

Sept. 21, 1937.

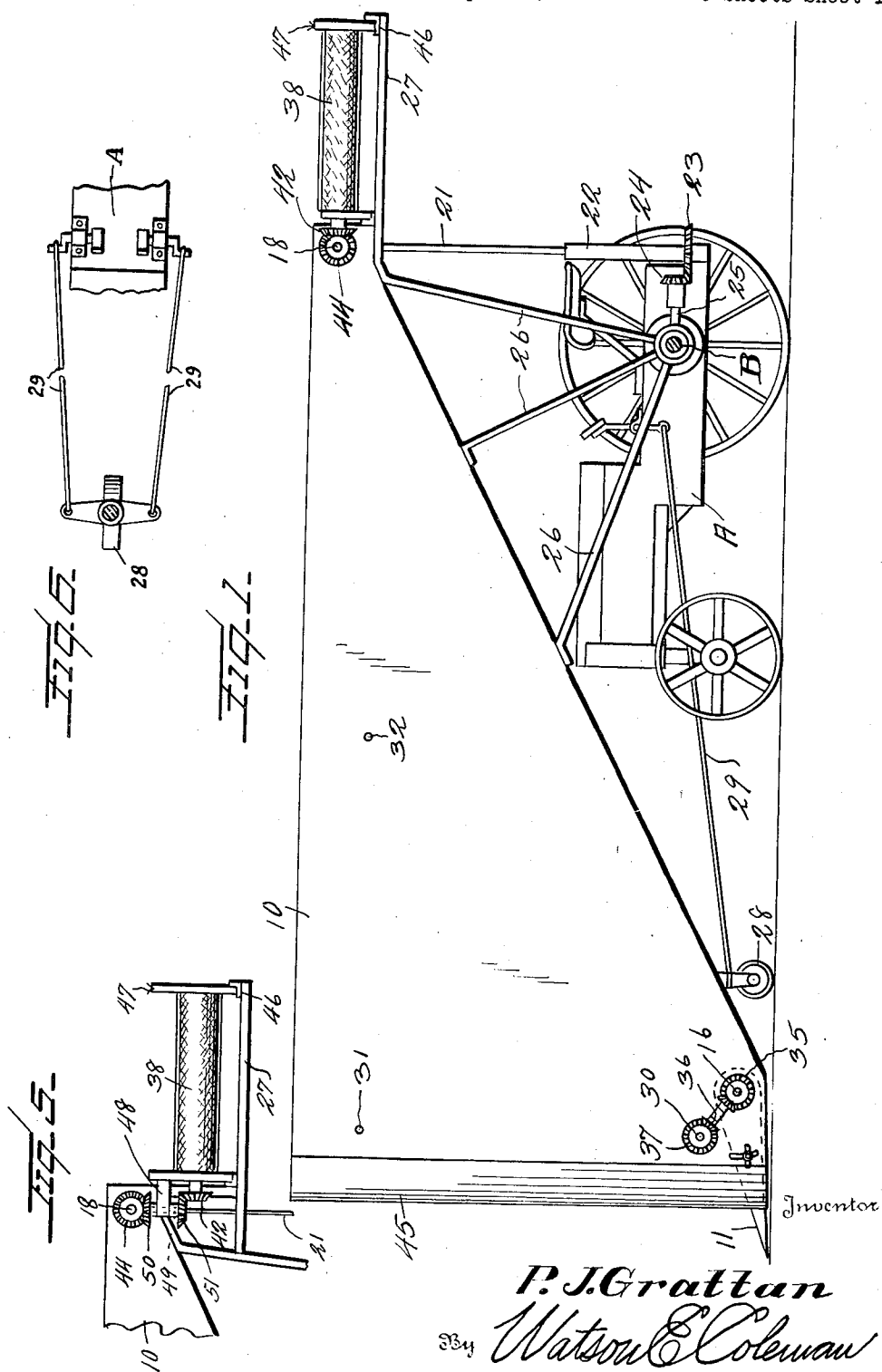
P. J. GRATTAN

2,093,721

SNOW REMOVER

Filed Sept. 12, 1936

3 Sheets-Sheet 1



Sept. 21, 1937.

