

Jan. 3, 1928.

1,654,685

F. GETTELMAN

SNOW REMOVING APPARATUS

Filed Aug. 13, 1924

4 Sheets-Sheet 1

Fig. 1.

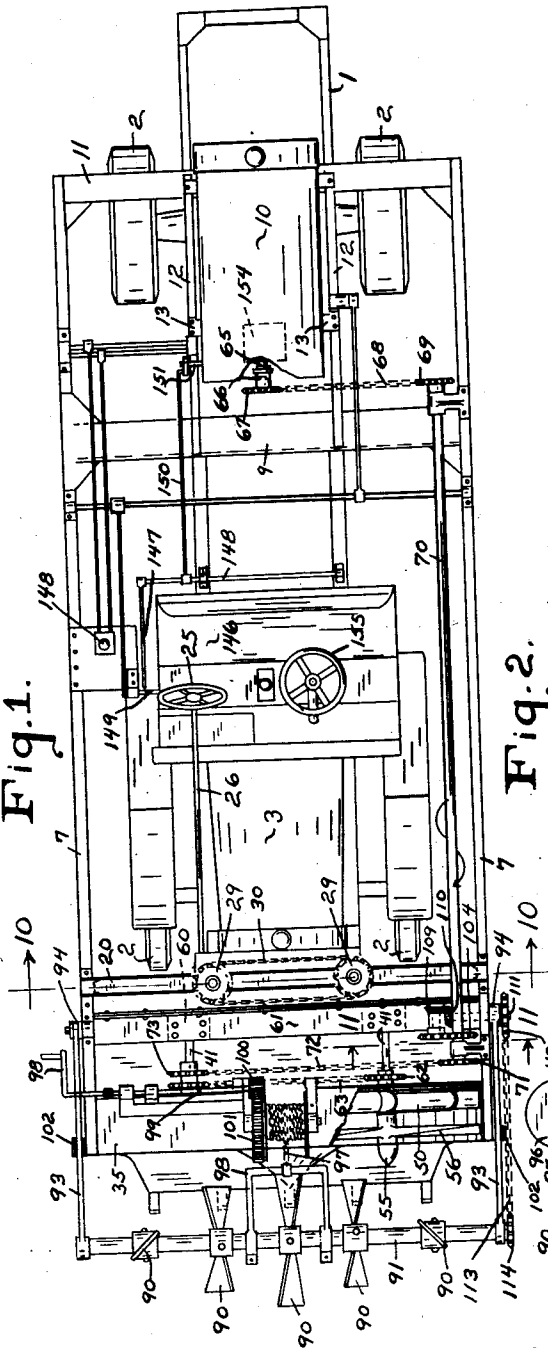
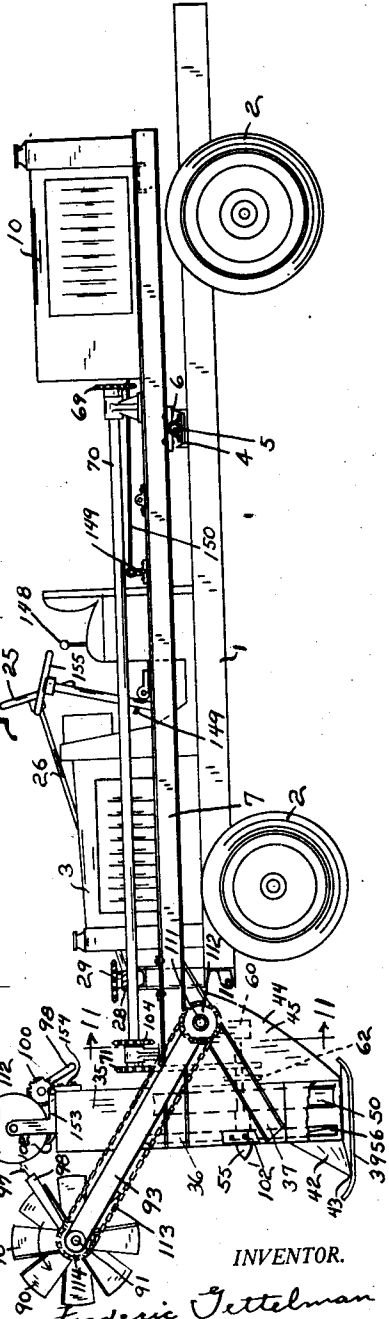


Fig. 2.



