Dec. 17, 1940. C. B. JENSEN 2,224,870

SNOWPLOW

Filed Dec. 15, 1938 3 Sheets-Sheet 1

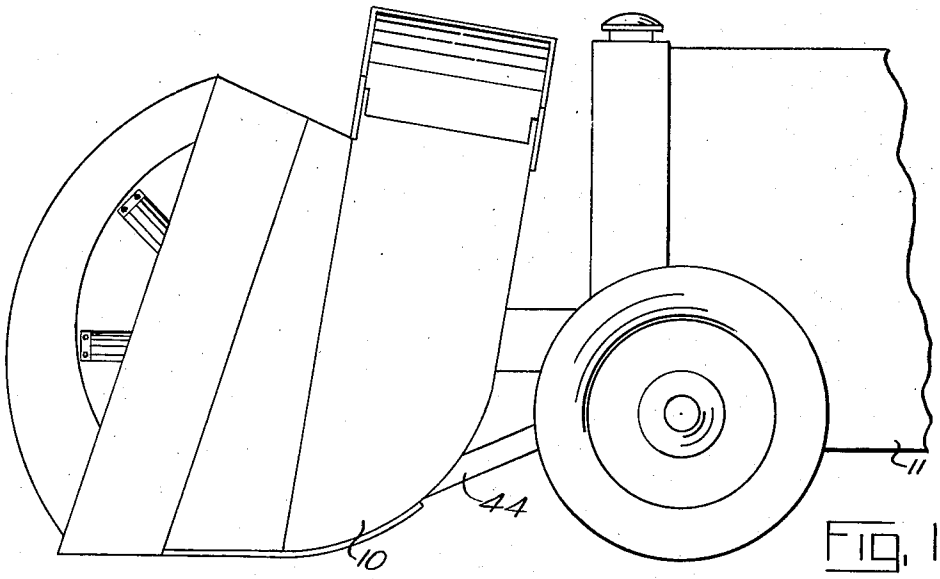


FIG. 1

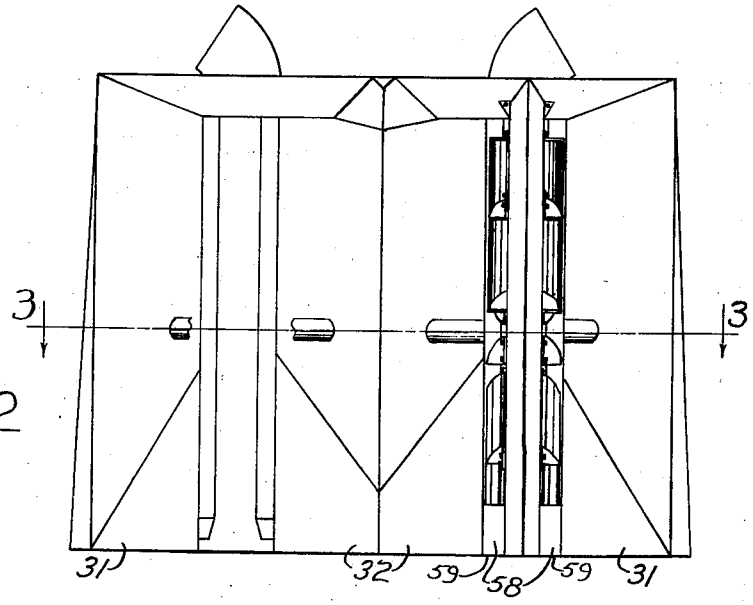


FIG. 2

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Dec. 17, 1940. C. B. JENSEN 2,224,870