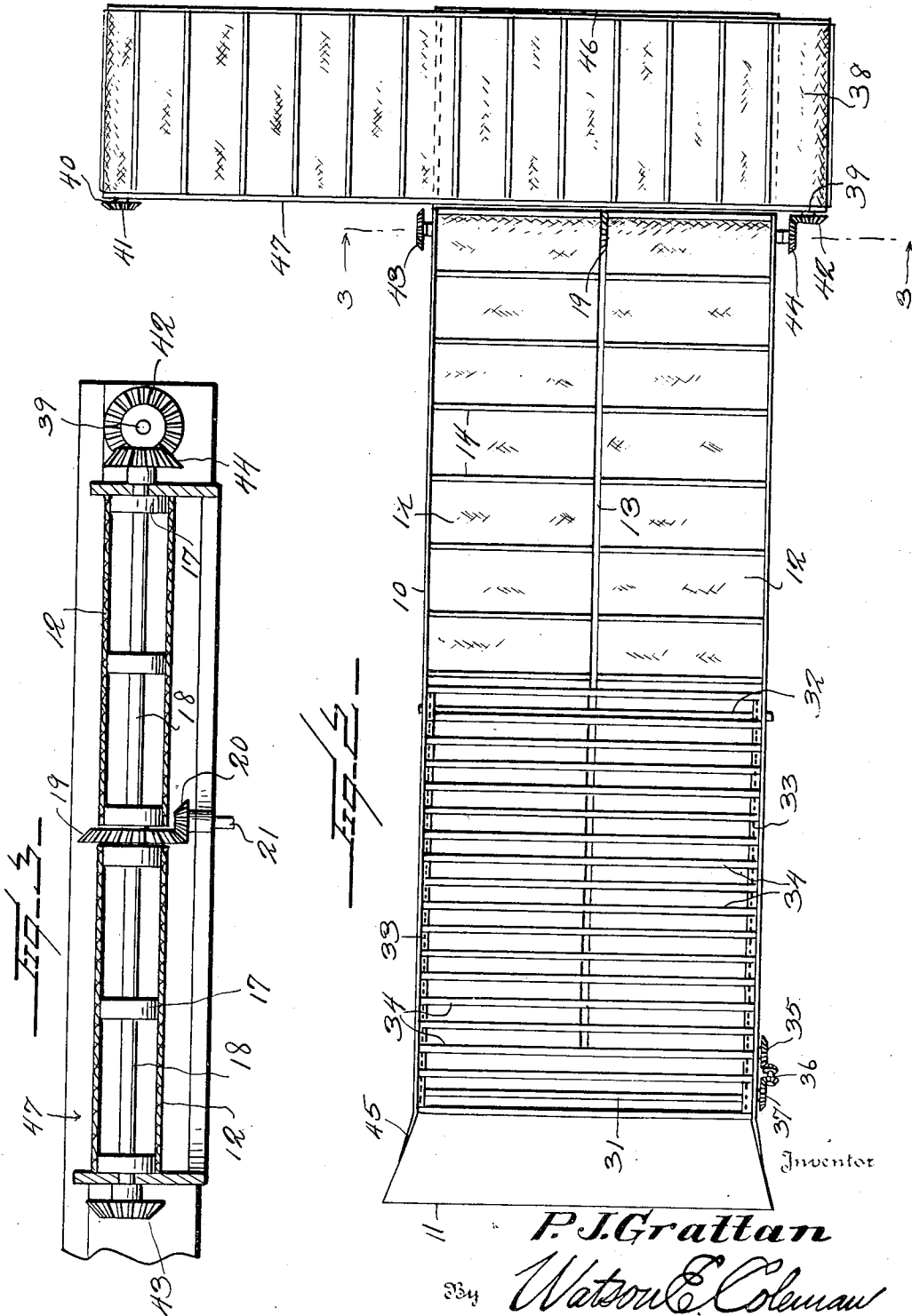
P. J. GRATTAN

2,093,721

SNOW REMOVER

Filed Sept. 12, 1936

3 Sheets-Sheet 2



P. J. Grattan

Watson & Coleman

Attorneys

Sept. 21, 1937.

