Dec. 17, 1940. C. B. JENSEN 2,224,869

SNOWPLOW

Filed March 5, 1938 3 Sheets-Sheet 1

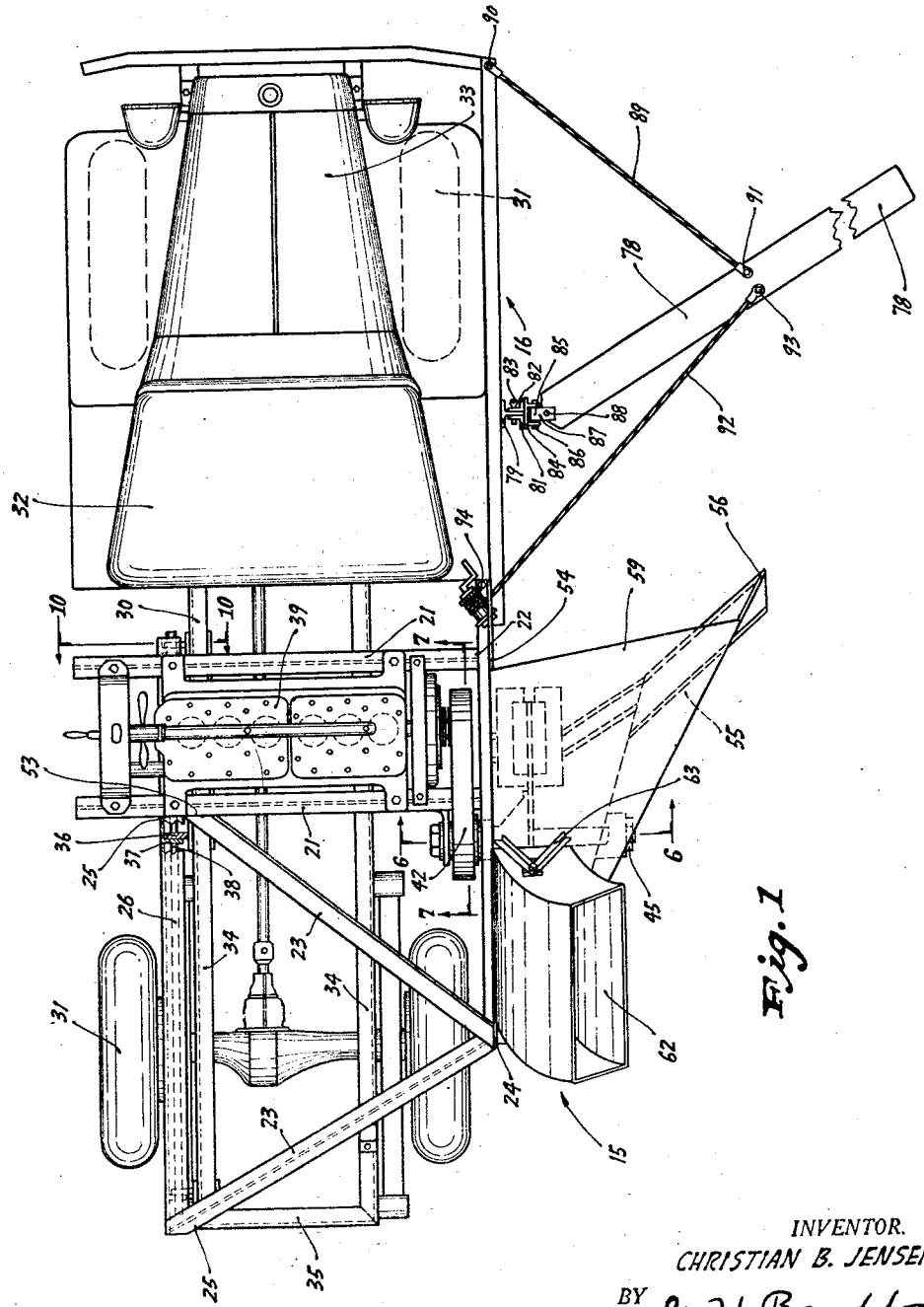


Fig. 1

INVENTOR.
CHRISTIAN B. JENSEN
BY G. H. Braddock
ATTORNEY

Dec. 17, 1940. C. B. JENSEN 2,224,869

SNOWPLOW

Filed March 5, 1938 3 Sheets-Sheet 2

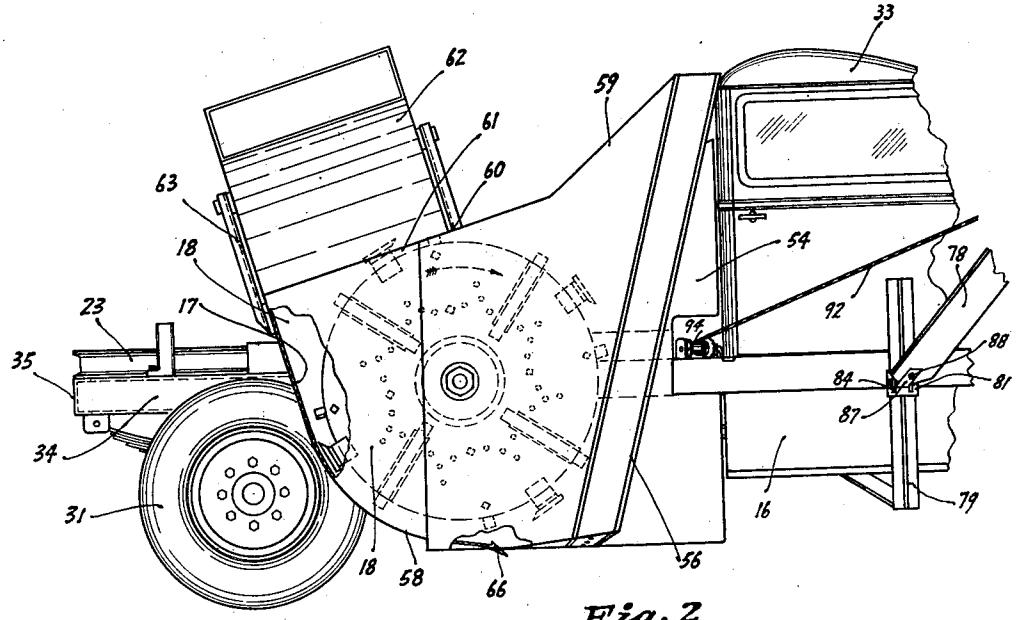


Fig. 2

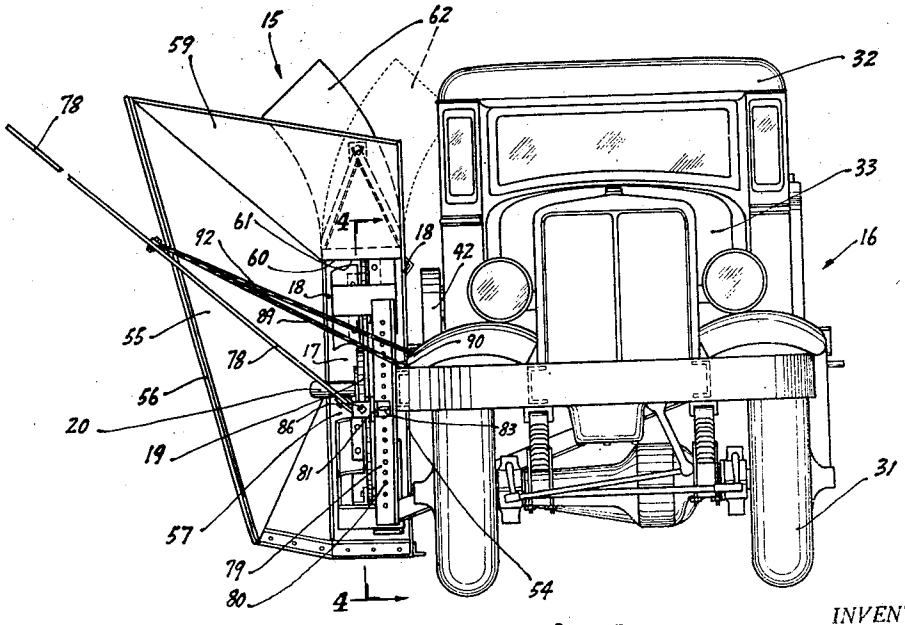


Fig. 3

INVENTOR.
CHRISTIAN B. JENSEN
BY G. H. Braddock
ATTORNEY

Dec. 17, 1940. C. B. JENSEN 2,224,869

SNOWPLOW

