Sept. 16, 1952 I. VANVICK 2,610,414

ROTARY SNOWPLOW

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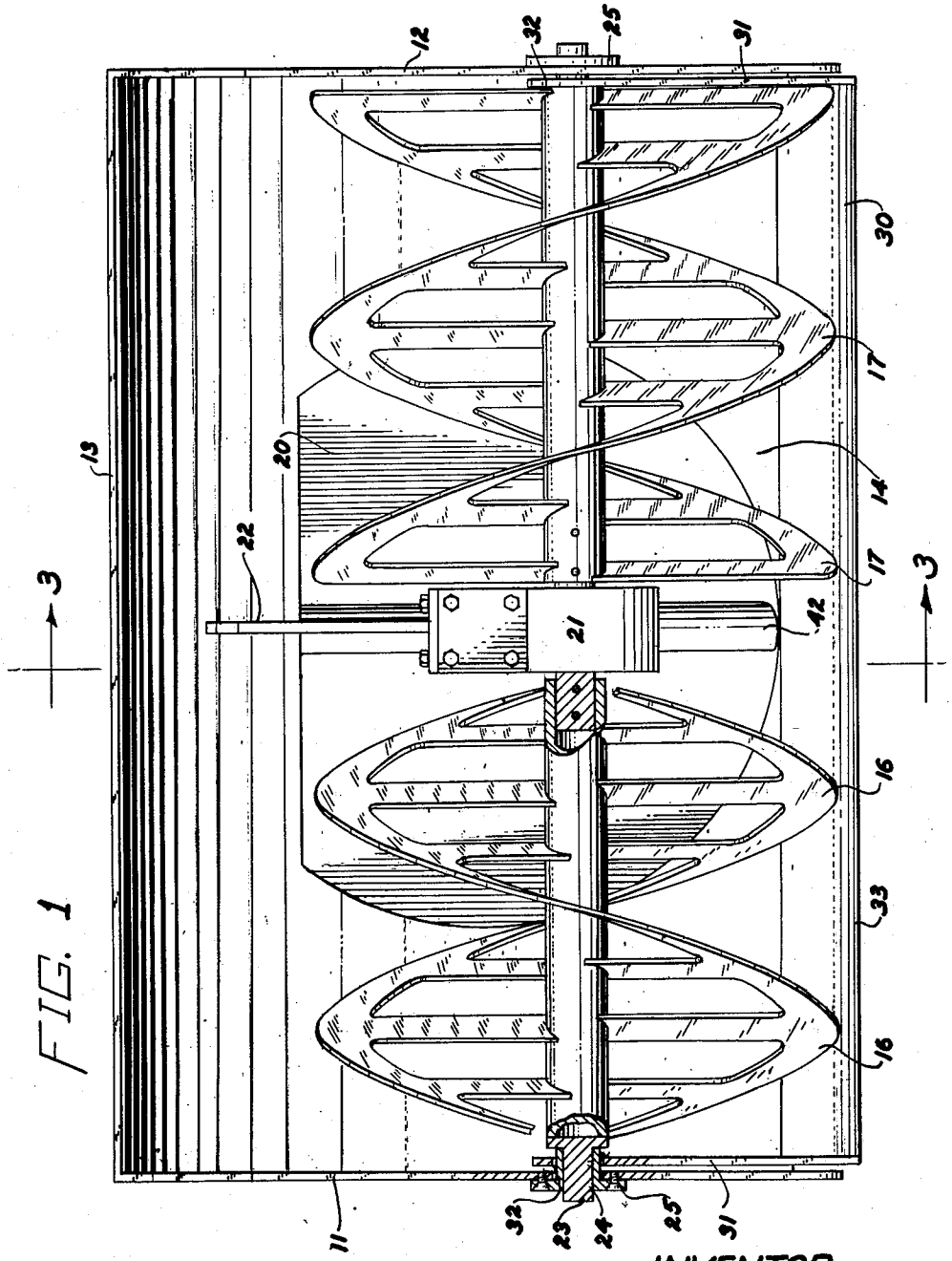

