

Jan. 10, 1939.

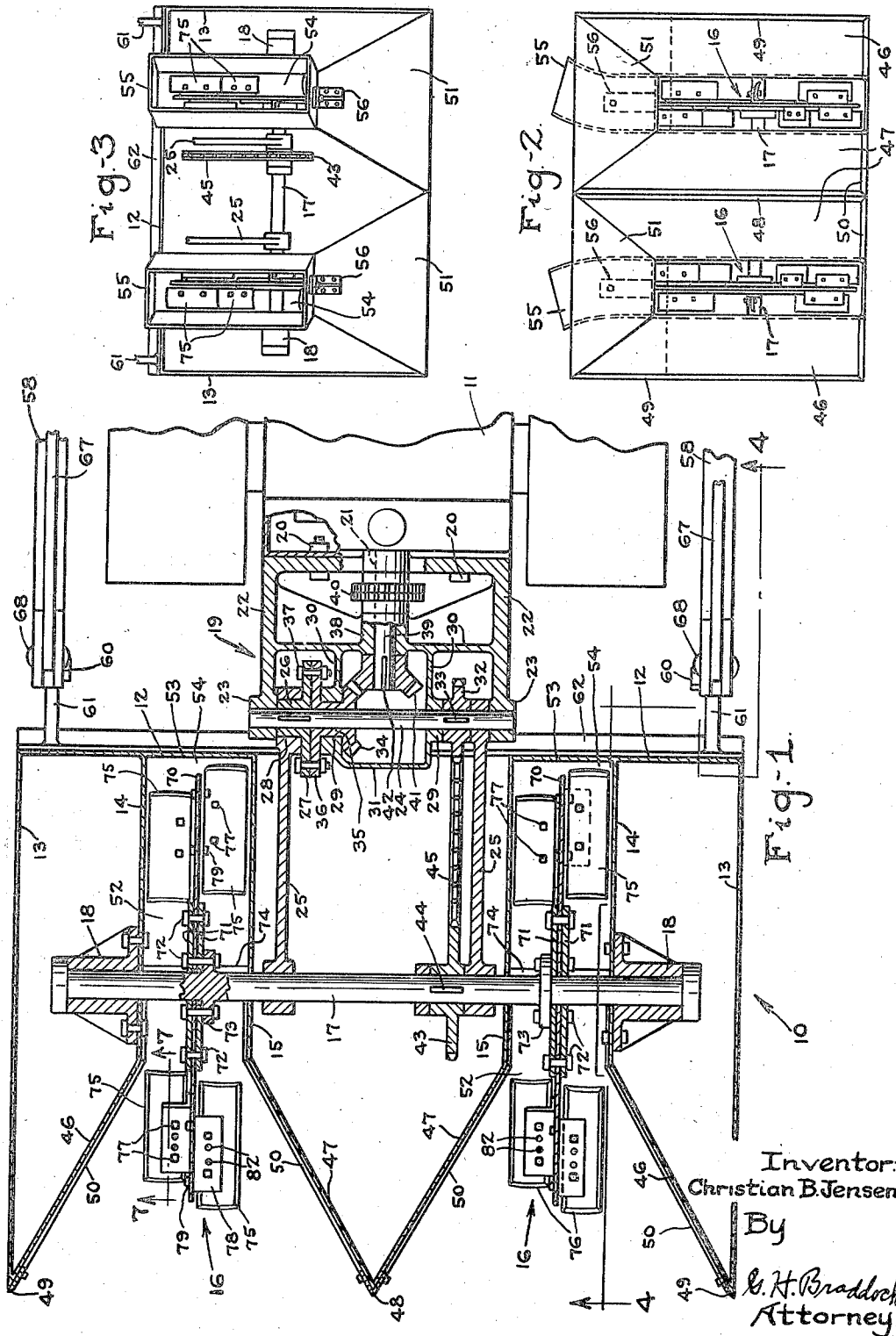
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SNOW PLOW

