Feb. 10, 1953 M. T. SCHULTE ET AL 2,627,680

SNOW LOADING DEVICE

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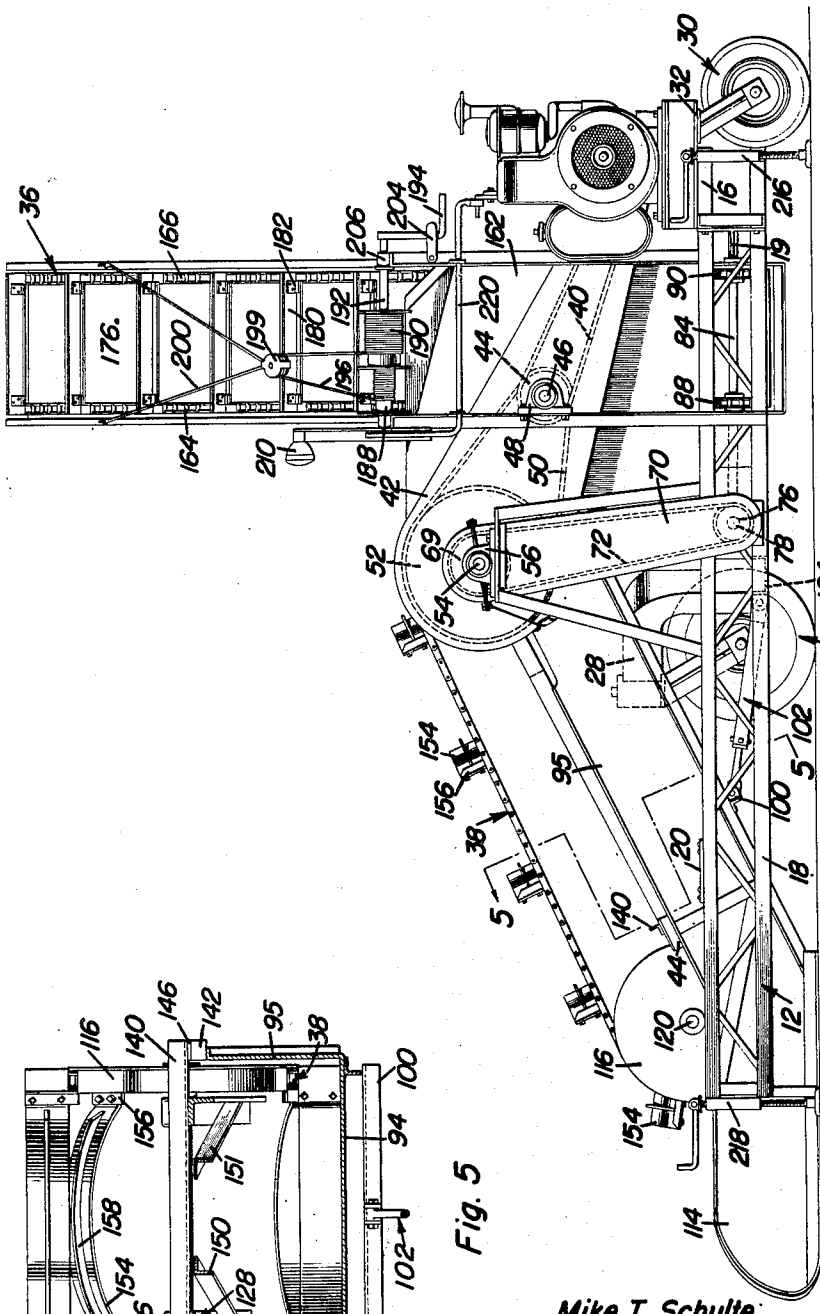