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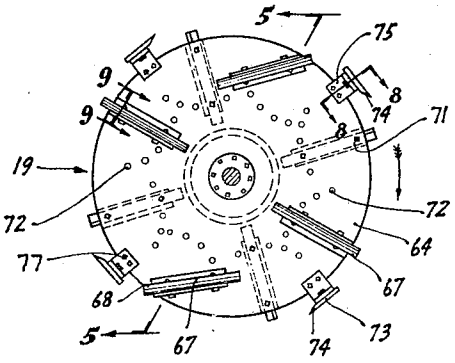


Fig. 4

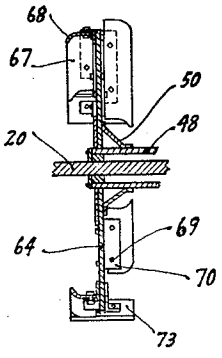


Fig. 5

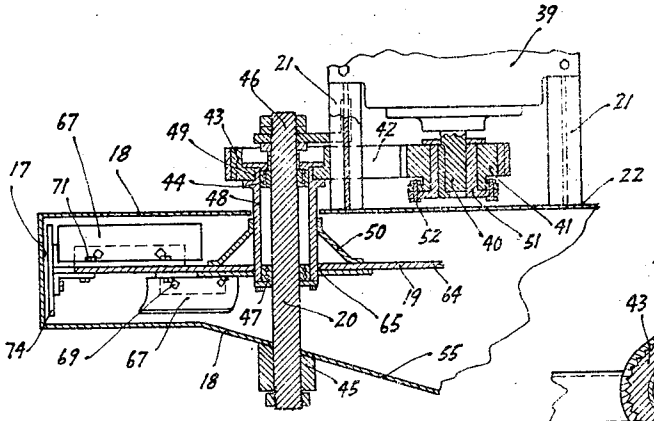


Fig. 6

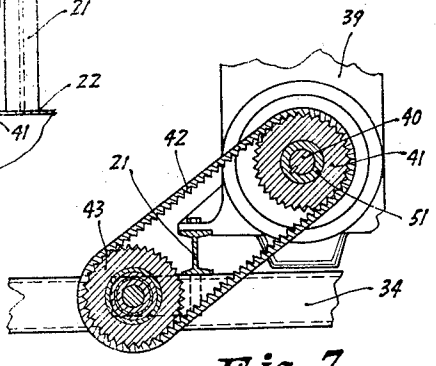


Fig. 7

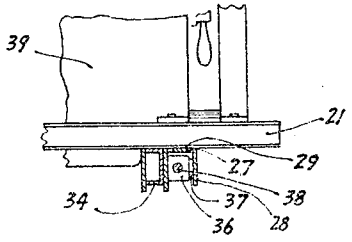


Fig. 10

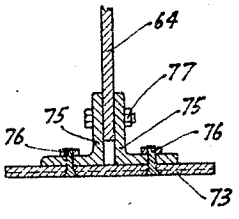


Fig. 8

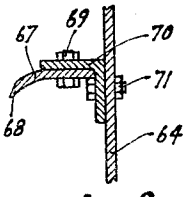


Fig. 9

INVENTOR.
CHRISTIAN B. JENSEN
BY G. H. Braddock
ATTORNEY

Patented Dec. 17, 1940 2,224,869

UNITED STATES PATENT OFFICE

2,224,869

SNOWPLOW

Christian B. Jensen, St. Paul, Minn.

Application March 5, 1938, Serial No. 194,139

7 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.

A further object is to provide a so-called widening snowplow which will be of novel and improved construction.

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

A further object is to provide a widening snow plow and novel and improved devices or mechanism for mounting the snowplow upon a propulsion vehicle therefor.