Filed April 29, 1935

2 Sheets-Sheet 1



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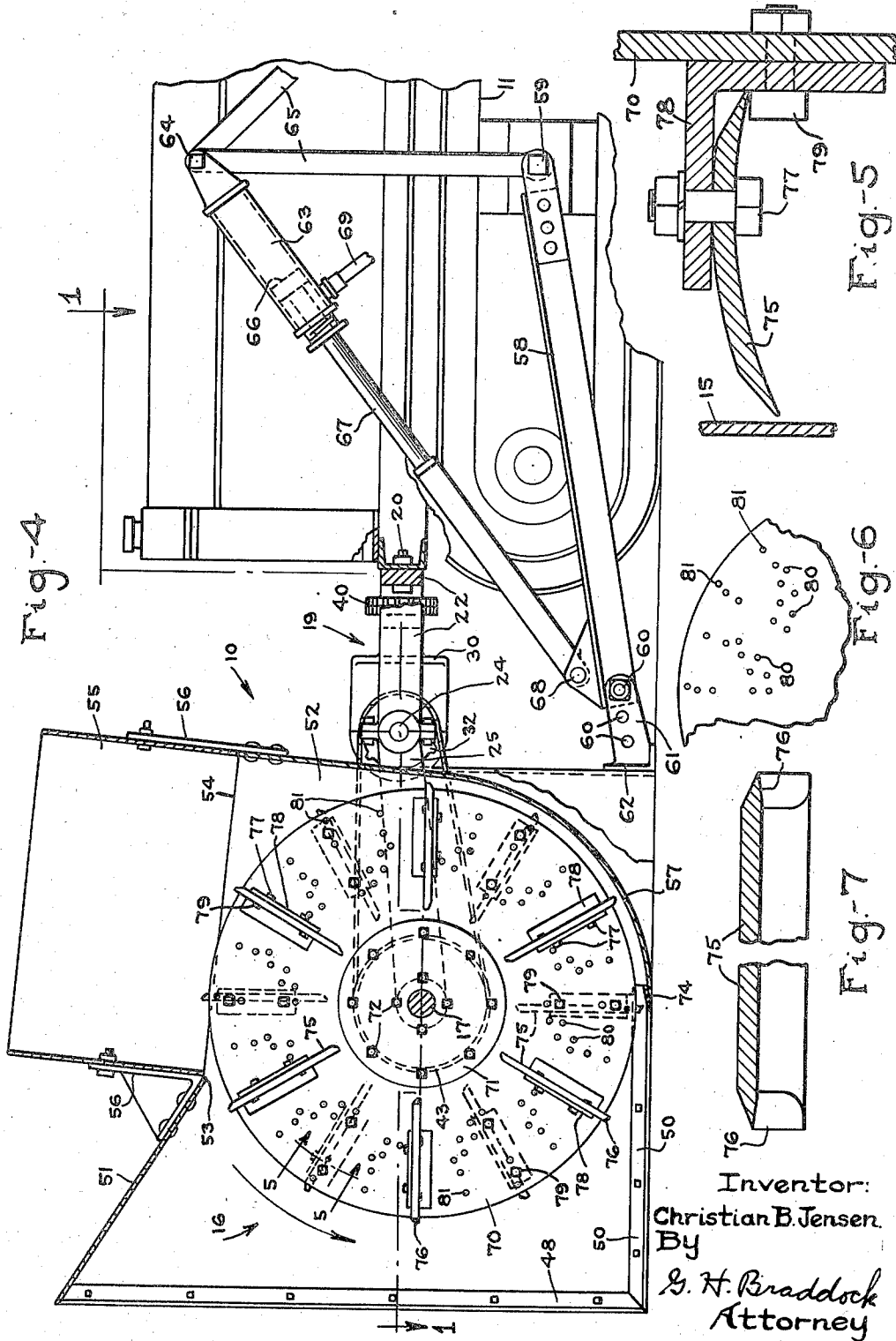
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SNOW PLOW

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8 Claims. (Cl. 37-43)

This invention relates to a snow plow, 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.

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

Another object is to provide an assembly of snow plow, including a snow removing or handling entity, with a propulsion vehicle for the snow plow, which assembly will incorporate novel and improved mechanism for driving a rotatable element of said snow removing or handling entity.

And yet another object is to provide novel and improved mechanism for adjustably mounting a snow plow upon an automotive or other vehicle adapted to propel the plow.