FIG. 1

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FIG. 2

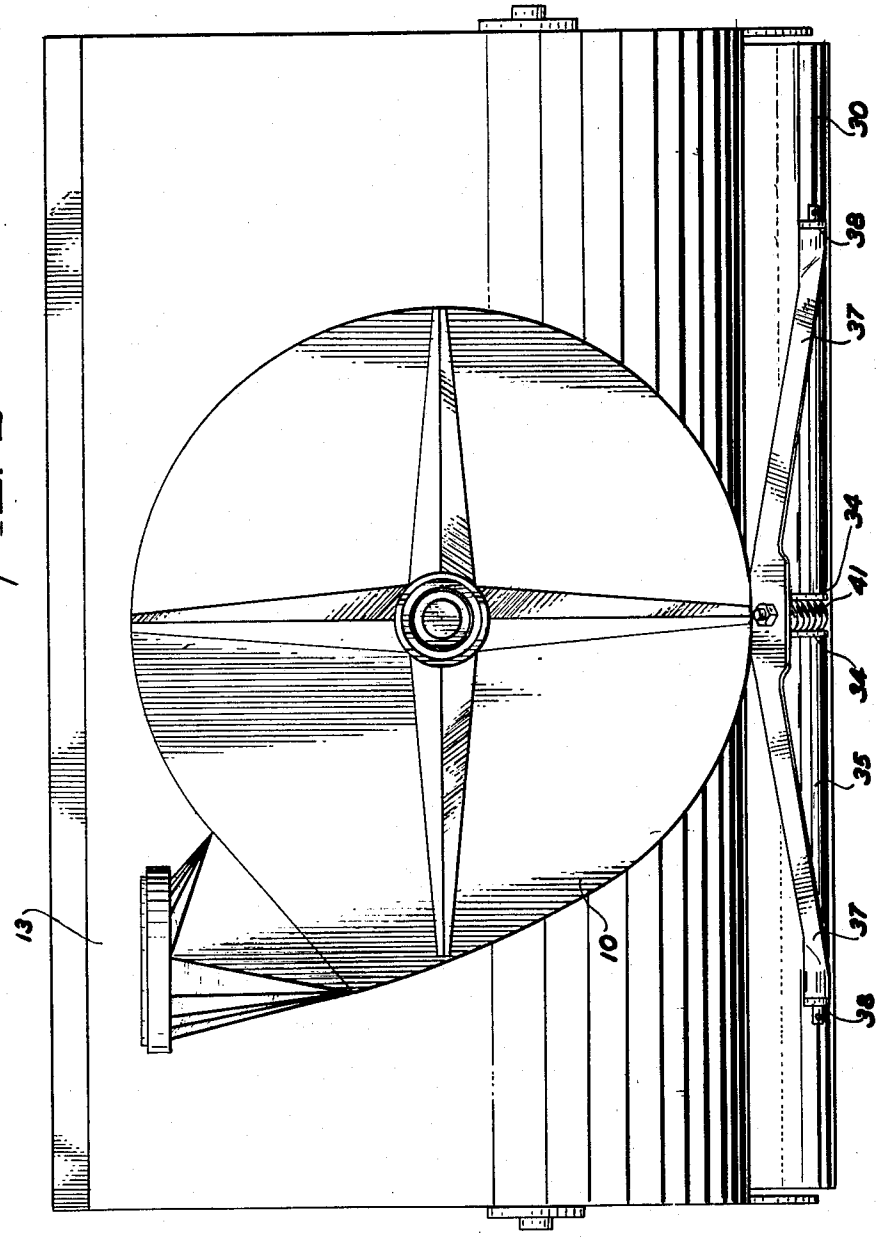

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FIG. 3

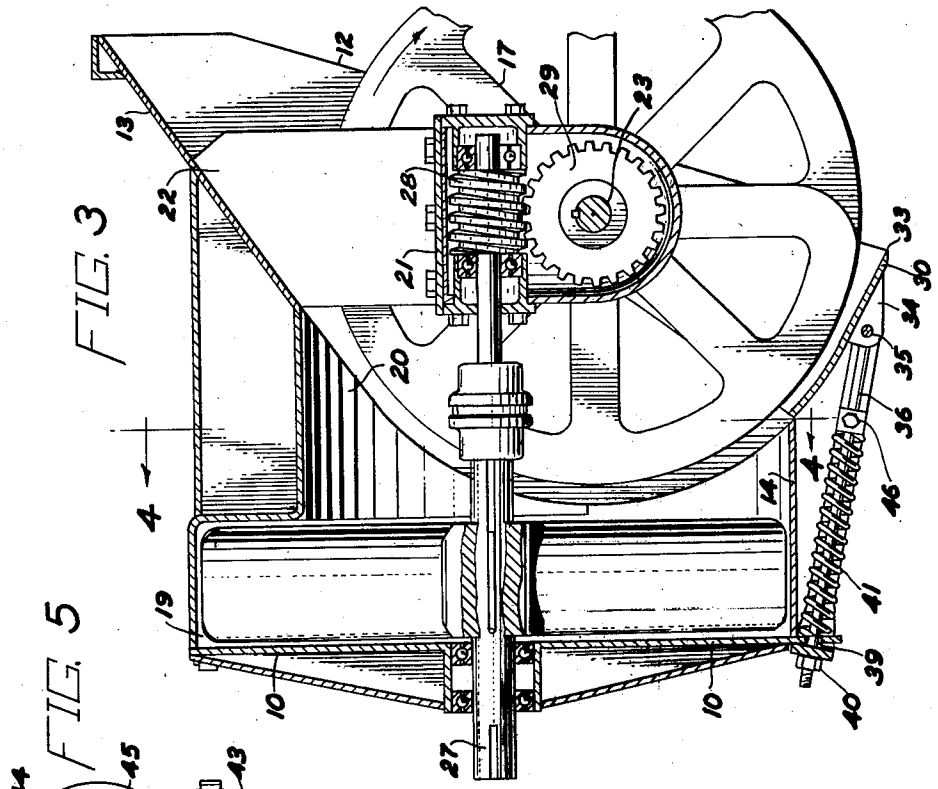

FIG. 5

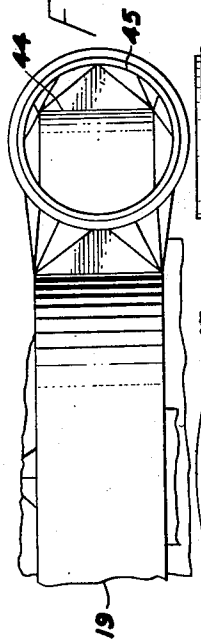

FIG. 4

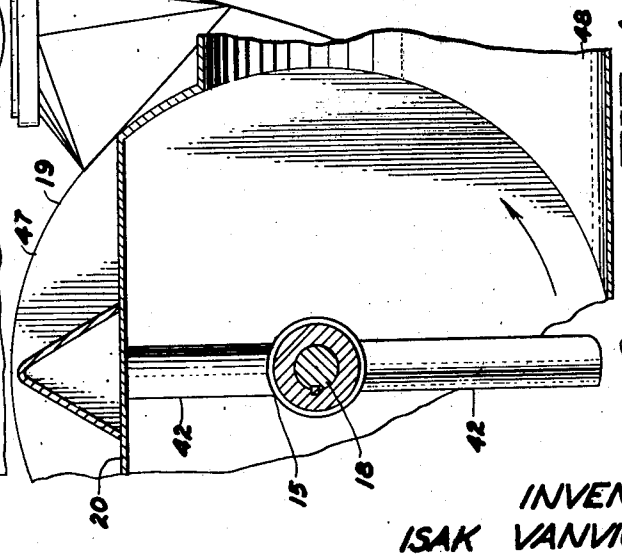

FIG. 6

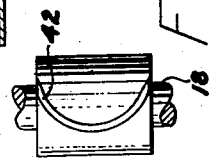

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FIG. 7

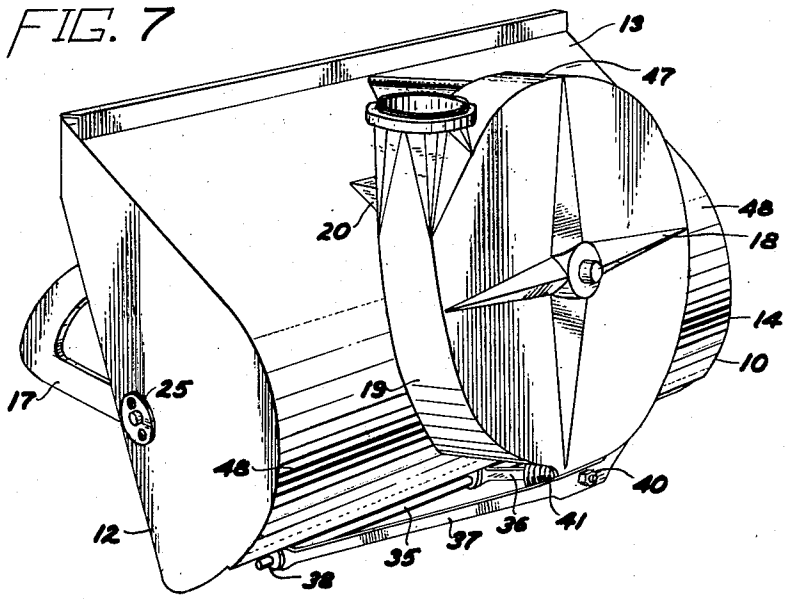
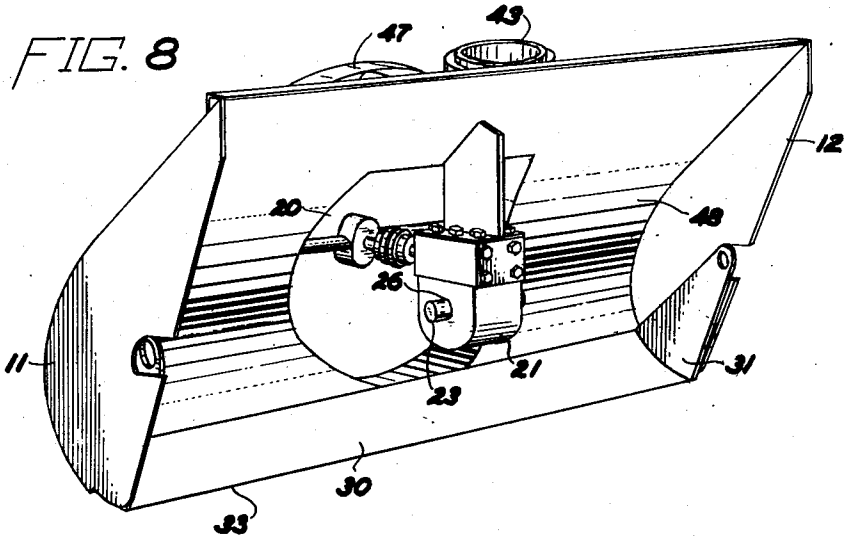


FIG. 8



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UNITED STATES PATENT OFFICE

2,610,414

ROTARY SNOWPLOW

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Application May 2, 1949, Serial No. 90,905

3 Claims. (Cl. 37—43)

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This invention presents a machine constituted as a rotary snow plow incorporating features and characteristics which are improvements over the disclosure of my pending application Serial No. 6,219, for Snow Plow, filed February 4, 1948, now Patent No. 2,587,415, issued February 26, 1952.