And a further object is to provide novel and improved mechanism for mounting a widening snowplow upon a propulsion vehicle, such as a truck or tractor, for the snowplow.

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 illustrated 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 top plan view of a widening snowplow made according to the invention and applied to or mounted upon a propulsion vehicle for the snowplow, ready to be put to use;

Fig. 2 is a side elevational view of the snowplow of Fig. 1, disclosing the rearward portion only of the propulsion vehicle having said snowplow;

Fig. 3 is a front elevational view of the widening snowplow and propulsion vehicle of Figs. 1 and 2;

Fig. 4 is a detail sectional view, taken on line 4—4 in Fig. 3;

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

Fig. 6 is a detail sectional view, taken about on line 6—6 in Fig. 1;

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

Fig. 8 is a detail sectional view, taken as on line 8—8 in Fig. 4;

Fig. 9 is a detail sectional view, taken as on line 9—9 in Fig. 4; and

Fig. 10 is a detail sectional view, taken on line 10—10 in Fig. 1.

With respect to the drawings and the numerals of reference thereon, 15 represents a widening snowplow, and 16 indicates a propulsion vehicle for the plow. As disclosed, the propulsion vehicle is a truck, but could be a tractor, or, in fact, any type of propelled vehicle, automotive or otherwise.

The widening snowplow 15 is adapted to be mounted upon a propulsion vehicle, such as the vehicle 16, to be transported thereby. A frame for said widening snowplow 15 includes an upright rear wall 17 extending transversely of the plow and propulsion vehicle, and upright, suitably spaced apart parallel side walls 18, 18 extending longitudinally of said plow and propulsion vehicle. The side walls, 18, 18 are integrally connected to the rear wall 17 in any convenient manner, as by welding or riveting.

As disclosed, the side walls 18, 18 cooperate with a rotatable element 19 of the plow to provide, together with additional elements to be described, a snow removing or handling entity for said plow. Said rotatable element 19 is situated between the side walls 18, 18, and is mounted for turning movement upon a transverse shaft 20 which extends through said side walls 18, 18 and is fixed upon the plow in a n nner to be set forth.

The frame of the widening snow low is adapted to be disposed at one side of t e propulsion vehicle which transports said plow. As disclosed, said frame is at the right side of the propulsion vehicle. A carrier for the plow frame includes a motor support of said widening plow constituted as spaced apart girders 21 extending transversely of the propulsion vehicle and the plow frame, and integrally connected, as at 22, as by welding or otherwise, to the inner side wall 18. Said carrier for the plow frame additionally includes oblique girder members 23 which are in the plane of the girders 21. An end portion of each oblique girder member 23 is integrally connected, as at 24, as by welding or otherwise, to said inner side

wall 18. The end portion of each oblique girder member 23 opposite the plow frame is integrally connected, as at 25, as by welding or otherwise, to a longitudinal beam 26 of the carrier for the plow frame. One of the girder members 23 is also welded to a girder 21 as at 53. Said longitudinal beam 26 is as disclosed an angle bar having a horizontal arm 27 thereof secured to the girder members 23 and a vertical arm 28 thereof extending downwardly. Said horizontal arm 27 of the longitudinal beam or angle bar 26 extends beneath and past, and is integrally connected, as at 29, as by welding or otherwise, to the lower surfaces of the transverse girders 21. In short, the elements 21, 23 and 26 integrally connected to each other and to the plow frame provide a carrier for supporting the widening snowplow upon a propulsion vehicle therefor, as for example, the propulsion vehicle 16.

Said propulsion vehicle 16 may be of any ordinary or preferred construction. As disclosed, it includes a chassis 30 upon wheels 31 and carrying a body 32, ordinary motor 33, etc., at the forward portion of the vehicle. At the rear of the body 32, the chassis 30 includes spaced apart, horizontal, longitudinally extending vehicle frame members 34 which connect at their rear ends with a transverse rearward vehicle frame member 35.