Fig. 1

Fig. 5

Mike T. Schulte
Louis J. Litchy
Elwood W. Downward
INVENTORS

BY Clarence A. O'Brien and Harvey B. Jacobson
Attorneys

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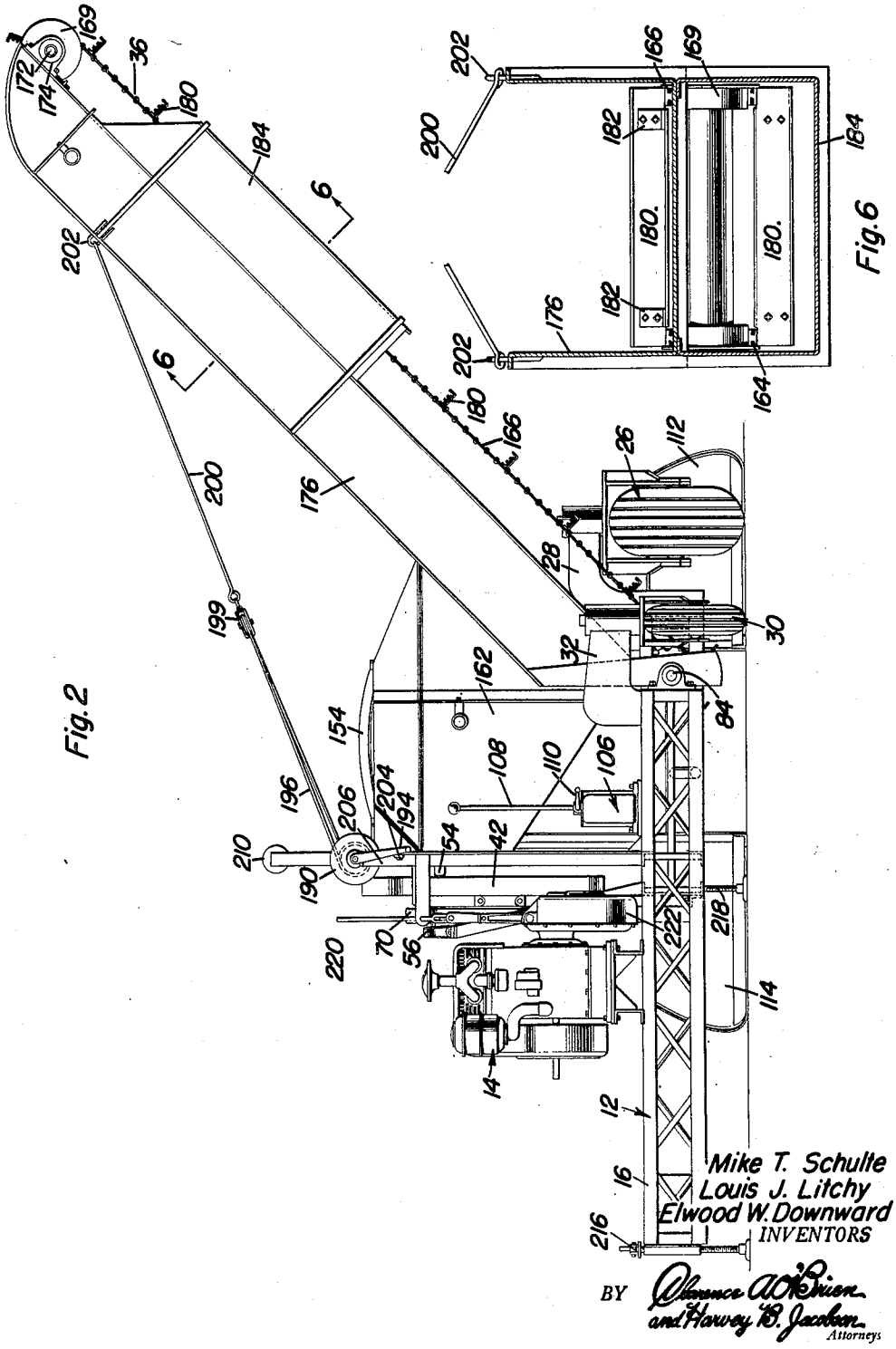