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FIG. 3

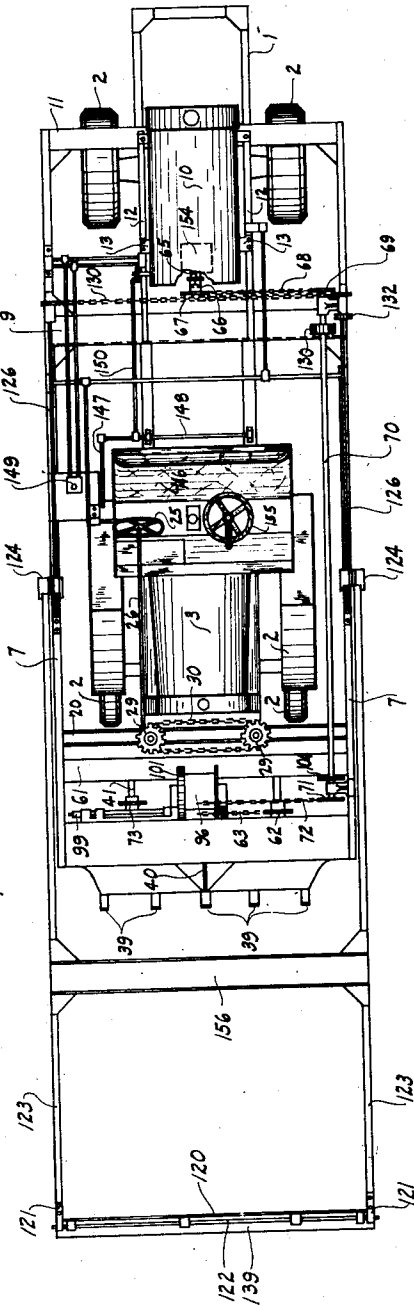


FIG. 4

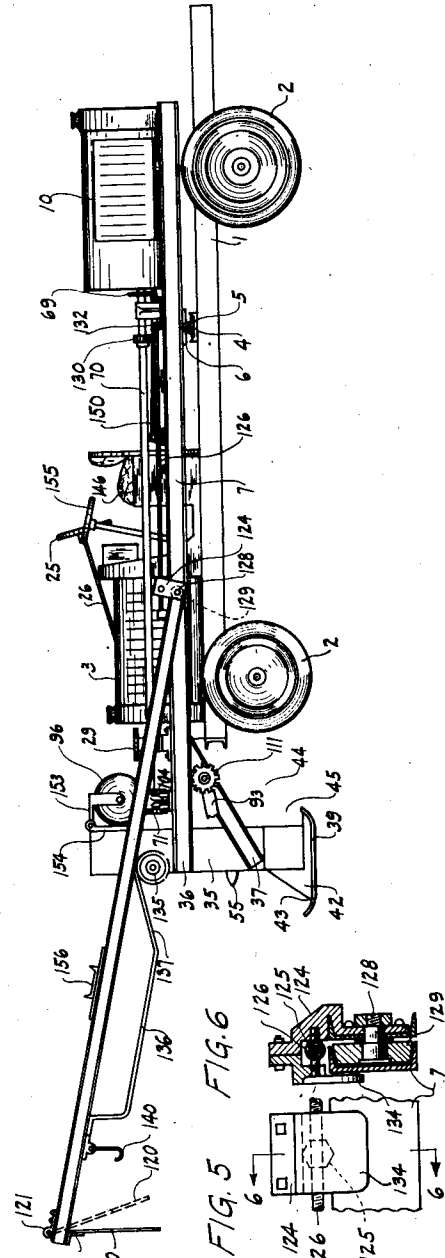


FIG. 5

FIG. 6

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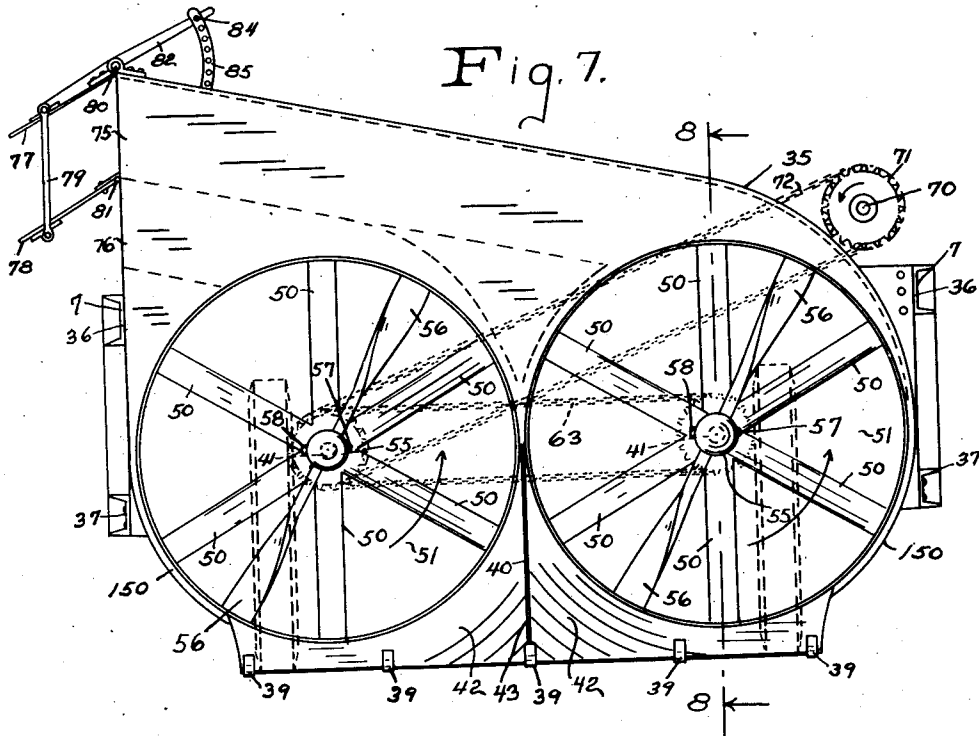