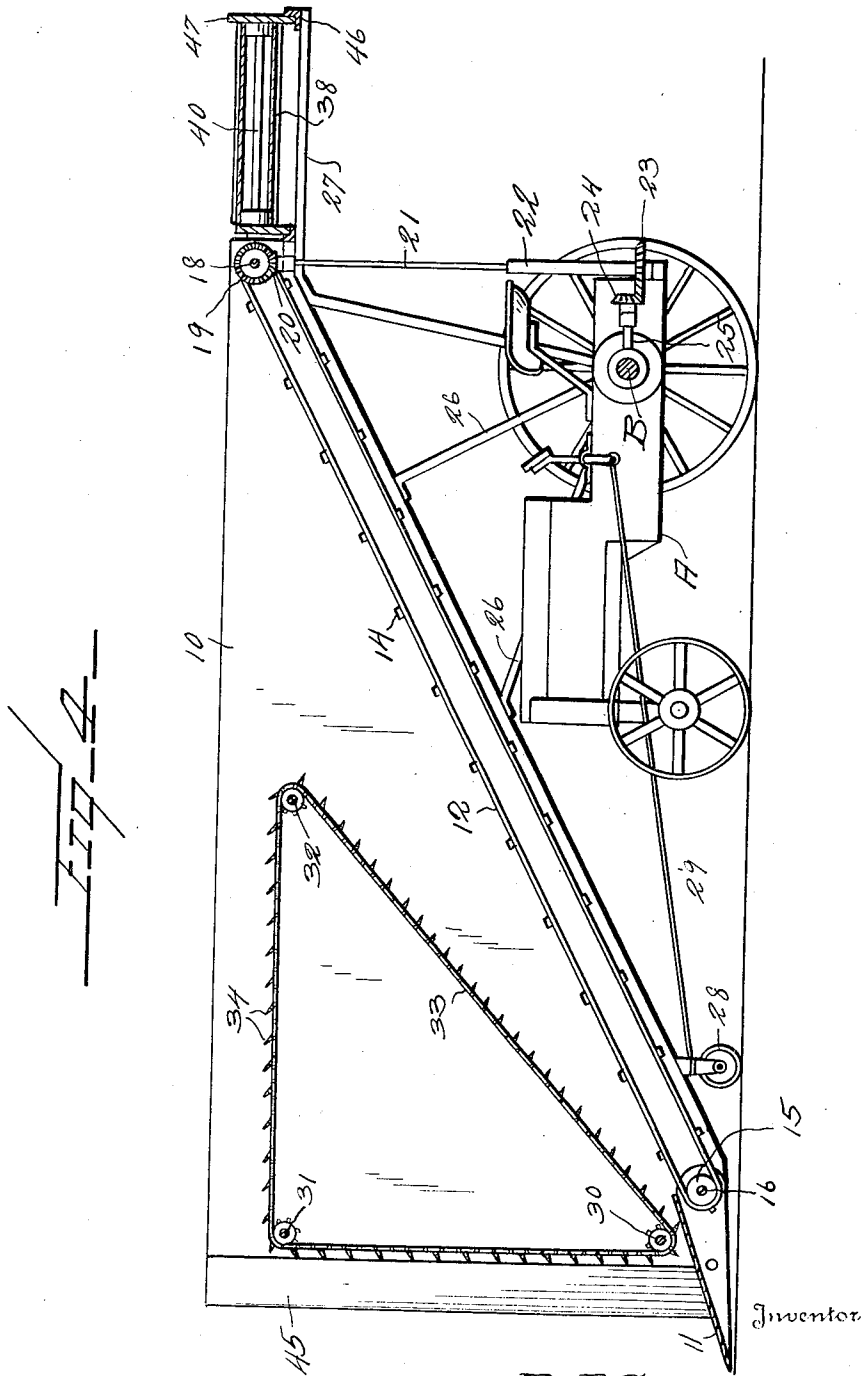
P. J. GRATTAN

2,093,721

SNOW REMOVER

Filed Sept. 12, 1936

3 Sheets-Sheet 3



P. J. Grattan
By *Watson & Coleman*
Attorneys

UNITED STATES PATENT OFFICE

2,093,721

SNOW REMOVER

Peter J. Grattan, Minneapolis, Minn.

