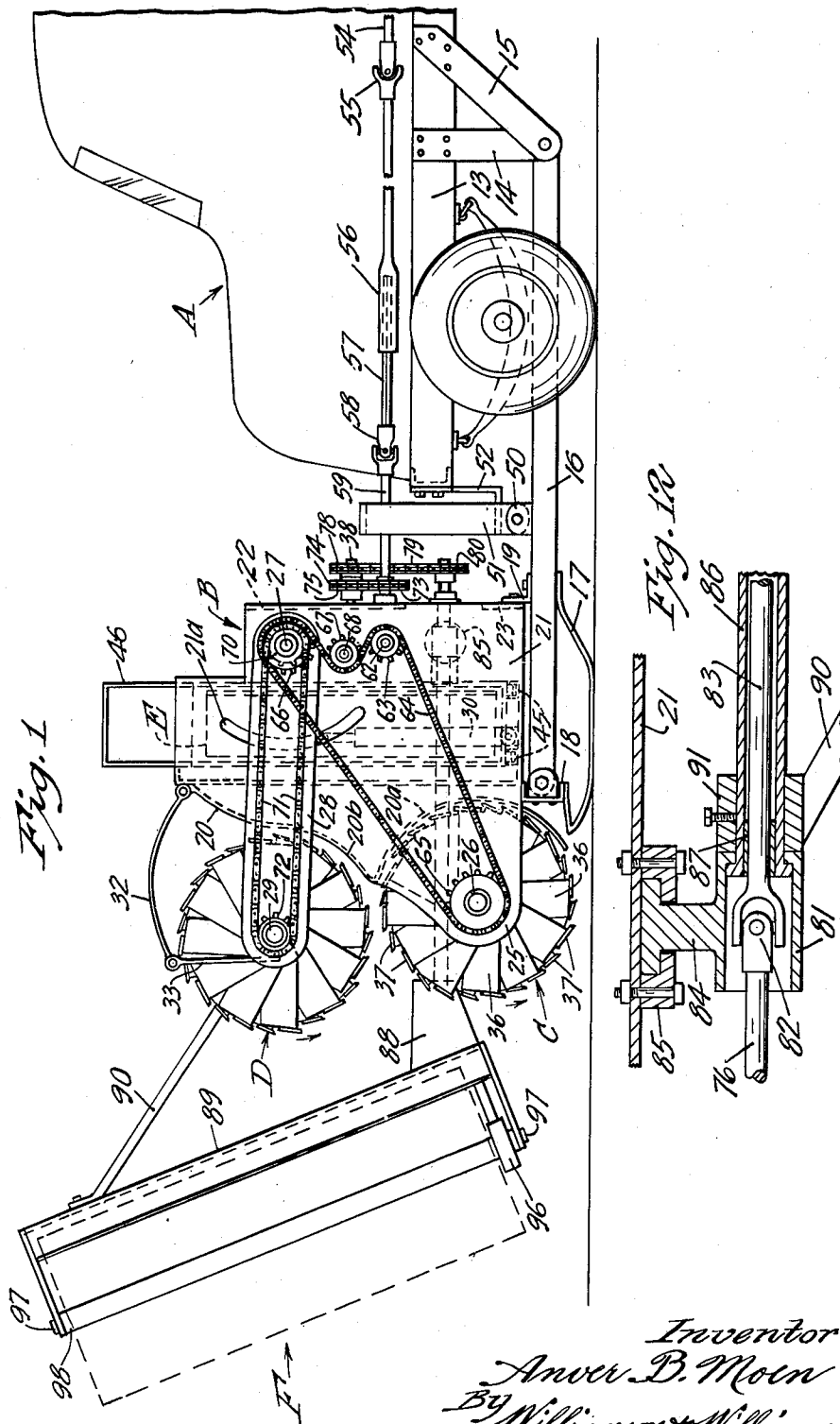
A. B. MOEN

2,736,111

ROTARY SNOW PLOW

Filed July 7, 1949

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2,736,111

ROTARY SNOW PLOW

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Fig. 12

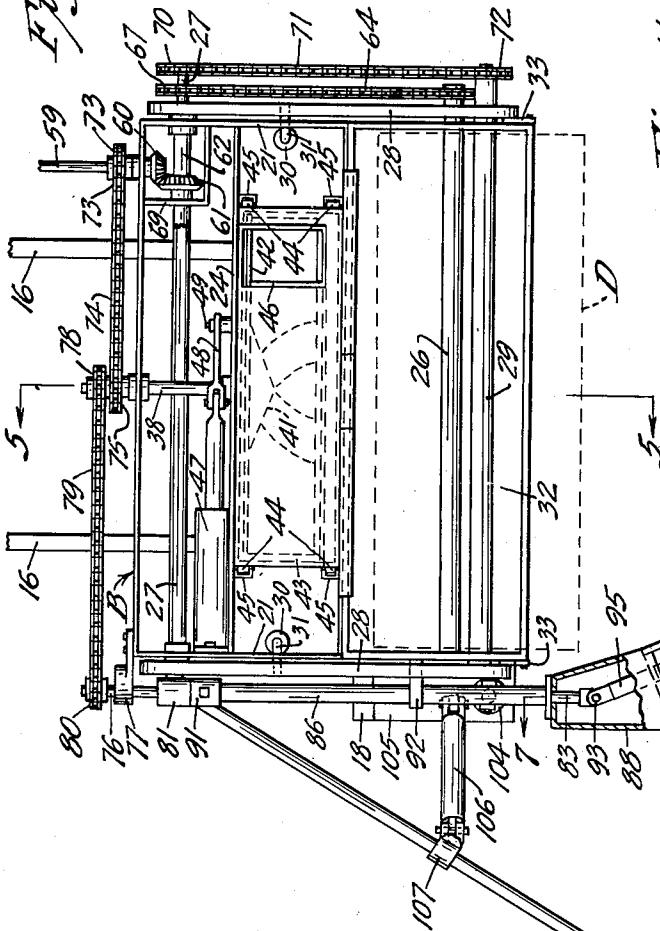


Fig. 11