SNOWPLOW

Filed Dec. 15, 1938 3 Sheets-Sheet 2

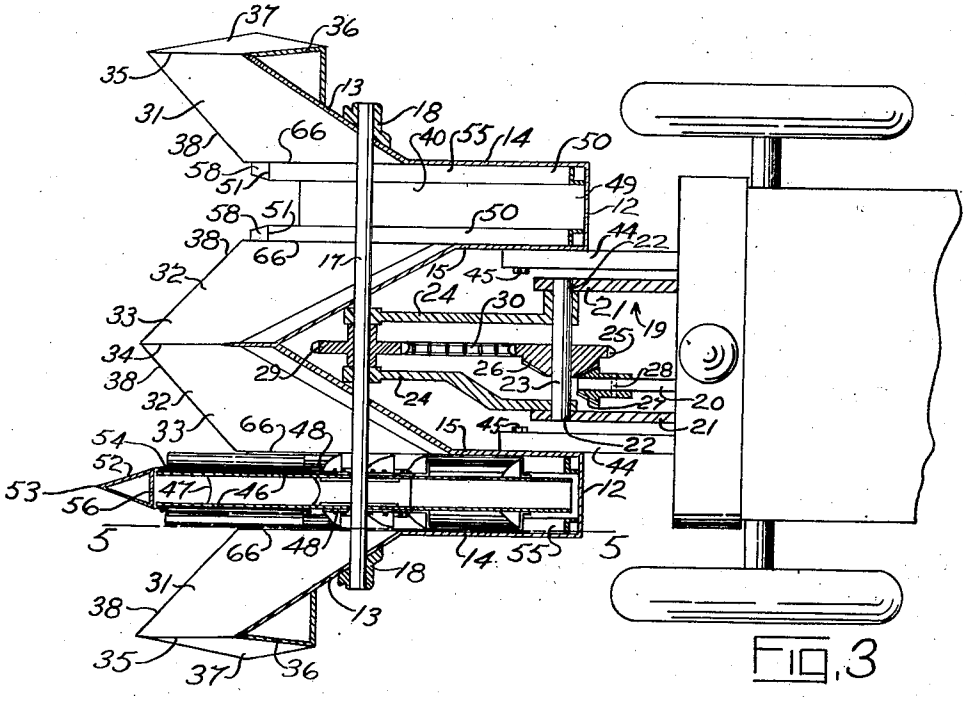


FIG. 3

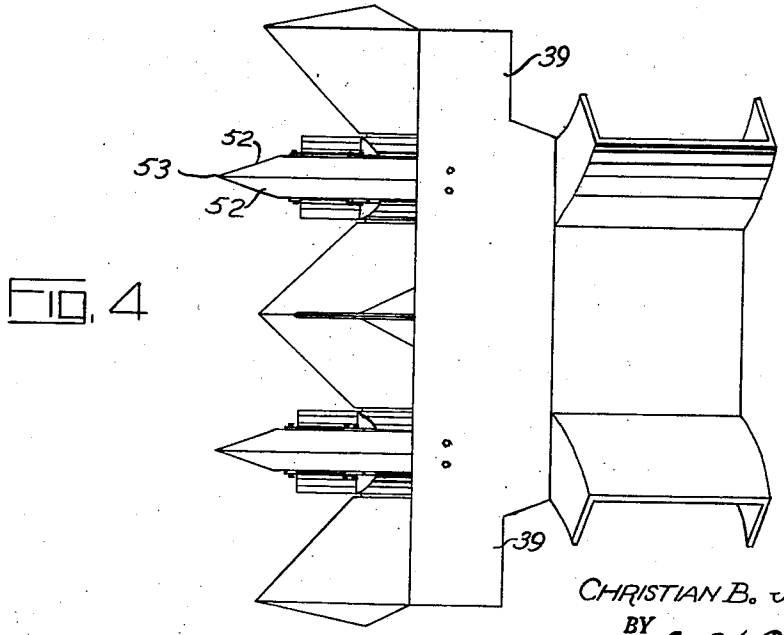


FIG. 4

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Dec. 17, 1940. C. B. JENSEN 2,224,870