Fig. 2

Fig. 6

Mike T. Schulte
Louis J. Litchy
Elwood W. Downward
INVENTORS

BY Clarence A. O'Brien and Harvey B. Jacobson
Attorneys

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SNOW LOADING DEVICE

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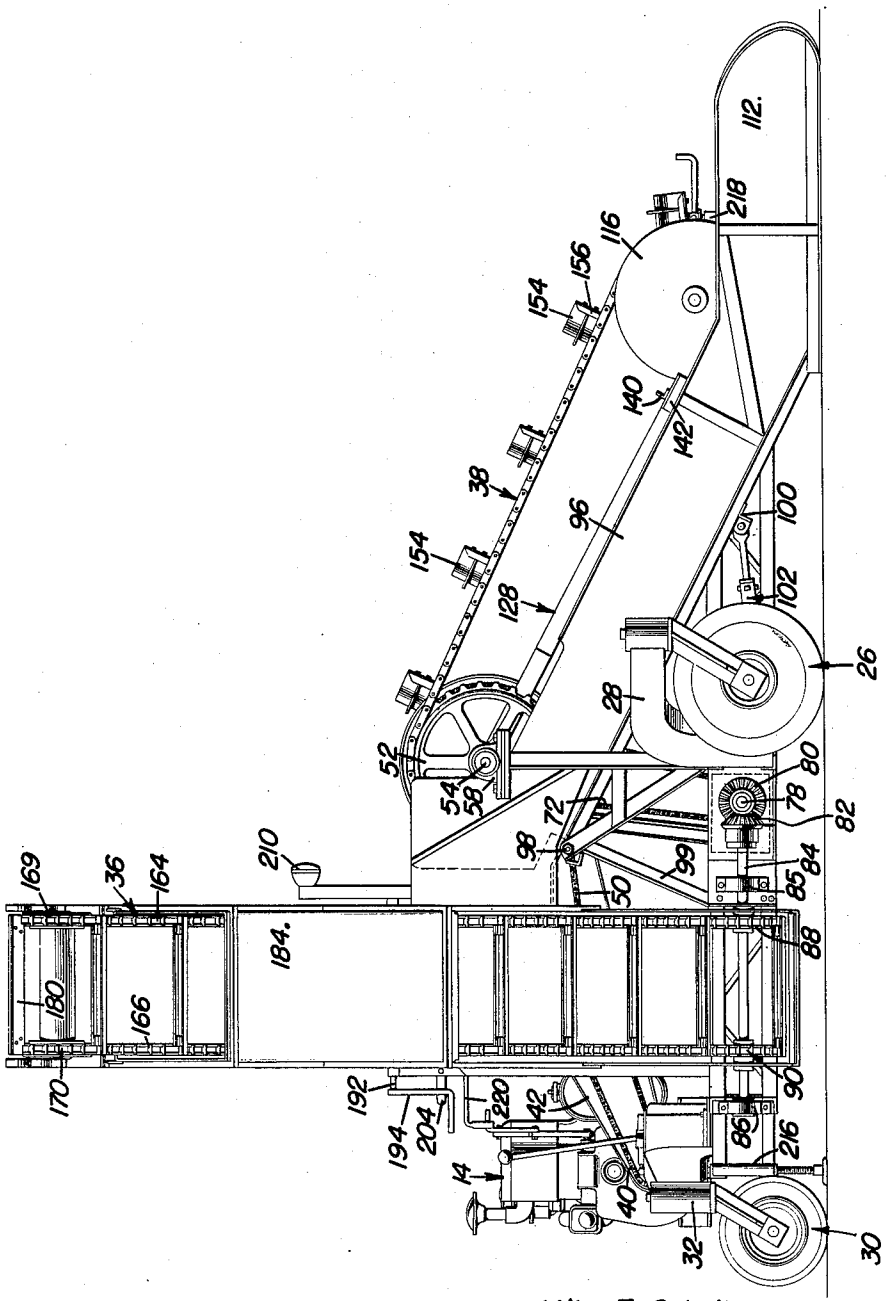