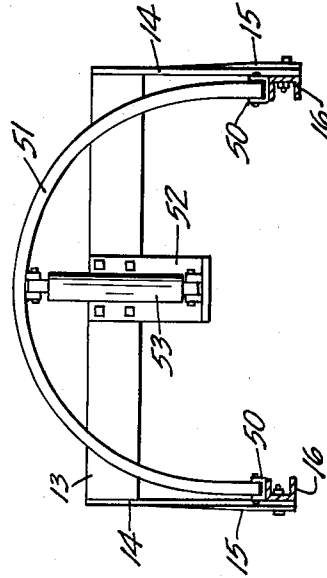
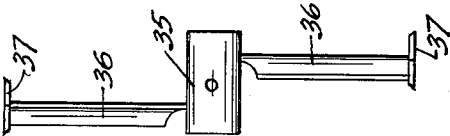


Fig. 10



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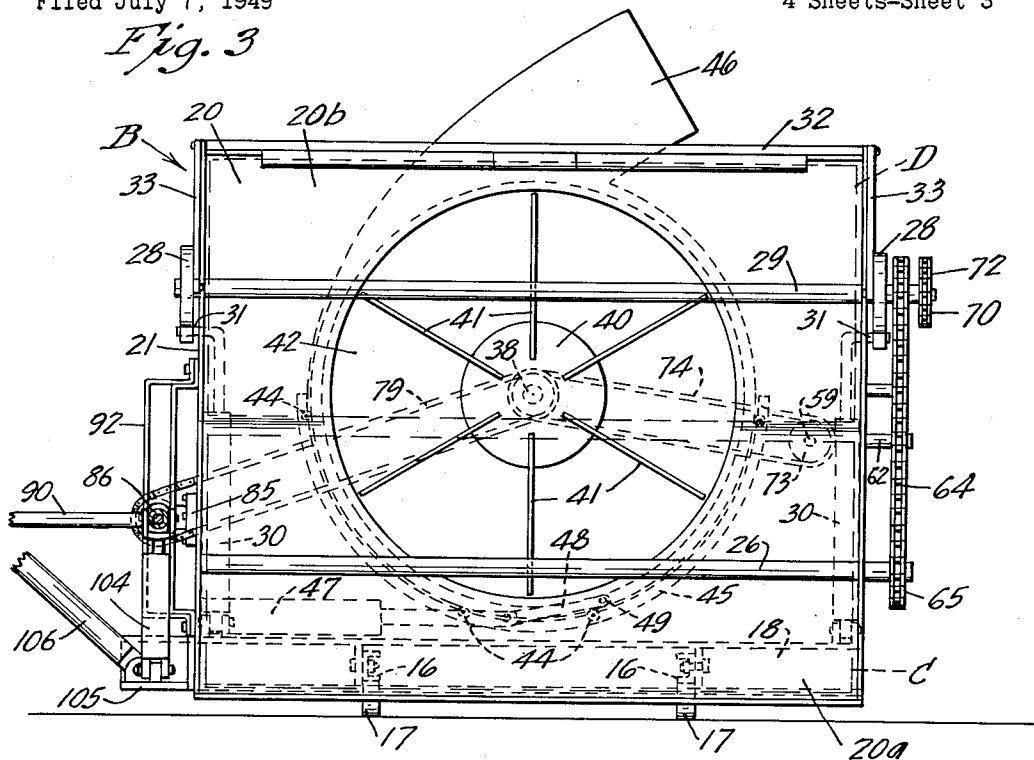
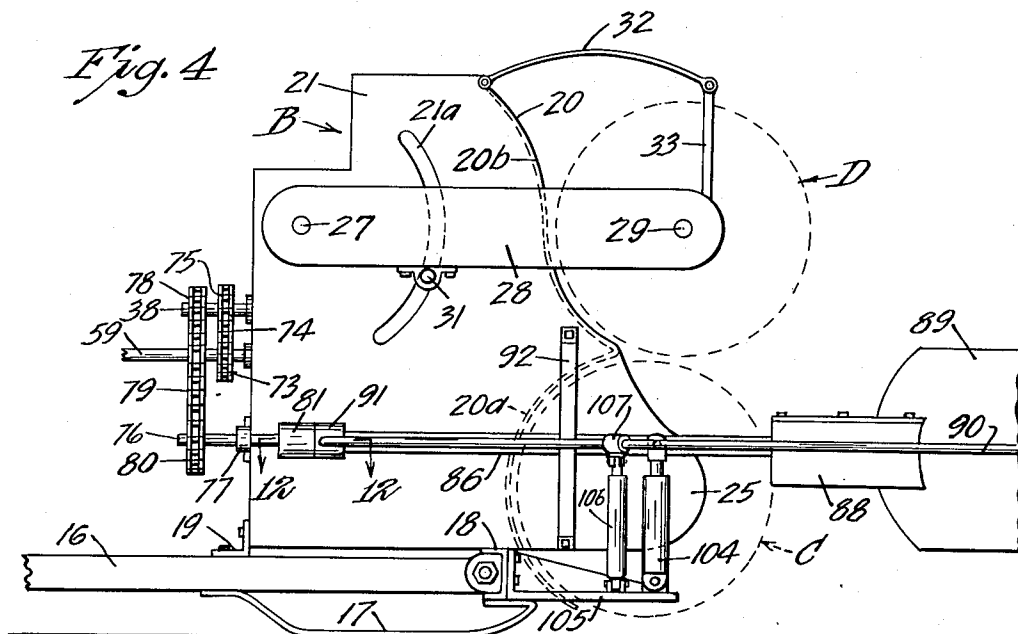
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ROTARY SNOW PLOW