With the above objects in view, as well as others which will appear as the specification proceeds, the invention comprises the construction, arrangement and combination of parts as now to be fully 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 horizontal sectional view, taken as on line 1-1 in Fig. 4, of a snow plow made according to the invention;

Fig. 2 is a front elevational view, on a reduced scale, of the snow plow of Fig. 1;

Fig. 3 is a top plan view, on the scale of Fig. 2;

Fig. 4 is a vertical sectional view, taken as on line 4-4 in Fig. 1;

Fig. 5 is a detail sectional view, taken as on line 5-5 in Fig. 4;

Fig. 6 is a fragmentary elevational view detailing the disc plate of the rotatable element of either of the snow removing or handling entities of the machine disclosed; and

Fig. 7 is a detail sectional view, taken on line 7-7 in Fig. 1.

With respect to the drawings and the numerals of reference thereon, 10 represents a snow plow, and 11 indicates a propulsion vehicle for the snow plow. As disclosed, the propulsion vehicle is a

tractor, but could be any other type of propelled vehicle, automotive or otherwise.

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

A frame for the plow includes a vertical rear wall 12 extending transversely of the plow and propulsion vehicle, and vertical 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, and are integrally connected to the rear wall 12 in any 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 plow, said plow in the present embodiment including two snow removing or handling entities. It is to be noted, however, that the plow can 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, in a manner to be set forth, upon a transverse shaft 17 which extends through all of the vertical, longitudinal walls 14, 15, 15 and 14 and is rotatably mounted in bearings 18 fixed to the outer surfaces of the walls 14, 14.

Mechanism for supporting the snow plow upon the propulsion vehicle may include a desirably cast member 19 bolted to the propulsion vehicle, as at 20, about the crank shaft 21 of the vehicle engine (not shown). As described, the cast member 19 includes spaced apart, forwardly extending arms 22 at either side of the crank shaft 21 providing opposed, split bearings 23 removably and rotatably housing a transverse shaft 24. A pair of radius rods 25, one adjacent each split bearing 23, have their rearward end portions detachably carried by the shaft 24. One of the radius rods 25 is mounted directly upon said shaft 24, and the other radius rod is mounted upon the hub 26 of a safety drive member 27 splined to the shaft 24, as at 28. The radius rods 25 extend parallelly forwardly from the shaft 24, and have their forward end portions rotatably mounted upon the shaft 17. The rear wall 12 is cut away to allow passage of the radius rods.

Additional spaced apart, split bearings for the shaft 24, between and spaced from the split bearings 23, are denoted 29. Said bearings 29 are provided by a reinforcing frame 30, disposed interiorly of and integral with the cast member 19, and a cover 31 suitably and detachably mounted upon said frame 30. The structure providing the split bearings 29 is preferably at equal distance from the arms 22 and the split bearings 23 thereof.

The shaft 24 is mounted directly in one of the split bearings 29, and a sprocket 32 splined to said shaft 24, as at 33, is situated between the adjacent split bearing 29 and the adjacent radius rod 25 in such manner that said sprocket 32 and said mentioned radius rod are confined against longitudinal movement upon the shaft. Said shaft 24 is not mounted directly in the other split bearing 29. Instead, a bevel gear 34 at the inner side of this mentioned split bearing includes a hub 35 freely rotatable upon said shaft 24, and the shaft is mounted in this hub. At the outer side of the split bearing 29 adjacent the safety drive member 27 and integral with the hub 35, is a drive member 36 bolted to and against said safety drive member 27, as at 37. The safety drive member and the adjacent split bearing 23 confine the adjacent radius rod 25 against longitudinal movement on the shaft 24.

The frame 30 integrally supports a horizontal bearing 38, in alignment with the crank shaft 21. A driven shaft 39 carried by said bearing 38 is flexibly coupled, as at 40, to said crank shaft. A bevel gear 41 is splined to the forward end portion of the driven shaft 39, as at 42, and meshes with the bevel gear 34. While as illustrated 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 25 obviously locate the shaft 17 at fixed distance from the shaft 24. A sprocket 43 is fixed upon said shaft 17, as at 44, in longitudinal alignment with the sprocket 32, and a sprocket chain 45 rides said sprockets 32 and 43.