Fig. 3

Mike T. Schulte
Louis J. Litchy
Elwood W. Downward
INVENTORS

BY Clarence A. O'Brien and Harvey B. Jacobson
Attorneys

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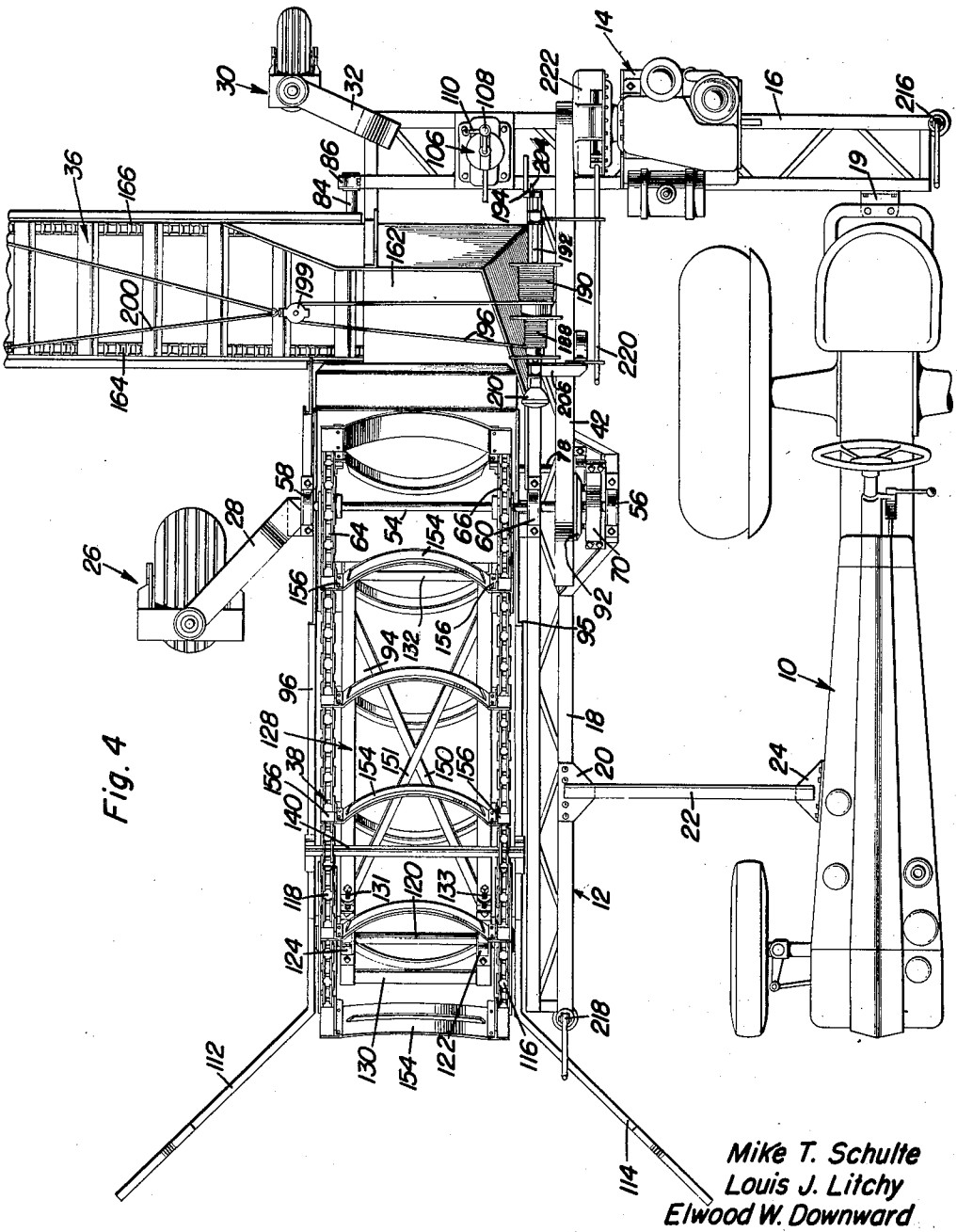

Fig. 4

Mike T. Schulte
Louis J. Litchy
Elwood W. Downward
INVENTORS

BY Clarence A. O'Brien and Harvey B. Jacobson
Attorneys

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UNITED STATES PATENT OFFICE

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SNOW LOADING DEVICE

Mike T. Schulte, Louis J. Litchy, and Elwood W. Downward, Little Falls, Minn.

Application March 10, 1950, Serial No. 148,774

2 Claims. (Cl. 37—45)

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This invention relates to improvements in snow removal devices of the type which collect the snow from a highway, deposit it in a hopper and then by means of an unloading conveyor, place it in a truck or alongside of the highway.

It is usual for certain equipment to urge the snow in windrows or a windrow alongside of a highway, road or any other area. Thereafter, it has been customary to either leave the snow in the windrows or collect it by means of certain type of collection apparatus, the most common of which employs endless conveyor belts. It is the primary object of the present invention to collect this snow by means of a device which does not employ expensive endless conveyor belts but which uses a more inexpensive paddle-type conveyor system, the blades of the collector conveyor being curved from end to end specifically for the purpose of scooping the snow from the windrows.

Another object of this invention is to provide an improved structural assemblage of elements which are arranged to provide an efficient machine requiring a small horse power expenditure for collecting the snow inasmuch as the normal sliding action of the snow (due to gravity) which is found in conveyor systems using the flat endless belts, is not present in the machine due to the positive displacement arrangement of the members forming virtual buckets in the conveyor assembly.