The rotary snow plow of my above identified application and the rotary snow plow herein illustrated and described are similar in certain respects, both incorporating a structure including an open front, side walls, an intermediate wall and a rear wall and providing a passageway, a snow gathering chamber for directing snow into the open front, a rotatable element including snow transporting members mounted in the passageway, feed screws at the open front situated forwardly of and in adjacent relation to the passageway for delivering snow by way thereof to the transporting members, and means for driving the transporting members and feed screws. In other respects, the disclosures of my pending and present applications are dissimilar. The snow plow of this invention is adapted to be connected with and propelled by a self-propelled vehicle, such, for instance, as a truck or tractor, and its feed screws and snow transporting members are adapted to be actuated by mechanism upon said self-propelled vehicle, whereas the snow plow of my pending application is manually or self-propelled and its feed screws and snow transporting members are actuated by power means upon the snow plow itself.

Novel and improved features and characteristics of the invention reside in the assembly with the snow plow and its feed screws and snow transporting members of supporting and propelling means for said snow plow and actuating means for said feed screws and transporting members.

Other novel and improved features, applicable to rotary snow plows no matter how propelled, reside in the provision of a spring loaded cutter bar disposed at a forward portion of the snow gathering chamber adapted to adjust itself to the feed screw cutting level, a structure such that the rear and lower working surfaces of the snow gathering chamber are disposed close to and concentric with the feed screw to provide for positive snow handling throughout the snow gathering chamber and a construction and arrangement accomplishing a gradual transforming of a rectangular passageway from a rotor housing of the snow plow into a circular passageway for snow from said rotor housing, thus to produce a snow-stream outlet from the rotor housing.