SNOWPLOW

Filed Dec. 15, 1938 3 Sheets-Sheet 3

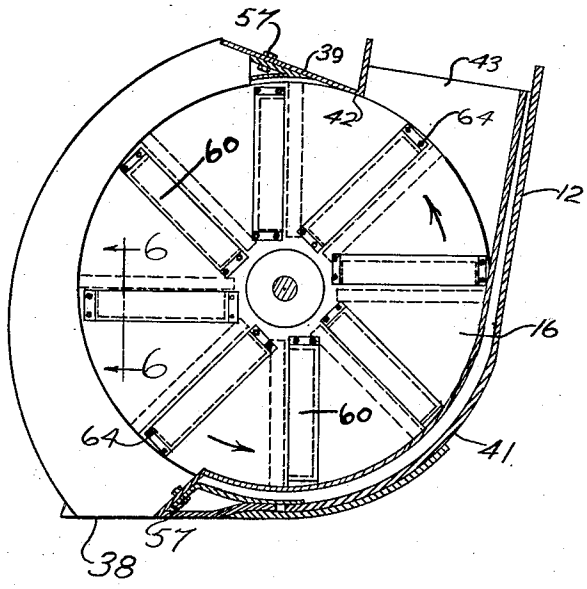


FIG. 5

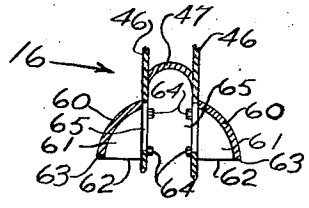
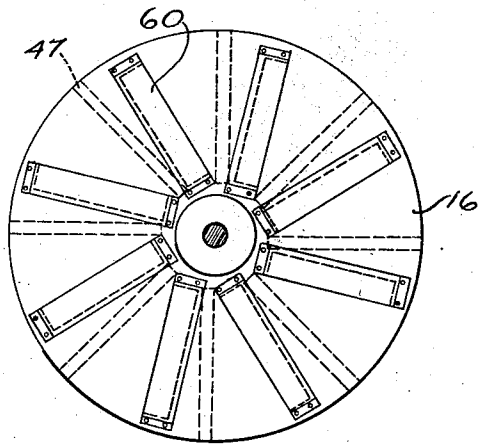


FIG. 6

FIG. 7



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UNITED STATES PATENT OFFICE

2,224,870

SNOWPLOW

Christian B. Jensen, St. Paul, Minn.

Application December 15, 1938, Serial No. 245,899

11 Claims. (Cl. 37—43)

This invention relates to a snowplow, and has for its general object to provide a machine for removing or handling snow wherein will be incorporated various improved features and characteristics of construction novel both as individual entities of the machine and in combination with each other.

A further object is to provide in a machine of the present character, a snow removing or handling entity of novel and improved construction.

With the above objects in view, as well as others which will appear as the specification proceeds, the invention comprises the construction, arrangement and combinaiton of parts as now to be dully described and as hereinafter to be specifically claimed, it being understood that the disclosure herein is merely illustrative and intended in no way in a limiting sense, changes in details of construction and arrangement of parts being permissible so long as within the spirit of the invention and the scope of the claims which follow.

In the accompanying drawings forming a part of this specification,

Fig. 1 is a side elevational view of a snowplow made according to the invention;

Fig. 2 is a front elevational view of the snowplow of Fig. 1, parts being omitted and other parts being broken away;

Fig. 3 is a horizontal sectional view, taken as on line 3—3 in Fig. 2;

Fig. 4 is a top plan view of the snowplow;

Fig. 5 is a vertical sectional view, taken as on line 5—5 in Fig. 3;

Fig. 6 is a detail sectional view, taken as on line 6—6 in Fig. 5; and

Fig. 7 is an elevational view, corresponding generally with the disclosure of Fig. 5, but showing a snow removing or handling entity of modified construction.

With respect to the drawings and the numerals of reference thereon, 10 represents a snowplow, and 11 indicates a propulsion vehicle for the plow. As disclosed, the propulsion vehicle is a truck, but could be any other type of propelled vehicle, automotive or otherwise.

The snowplow is adapted to be pushed by the propulsion vehicle, and the rotatable element of each snow removing or handling entity of said snowplow is adapted to be driven through the instrumentality of mechanism associated with the propulsion vehicle.

A frame for the plow includes an upstanding rear wall 12 extending transversely of the plow and propulsion vehicle, and upstanding outermost side walls 13, 13, intermediate walls 14, 14, and innermost walls 15, 15, all extending longitudinally of said plow and propulsion vehicle. All of the walls 13, 13 and 14, 14 and 15, 15 are in suitably spaced apart relation. The intermediate walls 14, 14 and the innermost walls 15, 15 are integrally connected to the rear wall 12, and the outermost side walls 13, 13 are integrally connected to the intermediate walls 14, 14, in any suitable and convenient manner, as by welding or riveting.

As disclosed, each adjacent set of walls 14 and 15 cooperates with a rotatable element 16 to provide, together with additional elements to be described, a snow removing or handling entity for the snowplow, said snowplow in the present embodiment of the invention including two snow removing or handling entities. The snowplow can, however, include a greater or less number of snow removing or handling entities than two.

Each rotatable element 16 is situated between adjacent walls 14 and 15, and said rotatable elements are fixed upon a transverse shaft 17 which has its opposite end portions rotatably mounted in bearings 18 suitably and conveniently fixed to the outer surfaces of the upstanding outermost side walls 13, 13.