Application September 12, 1936, Serial No. 100,548

6 Claims. (Cl. 37-45)

This invention relates to snow removing mechanism of that type wherein a rearwardly slanting elevator conveyor is mounted on a motor driven vehicle such as a tractor, whereby snow is lifted and carried back to a cross conveyor by which it may be discharged into carts at the sides of the road.

One object of this invention is to provide such snow removing machines with means for disintegrating the snow in front of the forward end of the elevator conveyor and starting the snow upward thereon.

Another object is to provide an upwardly and rearwardly extending conveyor, comprising a belt of canvas to which slats are attached, the canvas of the belt preventing snow sticking.

A further object is to form this conveyor belt in two lateral sections to thereby accommodate a driving sprocket for the driven shaft of the conveyor and provide means on this driven shaft whereby a cross conveyor may be driven.

A still further object is to provide a cross conveyor disposed at the upper end of the elevator conveyor and receiving the snow therefrom, this cross conveyor being shiftable so as to discharge the snow on one side or the other of the road.

Still another object is to provide means whereby the forward end of the conveyor may be steered from the driver's seat of the motor propelled vehicle.

Other objects will appear in the course of the following description.

My invention is illustrated in the accompanying drawings wherein:

Figure 1 is a side elevation of a snow remover constructed in accordance with my invention;

Figure 2 is a top plan view thereof;

Figure 3 is a section on the line 3-3 of Figure 2;

Figure 4 is a vertical longitudinal section through the machine;

Figure 5 is a fragmentary detail showing a driving connection between the cross conveyor and the main conveyor shaft whereby the cross conveyor may be disposed below the upper end of the main conveyor.

Figure 6 is a fragmentary top plan view of the steering mechanism, the spindle of the steering wheel being shown in section.

Referring to these drawings, A generally designates a motor vehicle such as a tractor of any well-known type, B designating the axle of the tractor or any portion of the frame of the tractor. Disposed in planes on each side of the tractor but in front thereof are side members 10 of a conveyor belt supporting frame. The lower edges of these side members extend upward and rearward; the top edges extend horizontally forward, and the forward end of each member 10 extends vertically downward. These members may be connected to each other in any suitable manner and

the forward ends of the members 10 carry the beveled blade 11 which has outward and laterally inclined ends, so that the blade flares to a width greater than the width between the frame members 10. Disposed between said members 10 are two conveyor belts 12 extending parallel to each other but slightly separated at 13. Each of these conveyor belts is made of canvas which carries the transverse slats which may be made of wood or any other suitable material. The lower end of the conveyor belt is carried by a drum 15 mounted upon a shaft 16. This drum is disposed immediately behind and slightly below the blade 11, this blade being hollow to receive the drum and shaft. At its rear end, each elevator conveyor 12 is mounted upon sprocket wheels 17 or equivalent elements carried by a shaft 18, which extends entirely across both conveyor belts 12. This shaft 18 at its middle carries thereon a beveled gear wheel 19 which is driven by a beveled gear 20 on a shaft formed of two sections 21 and 22 having telescopic engagement with each other. This shaft extends downward and carries a beveled gear wheel 23 in turn engaged by a beveled gear wheel 24 carried by a shaft 25, this shaft being operatively connected in any suitable manner to a driven shaft of the tractor A or connected to a power take-off on said tractor. The superstructure which carries the elevator conveyor belts and the side walls 10 is supported by a plurality of radial braces 26 and 27 converging to a central point, as for instance, the rear axle housing of the tractor, and being mounted for rotation around this central point, thus enabling the forward end of the conveyor to rise and fall.