In the accompanying drawings forming a part of this specification,

Fig. 1 is a front elevational view, partially in section and partially broken away, of a snow plow made according to the invention;

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Fig. 2 is a rear elevational view of the snow plow;

Fig. 3 is a vertical longitudinal sectional view, taken on line 3—3 in Fig. 1;

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

Fig. 5 is a fragmentary top plan view of the disclosure of Fig. 4;

Fig. 6 is a detail view of a snow transporting member as it would appear from the bottom of the sheet in Fig. 4;

Fig. 7 is a rear perspective view of the snow plow, on a reduced scale; and

Fig. 8 is a front perspective view, on a reduced scale, with parts of the snow plow omitted.

A frame of the snow plow includes an upright rear wall 10, upright side walls 11 and 12, an upper wall 13, a lower wall 14 and a cylindrical wall 47 disposed between said rear wall 10 and the upper, lower and side walls. An intermediate part-cylindrical wall 48, between the side walls 11 and 12 and exterior of the cylindrical wall 47, is contiguous with a forward portion of upper wall 13 and bounds the rear of the snow gathering chamber. The rear wall 10, the side walls 11 and 12, the upper wall 13, the lower wall 14, the cylindrical wall 47 and the part-cylindrical wall 48 are integrally connected in any suitable and convenient manner, as by welding or riveting.

The rear wall 10, the side walls 11 and 12, the upper wall 13, the lower wall 14, the cylindrical wall 47 and the part cylindrical wall 48 cooperate with a rotatable element 15 and feed screws 16 and 17 of the snow plow to provide a snow removing or handling entity for said snow plow. Said rotatable element 15 is fixed upon a longitudinal horizontal shaft 18 and is situated in an annular chamber 19 contiguous with the rear wall 10, and an annular passageway 20 disposed forwardly of said rear wall 10 is contiguous with said annular chamber 19. Annular chamber 19 and annular passageway 20 are provided by the cylindrical wall 47. Opposite end portions of said longitudinal shaft 18 are rotatably mounted in the rear wall 10 and in a gear box 21 suitably and conveniently supported, as at 22, upon the mid-length of the upper wall 13. The feed screws are double pitch, one is right and the other is left, and said feed screws are fixedly supported upon a transverse horizontal shaft 23 disposed forwardly of the annular chamber 19 and having its opposite ends rotatably mounted, as at 24, in bearing members 25 suitably and conveniently supported in the side walls 11 and 12. An intermediate part of the transverse shaft 23 is rotatably mounted, as at 26, in the gear box 21, and the feed screws 16 and 17 are at opposite sides of said gear box directly in front of the annular passageway 20 to the annular chamber 19, in adjacent relation to the lower wall 14.

The rearward end portion 27 of the longitudinal horizontal shaft 18 projects rearwardly of the rear wall 10, and said rearward end portion and said rear wall are adapted to be assembled with a self-propelled vehicle, such as a truck or tractor, so that a forward portion of the lower wall 14 of the frame will lie in spaced relation to the ground while the snow plow is being propelled by said self-propelled vehicle. Lower portions of the feed screws 16 and 17 are at elevation somewhat below that of the lowermost portion of said lower wall 14.

A self-propelled vehicle for propelling the snow plow will include a driven shaft (not shown) to be connected with the rearward end portion 27 of the longitudinal shaft 18 in such manner as to be capable of causing this to be rotated. Said self-propelled vehicle driven shaft and said longitudinal shaft 18 when connected can be in alined or angular relation. A worm 28 fixed upon the longitudinal shaft 18 and disposed in the gear box 21 meshes with a worm gear 29 fixed upon the transverse shaft 23. The rotatable element 15 will be driven or turned in response to rotation of the self-propelled vehicle driven shaft, through the instrumentality of the longitudinal shaft 18, and the feed screws 16 and 17 will be driven or turned in response to rotation of said driven shaft, through the instrumentality of said longitudinal shaft, the worm 28, the worm gear 29 and the transverse shaft 23.

Forward portions of the side walls 11 and 12, the upper wall 13, the lower wall 14 and all of intermediate part-cylindrical wall 48 together provide a snow gathering chamber of the snow plow, and the forward portions of upper wall 13, lower wall 14 and all of the intermediate wall 48 are constituted as an integral structure. The upper wall slants downwardly and rearwardly to merge into the intermediate wall, and said intermediate wall continues down in a circular path concentric with the feed screws to merge into the lower wall.