Mechanism for mounting the snowplow upon the propulsion vehicle may include a member 19 suitably and conveniently secured to the propulsion vehicle about the crank shaft 20 of the vehicle engine (not shown). As disclosed, the member 19 includes spaced apart, forwardly extending arms 21 at either side of the crank shaft 20 providing opposed bearings 22 rotatably housing a transverse shaft 23. A pair of radius rods 24, one adjacent each bearing 22, have their rearward end portions rotatably mounted upon said transverse shaft 23. The radius rods 24 extend parallel forwardly from the transverse shaft 23, and have their forward end portions rotatably mounted upon the transverse shaft 17. The rear wall 12 is cut away to allow the forward portion of the member 19 to be disposed between the rearward portions of the innermost walls 15, 15 of the snowplow.

A sprocket 25 is suitably and conveniently fixed to the transverse shaft 23 between the radius rods 24, and said sprocket 25 integrally includes a bevel gear 26. A bevel gear 27 is suitably secured upon the forward end portion of the crank shaft 20 and meshes with the bevel gear 26. As disclosed, said bevel gear 27 is fixed to said crank shaft 20 by a bolt 28. While as illus-

trated and described, the propelling means for the rotatable elements 16 of the machine is the crank shaft of a propulsion vehicle, it will be evident that said rotatable elements could be driven by any actuated part of a propulsion vehicle, or by an auxiliary motor or engine upon the vehicle.

The radius rods 24 locate the transverse shaft 17 at fixed distance from the transverse shaft 23. A sprocket 29 is fixed upon said shaft 17 in longitudinal alinement with the sprocket 25, and a sprocket chain 30 rides said sprockets 25 and 29.

As illustrated, the mold board of the plow is of general W-shape in cross-section, including oblique inwardly and upwardly slanting snow guiding surfaces 31, which are a part of the forward surfaces of the upstanding outermost side walls 13 of the plow, and oblique outwardly and upwardly slanting snow guiding surfaces 32 at the center of the front of said plow. The snow guiding surfaces 32 are a part of the forward surfaces of the walls 33 which slant away from a vertical knife edge 34 at the front of the plow where said walls 33 are connected together. Each oblique surface 31 slants away from a vertical knife edge 35 at the front of the plow where the walls 13 are connected to outwardly and rearwardly extending strengthening members 36 including forward outwardly and upwardly and rearwardly extending snow engaging surfaces 37. The rearward edge of each wall 13 is connected to the forward edge of a wall 14, and the rearward edge of each wall 33 is connected to the forward edge of a wall 15. Each wall 13, 13, 33, 33 includes a horizontal knife edge 38 adapted to rest upon the ground. The upper portions of adjacent walls 13, 33 and 13, 33 are in each instance interconnected by a downwardly and rearwardly disposed wall 39 meeting the top forward edges of vertical walls 14 and 15 which are adjacent each other. Adjacent walls 13, 33 in each instance provide surfaces 31 and 32 for guiding snow and ice into an open front, rectilinear passageway or slot 40 defined by a curvilinear wall 41 extending downwardly and forwardly from the rear wall 12 and walls 14 and 15 which are adjacent each other, and each downwardly and rearwardly disposed wall 39 and its rear edge 42 cooperate, in the instance of each rectilinear passageway or slot 40, with said rear wall 12 and adjacent walls 14 and 15 to provide a closed, rectilinear passageway or slot 43. A snow deflector (not shown) suitably and conveniently may be arranged over each closed passageway or slot 43. That is, snow deflectors may be employed to direct the removed snow and ice toward either side of the snowplow, or in any selected direction.

Push beams 44 for the snowplow have their rearward ends suitably and conveniently connected to the propulsion vehicle and their forward ends pivotally connected, as at 45, to the inner surfaces of the innermost walls 15 of the snowplow. As disclosed, the pivotal connections 45 are disposed forwardly of the transverse shaft 23, which transverse shaft is arranged forwardly of the upstanding wall 12. Said rear wall 12 is cut away to afford clearance for the push beams.

The rearward ends of the push beams 44 desirably will be pivotally connected to the propulsion vehicle 11, and mechanism (not shown) will be provided for manipulating the snowplow. Preferably, such mechanism will be capable of producing upward and downward movement of the plow and propulsion vehicle relative to each other, and of lifting the snowplow off of the ground, when this is desirable, as when traveling to or from a job to be accomplished. The arrangement will be such that as the push beams 44 are swung upwardly, the snowplow will also be swung upwardly about the transverse shaft 23 as an axis. Such upward movement of the snowplow will offer no interference to the chain drive for the rotatable elements 16, because the distance between the transverse shafts 17 and 23 does not vary.