The longitudinal beam or angle bar 26 is adapted to be detachably pivoted to one of the longitudinal vehicle frame members 34 in such manner that the girders 21 and girder members 23 of the carrier for the plow frame including the rear wall 17 and the side wall 18, 18 can rest upon said vehicle frame members 34 with said plow frame and the rotatable element 19 therein situated in proper and intended operative position at a side of and relatively to the propulsion vehicle. To this end, the longitudinal vehicle frame member 34 at the side of said vehicle opposite the plow frame integrally supports, as by welding or otherwise, spaced apart ears 36 disposed adjacent the vertical arm 28 of the longitudinal beam or angle bar 26, and said vertical arm 28 likewise integrally supports, as by welding or otherwise, spaced apart ears 37 disposed adjacent said ears 36. Each of the ears 36 and 37 is perforated, and a longitudinally extending rod 38 removably located in all of said ears 36 and 37 pivotally or hingedly secures or fastens the carrier for the plow frame upon the chassis of the propulsion vehicle, as will be obvious. In practice, the arrangement is such that the weight of the widening plow ordinarily causes the elements 21 and 23 to rest or bear firmly upon the longitudinal members 34 of the chassis 30 of the vehicle and the plow frame with rotatable element to be thus maintained in operative position. At the same time, the pivotal or hinged connection between the propulsion vehicle and the snowplow makes provision for swinging said snowplow upwardly, and, naturally, inwardly, of the vehicle in any instance where this is desirable, as when the vehicle is to be made to travel at a location providing no clearance space for the snowplow at its normal, operative position.

The girders 21 support an internal combustion engine 39 of the widening snowplow which is adapted to the purpose of driving or turning the rotatable element 19. As shown, the shaft 40 of said engine 39 integrally supports a gear or sprocket 41. A chain or belt 42 which rides on the gear or sprocket 41 also rides on a second gear or sprocket 43 rotatably mounted, as at 44, upon the fixed shaft 20. Said shaft 20 has its outer end located, as at 45, in the outer side wall 18 and its inner end fixedly supported, as at 46, upon a part of the engine 39. The bearing 44 which rotatably supports the gear or sprocket 43 cooperates with a second bearing 47 upon said shaft 20 to rotatably support a hub 48 for the rotatable element 19. Said hub 48 is suitably and conveniently fixed as at 49, to the gear or sprocket 43 to rotate therewith, and said rotatable element 19 is made fast to the hub 48 by bracing straps 50 welded or otherwise secured to said hub and rotatable element. The hub 48 is snugly and rotatably arranged in an opening through the inner side wall 18, as will be most clear from Fig. 6. Evidently, the engine or motor 39, the rotatable element 19 and the driving connection as described between said engine or motor and rotatable element are a unitary structure of the widening snowplow, and upon operation of the engine or motor, the rotatable element will be driven or turned through the instrumentality of the gear or sprocket 41, the chain or belt 42, the gear or sprocket 43 and the hub 48. The gear or sprocket 41 is not arranged directly upon the shaft 40, but is mounted upon a safety drive member 51 splined to said shaft and is connected to said safety drive member by bolts or shear pins 52.

The inner upstanding side wall 18 of the frame merges at its forward portion in a forwardly extended wall 54 which may be a continuation of and in the same plane as said inner side wall 18. The outer upstanding side wall 18 merges at its forward portion in a forwardly extending, downwardly and inwardly slanting mold board 55 disposed opposite and in spaced relation to the forwardly extending wall 54. The forward, upright edge of the mold board 55 includes a knife edge 56. The wall 54 and the mold board 55 provide surfaces for guiding snow into an open front passageway 57 defined by a curvilinear wall 58 extending downwardly and forwardly from the rear wall 17 and the side walls 18, 18 of the frame. The upper portions of the wall 54 and the mold board 55 are interconnected by a downwardly and rearwardly extending wall 59 which meets the top forward edges of the upright side walls 18, 18 and said downwardly and rearwardly extending wall 59 and its rear edge 60 cooperate with the rear wall 17 and side walls 18, 18 to provide a closed passageway 61. Numeral 62 indicates an ordinary or preferred type of snow deflector arranged over the closed passageway 61 and removably attached to the plow as at 63. The closed passageway 61 has a discharge opening and the deflector 62 is positioned over this discharge opening. The snow deflector 62 is adapted to completely cover the closed passageway 61 defined by the walls 17, 18, 18 and 59. As shown, the snow deflector is, in full lines, positioned to direct the removed snow toward the right side of the road, and, in dotted lines, positioned to direct the snow toward the left side of the road.