A further object of the invention is to improve the adjustability of the collector conveyor and trough assembly inasmuch as the collector conveyor is disposed on a conveyor frame which has one part thereof resting on the upstanding sides of the trough, both the trough and the collector conveyor frame being pivoted whereby upon pivotal adjustment of the trough, the entire frame for the collector conveyor is similarly adjusted.

Other objects and features will become apparent in following the description of the illustrated form of the invention.

In the drawings:

Figure 1 is a side view of the device;

Figure 2 is a rear view of the device shown in Figure 1;

Figure 3 is a side view of the snow collecting and unloading device, showing the side of the machine opposite from that in Figure 1;

Figure 4 is a plan view of the structure;

Figure 5 is a sectional view taken substantially on the line 5—5 of Figure 1 and in the direction of the arrows, illustrating particularly the structure of the collector conveyor and trough assembly; and,

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Figure 6 is a sectional view taken substantially on the line 6—6 of Figure 2 and in the direction of the arrows, showing particularly the structure of the unloading conveyor and guard which is used for protecting the endless conveyor.

The general operation of the invention includes the forward movement of the machine to help collect the snow, this forward movement being imparted by a conventional, small tractor 10. Usually, snow on highways is first pushed to the sides in windrows by means of conventional machinery. Thereafter, it is collected by a rather large machine and distributed in an area where it will not be in the vehicular path of movement. Another alternative is to omit the step of windrowing the snow and simply collect it directly from the highway for distribution on the adjacent area. The instant machine is adapted to operate when the snow has been windrowed or for initial collection from the highway.

The snow is gathered in the collector conveyor by means of the converging sides of a trough and urged upwardly until it is deposited in a hopper. This hopper has in communication therewith, a discharge conveyor for taking the snow from the hopper and urging it transversely of the line of travel of the machine for emission into a truck or into a field alongside of the highway.

Both of the conveyors are adjustable in response to a manually operative pair of mechanisms.

There is provided a chassis 12 of sufficient structural makeup to accommodate the two conveyors, an engine 14 and other elements formed in the makeup of the machine. The chassis is substantially L-shaped (see Figure 4), the shorter leg 16 thereof having the engine 14 fixed thereto by any conventional means and having a hitch 19 secured thereto. This hitch is adapted to be connected with the drawbar of the tractor 10. The longer leg 18 of the chassis has a conventional hitch 20 fixed thereto which, through the drawbar 22, is secured to a hitch 24 on the side of the tractor 10.

A rather large caster assembly 26 is secured by means of a bracket 28 to the longer leg 18 of the chassis 12 and on the opposite side from the hitch 20. A smaller caster assembly 30 is secured by means of the bracket 32 to the chassis at approximately the junction of the two legs of the chassis. The two caster assemblies together with the tractor provide the wheel base for the device.

Reference is now made to the drive mechanism for the two conveyors 36 and 38. The preferred drive mechanism consists of a number of shafts, chains and sprockets. The output shaft of the

engine has a sprocket secured thereto and a chain 40 is entrained therearound. This chain is housed in a case 42 and extends around a sprocket 44 which is fixed to the shaft 46. Said shaft 46 extends transversely of the normal line of travel of the device and is mounted in pillow block bearings 48. A second sprocket (unnumbered) is secured to the shaft 46 and has the chain 50 extending therearound (Figures 1 and 3), the last named chain being also entrained around a rather large sprocket 52 which is disposed on the shaft 54. This shaft is mounted in pillow blocks 56 and 58 and 60 which are carried by parts of the chassis. The endless conveyor 38 is entrained around sprockets 64 and 66 which are fixed to the shaft 54, whereby upon operation of the engine 14, the endless conveyor 38 is rendered operative.

A sprocket 69 is fixed to the shaft 54 at one end thereof and is covered by means of a housing 70 (Figure 4). This sprocket has a chain 72 (Figures 1 and 3) extending therearound, which also extends around a sprocket 76. Said sprocket 76 is fixed to a shaft 78 which has a bevel gear 80 carried thereby, said gear 80 being enmeshed with another bevel gear 82. The bevel gear 82 is fixed to the shaft 84 which is mounted in bearings 85 and 86, carried by a part of the chassis. Sprockets 88 and 90 are fixed to the shaft 84 for operation therewith, and said sprockets 88 and 90 form a part of the discharge conveyor 36. Hence, when the engine 14 is operative, not only is the endless conveyor 38 actuated but the endless conveyor 36 is also actuated.