The shaft 16 and the shaft 18 may be mounted in the side members 10 to thus permit the frame and the conveyor with it to rise and fall or move vertically around the center with which the converging ends of the braces 26 engage. The side frame members 10 are supported by a wheel or wheels 28 mounted for rotation in a horizontal plane and having connections 29 extending rearward to the driver's station on the tractor whereby these wheels 28 may be turned to thus steer the forward end of the elevator.

Mounted in the side members 10, which side members carry bearings for the support of the shafts 16 and 18, are three shafts 30, 31 and 32. The shaft 30 is disposed slightly rearward of the forward edge of the blade 11; the shaft 31 is disposed immediately above the shaft 30, while the shaft 32 is disposed on a horizontal line with the shaft 31 but rearward thereof. These several shafts carry an endless belt or like element. This element as illustrated consists of lateral chains 33 and transverse blades 34 projecting from its surface and extending at an inclination to the plane of flight and in the direction of movement of the endless element 33. It will be noted that

the lower flight of the endless element 33 extends upward and rearward at an acute angle to the inclined plane of the elevator conveyors 12, so that at the forward end, the endless element 33 is disposed relatively close to the blade 11, but at the rear end of the rearwardly and upwardly extending flight, the endless element is disposed at a distance from the conveyor belts 12.

The purpose of this endless element is to integrate the snow in advance of the blade 11, break up or pulverize this snow and act as an auxiliary to the conveyor 12, starting the snow up this conveyor and gradually lessening its engagement with the snow, thus preventing any clogging of the conveyor 12, enabling the machine to move forward easily. Preferably this pulverizing element 33 is made up of chains 33 carrying steel blades 34, pulverizing the snow on the downward movement of the element 33 and acting as slats on the diagonal upward movement of the element. Inasmuch as the vertical flight of the pulverizer is of a considerable height, it will operate against the face of a cut made in deep snow or against the face of the cut being made in shallow snow.

While I do not wish to be limited to this, I have illustrated the shaft 30 of the pulverizer 33 as being driven from the shaft 16 by means of the beveled gear wheel 35 mounted on the shaft 16 which drives an upwardly and forwardly extending shaft 36 which in turn drives a beveled gear wheel 37 mounted upon the shaft 30. The shaft 16 may carry two beveled gear wheels 35, one on each side, and the shaft 30 may have two beveled gear wheels 37, one on each side, so that the shaft 30 may be driven at both ends from the shaft 16.

The snow is carried up the upwardly inclined conveyor or conveyors 12 and is discharged at the upper ends of these conveyors onto a cross conveyor designated generally 38, whereby the snow may be discharged at the sides of a road or into carts. This cross conveyor is designed to be driven by the shaft 18 and is mounted upon the frame of the machine so that it may be shifted in one direction or the other to discharge the snow either to the right or to the left. To this end, the cross conveyor 38, which may be made of canvas in the form of an endless slatted belt, is supported at its ends upon the shafts 39 and 40, each of which carries a beveled gear wheel designated respectively 41 and 42. When the cross conveyor is shifted to the right in Figure 2, the beveled gear 41 is in engagement with a beveled gear 43 mounted upon one end of the shaft 18. When the cross conveyor is shifted to the left in Figure 2, the beveled gear wheel 42 comes into engagement with the beveled gear wheel 44 mounted upon the opposite end of the shaft 18. Any suitable means may be provided for supporting this cross conveyor and for lateral movement.

The side walls 10 of the conveyor frame are also formed at their forward ends with outwardly and forwardly inclined blades 45 so that the "cut" through the snow will be wider than the distance between these side frames 10.

For the purpose of supporting the cross conveyor 38, I extend the rearmost braces 26 outward, as at 27, and mount upon these braces 27 the tracks 46 which support the side frames 47 of the cross conveyor so that this cross conveyor may be shifted in one direction or the other upon these tracks.