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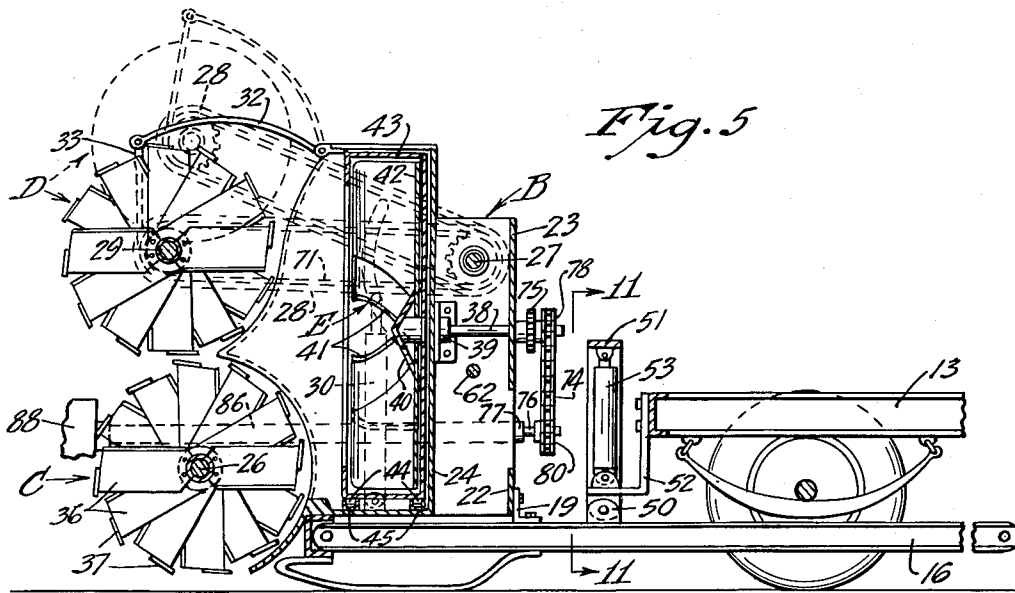
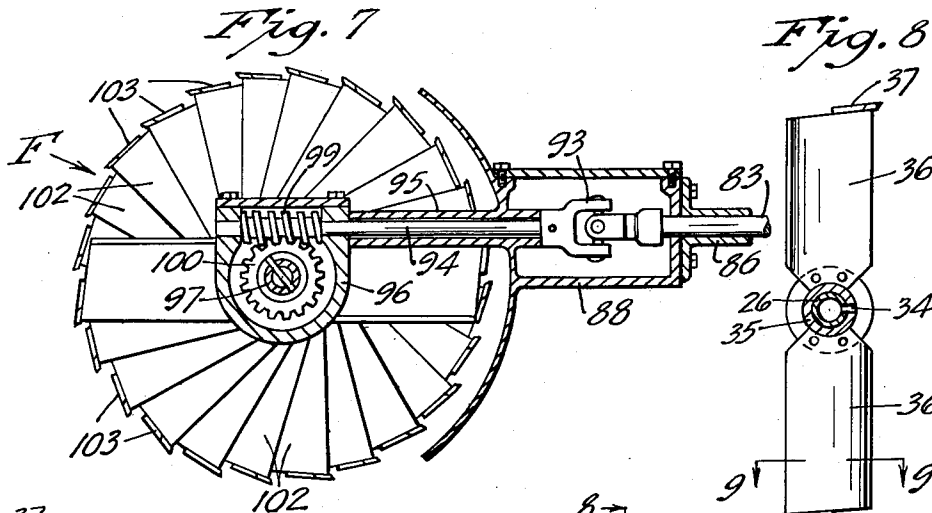
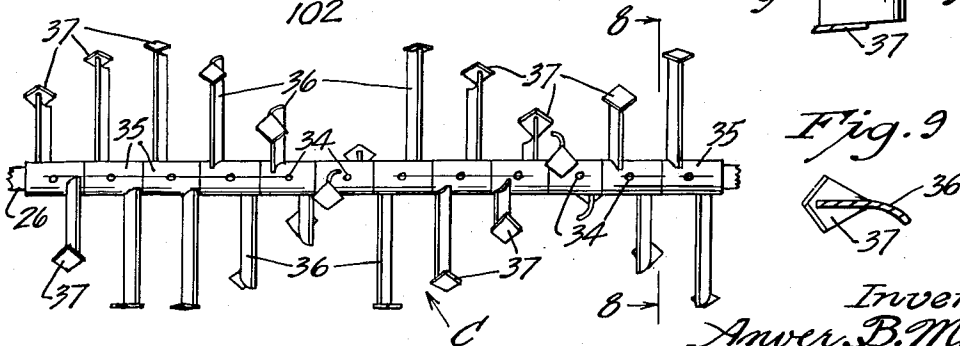


Fig. 6

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2,736,111

ROTARY SNOW PLOW

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Application July 7, 1949, Serial No. 103,432

8 Claims. (Cl. 37-43)

This invention relates to snow plows.

It is one of the objects of the present invention to provide a snow plow which is an improvement on the snow plow disclosed in United States Patent No. 1,820,707, issued jointly to me and Syver Lien on August 25, 1931.

It is a further object to provide a highly efficient snow plow which includes a snow disintegrating conveyor mounted in a moldboard whereon a snow discharging blower is centrally mounted, the said conveyor including a shaft, concavo-convex arms mounted on the shaft and projecting radially outwardly therefrom, and cutter blades fixed to the outer ends of the arms, the arms being longitudinally and circumferentially spaced from each other and being disposed in outwardly directed spiral patterns relative to the direction of rotation of the shaft so that inner arms work ahead of outer arms to prevent the massing of snow at the central portion of the moldboard and the concave sides of the arms to the right and to the left of the central portion of the moldboard facing inwardly to throw the snow inwardly to the blower.

A further object is to provide such a snow plow as in the last paragraph above referred to wherein the arrangement of the arms and blades of the snow disintegrating conveyor is such that each blade is circumferentially spaced from all other blades relative to the axis of rotation of the shaft so that each blade will initially cut into the snow ahead of the moldboard at a different time whereby the power derived from the shaft may be concentrated on the different blades successively rather than simultaneously and thus the driving power required for operating the plow may be held at a minimum.