The side walls 11 and 12 rotatably support a cutter bar of the snow plow. Said cutter bar is constituted as a length 30 of rigid material, preferably metal, which extends from side to side of the frame, and flange portions 31, 31 integral or rigid with opposite end portions of said length 30. The flange portions 31, 31 are perpendicular to the length 30 and extend inwardly therefrom in parallel relation to each other and in adjacent relation to the frame side walls at their inner sides, and upper parts of said flange portions are rotatably supported, as at 32, 32 upon the bearing members 25, 25. The length 30 of the cutter bar is curvilinear in direction transversely thereof, and the forward margin of said length 30 is constituted as a straight knife edge 33 spanning the distance between the flange portions 31, 31 and in perpendicular relation to the side walls.

The concave surface of the length 30 faces upwardly, and spaced apart ears 34, 34 integral or rigid with the lower, convex surface of said length of the cutter bar and disposed in spaced relation to both its rearward edge and knife edge 33, as well as substantially at the midlength of said cutter bar, rigidly support a rod or bar 35 disposed in openings through said ears and extending to a position beyond each of the ears. The rod 35 is in spaced, parallel relation to the length 30 of the cutter bar, and a link 36, pivoted upon said rod and disposed between the ears 34, 34, extends rearwardly and upwardly. Brace rods 37, 37, having their forward, exterior

ends secured, as at 38, 38, to opposite end portions of the rod 35 and to the cutter bar, extend rearwardly and interiorly toward each other, and rearward, interior end portions of said brace rods, in alined relation to the link 36 in direction longitudinally of the snow plow, are secured together in overlapping relation. A rearward end portion of the link 36 passes freely through an opening 39 in a lower extension upon the rear wall 10 and then snugly through openings in the overlapped and secured together rearward, interior end portions of the brace rods, and a nut 40 upon the rearward end of said link is turned down against the rearward, interior end portion of one of said brace rods. A compression coil spring 41 upon the link 36, between the forward surface of the lower extension upon the rear wall 10 having the opening 39 and a collar 46 upon said link, normally resiliently retains the rearward, interior end portions of the brace rods in engaged relation with the rearward surface of said lower extension and the cutter bar at its farthermost forward position. The construction and arrangement will be such that the rearward edge of the length 30 of the cutter bar will be situated in proximate relation to the forward edge of the lower wall 14 forwardly thereof, and the knife edge 33 of said length 30 will be situated below the elevation of the feed screws 16 and 17, as in Figs. 1, 2 and 3 of the drawings, when said cutter bar is at its farthermost forward position. While the rearward edge of the length 30 of the cutter bar normally is in proximate relation to the forward edge of said lower wall 14, the flange portions 31, 31 of said cutter bar are rotatably supported upon the side walls in such manner that the cutter bar can swing rearwardly and upwardly in clearing relation to the lower wall and its forward edge in response to force applied at the knife edge 33 in direction rearwardly of the snow plow.

The rotatable element 15 as disclosed is constituted as a pair of snow transporting members 42 situated at opposite sides of and disposed radially of the longitudinal shaft 18, although more than two snow transporting members could be employed. Each snow transporting member 42 is straight in the direction of its length and curvilinear in cross-section.

The snow transporting members 42 are arranged concentrically of and in comparatively close relation to the cylindrical wall bounding the annular chamber 19, and said snow transporting members are in vertical alinement with an upright outlet passageway 43 from said annular chamber. As will be apparent from the drawings, especially Figs. 4 and 5, the outlet passageway 43 is of such configuration that there is a gradual transforming of a rectangular outlet 44 from the annular chamber 19 into a circular outlet 45 from said passageway 43. Stated differently, the outlet passageway 43 constitutes a gradually transforming snowstream outlet from the annular chamber 19.

The rotatable element 15 is revolved so that its snow transporting members 42 move in the direction of the arrow in Fig. 4, and said snow transporting members 42 have width a bit less than the width of the annular chamber 19. The arrangement is such that the concave surfaces of the snow transporting members are the working and transporting surfaces, respectively, thereof.

The transverse shaft 23, with the feed screws 16 and 17, is revolved so that said feed screws will

cause snow to be fed interiorly of the snow plow, toward the gear box 21.

The upright outlet passageway 43 is adapted to adjustably support a snow deflector (not shown) which can be of ordinary or preferred construction.