As illustrated, the mold board of the plow is of general W-shape in cross section, including vertical, inwardly slanting snow guiding walls 46 at the sides of the front of the plow, and vertical, outwardly slanting snow guiding walls 47 at the center of the front of said plow. The walls 47 slant away from a vertical knife edge 48 at location at the front of the plow where said walls 47 are connected together, and each wall 46 slants away from a vertical knife edge 49 at the front of the plow where said walls 46 are connected to the walls 13. The rearward edge of each wall 46 is connected to the forward edge of a wall 14, and the rearward edge of each wall 47 is connected to the forward edge of a wall 15. Each wall 46, 46, 47 and 47 includes a horizontal knife edge 50 adapted to rest upon the ground. The upper portions of adjacent walls 46, 47 and 46, 47 are in each instance interconnected by a downwardly and rearwardly disposed wall 51 meeting the top forward edges of vertical walls 14 and 15 which are adjacent each other. Adjacent walls 46, 47 and 46, 47 in each instance provide surfaces for guiding snow into an open front, rectilinear passageway or slot 52 defined by a curvilinear wall 57 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 51 and its rear edge 53 cooperate, in the instance of each rectilinear passageway or slot 52, with said rear wall 12 and adjacent walls 14 and 15 to provide a closed, rectilinear passageway or slot 54. Numeral 55 indicates a rectilinear snow deflector arranged over each closed passageway or slot 54 and removably attached to the plow as at 56. Each snow deflector 55 is adapted to completely cover a passageway or slot 54 defined by walls 12, 14, 15 and 51. As shown, the snow deflectors are positioned to direct the removed snow toward opposite sides of the snow plow. Each could, however, be adjustable to cause the snow to be delivered in any preferred direction.

Push beams 58 for the snow plow have their rearward ends pivotally connected to the propulsion vehicle, as at 59, and their forward ends pivotally connected, as at 60, to arms 61 integral with the opposite ends of an angle plate 62 connected to the lower portion of the rear wall 12 and extending transversely of the plow. The push beams 58 can be pivotally attached to the arms 61 at any one of several different locations along the lengths of said arms to thus tilt the plow forwardly or rearwardly about the shaft 24 as an axis. By provision of the pivotal connections at 60, the plow and propulsion vehicle can have upward and downward movement relative to each other as the assembly is advanced over the ground, as will be understood.

Mechanism for lifting the snow plow off of the ground, when this is desirable, as when traveling to or from a job, can include a pair of cylinders 63, one at each side of the propulsion vehicle, each having its upper end pivotally connected, as at 64, to a bracket 65 upon said vehicle, there being a bracket 65 at each side of the vehicle. A piston 66 in each cylinder is supported by a rod 67 which is pivotally connected, as at 68, to a forward portion of a push beam 58. A hose 69 for conveying fluid to each cylinder to operate the pistons leads from a suitable pump (not shown). The arrangement is such that the fluid forces the pistons inwardly of the cylinders to lift the push beams and the plow, and said push beams and plow return to position where the plow rests upon the ground when the fluid pressure is released from the cylinders. As the push beams swing upwardly, the snow plow is also swung upwardly about the shaft 24 as an axis. This upward swinging of the plow will offer no interference to the chain drive for the rotatable elements, because the distance between the shafts 17 and 24 does not vary.

Each rotatable element 16 includes a disc plate 70 having a central opening receiving the shaft 17. Smaller plates 71 are at the opposite surfaces of each disc plate 70 and about said shaft 17, and bolts 72 pass through an annular flange 73 integral with the shaft, one flange for each disc plate, and through the smaller plates 71 to fasten the disc plates upon said shaft 17.

Each disc plate 70 is arranged approximately concentrically of a corresponding curved wall 57 and in comparatively close proximity to said curved wall 57. The major portion of the diameter or width of each disc plate 70 is within the snow passageway or slot 52, and the upper portion of the diameter or width of each disc plate terminates at about the elevation of the corresponding closed passageway or slot 54, all about as shown in Fig. 4.

Each curved wall 57 supports a horizontal knife edge 74 extending transversely of the correspond-

ing disc plate 70 at the elevation of the knife edges 50. The knife edges 74 extend from side to side of the snow passageways or slots 52.