Another object is to provide an upper snow disintegrating conveyor which can be set to work at a desired level above the first mentioned disintegrator above referred to and operating in conjunction therewith, to permit the plow to clear away high drifts of snow.

Still another object is to provide a shoulder moldboard mounted laterally of the above referred to and main moldboard, there being a snow disintegrating conveyor mounted to work in the shoulder moldboard to discharge into the path of the main moldboard and the shoulder moldboard being capable of being both angularly tilted and raised and lowered relative to the main moldboard to cut away and plow the shoulder of a road laterally of the path taken by the main moldboard.

The objects and advantages of the 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 different views, and in which

Fig. 1 is a view in side elevation of a snow plow embodying the invention mounted on a truck, the shoulder snow disintegrating conveyor being indicated in dotted lines to eliminate unnecessary drawing;

Fig. 2 is a plan view of the snow plow, the shoulder moldboard and shoulder snow disintegrating conveyor

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being set somewhat differently than as in Fig. 1 and being horizontally disposed;

Fig. 3 is a view in front elevation of the moldboard and other parts of the plow, the outlines of the main and upper snow disintegrating conveyors being shown in dotted lines but the shafts thereof being shown in full lines;

Fig. 4 is a view in side elevation of the plow looking toward the opposite side of the same from that shown in Fig. 1;

Fig. 5 is a vertical section taken substantially on the line 5-5 of Fig. 2 as indicated by the arrows;

Fig. 6 is a view in front elevation of the main disintegrating conveyor removed from the plow;

Fig. 7 is a section taken substantially on the line 7-7 of Fig. 2 as indicated by the arrows and showing portions of the shoulder moldboard and disintegrating conveyor;

Fig. 8 is a vertical section taken on the line 8-8 of Fig. 6 as indicated by the arrows;

Fig. 9 is a horizontal section taken on the line 9-9 of Fig. 8 as indicated by the arrows;

Fig. 10 is a detail showing a pair of disintegrator arms and blades and their manner of connection to one of the disintegrating conveyor shafts;

Fig. 11 is a vertical section taken substantially on the line 11-11 of Fig. 5 as indicated by the arrows; and

Fig. 12 is a horizontal section taken substantially on the line 12-12 of Fig. 4 as indicated by the arrows.

Referring to the drawings, there are there shown the forward portions of a truck A which can be employed for the mounting and driving of the snow plow of the invention. The truck A includes a frame 13 from which the snow plow is mounted. Carried by the truck frame 13 at the two sides thereof are arms 14 and 15 which project downwardly below the frame 13 behind the front wheels of the truck A, and pivotally connected to the lower ends of the arms 14 and 15 are forwardly extending bars 16 carrying runners 17 adjacent their forward ends. The two bars 16 are in turn connected at their forward ends to a channel shaped cross bar 18. Supported on the cross bar 18 and by angle brackets 19 attached to the forwardly extending bars 16 is a housing or plow frame structure which may be designated as an entirety by the letter B. This housing incorporates therein a moldboard 20, side plates 21, a lower back cross bar 22, and an upper back plate 23. The moldboard 20 is centrally recessed to form a cylindrical well open forwardly of the plow forming a blower housing 24.

The moldboard 20 is of peculiar formation. It forms a lower or main moldboard section 20a of arcuate concave formation which runs upwardly to about the mid-height of the housing B. The main moldboard section is then joined by an upper moldboard section 20b, the lower portion of which diverges from the upper edge of the main moldboard section 20a and is of arcuate concavity and the upper portion of which joins the upper portion of the lower concave portion of the upper moldboard section and is of arcuate convex form. It will be appreciated that both the main and upper sections of the moldboard are interrupted centrally by the cylindrical blower housing 24, but except for this interruption the two sections of the moldboard extend transversely between the two side plates 21, the lower part of the main section 20a in fact projecting below the lower edges of these plates.

The side plates 21 project forwardly of the main section 20a of the moldboard forming arms 25 within which a main disintegrating conveyor shaft 26 is journaled, this shaft being mounted co-axial with the arcuate main section 20a of the moldboard. An upper cross shaft 27 is journaled in the upper rear portions of the two side plates

21 and pivoted on this shaft are a pair of forwardly projecting arms 28 which extend forwardly of the upper section 20b of the moldboard. These arms 28 have journaled therein an upper disintegrating conveyor shaft 29 in such relation that when the forward ends of the arms 28 are positioned so that the arms are located approximately horizontally the shaft 29 will be approximately co-axial with the lower portion of the upper moldboard section 20b. The conformation of the upper section 20b of the moldboard is such that as the arms 28 are swung upwardly or downwardly at their forward ends the shaft 29 will maintain approximately equal spacing from the different portions of the upper moldboard section 20b. To raise and lower the forward ends of the arms 28 and the parts carried thereby a pair of hydraulic jacks 30 are provided mounted as on the base of the housing B between the blower housing 24 and the side plates 21 and the extensible portions of these jacks are connected to short inwardly extending arms 31 as best seen in Fig. 2 which are secured to the inner sides of the arms 28 and work through arcuate slots 21a formed in the side plates 21. By operation of these jacks 30, the forward ends of the arms 28 and the parts carried thereby can be raised to a desired level and held in such position.

A forwardly projecting arcuate plate 32, best seen in Figs. 1 and 5, is pivotally connected at its rear edge to the upper edge of the upper moldboard section 20b and the forward edge of this plate is pivotally connected for movement with the arms 28 to the forward ends of the arms by links 33.

There is provided a main or lower snow disintegrating conveyor including the shaft 26 and designated as an entirety by the letter C which works within the main section 20a of the moldboard. There is also provided a similar upper disintegrating conveyor D including the shaft 29 which works within the upper section 20b of the moldboard. As the main and upper disintegrating conveyors are quite similar in structure it becomes necessary to describe and illustrate in detail but one of them and, hence, the main disintegrator C will be described.