Each rotatable element 16 includes a pair of spaced apart, parallel disc plates 46 which are retained in fixed relation to each other by a plurality of spaced apart snow transporting elements 47. As disclosed, the snow transporting elements 47 are in the instance of each rotatable element 16 arranged between the corresponding disc plates 46 and are disposed radially of said disc plates. Each snow transporting element 47 is straight in the direction of its length and curvilinear in cross-section, and the opposite side edges of the snow transporting elements are integrally secured to the inner surfaces of the disc plates, as by welding or riveting. The inner end of each snow transporting element 47 desirably may terminate in slightly spaced relation to the axis of the corresponding rotatable element 16, and the outer end of each of said snow transporting elements desirably may terminate flush with the perimeters or margins of the corresponding disc plates 46. Each disc plate 46 includes a central opening which receives the shaft 17, and each rotatable element 16, including a pair of disc plates, is suitably and conveniently rigidly secured upon said shaft 17, as indicated generally at 48.

Each set of disc plates 46 of each rotatable element 16 is arranged approximately concentrically of a corresponding curvilinear wall 41 and in comparatively close proximity to said curvilinear wall 41. The major portion of the diameter or width of each set of disc plates 46 of each rotatable element 16 is within the corresponding snow passageway or slot 40, and the upper portion of the diameter or width of each set of disc plates terminates at about the elevation of the corresponding closed passageway or slot 43, all about as shown in Fig. 5.

Each curvilinear wall 41 includes a central portion 49 thereof, about equal in width to the overall width of each set of disc plates 46 of each rotatable element 16, which is of relatively large circumference, and also includes outer portions 50 thereof, at the outer sides of said central portion 49, which are of comparatively smaller circumference than is the central portion 49. Desirably, the outer portions 50 are of equal circumference and width. Each outer portion 50 includes a knife edge 51 extending transversely of the corresponding set of disc plates 46 of each rotatable element 16 at elevation above the knife edges 38. The knife edges 51 extend from side to side of the portions 50. The central portion 49 of each curvilinear wall 41 is disposed concentrically of the corresponding rotatable element 16, and the arrangement is such that the circumferential marginal portion of each rotatable element 16 is snugly rotatable in the space adjacent the central portion 49 and between the outer portions 50, with the circumference of the rotatable element in proximate relation to said central portion 49.

The mold board of the plow includes a set of

snow directing and guiding surfaces 52 at the front of the central portion 49 of each curvilinear wall 41, which meet at a knife edge 53 in a plane passed centrally and longitudinally through said central portion 49 and diverge rearwardly of the snowplow. The rearward edges 54 of the snow directing and guiding surfaces 52 are contiguous with the inner ends of the knife edges 51 of said outer portions 50, and are in spaced relation to the corresponding walls 14 and 15. That is, in the instance of each snow removing or handling entity of the snowplow, spaces 55 of equal width are provided between the rearward edges 54 of the snow guiding surfaces 52 and the adjacent walls 14 and 15, each of said spaces 55 having width equal to that of a corresponding outer portion 50. Each set of snow directing and guiding surfaces 52 is provided by a member including an arc shape portion 56 thereof which is disposed about a portion of the perimeter of the corresponding rotatable element 16 and is suitably and conveniently secured upon the snowplow, as indicated generally at 57. In the instance of each snow removing or handling entity of the snowplow, snow guiding surfaces 58 lead from knife edges 59 at the opposite sides of a knife edge 53 and at the elevation of the knife edges 38 to the knife edges 51. The snow guiding surfaces 31 lead to the outer sides of the snow guiding surfaces 58 and to the outer ends of said knife edges 51, as well as to a rectilinear passageway or slot 40, and the snow guiding surfaces 32 lead to the inner sides of said snow guiding surfaces 58 and to the inner ends of the knife edges 51, as well as to a rectilinear passageway or slot 40.

Each disc plate 46 carries a series of working blades or shovels 60 at the periphery of the disc plate. There are spaced apart working blades or shovels 60 at the outer side of each disc plate 46.

Each working blade or shovel 60 extends more or less radially of the corresponding disc plate 46, with its width arranged transversely of the snowplow. Each working blade or shovel 60 is curved in the direction of its width and is straight in the direction of its length. In general outline the working blades or shovels 60 are rectilinear, and the outer or working end or edge of each of said blades or shovels includes an element 61 thereof providing a knife edge 62. Desirably, a side edge 63 of each working blade or shovel 60 is a knife edge.