The rotatable element 19 includes a disc plate 64 which is the part of said rotatable element secured to the hub 48. As disclosed, the disc plate 64 has a central opening 65 which receives said hub 48.

The disc plate 64 is arranged approximately concentrically of the curved wall 58 and in comparatively close proximity to said curved wall 58. A portion of the diameter or width of said disc plate 64 is within the snow passageway 57, and the upper portion of the diameter or width of the

disc plate terminates at about the elevation of the closed passageway 61.

The curved wall 58 supports a horizontal knife edge 66 extending transversely of the disc plate 64 at the elevation of the lower portions or edges of the side walls 18, 18. The knife edge 66 extends from side to side of the snow passageway 57.

The disc plate 64 carries a series of working blades or shovels 67 at the periphery of the disc plate. There are spaced apart working blades or shovels 67 adjacent each of the opposite surfaces of said disc plate, and said working blades or shovels at the different sides, respectively, of the disc plate are desirably disposed in staggered relation, as disclosed.

Each working blade or shovel 67 extends more or less radially of the disc plate 64, with its width arranged transversely of the snowplow. Also, each working blade or shovel 67 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 67 are rectilinear, and the outer or working edges or ends of said blades or shovels are knife edges, as denoted at 68.

Each working blade or shovel 67 is not as disclosed directly supported by the disc plate 64, but is removably carried, as by bolts 69, upon an angle piece 70, one for each blade or shovel, itself secured to the disc plate, as by bolts 71.

The disc plate 64 is rotated so that its forward portion moves downwardly and its lower portion moves rearwardly, in the direction of the arrow in Fig. 2. Each working blade or shovel 67 has its outer knife edge arranged to project a greater or less distance beyond the periphery of the disc plate 64, while the length of each blade or shovel is such that the inner end terminates a considerable distance inwardly of said periphery. The width of each working blade or shovel is just less than the distance between the disc plate 64 and each adjacent side wall 18, 18, it being understood that said disc plate is disposed in the snow passageway at equal distance from said side walls 18, 18. The arrangement is such that the concave surfaces of the blades or shovels 67 are the working surfaces thereof. The outer ends or edges of the working blades or shovels 67 rotate in close proximity to the curved wall 58.

The manner in which the rotatable element 19, including the disc plate 64 with working blades or shovels 67, operates will be evident. The forward wall 54 and the mold board 55 direct the snow into the passageway 57, and each working blade or shovel 67 cooperates with the disc plate 64 and the adjacent side wall 18 to carry individual loads or shovels-full of snow up through the snow deflector 62. The disc plate rotates at high speed, and the snow leaves the deflector 62 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 67. Said blades or shovels keep wiping through the snow passageway or slot, and the cooperating arrangement between working blades or shovels 67, disc plate 64 and upright 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 70 upon the disc plate 64 so that the blades or shovels 67 can be set at angles more sharp or more acute. For relatively loose snow, the blades or shovels 67 will be set at an angle to the ground approaching a right angle. When the snow is of nature to require more effort for removal, the blades or shovels 67 will be tilted, more or less as the case may be, to thus be set at an 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, 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 70 may be adjustably fastened to the disc plate 64 by the employment of selective holes 72 in said disc plate. In an instance where ice is to be removed, it may be desirable to set some of the working blades or shovels 67 at really sharp, cutting angle to the snow or ice. In such an event, a satisfactory arrangement is to set alternate blades or shovels at a sharp angle and arrange a blade or shovel at substantially a right angle 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 periphery of the disc plate. 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 deflector 62 and out of the machine. When a working blade or shovel 67 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 the desired relation to the periphery of the disc plate 64. To overcome this difficulty, the blades or shovels may be adjustably attached to the angle pieces 70 by employment of several different bolt holes, as will be understood.