In the event that a relatively immovable object is struck by the collector conveyor 38, provision is made for preventing damage to the machinery. This provision is in the form of a slip clutch 92 which is in itself structurally conventional and which is interposed in the shaft 54 between the sprocket 52 and the sprocket 69.

The specific structure of the collector conveyor 38 and its trough will be discussed at this time. An upwardly opening channel-shaped trough having a bottom 94 and sides 95 and 96 rising therefrom is pivoted by means of the pivot pin 98 to the upstanding framing 99 on each side of the longer leg 18 of said chassis 12. (Figure 3.) A yoke 100 is secured to the bottom 94 of the trough and has a piston-cylinder assembly 102 secured thereto for pivotal movement. The other end of this assembly is secured to an angle iron cross member 104 of the chassis. Conventional hose connections for conducting air or liquid to the cylinder in this assembly are not shown but are of necessity provided. A pump 106 of the manually operable type is disposed on the chassis at the rear thereof and has an operating lever 108 extending therefrom. This operating lever is used for the purpose of urging fluid to the assembly 102 which causes the trough to be pivoted about the pivot axis 98. A holding valve 110 is supplied in the pump structure 106 so that the trough may be maintained in any adjusted position.

The lower ends of the sides 95 and 96 of the trough are flared outwardly as at 112 and 114 in order to form a scoop for collection of the snow. The endless conveyor 38 is made of the chains shown in Figure 4 extending parallel to each other and around the sprockets 64 and 66. These chains also extend around a pair of large wheels 116 and 118 which are mounted on a shaft 120, said shaft being carried in bearings 122 and 124. These bearings are disposed on a conveyor frame 128 which consists of side members connected by means of cross braces 130 and 132. Said bearings 124 and 122 are adjustably disposed on the side pieces of the frame 128 and screws 131 and 133 are mounted in brackets for adjustment of these bearings longitudinally of the frame, whereby tightening or loosening of the chains of the endless conveyor 38 is accomplished.

The frame 128 extends upwardly so that it is pivoted on the shaft 54 (Figure 3). Hence, the shaft 54 is the pivot axis for the frame 128, thereby becoming the pivot axis for the collector conveyor 38. Although the pivot axis 98 of the trough is vertically spaced from the pivot axis 54, provision is made for the operability of the endless conveyor 38 and the trough insofar as pivotal adjustment is concerned.

An angle iron cross member 140 is welded or otherwise rigidly fixed to the upper surface of the sides of the conveyor frame 128. This cross member is sufficiently long to overlie the upstanding edges of the sides 95 and 96 of said trough. Blocks 142 and 144 (Figure 5) are disposed on these upstanding edges to accommodate wear plates 146 and 148 which are either fixed to the upper surfaces of the blocks 142 or the bottom surface of the cross member 140 to engage said blocks. The cross member 140 through the blocks and wear plates forms the downward limit of movement of the conveyor frame 128 and hence the endless conveyor thereon. Accordingly, when the trough is raised or lowered through the action of the cylinder-piston assembly 102, the trough is pivoted about its pivot axis 98. At the same time, the endless conveyor frame 128 is raised so that it pivots about its axis 54. The horizontal displacement of these pivot axes is taken into consideration by the sliding movement of the crossbar 140 of the conveyor frame 128 on the trough sides 95 and 96.

As discussed in connection with the chassis, sufficient structural members are provided wherever necessary to form a rigid frame, and the same holds true for the various other framing of the machine as for example, the braces 150 and 151 which extend diagonally across a part of the conveyor frame 128.

In order to complete the conveyor 38, there are a number of slats 154 which are secured to brackets 156 at each end. These brackets are welded or otherwise rigidly affixed to links of the chains of the endless conveyor.

Each slat is provided with a strengthening or reinforcing rib 158 on one surface thereof. The opposite surface is the work surface and is concavely curved, the concavity being in the direction of movement of the conveyor slats during the work portion of the operation of the conveyor. By this expedient, the endless conveyor slats 154 taken together with the bottom 94 of the trough, form virtual buckets for collection of the snow, so that it may be deposited ultimately in the hopper 162.

Said hopper is secured to the chassis 12 adjacent the junction of the legs 16 and 18 thereof. The discharge end of the conveyor 38 is in communication with the hopper so that the snow which has been collected is deposited in this hopper. Thereafter, the snow is collected from the hopper and discharged by means of the discharge conveyor 36.