Each working blade or shovel 60 is adapted to be bolted, as at 64, or otherwise secured, up against the outer surface of the corresponding disc plate 46 at the rear of an opening 65, rectangular as shown, through the disc plate and directly in advance of a snow transporting element 47. That is, there is a working blade or shovel corresponding to each snow transporting element 47 and an opening 65 affording communication between each working blade or shovel and its corresponding snow transporting element. Each working blade or shovel 60 has one of its side edges fitted to the corresponding disc plate 46 just to the rear of an opening 65 and its cutting side edge 63 arranged in spaced relation to said disc plate, so that the working blades or shovels in effect constitute scoops for snow. The knife edge 62 of each element 61 is adapted to travel in close proximity to a knife edge 51, and the knife edge 63 of each element 61 is adapted to travel in close proximity to a knife edge 66. Each outer knife edge 66 is constituted as the inner edge of a snow guiding surface 31, and each inner knife edge 66 is constituted as the outer edge of a snow guiding surface 32. Each working blade or shovel 60 is situated upon its corresponding disc plate 46 so that its knife edge 62 cooperates with the corresponding knife edge 51 and its knife edge 63 cooperates with a corresponding knife edge 66 to cause snow and ice to be cut or severed. Said working blades or shovels 60 are adapted to wipe through the spaces 55 between the corresponding rotatable element 16 and the adjacent walls 14 and 15, respectively, when the rotatable elements are in operation. The openings 65 and the blades or shovels 60 at one side of each rotatable element could be in staggered relation to the openings and the blades or shovels at the opposite side of said rotatable element. In such event, each disc plate 46 desirably will be closed directly opposite an opening 65 in the adjacent disc plate.

The rotatable elements 16 are revolved so that their forward portions move downwardly and their lower portions move rearwardly, in the direction of the arrow in Fig. 5. Each working blade or shovel 60 has its outer knife edge 62 arranged immediately above a knife edge 51, somewhat within the perimeter of the corresponding rotatable element 16. The length of each working blade or shovel is such that the inner end thereof terminates a considerable distance inwardly of said perimeter. The inner end of each snow transporting element 47 and the inner end of each opening 65 may terminate about flush with the inner end of each working blade or shovel 60. As shown, the outer end of each opening 65 terminates at about the location of the corresponding element 61. The width of each working blade or shovel 60 is just less than the width of the corresponding space 55. The arrangement is such that the concave surfaces of the working blades or shovels 60 and the snow transporting elements 47 are the working and the transporting surfaces, respectively, thereof. The outer ends or edges of the working blades or shovels 60 rotate in close proximity to the outer portions 50 of the curvilinear walls 41, and the outer ends or edges of the snow transporting elements 47 rotate in close proximity to the central portions 49 of said curvilinear walls 41. The spaces between the disc plates 46 of each rotatable element 16 and defined by said disc plates and the snow transporting elements 47 are open at their outer portions.

The manner in which the rotatable elements 16, each including a pair of disc plates 46 with snow transporting elements 47 and working blades or shovels 60, operate will be evident. The surfaces 31, 32, 52 and 58 of the mold board cooperate to lift the snow and ice severed or cut from the ground by the knife edges 38 and 59 and to direct the snow and ice into the spaces 55 of the passageways or slots 40. Each working blade or shovel 60 cooperates with the disc plate 46 to which connected and with the adjacent side wall, 14 or 15 as the case may be, to cause snow and ice to be carried through the corresponding opening 65 into the space between the disc plates 46 of the corresponding rotatable element 16 in front of a snow transporting element 47, and each snow transporting element 47 carries an individual load or shovelfull of snow up through the corresponding outlet passageway 43. The disc plates 46 rotate at high rate of speed, and the snow and ice leaves the outlet passageways 43 in the form of individual and separate charges of snow and ice each equal in amount

to a shovel-full of snow and ice forced out of the machine under considerable momentum by the centrifugal force exerted through the working blades or shovels **60** and the snow transporting elements **47**. Said working blades or shovels keep wiping through the spaces **55** of the snow passageways or slots **40**, and the cooperating arrangement among the working blades or shovels, openings **65**, snow transporting elements **47**, disc plates **46** and curvilinear and vertical rear walls and parallel side walls of said passageways or slots **40** is such that snow and ice once upon a working blade or shovel will be quickly forced or carried out of the machine by a corresponding snow transporting element **47**. There is no opportunity for snow and ice when once upon a working blade or shovel or a snow transporting element to fall backwardly of the working blades or shovels or the snow transporting elements.