In addition, the disc plate 64 may support cutters or cutting tools 73 disposed in spaced apart relation about the periphery of said disc plate 64 and arranged in tangential relation to the disc plate at locations just outside of its perimeter or circumference. As disclosed, each cutter or cutting tool 73 consists of a flat plate with forward knife edge 74. Each flat plate is detachably connected to the marginal portion of the disc plate 64 by means of a pair of angle pieces 75, one at either surface of said disc plate 64. An outer arm of each angle piece 75 is removably bolted or fixedly riveted to the corresponding flat plate 73 as at 76, and inner arms of each set of angle pieces are removably bolted to the disc plate 64 as at 77.

The snowplow illustrated in the drawings and hereinbefore described is more especially useful as a widening snowplow, that is, the propulsion vehicle will transport the snowplow over a surface or roadway which may have been partially cleared of snow, and said snowplow will cause snow to be removed along a line parallel to a cleared or partially cleared strip of roadway to widen said cleared or partially cleared strip, as will be understood. The widening snowplow can be supported upon the propulsion vehicle to be nearer to or farther away from the ground. As disclosed, the frame of the widening snowplow including the rotatable element 19 is disposed several inches above the surface over which the propulsion vehicle is to be made to travel. Stated otherwise, the snowplow frame is at elevation

slightly above the ground. Obviously, by pivotally or hingedly supporting the widening snowplow upon the propulsion vehicle, in the manner as before set forth, provision is made for adjustment upwardly and downwardly of the operating or snow clearing devices of said snowplow.

In the embodiment as disclosed, the rotatable element 19 is driven whenever the engine shaft 40 is in operation, the drive being from said shaft 40 to the gear or sprocket 41 through the safety drive member 51. The shear pins or bolts 52 are combinedly of less strength than is any part of the rotatable element 19, so that when an obstruction causes breakage, the breakage is of said shear pins or bolts 52 and disconnects the driving or engine shaft 40 from driving connection with the gear or sprocket 41.

The angle pieces 70 are at the rearward sides of the advancing working blades or shovels 67, and said blades or shovels are of relatively rigid material. Inasmuch as the working 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 working 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 the disc plate 64 independently of all others of the blades or shovels.

The construction includes a slicer bar 78 which is mounted upon the body 32, for vertical and swinging adjustment, directly in front of the widening snow plow.

As disclosed, a vertical support 79 is conveniently and suitably secured to a side of the body 32, the right side as disclosed, and said support 79 includes spaced apart openings 80 disposed along the length of the support.

A bracket 81 includes spaced apart ears 82 arranged at either side of the vertical support 79, and a pin 83 is for removably attaching said ears to said support. The pin 83 is adapted to be removably passed through openings in the ears 82 and through any selected one of the openings 80 in the support 79. The bracket 81 also includes spaced apart ears 84, opposite the ears 82, and one end of the short link 85 is arranged between said ears 84 and pivoted thereto by a pin 86 extending through alined openings in said ears 84 and said short link 85. The short link 85 includes spaced apart ears 87 at its end opposite the pin 86 and disposed at right angles to said pin 86. The inner end portion of the slicer bar 78 is arranged between the ears 87 and is pivoted to said ears by a pin 88 extending through alined openings in said ears 87 and said slicer bar. The connections between the bracket 81 and the short link 85 and between said short link and the slicer bar 78 together constitute a universal joint.

A cable, rope, or chain 89 is attached to a forward portion of the vehicle, as at 90, and to an intermediate portion of the slicer bar 78, as at 91. A second cable, rope or chain 92 is attached to an intermediate portion of the slicer bar, as at 93, and is adjustably attached to a rearward portion of the vehicle by employment of a winch 94. A hydraulic cylinder could be substituted for the cable, rope or chain 89, and a telescoping pipe could be substituted for the cable, rope or chain 92.

In practice, the slicer bar 78 assumes an oblique position as suggested in the drawings, slanting outwardly and upwardly from the vehicle. It is vertically adjustable bodily by selective positioning of the pin 83 in different ones of the openings 80 and in the ears 82. Said slicer bar is adjusted to be at greater or less oblique angle to the vehicle and to the ground by pulling in and letting out the cable, rope or chain 92 by employment of the winch 94.