During practical operation of the snow plow, the frame is supported so that the knife edge 33 which forms the forward margin of the cutter bar is positioned at or just above the surface of the ground to be plowed. In hard packed snow and ice the knife edge 33 will adjust itself to the feed screw cutting level, and, too, the cutter bar will be swung upwardly and rearwardly, against the action of the compression coil spring 41, when obstacles are encountered, thus to be in clearing relation to the obstacles. Furthermore, the cutter bar will react after the fashion of a shock absorber when obstacles are met.

The snow gathering chamber and the cutter bar of the snow plow direct snow and ice severed from the ground into the snow plow. The feed screws 16 and 17 direct the snow and ice to the annular passageway 20 whence said snow and ice will enter the annular chamber 19 concurrently with movement ahead of the snow plow. The snow transporting members 42 are adapted to cause snow and ice to be forced through the outlet passageway 43 out of the machine. Each snow transporting member 42 will carry an individual load or shovel-full of snow up through said outlet passageway 43. The rotatable element 15 will be revolved at a high rate of speed, and the snow and ice will leave the outlet passageway 43 in the form of individual and separate charges of snow and ice each equal in amount to a shovelfull of snow and ice forced out of the machine under considerable momentum by the centrifugal force exerted through the snow transporting members 42.

Attention is called to the fact that the spring loaded cutter bar is so mounted upon the frame of the snow plow that it will be swung bodily rearwardly and upwardly when obstacles are encountered at any location along the length of the knife edge 33. Rearward and upward swinging movement of said cutter bar of course will be accompanied by compression of the coil spring 41 and rearward sliding movement of the rearward end portion of the link 36 in the opening 39 in the lower extension upon the rear wall 10.

The feed screws 16 and 17 need not necessarily be in alined relation. In some instances it may be desirable, for example, to connect the feed screws together through the instrumentality of a universal joint and tilt them forwardly toward each other.

What is claimed is:

1. In a snow plow, the combination with a frame member, upright side walls, an upper wall and a part-cylindrical lower wall forming a forwardly facing snow gathering chamber and a shaft mounted in said side walls in concentric relation to said part-cylindrical wall, of a cutter bar comprising a part-cylindrical cutting plate extending between said side walls of the snow gathering chamber in concentric relation to said part-cylindrical lower wall and having a rearward surface thereof in overlapping relation to a lower, forward portion of the lower wall and a knife edge normally disposed forwardly of said lower wall, flange portions extending perpendicularly from said cutting plate and rotatably mounted on said shaft, a bar mounted on and extending longitudinally of said cutting plate adjacent the rearward surface thereof in a position normally spaced forwardly of said part-cylindrical lower wall, a link pivotally connected to said bar and passing through an extension in said frame, a pair of brace rods each pivotally secured at a first end thereof to one of opposite end portions of said bar and secured at a second end thereof to each other and to said link at a location rearward of said frame extension, and spring means for urging said link in a direction forwardly of said frame extension.

2. In a snow plow, the combination with a frame member, upright side walls, an upper wall and a part-cylindrical lower wall forming a forwardly facing snow gathering chamber and a shaft mounted in said side walls in concentric relation to said part-cylindrical wall, of a cutter bar comprising a part-cylindrical cutting plate extending between said side walls of the snow gathering chamber in concentric relation to said part-cylindrical lower wall and having a rearward surface thereof in overlapping relation to a lower, forward portion of the lower wall and a knife edge normally disposed forwardly of said lower wall, flange portions extending perpendicularly from said cutting plate and rotatably mounted on said shaft, and spring means for urging said cutting plate to swing forwardly.

3. In a snow plow, the combination with a frame member, upright side walls, an upper wall and a part-cylindrical lower wall forming a forwardly facing snow gathering chamber and a shaft mounted in said side walls in concentric relation to said part-cylindrical wall, of a cutter bar comprising a part-cylindrical cutting plate extending between said side walls of the snow gathering chamber in concentric relation to said part-cylindrical lower wall and having a rearward surface thereof in overlapping relation to a lower, forward portion of the lower wall and a knife edge normally disposed forwardly of said lower wall, flange portions extending perpendicularly from said cutting plate and rotatably mounted on said shaft, a bar mounted on and extending longitudinally of said cutting plate adjacent the rearward surface thereof in a position normally spaced forwardly of said part-cylindrical lower wall, a link pivotally connected to said bar and passing through an extension rigid with said frame, and spring means urging said link in a direction forwardly of said extension.

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