Fixed to the disintegrator shaft 26 and held in place thereon by shear pins 34 are a plurality of hubs 35 to which a pair of radially extending arms 36 are secured. Each arm 36 is of concavo-convex form in cross section as best seen in Fig. 9 and each arm at its outer end carries a cutting blade 37 forming a four sided polygon, none of the sides of which are parallel. Each blade 37 projects slightly forwardly relative to the advancing edge of the arm 36 to which it is secured and extends generally transversely of the arm, the outer end of the arm being cut to extend at slightly less than a right angle from the advancing edge of the arm whereby the blade 37 attached to the arm is also caused to lie in a plane at slightly less than a right angle relative to the advancing edge of the arm 36 to which it is attached. Each blade 37 has two sharpened forward edges, the bevel of these edges inclining inwardly relative to the hub 35 to which the arm and blade are secured. Also, both advancing edges of each blade are set in V relation relative to each other. The rear edges of the blade converge from the points where they join the forward edges and these rear edges are also preferably of equal length. The particular portion of each arm 36 to which a blade 37 is attached is flat, the concavo-convex curvature of the arm being rearwardly of the flat forward portion of the blade.

The various arms 36 are made in rights and lefts so arranged that the concave sides of the arms 36 to the left and right of the center of the shaft taken longitudinally thereof face toward the said center. This is to permit the arms at the left of the plow to throw centrally and toward the right of the plow and to permit the arms at the right side of the plow to throw centrally and toward the left of the plow, snow contacted by the arms during their rotation. The circumferential spacing of the arms 36 carried by the hubs 35 and the mounting of the hubs

35 on the particular shaft 26 or 29 to which the hubs are secured is such that the arms to the left of the longitudinal center of the shaft will form a spiral pattern from the center of the shaft to the left end of the shaft and the arms to the right of the longitudinal center of the shaft will form another spiral pattern from the center of the shaft to the right end of the shaft. Also, each of these two spiral patterns is arranged to work outwardly relative to the direction of rotation of the shafts 26 and 29, the direction of rotation of these shafts being counterclockwise as viewed in Fig. 1, and this is to permit inner arms and blades to cut and throw the snow inwardly prior to the time that outer arms and blades cut and throw, thereby relieving the congestion of snow inwardly from the blades cutting and throwing and preventing the massing of the snow centrally of the moldboard 20. The angular circumferential spacing of each arm carried by each shaft 26 and 29 relative to the axis of rotation of the shaft is different and this is for the purpose of causing only one arm and blade carried by each shaft to strike and cut into the snow ahead of the moldboard 20 at a particular level at one time, thereby conserving on the power required to rotate one of the shafts and concentrating the main cutting power on one blade and arm at a time. The blades 37 are of such width relative to each other and to the length of the hubs 35 that the paths taken by adjacent blades will slightly overlap each other, thereby assuring that all snow or ice ahead of one of the disintegrating conveyors will be attacked by one or more of the blades 37. The hubs 35, arms 36 and blades 37 thus far described are located in the case of the main disintegrating conveyor C on the shaft 26 between the two arms 25 forming extensions of the side plates 21, while in the case of the upper disintegrator D they are located on the shaft 29 between the two arms 28.

A snow conveying blower designated as an entirety by the letter E is mounted in the blower housing 24 located in the central portion of the moldboard 20. This blower includes a horizontal blower shaft 38 journaled in the upper rear plate 23 and in a bearing 39 centrally fixed to the blower housing 24. The shaft 38 runs forwardly through the blower housing and it carries at its forward end a conical blower head 40 from which radiate a plurality of blower blades 41, these blades and the conical head being secured at their rear edges to a disc 42 secured to the forward portion of the shaft 38. The inner ends of the blades 41 are cut away as best shown in Fig. 5, and the forward edges of the blades may be given a slight curl as is indicated in Fig. 5 in the direction of rotation of the blower, tending to prevent the snow conveyed by the blades from throwing forwardly. The blades 41, the conical head 40, and the disc 42 are partially encased by a blower casing 43 which carries at its lower portion on its exterior side rollers 44 riding in channeled rings 45 carried by the blower housing 24. The blower casing 43 has a substantially tangentially extending discharge portion 46 which projects upwardly through an opening in the upper part of the housing 24. There is a hydraulic jack 47 secured to the lower inner portion of one of the side plates 21 and the extensible member of this jack is pivotally connected by a link 48 to a lug 49 at the lower portion of the blower casing 43. By operation of this jack 47 the blower casing 43 may be turned so as to locate the discharge outlet 46 in different angular relationships, thereby permitting the discharge of snow to either one side or the other side of the plow at different angles, depending on the desires of the operator, the wind condition, and other factors.

The two bars 16 which carry the snow plow and support it from the truck A carry intermediate the truck and the housing B channel shaped lugs 50 on which the lower ends of an inverted U shaped yoke 51 are pivotally mounted. The truck frame 13 is provided at its forward end with an angular bracket 52, the lower

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forwardly projecting portion of which underlies the central part of the yoke 51. A hydraulic jack 53 has one end, such as the cylinder end, pivotally connected to the bracket 52 and its other end, such as its extensible end, pivotally connected to the underside of the central portion of the yoke 51. By operation of this jack 53 it is possible to raise or lower the two bars 16 and the snow plow structure carried thereby relative to the frame 13 of the truck, thus permitting the runners 17 to at times be raised from the ground and permitting the travel of the vehicle carrying the snow plow over rough roads or with the plow raised in non-plowing condition.