The purpose of the slicer bar 78 is to cut down high banks of snow at the outer side of the widening snow plow to the elevation and angle which may in a particular instance be desired and cause the cut down snow to fall and lie in the path of said widening snowplow, whence the snow will be picked up and removed by the plow.

What is claimed is:

1. The combination of a widening snowplow with a propulsion vehicle therefor, said propulsion vehicle including spaced apart, longitudinally extending frame members adjacent the opposite sides thereof, comprising a snow removing entity adapted to be positioned at a side of said propulsion vehicle in adjacent relation to one of said longitudinally extending frame members, said snow removing entity including a shaft, a rotatable element upon said shaft and having a working blade and a structure including a passageway through which said working blade is adapted to wipe, a carrier for said snow removing entity rigid therewith and adapted to rest upon said propulsion vehicle crosswise thereof in supporting relation to said snow removing entity, an engine assembled with said carrier for driving said rotatable element, and means for hingedly mounting said widening snowplow upon another of said longitudinally extending frame member adjacent the side of said propulsion vehicle opposite said snow removing entity.

2. The combination of a snowplow with a propulsion vehicle therefor, comprising a snow removing entity adapted to be positioned at a side of said propulsion vehicle in adjacent relation to a lower portion thereof, a carrier at a side of said snow removing entity rigid therewith and adapted to rest upon and across said propulsion vehicle in supporting relation to said snow removing entity, means for operating said snow removing entity, and means for hingedly mounting said carrier upon said propulsion vehicle adjacent the side thereof opposite said snow removing entity.

3. The combination of a snowplow with a propulsion vehicle therefor, said propulsion vehicle including spaced apart, longitudinally extending frame members adjacent the opposite sides thereof, comprising a snow removing entity adapted to be positioned at a side of said propulsion vehicle in adjacent relation to one of said longitudinally extending frame members, a carrier rigidly secured to said snow removing entity and adapted to be supported by and across said propulsion vehicle, means for driving said snow removing entity, and means for hingedly mounting said snowplow upon another of said longitudinally extending frame members adjacent the side of said propulsion vehicle opposite said snow removing entity.

4. The combination of a snowplow with a propulsion vehicle therefor, comprising a snow removing entity adapted to be positioned at a side of said propulsion vehicle and including an element to be rotated, a carrier rigidly secured to said snow removing entity and adapted to be sup-

ported by and across said propulsion vehicle, an engine assembled with said carrier, driving connections between said engine and said element to be rotated, and means for hingedly mounting said carrier upon said propulsion vehicle adjacent the side thereof opposite said snow removing entity.

5. The combination of a snowplow with a propulsion vehicle therefor, said propulsion vehicle including spaced apart, longitudinally extending frame members adjacent the opposite sides thereof, comprising a snow removing entity adapted to be positioned at a side of said propulsion vehicle in adjacent relation to one of said longitudinally extending frame members, said snow removing entity including an element to be rotated, a carrier rigidly secured to said snow removing entity and adapted to be supported by and across said propulsion vehicle, an engine rigid with said carrier and including a driving shaft, an operative connection between said driving shaft and said element to be rotated, and means for hingedly mounting said snowplow upon another of said longitudinally extendng frame members adjacent the side of said propulsion vehicle opposite said snow removing entity.

6. In combination, a vehicle, an engine for propelling said vehicle, and a snowplow adapted to be transported by said vehicle, said snowplow comprising a snow removing entity adapted to be positioned at a side of said vehicle and including an element to be rotated, a carrier rigidly secured to said snow removing entity and adapted to be supported by and across said vehicle, an engine other than said engine for propelling said vehicle assembled with said carrier, driving connections between said second mentioned engine and said element to be rotated, and means for hingedly securing said carrier upon said vehicle adjacent the side thereof opposite said snow removing entity.

7. The combination with a vehicle, of a widening snowplow conveyed by said vehicle at a side thereof, an obliquely disposed slicer bar conveyed by said vehicle at a side thereof in front of and in spaced relation to said widening snowplow, means for accomplishing vertical adjustment bodily of said slicer bar, and means for adjusting the oblique relation of said slicer bar to said vehicle.

CHRISTIAN B. JENSEN.