Each disc plate 70 carries a series of working blades or shovels 75 at the periphery of the disc plate. There are spaced apart working blades or shovels 75 adjacent each of the opposite surfaces of each disc plate, and said working blades or shovels at the different sides of a disc plate, respectively, are desirably disposed in staggered relation, as disclosed.

Each working blade or shovel 75 extends more or less radially of the corresponding disc plate, with its width arranged transversely of the snow plow. Also, each working blade or shovel 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 75 are rectangular, and the outer or working edges or ends of said blades or shovels are knife edges, as denoted at 76. Either end of the blade or shovel may be disposed outwardly, so all of the ends of the blades or shovels are of knife edge shape. And desirably the side edges of the blades or shovels are also knife edged to better cut through snow.

Each working blade or shovel 75 is not as disclosed directly supported by a disc plate 70, but is removably carried, as by bolts 77, upon an angle piece 78, one for each blade, itself secured to the disc plate, as by bolts 79.

The disc plates are rotated so that their forward portions move downwardly and their lower portions move rearwardly, in the direction of the arrow in Fig. 4. Each working blade or shovel 75 has its outer knife edge arranged to project a greater or less distance beyond the periphery of the corresponding disc plate, while the length of each blade or shovel is such that the inner end thereof terminates a considerable distance inwardly of said periphery. The width of each working blade or shovel is just less than the distance between the corresponding disc plate and the adjacent wall 14 or 15, it being understood that the disc plate in each snow passageway or slot is at equal distance from the side walls thereof. The arrangement is such that the concave surfaces of the blades or shovels are the working surfaces thereof. The outer ends or edges of the working blades or shovels rotate in close proximity to the curved walls 57.

The manner in which the rotatable elements, each including a disc plate 70 with working blades or shovels 75, operate will be clear. The surfaces 46 and 47 of the mold board direct the snow into the passageways or slots 52, and each working blade or shovel 75 cooperates with the corresponding disc plate and adjacent side wall, 14 or 15 as the case may be, to carry individual loads or shovels-full of snow up through the corresponding snow deflector 55. The disc plates rotate at high rate of speed, and the snow leaves the deflectors 55 in the form of individual and separate charges of snow each equal in amount to a shovel-full of snow forced out of the machine under considerable momentum by the centrifugal force exerted through the working blades or shovels 75. Said blades or shovels keep wiping through the snow passageway or slot, and the cooperating arrangement between working blades or shovels, disc plate and vertical and parallel side walls of the passageway or slot is such that snow once upon a blade or shovel will be quickly carried out of the machine. There is no opportunity for any snow to fall backwardly

of the working blades or shovels when once upon a blade or shovel.

Provision is included for adjustably mounting the angle pieces 78 upon the disc plates, so that the blades or shovels can be set at angle more sharp or more acute. The radial arrangement as disclosed in the drawings is satisfactory for relatively loose snow. When the snow is of nature to require more effort for removal, the angle pieces with blades or shovels will be tilted, more or less as the case may be, to thus be set at angle less than a right angle to the ground when adjacent the ground. That is, it may be desirable in one instance to set the blades or shovels so that they simply wipe against the snow to carry it into the machine, as said blades or shovels are disclosed, while in other instances it may be necessary to present the blades or shovels in cutting relation to the snow. For this purpose, the angle pieces may be adjustably fastened to the disc plates by the employment of selective holes 80 in said disc plates, as more clearly shown in Fig. 6. In an instance where ice must be removed, it may be desirable to set some of the working blades or shovels 75 at really sharp, cutting angle to the snow or ice, as by use of openings such as 81 through the disc plates. In such an event, a good arrangement is to set alternate blades or shovels at a sharp angle and arrange a blade or shovel about at an angle as in the drawings between alternate cutting blades or shovels, but to set the right-angle or radial blades inwardly slightly so that their outer edges will not extend beyond the peripheries of the disc plates. Then in practice, the cutting blades or shovels will remove the snow from the ground, and the blades or shovels between the cutting blades or shovels will carry the snow to the deflectors and out of the machine. When a working blade or shovel is adjusted to some desired angle, by adjustment of its angle piece, the working edge of the blade or shovel may not in some instance be at desired relation to the periphery of the corresponding disc. To overcome this difficulty, the blades or shovels may be adjustably attached to the angle pieces by employment of several selective bolt holes 82, as in Fig. 1.