The rotary parts of the plow may be driven from an engine (not illustrated) which may be mounted on the truck A, through a shaft 54 equipped with a universal joint 55 and having at its forward end a polygonal shaped socket 56 within which a polygonal shaped shaft 57 slidably fits. The shaft 57 is in turn connected by a universal joint 58 to a drive shaft 59 journaled in the rear upper plate 23 of the housing B adjacent one side of the housing. The shaft 59 carries inwardly from the plate 23, as best shown in Fig. 2, a beveled pinion 60 meshing with a beveled gear 61 carried by a cross shaft 62 journaled in the two side plates 21. The shaft 62 outwardly from the left side plate 21 as shown in the drawings carries a sprocket 63 as best shown in Fig. 1, and a sprocket chain 64 runs over the sprocket 63, a sprocket 65 carried by the main disintegrating conveyor shaft 26, a sprocket 66 carried by the shaft 27, and a sprocket 67 carried by a short idler shaft 68 journaled in the side plate 21 at the left hand side of the machine as illustrated and also journaled in a strap 69 attached to suitable portions of the housing B as best seen in Fig. 2. Of course, the sprocket 65 and the sprocket 66 are secured to the shafts 26 and 27 at end portions thereof projecting beyond the left side plate 21 in the illustrated embodiment.

The shaft 27 outwardly from the sprocket 66 carries another sprocket 70 as best shown in Figs. 1, 2, and 3, and a sprocket chain 71 runs over the sprocket 70 and over a sprocket 72 secured to one end portion of the upper disintegrating conveyor shaft 29. With this arrangement it will be seen that as the shaft 59 is driven in a counterclockwise direction as viewed from the rear of the snow plow, the two disintegrating conveyor shafts 26 and 29 will be driven in a counterclockwise direction as viewed in Fig. 1 and, accordingly, the forward lower portions of the two disintegrators will be moved downwardly and rearwardly.

The blower shaft 38 is driven from the drive shaft 59 through a sprocket 73 carried by the drive shaft 59 rearwardly of the plate 23, and a sprocket chain 74 running over the sprocket 73 and another sprocket 75 secured to the blower shaft 38. Accordingly, the blower shaft 38 as viewed from the rear of the plow will be driven in a counterclockwise direction.

At the right side of the machine shown there is provided what may be called drive shaft 76 for a shoulder snow disintegrating conveyor. The shaft 76 runs fore and aft the housing B, being of relatively short length and being journaled in a suitable bearing 77 secured to the rear portion of the right hand side plate 21. The shaft 76 is driven from the blower shaft 38 through a sprocket 78 carried by the blower shaft and a sprocket chain 79 running over the sprocket 78 and a sprocket 80 carried by the shaft 76. The shoulder disintegrating conveyor drive shaft 76 runs forwardly from the bearing 77 into a sleeve 81 as is best seen in Fig. 12 and within this sleeve is connected by a universal joint 82 to a shaft 83 which runs forwardly from the sleeve 81. The sleeve 81 is carried by a pin 84, the central longitudinal axis of which is in line with the universal joint 82, and this pin 84 has an enlarged head received and mounted for rotation between the right

side plate 21 of the housing B and a flanged cylindrical bearing 85 bolted to the said side plate 21.

A tube 86 runs forwardly from the sleeve 81 and it has a flange at its rear end fitting the sleeve 81 and bearing against an internal flange at the forward end of the sleeve. The rear end portion of the tube 86 carries a bearing 87 within which the rear portion of the shaft 83 is journaled. The tube 86 runs forwardly and has a flanged forward end rigidly connected to a housing 88 carried by the tube 86. The housing 88 in turn is secured or formed integral with the inner end of a shoulder moldboard 89 of arcuate contour. The moldboard 89 as is best seen in Fig. 2 is set at an angle relative to the shaft 26 of the main disintegrating conveyor C with the outer end of the moldboard 89 located forwardly of the inner end therefore. A diagonal strut 90 is secured at its forward end to the rear side of the outer end of the shoulder moldboard 89 and at its inner end the strut 90 is equipped with a hub 91 which encircles the tube 86 adjacent the forward end of the sleeve 81 and is attached to the tube by a set screw or other appropriate securing means. The tube 86 adjacent its forward end is confined and guided for vertical movement by an elongated strap-like guide 92 best shown in Figs. 2, 3, and 4 of the drawings.

The shaft 83 located within the tube 86 runs forwardly into the housing 88 at the rear inner portion of the shoulder moldboard 89 and it is connected by a universal joint 93 within the housing 88 to the rear end of a shaft 94 running forwardly through a tube 95 projecting ahead of the shoulder moldboard 89 and connected to a gear casing 96. A shoulder disintegrating conveyor shaft 97 is journaled at one end within the gear casing 96 and is journaled at its other end in a bearing 98 carried by and projecting forwardly from the outer end of the shoulder moldboard 89. The snow disintegrating conveyor shaft 97 is driven from the shaft 94 through a worm 99 carried by the shaft 94 within the gear casing 96 and a worm gear 100 carried by the shaft 97 within the gear casing 96.

The shaft 97 forms part of a shoulder snow disintegrating conveyor designated as an entirety by the letter F. The shaft 97 carries thereon a plurality of hubs 101 generally similar to the hubs 35 previously described and carrying radial arms 102 of concavo-convex formation in cross section similar to the arms 36 previously described. The ends of the arms 36 in turn carry cutting blades 103 of generally similar formation to the blades 37 previously described. The various arms 102 are disposed with their concave sides facing toward the inner end of the shaft 97 so as to cause the shoulder disintegrating conveyor F to discharge into the path of the main moldboard 20. Also, the various arms 102 and blades 103 are arranged in a spiral pattern working from the inner end of the shaft toward the outer end thereof relative to the direction of rotation of shaft 97, and, accordingly, inner arms and blades will cut and move the snow ahead of outer arms and blades to prevent the massing and concentration of snow at the inner end of moldboard 89.