In Fig. 7 there is disclosed a construction and arrangement wherein the working blades or shovels **60** and the openings **65**, each in front of its corresponding snow transporting element **47** as before described, are arranged to provide snow receiving spaces forwardly of said snow transporting elements **47** of size somewhat greater than as shown in Fig. 5. Clearly, each working blade or shovel **60** can be at any relation to its corresponding snow transporting element **47** which may in a particular case be selected as satisfactory. In Fig. 5 each snow transporting element **47** and its corresponding working blade or shovel **60** are parallel. In Fig. 7 each element **47** and its corresponding blade or shovel **60** are out of parallel, said elements **47** being disposed radially as in Fig. 5.

The working blades or shovels may be set radially, as in Fig. 5, or set at sharper angle to snow and ice, as suggested in Fig. 7, better to remove or handle the snow and ice. The working blades or shovels **60** will remove or sever snow and ice which is directed to said working blades or shovels from snow and ice upon the ground and carry the removed or severed snow and ice through the openings **65** to the snow transporting elements **47**, and said snow transporting elements will force or carry the snow and ice through the outlet passageways **43** and out of the machine.

It will be seen that snow and ice is dislodged by the working blades or shovels **60** inwardly of the perimeters of the rotatable elements **16**, while dislodged snow and ice is propelled from the outer ends of the snow transporting elements **47** at the perimeters of said rotatable elements. The working blades or shovels are of inexpensive construction, are easily replaceable, and have great strength. Each blade or shovel is bolted to its disc plate independently of all others of the blades or shovels. The snow transporting elements are subjected to no such hard labor as is required of the working blades or shovels and are not liable to become broken under any, even the severest, conditions of use of the machine.

The snow engaging surfaces **37** are constructed to be operated against by snow and ice upon the ground to the purpose of causing the snowplow to have tendency to be moved sidewise in direction opposite that in which snow and ice engaging the snow directing surfaces **31** causes said snowplow to have tendency to be moved, so that when one side only of the snowplow is operating upon snow and ice, the surfaces **31** and **37** at said mentioned side of said snowplow will function in cooperation with each other to tend to cause the plow to have movement straight ahead, as will be understood.

The mold board of the snowplow could of course be V-shape, in which case but a single snow removing or handling entity would be employed, or said mold board could be of some other suitable and convenient configuration.

The rotatable elements **16** are driven whenever the crankshaft **20** is in operation, the drive being through the bevel gears **27** and **26** to the transverse shaft **23**. The bolt **28** is of less strength than is any part of either rotatable element **16**, so that when an obstruction causes breakage, this breakage is of said bolt **28** and disconnects the driving crankshaft, or other driving member, from said rotatable elements **16**.

What is claimed is:

1. In a machine of the character described, a structure including an open front, parallel, upstanding side walls and a curvilinear rear and lower wall defining a passageway to which said open front leads, an annular entity rotatably mounted in said passageway and including working blades and transporting elements which together approximately span the width of the passageway, said working blades and transporting elements being disposed more or less radially of said annular entity, said working blades being arranged in a plane disposed substantially perpendicularly to the axis for said annular entity, said transporting elements being disposed at a side of said working blades, and said working blades being adapted to wipe through said passageway and to deliver material to said transporting elements, and means for rotating said annular entity to cause said working blades to wipe through said passageway at location in close proximity to said curvilinear rear and lower wall.

2. In a machine of the character described, a structure including an open front, parallel, upstanding side walls and a rear wall with curvilinear lower portion defining a passageway to which said open front leads, and a mold board for directing snow into said open front, said structure being adapted to rest upon the ground with the curvilinear lower portion of said rear wall approximately at ground level, an annular entity mounted in said structure adjacent said mold board and disposed in said passageway and having working blades and transporting elements which together approximately span the width of the passageway, said working blades and transporting elements being disposed more or less radially of said annular entity, said working blades being arranged in a plane disposed substantially perpendicularly to the axis for said annular entity, said transporting elements being disposed at a side of said working blades, and said working blades being adapted to move downwardly adjacent said open front, wipe upwardly through said passageway and deliver material to said transporting elements, and means for rotating said annular entity.

3. In a machine of the character described, a boxlike structure including an open front, parallel side walls and a rear wall defining a passageway leading from said open front, a pair of spaced apart disc plates rotatably mounted in said passageway in spaced relation to its side walls, spaced apart transporting elements disposed between said disc plates and extending substantially radially of the disc plates, and working blades secured to the outer surfaces of said disc plates, each working blade approximately spanning the distance between the disc plate to

which secured and the adjacent side wall of said passageway.