The mold board of the snow plow 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 convenient configuration. However, a mold board of W-shape has several distinct advantages. The snow friction area is less when employing a W-shape mold board than when employing a V-shape, and, the snow engaging surfaces of the mold board being of smaller magnitude, the requirement for reinforcement of the mold board is reduced.

In the embodiment as disclosed, the rotatable elements 16 are driven whenever the crank shaft 21 is in operation, the drive being from the bevel gear 34 to the shaft 24 through the bolts 37 and the safety drive device 27. The bolts 37 are of combinedly less strength than any part of either rotatable element 16, so that when an obstruction causes breakage, this breakage is of said bolts 37 and disconnects the driving crank shaft or other driving member from the rotatable members.

The angle pieces 78 are at the rearward sides of the advancing working blades or shovels 75, and said blades or shovels are of relatively rigid material. Inasmuch as the blades or shovels are curvilinear in the direction of their widths and

straight in the direction of their lengths, they have great strength. The cutting and removal of ice and snow from the ground causes considerable stress or pressure to be exerted against the blades or shovels in the direction of their lengths. A broken blade or shovel can obviously be quickly and easily replaced, each blade or shovel being detachably bolted to its disc plate independently of all others of the blades or shovels.

What is claimed is:

1. In a machine of the character described, a box like structure including an open front wall, and parallel side walls and a rear wall defining a passageway leading from said open front wall, a shaft extending transversely of said passageway, a disc plate mounted at its center portion upon said shaft and disposed in said passageway in spaced relation to its side walls, and working blades removably secured to the opposite surfaces of said disc plate adjacent its periphery, each working blade approximately spanning the distance between said disc plate and the adjacent side wall of said passageway.

2. The combination as specified in claim 1, and means for adjusting the working blades relatively to the disc plate.

3. In a machine of the character described, a disc plate adapted for attachment to a driven shaft, and working shovels attached to the opposite surfaces of said disc plate adjacent the periphery thereof, each of said working shovels lying in a plane substantially perpendicular to said disc plate, the lengths of the shovels being disposed radially, more or less, of the disc plate, and said shovels being straight in the direction of their lengths and curvilinear in the direction of their widths.

4. In a snow plow, the combination of a rearwardly extending mold board, a disc disposed adjacent a rearward portion of said mold board and in a plane extending longitudinally of the plow, blades secured to both sides of said disc in circumferentially spaced apart relation to each other, and means for securing said blades to said disc at various angles to the radius of said disc.

5. In a machine of the character described,

a box like structure including an open front wall, parallel side walls and a rear wall defining a passageway leading from said open front wall, a shaft extending transversely of said passageway, a disc plate mounted upon said shaft and disposed in said passageway between said open front wall and said rear wall in spaced relation to a side wall thereof, and working blades secured to a surface of said disc plate adjacent its periphery, each working blade approximately spanning the distance between said disc plate and the adjacent wall of said passageway.

6. In a machine of the character described, a shaft to be driven, a disc plate carried by said shaft, and working shovels removably attached to opposite surfaces of said disc plate, each of said working shovels lying in a plane substantially at right-angles to said disc plate, the lengths of the shovels being disposed radially, more or less, of the disc plate, and said shovels being curvilinear in the direction of their widths.

7. In a machine of the character described, a box like structure including an open front wall, spaced apart, upstanding side walls and a rear wall defining a passageway leading from said open front wall, a shaft extending transversely of said passageway, a disc plate mounted upon said shaft and disposed in said passageway between said open front wall and said rear wall, and spaced apart working blades secured at a surface of said disc plate adjacent its periphery, each working blade lying in a plane substantially perpendicular to said disc plate.

8. In a machine of the character described, a box like structure including an open front wall, spaced apart, upstanding side walls and a rear wall defining a passageway leading from said open front wall, a shaft extending transversely of said passageway, a disc plate mounted upon said shaft and disposed in said passageway, and working blades secured at a surface of said disc plate adjacent its periphery and disposed substantially perpendicularly to the disc plate, each working blade approximately spanning the distance between said disc plate and the adjacent side wall.

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