To raise and lower the forward end of the tube 86 and consequently to raise and lower the inner end of the shoulder moldboard 89 and the shoulder snow disintegrating conveyor F there is provided a hydraulic jack 104, one end, such as the cylinder end, of which is pivotally connected to a platform 105 carried by the forward end of the right hand bar 16 and the other or extensible end of which jack is pivotally connected to a forward portion of the tube 86. To vary the tilt of the shoulder moldboard 89 and the shoulder snow disintegrating conveyor F there is provided another hydraulic jack 106, one end of which, as the cylinder end, is pivotally connected to the platform 105 and the other end of which, such as the extensible end, is pivotally connected to a suitable bracket 107 carried by the strut rod 90 forward from its rear end. With this construction it will be seen that it will be possible not only to vary the level of the inner end

of the shoulder moldboard 89 and the shoulder snow disintegrating conveyor F, but it will also be possible to vary the tilt of the said moldboard and conveyor when the inner end of the same is set at any level. This permits the plowing of shoulders of the road over which the snow plow is traveling and the varying of the position of the shoulder disintegrating conveyor F dependent on the contour of the said shoulders and dependent on the height of the same relative to the main moldboard 20 of the plow. The various universal joints provided in the shaft drive from the shoulder disintegrator driving shaft 76 to the shaft 97 and the swiveling of the tube 86 in the sleeve 81 and the swiveling of the pin 84 in line with the universal joint 82 on the side plate 21 permits of the various adjustment of level and tilt of the shoulder snow disintegrating conveyor F and the moldboard 89 within which it works. The drive to the shoulder disintegrating conveyor shaft 97 is such that as viewed in Fig. 7 the said shaft will be driven in a counterclockwise direction so that the forward lower portion of the shoulder disintegrator will move downwardly and rearwardly.

No attempt has been made to show in the present drawings the hydraulic system for operating the various hydraulic jacks, but it will be understood that such system is conventional and that controls will be provided for the different jacks for operating them from within the cab of the truck A upon which the snow plow is mounted.

When the snow plow is mounted as described on a truck and the truck is driven forwardly over a road, the main snow disintegrator and conveyor will work into the snow ahead of the main section 20a of the main moldboard 20 while the upper disintegrating conveyor D will work into the snow at a higher level above the main disintegrating conveyor C. The blades 37 of these two conveyors will chop into the snow breaking up hard crusts of the snow or ice formed on the snow and the left hand blades 37 and arms 36 will move the snow encountered centrally of the moldboard 20 to deliver into the blower casing 43 while similarly the right hand cutters 37 and the right hand blades will move the snow and ice inwardly from the right hand portion of the main moldboard 20 to deliver the same centrally into the blower casing 43. The upper disintegrating conveyor D also tends to throw the snow down to the lower disintegrating conveyor C. The curved plate 32 above the upper disintegrating conveyor D prevents the same from throwing the snow forwardly and forms in reality an extension of the upper section 20b of the main moldboard. The blower E receiving the snow from the two conveyors C and D picks the same up and throws the snow laterally to one side of the path being taken by the snow plow. The shoulder disintegrating conveyor F will work over the shoulder of the road or laterally of the path being plowed by the two conveyors C and D and will deliver to a point in the path of the main moldboard 20 where this snow can be acted on by the two snow disintegrating conveyors C and D. The two jacks 30 permit the raising and lowering of the upper disintegrating conveyor D and the holding of the same at a desired level so that depending on the different conditions of the snow encountered this upper disintegrating conveyor can be set at the proper level for use. Two different positions of this upper snow disintegrating conveyor D are shown in Fig. 5 of the drawings. The jack 47 permits the snow to be delivered either to one side of the road or the other through adjustment of the blower casing 43. The jack 53 permits the raising and lowering of the forward portion of the plow as desired. The jack 104 permits varying the level of the lower end of the shoulder snow disintegrating conveyor F, while the jack 106 permits variance in the tilt of this same conveyor F.

It will be seen that a highly effective snow plow has been provided. The shoulder snow disintegrating conveyor F and its various parts can be removed when it is not desired to plow the shoulder of the road.

It will, of course, be understood that various changes

may be made in the form, details, arrangement and proportions of the various parts without departure from the scope of the present invention, which, generally stated, consists in the matter shown, and described, and set forth in the appended claims.

What I claim is:

1. A snow plow comprising a moldboard having a lower arcuately curved concave portion, an upper arcuately curved concave portion joining said lower concave portion and diverging therefrom, and a top arcuately curved convex portion joining said upper concave portion, a blower centrally mounted in said moldboard, receiving therefrom and discharging upwardly therefrom, lower supports projecting forwardly from the ends of said moldboard at the lower concave portion thereof, a lower snow disintegrating conveyor journaled within the forward portions of said supports and working within said lower concave portion of the moldboard, said lower disintegrating conveyor being constructed to cut into and disintegrate snow and convey the same centrally of the moldboard to said blower, a pair of upper supports pivotally mounted at the ends of said moldboard and projecting forwardly therefrom above said lower supports, means for holding said upper supports with the forward portions thereof located at various levels relative to both said upper concave portion and said top convex portion, an upper disintegrating conveyor journaled in the forward portions of said upper supports above said lower conveyor and constructed to cut through the snow ahead of it and convey the same centrally of the moldboard to said blower, and means for driving both said lower and upper conveyors.

2. A snow plow comprising a moldboard, a blower receiving centrally therefrom and discharging upwardly therefrom, supports projecting forwardly from the ends of said moldboard, a snow disintegrating conveyor working within said moldboard, said conveyor comprising a shaft journaled in said supports, concavo-convex arms mounted on said shaft and projecting radially outwardly therefrom, and cutter blades fixed to the outer ends of said arms, said arms being longitudinally and circumferentially spaced from each other outwardly from the central portions of said shaft in spiral patterns which are outwardly directed relative to the direction of rotation of said shaft, the concave sides of the arms to the right and to the left of the central portion of said moldboard facing inwardly and the blades being of such number and width that the path cut by one blade during rotation of said shaft will overlap slightly the path cut by adjacent blades, means for rotating said shaft, a pair of upper supports mounted at the sides of said moldboard and projecting forwardly therefrom above said first mentioned supports, means for holding the forward portions of said upper supports at different levels, an upper snow disintegrating conveyor similar to said first mentioned disintegrating conveyor mounted in said upper supports and working in the upper portion of said moldboard above said first mentioned conveyor, a plate pivotally connected to the upper portion of said moldboard and projecting substantially horizontally and forwardly over the upper portion of said upper conveyor, links interconnecting the forward portion of said plate to said upper supports, and means for driving said upper conveyor.