In Figure 5, I have illustrated a slight modification of the structure shown in the other figures with regard to the cross conveyor. It may be de-

sirable to dispose the cross conveyor below the upper end of the main conveyor and under these circumstances, the frame 47 of the cross conveyor supports a bracket 48 which in turn supports a vertical shaft 49 carrying the upper and lower beveled gear wheels 50 and 51. The beveled gear wheel 51 engages with the beveled gear wheel 42 which drives the cross conveyor while the beveled gear wheel 50 engages with the beveled gear wheel 44 on shaft 18. It is to be understood that there is a bracket 48 with the beveled gear wheels 50 and 51 at each end of the frame 47 so that this conveyor frame 47 may be slid longitudinally, as before described, from one discharging position to the other and in either of these positions will have driving engagement with the beveled gear wheels 43 or 44 as the case may be. This construction permits the cross conveyor 38 to be disposed on any desired level below the discharge end of the main conveyor 12.

While I have illustrated a particular construction for supporting the cross conveyor and shown as mounted upon tracks, it will be obvious that it might be supported in other ways without departing from the spirit of the invention.

It will be seen that I have provided a snow remover adapted to be mounted upon and propelled by a tractor which is so designed that it will cut into the snow, lift it and carry it upward and rearward of the tractor and deposit it upon a cross conveyor. It will be seen also that by reason of the supporting frame for the upwardly and rearwardly extending conveyor being pivoted upon the rear end of the tractor, the forward end of this supporting frame may rise and fall to correspond to the changes in contour of the road.

It will be further seen that I have provided means whereby the snow may be disintegrated before engagement with the elevator conveyor and means whereby this snow may be started up the conveyor, thus preventing any chance of the snow clogging. This is particularly valuable where the snow has become hard packed, the chains of the endless element 33 with the blades thereon cutting this packed snow and breaking it up so that it may be carried upward. By mounting the cross conveyor so that it may be shifted from one side to the other, it is possible to deliver snow to either side of the machine and by the driving connection which I have shown between this cross conveyor and the driving shaft of the elevator conveyor 12, the cross conveyor will be driven in opposite directions depending upon to which side it is shifted. The elevator 12 is preferably eight feet in width.

The machine is capable of not only removing the snow from the middle of country roads or streets, but of also loading the snow into trucks, if desired.

While the snow remover frame and the main elevator extends downward in front of the operator, yet the operator may readily get a view of the forward end of the snow remover by mirrors one at each side working on the order of a periscope. As this particular construction of these mirrors is no part of my present invention, they have not been illustrated.

What is claimed is:—

1. A snow remover, including a motor propelled vehicle, an upwardly and rearwardly inclined elevator conveyor mounted upon the vehicle to extend upward and over the vehicle, a pulverizer comprising an endless element arranged to provide a vertical downwardly directed flight immediately in advance of the lower end of the elevator

conveyor and an upwardly and rearwardly directed flight extending upward and rearward directly from the vertical flight at an acute angle thereto and at an acute divergent angle to the plane of the elevator conveyor, the endless element carrying outwardly projecting members, and means driven from the motor vehicle for driving the elevator conveyor and the endless element.

2. A snow remover, including a motor vehicle having a rear axle housing, a supporting frame including side members, braces connected to the side members and extending all to the rear axle housing and rotative therearound, an endless upwardly and rearwardly extending elevator conveyor mounted between said side members, a sharp-edged blade carried by the side members forward of the forward end of the elevator conveyor, a pulverizer disposed between the side members and including an endless element having projections, means carried by the side members for supporting the endless element, the endless element having a vertical flight disposed immediately above the blade, a lower flight extending upward and rearward at an acute divergent angle to the elevator conveyor, a cross conveyor mounted upon the rear end of the motor vehicle and upon which the elevator conveyor discharges, and means for driving the elevator conveyor, the pulverizer and cross conveyor from the motor vehicle.