4. In a machine of the character described, a boxlike structure including an open front, parallel side walls and a rear wall defining a passageway leading from said open front, a pair of spaced apart disc plates rotatably mounted in said passageway in spaced relation to its side walls, spaced apart transporting elements disposed between said disc plates and extending substantially radially of the disc plates, and spaced apart working blades removably secured to the outer surfaces of said disc plates, each working blade approximately spanning the distance between the disc plate to which secured and the adjacent side wall of said passageway, there being a working blade corresponding to each transporting element, and said working blades being adapted to move downwardly adjacent said open front, wipe upwardly through said passageway and deliver material to said transporting elements.

5. In a machine of the character described, a pair of spaced apart disc plates, means for rotatably supporting said disc plates, spaced apart transporting elements extending between said disc plates and disposed substantially radially thereof, and working blades secured to the surfaces of said disc plates opposite said transporting elements, each of said working blades being adapted to deliver material to one of said transporting elements.

6. In a machine of the character described, a pair of spaced apart disc plates, means for rotatably supporting said disc plates, spaced apart transporting elements extending between said disc plates and disposed substantially radially thereof, and working blades secured to the surfaces of said disc plates opposite said transporting elements, each of said working blades lying in a plane substantially perpendicular to the disc plate to which secured, the lengths of the working blades being disposed radially, more or less, of the disc plates, and said working blades being straight in the direction of their lengths and curvilinear in the direction of their widths.

7. In a machine of the character described, a boxlike structure including walls defining a passageway, one of said walls being open, a disc plate mounted in said passageway in spaced relation to a wall thereof, transporting elements secured to a surface of said disc plate in spaced relation to each other, and working blades secured to an opposite surface of said disc plate in spaced relation to each other, there being a working blade corresponding to each of said transporting elements, each working blade approximately spanning the distance between said disc plate and an adjacent wall of said passageway, and said working blades being adapted to deliver material to said transporting elements.

8. In a machine of the character described, a structure including an open front, upstanding side walls and a lower and rear wall defining a passageway to which said open front leads, an annular entity including working blades and transporting elements cooperating with said working blades, means rotatably mounting said annular entity in said passageway, said working blades and transporting elements together approximately spanning the width of said passageway and being disposed more or less radially of said annular entity, said working blades being arranged in a plane disposed substantially perpendicularly to the axis for said annular entity, said transporting elements being disposed at a side of said working blades, and said working blades being adapted to wipe through said passageway and to deliver material to said transporting elements, and means for driving said annular entity to cause said working blades to wipe through said passageway.

9. In a machine of the character described, a structure including an open front, parallel, upstanding side walls and a curvilinear lower and rear wall defining a passageway to which said open front leads, an annular entity in said passageway and including working blades and transporting elements with which said working blades cooperate, means rotatably mounting said annular entity in said passageway, said working blades and said transporting elements together approximately spanning the width of said passageway, being disposed more or less radially of said annular entity and being adapted to move downwardly adjacent said open front, wipe rearwardly and upwardly through said passageway and deliver material from said machine, said working blades being arranged in a plane disposed substantially perpendicularly to the axis for said annular entity, and said transporting elements being disposed at a side of said working blades, and means for driving said annular entity.

10. In a machine of the character described, a boxlike structure including an open front and walls defining a passageway to which said open front leads, a disc plate mounted in said passageway in spaced relation to a wall thereof, spaced apart transporting elements secured to a surface of said disc plate, and spaced apart working blades secured to a surface of said disc plate, there being a working blade corresponding to each transporting element at a side thereof, each working blade being adapted to deliver material to a transporting element, and said working blades and transporting elements together approximately spanning the width of said passageway.

11. In a machine of the character described, a structure including an open front, spaced apart upstanding side walls and a curvilinear rear wall defining a passageway to which said open front leads, an annular entity rotatably mounted in said passageway and including working blades and transporting elements which together approximately span the width of the passageway, said working blades being disposed in a plane substantially perpendicular to the axis for said annular entity, said transporting elements being disposed at a side of said working blades, and said working blades being adapted to deliver material to said transporting elements, and means for rotating said annular entity, said working blades including outer portions thereof adapted to wipe through said passageway at location closely adjacent to said curvilinear rear and lower wall and at location adjacent the open front of the passageway.

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