3. A snow plow comprising a moldboard having a lower arcuately curved concave portion, an upper arcuately curved concave portion joining said lower concave portion and diverging therefrom, and a top arcuately curved convex portion joining said upper concave portion, a blower centrally mounted in said moldboard, receiving therefrom and discharging upwardly therefrom, lower supports projecting forwardly from the ends of said moldboard at the lower concave portion thereof, a lower snow disintegrating conveyor journaled within the forward portions of said supports and working within said lower concave portion of the moldboard, said lower disintegrating conveyor being constructed to cut into and disinte-

grate snow and convey the same centrally of the moldboard to said blower, a pair of upper supports pivotally mounted at the end of said moldboard and projecting forwardly therefrom above said lower supports, means for holding said upper supports with the forward portions thereof located at various levels relative to both said upper concave portion and said top convex portion, an upper disintegrating conveyor journaled in the forward portions of said upper supports above said lower conveyor and constructed to cut through the snow ahead of it and convey the same centrally of the moldboard to said blower, means for driving both said lower and upper conveyors, a plate pivoted to the upper part of said moldboard and overlying the upper portion of said upper conveyor and links pivotally connecting the forward edge of said plate to the forward portion of said upper supports.

4. A snow plow comprising a moldboard having a snow receiving opening substantially centrally between opposite ends thereof, a blower positioned rearwardly of said opening to receive snow moving therethrough and discharge the same away from the moldboard, supports projecting forwardly from the ends of the moldboard, a snow disintegrating conveyor working within said moldboard, said conveyor comprising a shaft journaled in said supports and extending across the moldboard, substantially concavo-convex arms mounted on said shaft and projecting radially outwardly therefrom, and cutter blades at the outer ends of said arms and projecting laterally therefrom, the concave sides of the arms to the right and to the left of the center of said opening in the moldboard facing inwardly toward the transverse center of the shaft, said arms being spaced from each other longitudinally of said shaft and outwardly and circumferentially from substantially the transverse center of the shaft in spiral patterns which extend outwardly in a direction opposite to the direction of rotation of the shaft, certain of said arms during rotation of the shaft extending into the path of said opening, the arms of each spiral pattern serving to continuously move successive amounts of snow relatively loosely to said transverse center of the shaft out of the path of the snow moved by the next successive arm to be received directly in the moldboard opening and said blades being of such number and width that the path cut by one blade during rotation of said shaft will overlap slightly a path cut by adjacent blades, and means for rotating said shaft in a direction opposite to the direction of said spiral patterns.

5. A snow plow comprising a moldboard, a blower receiving centrally therefrom and discharging upwardly therefrom, supports projecting forwardly from the ends of said moldboard, a snow disintegrating conveyor working within said moldboard, said conveyor comprising a shaft journaled in said supports, concavo-convex arms mounted on said shaft and projecting radially outwardly therefrom, and flat cutter blades fixed to and across the outer ends of said arms to extend beyond opposite sides thereof, said arms being spaced from each other longitudinally of said shaft and outwardly and circumferentially from the central portions of said shaft in spiral patterns which are directed outwardly in a direction opposite to the direction of rotation of said shaft, the concave sides of the arms to the right and to the left of the central portion of said moldboard facing inwardly and the blades being of such number and width that the path cut by one blade during rotation of said shaft will overlap slightly the paths cut by adjacent blades, and means for rotating said shaft in a predetermined direction opposite to the direction of said spiral patterns.

6. A snow plow comprising a moldboard, a blower receiving centrally therefrom and discharging upwardly therefrom, supports projecting forwardly from the ends of said moldboard, a snow disintegrating conveyor working within said moldboard, said conveyor comprising a shaft journaled in said supports, arms of substantially

concavo-convex cross section and constant and substantial width through the major part of the length thereof mounted on said shaft and projecting radially outwardly therefrom, and cutter blades fixed across the outer ends of said arms to extend beyond opposite sides thereof, said arms being spaced from each other longitudinally of said shaft outwardly and circumferentially from the central portions of said shaft in spiral patterns which are directed outwardly in a direction opposite to the direction of rotation of said shaft, the concave sides of the arms to the right and to the left of the central portion of said moldboard facing inwardly and being in face overlapping relation through the major portions of their length and the blades being of such number and width that the path cut by one blade during rotation of said shaft will overlap slightly the paths cut by adjacent blades, and means for rotating said shaft in a predetermined direction opposite to the direction of said spiral patterns.

7. A snow plow comprising a moldboard, a blower receiving centrally therefrom and discharging upwardly therefrom, supports projecting forwardly from the ends of said moldboard, a snow disintegrating conveyor working within said moldboard, said conveyor comprising a shaft between and journaled at its ends in said supports, snow moving arms mounted on said shaft and projecting radially outwardly therefrom, said arms being of substantial width and being flat through approximately half the width thereof from the leading edge and substantially concavo-convex through the remaining width, and a flat cutter blade fixed to the outer end of the flat half of each arm, said arms being spaced apart longitudinally of said shaft and arranged outwardly and circumferentially from the transverse center of the shaft in spiral patterns each of which patterns extends outwardly in a direction opposite to the direction of rotation of the shaft, the concave surfaces of the arms to the right and to the left of the central portion of said moldboard facing inwardly toward such center and the arms being so spaced circumferentially of the shaft and of such width that successive arms are in face overlapping relation through the major extent of their lengths and said blades being of substantial width whereby the rotary path cut by one blade will overlap paths cut by adjacent blades, and means for rotating the shaft in the direction opposite to the direction of the spiral patterns.

8. The invention according to claim 7, wherein the edge of the said outer end of each arm extends at less than a right angle to the leading edge whereby said flat cutter blade is disposed in a plane at less than a right angle to said leading edge and said blade having a lead point formed by two forwardly converging cutting edges.

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