3. A snow remover, including a motor propelled vehicle, an upwardly and rearwardly inclined elevator conveyor, a supporting frame therefor mounted upon the vehicle for tilting movement in a vertical plane, a pulverizer mounted upon the supporting frame above the forward end of the elevator conveyor and including an endless element having projections, the endless element providing a vertical flight and then extending upward and rearward at an acute angle to the plane of the elevator conveyor, a blade mounted upon the supporting frame in advance of the forward end of the elevator conveyor, a cross conveyor mounted upon the supporting frame rearward and below the upper end of the elevator conveyor and upon which the elevator conveyor discharges, said cross conveyor being mounted for shifting movement transversely of the elevator conveyor, means for driving the elevator conveyor, the pulverizer and the cross conveyor from the motor vehicle, and means for causing a reverse movement to be given to the cross conveyor when it is shifted to either of its operative positions.

4. A snow remover, including a motor propelled vehicle, an upwardly and rearwardly inclined elevator conveyor, a supporting frame therefor mounted upon the vehicle for tilting movement in a vertical plane, a pulverizer mounted upon the supporting frame above the forward end of the elevator conveyor and including an endless element having projections, the endless element providing a vertical flight and then extending upward and rearward at an acute angle to the plane of the elevator conveyor, a blade mounted upon the supporting frame in advance of the forward end of the elevator conveyor, a cross conveyor mounted upon the supporting frame rearward and below the upper end of the elevator conveyor and upon which the elevator conveyor discharges, said cross conveyor being mounted for shifting movement transversely of the elevator conveyor, means for driving the elevator conveyor, the pulverizer and the cross conveyor from the motor vehicle, and means for causing a reverse movement to be given to the

cross conveyor when it is shifted to either of its operative positions, including a shaft supporting the upper end of the elevator conveyor and driven from the motor vehicle, beveled gear wheels mounted upon the opposite ends of said shaft, a supporting frame for the cross conveyor, and shafts at the opposite ends of said frame over which the cross conveyor is trained, each of said shafts having an operative driving engagement with the corresponding beveled gear wheel on the first named shaft when the cross conveyor is shifted to either one of its positions.

5. A snow remover, including a motor propelled vehicle, a supporting frame disposed above the vehicle and at its rear end supported on the motor vehicle for tilting movement in a vertical plane, transversely extending shafts carried by said frame, an endless elevator conveyor carried by said shafts and extending upward and rearward, the shaft supporting the upper end of the elevator conveyor constituting a driving shaft therefor and carrying at its middle a beveled gear wheel, the elevator conveyor being formed in two sections separated from each other along a middle line to accommodate the intermediately disposed beveled wheel, a shaft driven from the motor vehicle and engaging said beveled gear wheel on the first named shaft, the first named shaft having at each end a beveled gear wheel, a cross conveyor mounted upon said frame and upon which the elevator conveyor discharges, the cross conveyor being mounted for shifting movement to discharge either to the right or to the left of the elevator conveyor and including a supporting frame having shafts at its opposite ends over which the cross conveyor operates, said shafts each having a beveled gear wheel operatively engageable with one or the other of the beveled gear wheels on the driving shaft for the elevator conveyor, a blade carried by said frame and disposed in advance of the lower end of the elevator conveyor but having a portion extending above said lower end, the blade being wider than said supporting frame, a pulverizer mounted between the side members of the supporting frame, supporting shafts for the pulverizer, the pulverizer including endless elements trained over said supporting members, the endless elements having projecting blades, the endless element being trained to provide a vertical flight disposed above the blade and extending downward into relatively close proximity to the forward end of the elevator conveyor, then extending upward and rearward at an acute angle to the elevator conveyor, and means for driving the pulverizer from the motor vehicle.

6. A snow remover, including a motor propelled vehicle, an upwardly and rearwardly inclined elevator conveyor mounted upon the vehicle to extend upward over the vehicle, a blade supported in front of the forward end of the elevator conveyor, a pulverizer mounted above said blade and arranged to provide a vertical flight and a flight inclined at an acute angle to the plane of the elevator conveyor, a cross conveyor upon which the elevator conveyor discharges, means for supporting the elevator conveyor, pulverizer and the cross conveyor upon the motor vehicle for rocking movement in a vertical plane, means driven from the motor vehicle for driving the elevator conveyor, the pulverizer and the cross conveyor, and a steering wheel supporting the forward end of the elevator conveyor.