Said discharge conveyor 36 is formed of a pair of chains 164 and 166 respectively which are entrained around said sprockets 88 and 90 (Figure 3) and which are entrained around the wheels 169 and 170. These wheels are mounted

on a shaft 172 which is carried by bearings 174 at the end of the upwardly opening trough 176. This trough is pivoted at its inner end on the shaft 84 so that the pivot axis for the conveyor 36 is the same as the pivot axis for the trough 176. Substantially straight slats 180 are secured at their ends by means of brackets 182 to the spaced chains 164 and 166 to complete the structure of the conveyor 36.

A substantially U-shaped guard 184 is secured to the trough 176 and extends around the lower part of the chain conveyor 36. This trough is adapted to engage the side of a truck or any other obstacle or object which may be in the line of pivotal movement of the conveyor 36 when it is adjusted. The utility of the guard is to prevent damage to the chain and also to prevent the chain from damaging any other object which may be in the line of movement of the conveyor.

The inlet end of the conveyor 36 is in communication with the interior of the hopper 162 so that the snow which is collected therein may be gathered for final dispersal at the discharge end of this conveyor.

The means for pivotally adjusting the conveyor 36 and its trough 176 is seen best in Figure 4 and consists of a pair of drums 188 and 190 which are mounted on the shaft 192 rigidly. Said shaft has an operating handle 194 fixed thereto in order to rotate the drums. A cable 196 extends from both drums and is entrained around a sheave 199. This sheave has the rods 200 secured thereto which are attached at its ends to brackets 202 which are fixed to the top edges of the trough 176. Accordingly, upon operation of the handle 194, the cable 196 is played inwardly or outwardly of the drums 190 and 188 thereby causing the conveyor 36 to be raised or lowered. In order to hold the conveyor in an adjusted position, a pivoted keeper 204 is carried by the standard 206 which also mounts the shaft 192 for rotation, and is adapted to be engaged by the handle. The handle being fixed with the shaft 192, causes the shaft to be locked when the handle engages the keeper 204. Also mounted on this standard is a lamp 210 which is employed for the purpose of lighting the region wherein the work is being done. Any number of such lights may be employed, as found desirable and practical.

In order to attach the device to a tractor, it may be necessary to raise one side of the device so that the drawbars and hitches may be aligned the necessary amount. For this purpose there is provided screw-type jacks 216 and 218 on one side of the chassis. Actuation of these jacks raises the side of the device remote from the caster assemblies 26 and 30.

In initiating operation of the machine, the lever 220 is manipulated properly for the purpose of disengaging the clutch which is disposed in the clutch housing 222. This clutch permits the engine to operate without causing operation of either conveyor. However, when the clutch is engaged by further operation of the lever 220, both conveyors are caused to operate.

In use of the device the patrol blade of a patrol grader or tractor is so aligned with the snow loader scoops that the blade sends the snow into the snow loader and consequently it is not necessary with this machine that the snow first be arranged in windrows. The machine can either be used with a windrow device or without it depending on how the operator desires to use it. With a windrow arrangement, the patrol grader or tractor used does not need a blade, but if you do not have a windrow the patrol grader blade can be used to send snow into the machine scoops.

Having thus described the invention, what is claimed as new is:

1. Snow removal apparatus comprising a wheel supported chassis frame, a snow removal trough inclining upwardly and rearwardly of said frame and having a front snow scooping end and a rear end pivoted on said frame in elevated position for vertical adjustment of said trough into different inclined positions, an endless power driven chain conveyor running in said trough in engagement with the bottom thereof to convey the snow rearwardly out of said trough, a conveyor driving shaft extending across the rear end of said trough above the same and journalled on said frame, a conveyor frame including side bars normally resting on the sides of the trough and supporting the front end of the conveyor and being pivoted on said shaft for vertical swinging of the front end of the conveyor relative to said trough and vertical swinging adjustment of said conveyor by vertical adjustment of said trough, and means for adjusting said trough.

2. Snow removal apparatus according to claim 1 wherein said conveyor comprises cross slats having concave sides facing the rear end of the trough when said conveyor is engaged with the bottom of the trough whereby to facilitate conveying the snow rearwardly out of said trough.

MIKE T. SCHULTE.
LOUIS J. LITCHY.
ELWOOD W. DOWNWARD.

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