Fig. 8.

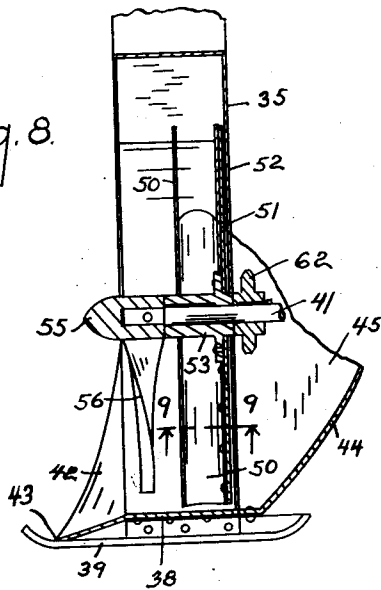
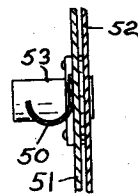


Fig. 9.



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Fig. 10

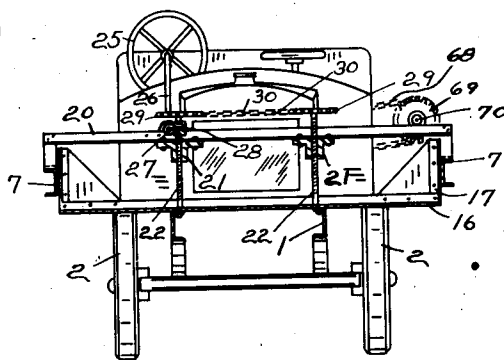


Fig. 11.

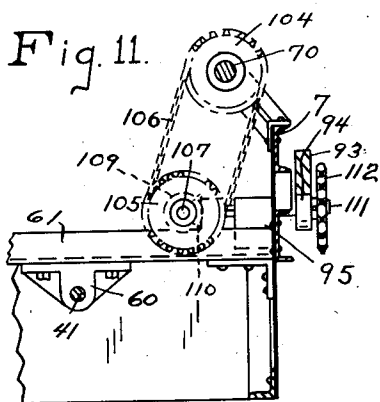


Fig. 12.

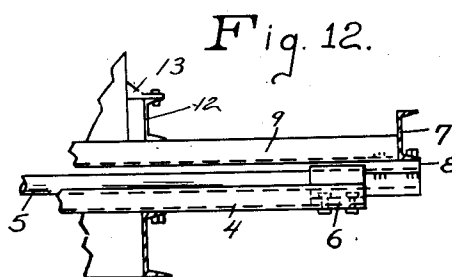


Fig. 13.

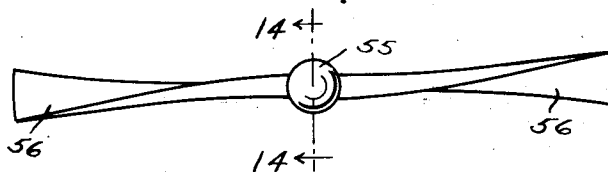
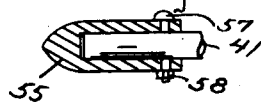


Fig. 14.



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SNOW-REMOVING APPARATUS.

Application filed August 13, 1924. Serial No. 731,727.

My invention relates to improvements in snow removing apparatus, with particular reference to motor driven apparatus for lifting and delivering the snow laterally from a roadway.

The objects of my invention are to provide an improved duplex rotary plow; to provide a duplex rotary plow which will break up ice masses, and throw the fragments with the snow through suitable laterally extending chutes; to provide means for adjustably supporting the plow from an ordinary motor truck; to provide improved means for operating such a plow independently of the truck motor; to provide an auxiliary ice breaker operative in advance of the rotary plow; to provide means for first removing the top portion of a snow bank which is too deep for an effective operation of the plow; to provide an improved system of control and adjusting mechanism; and to provide a form of construction which will remove snow from a roadway expeditiously and with minimum expenditure of power in proportion to volume and weight of the snow and ice removed.

In the drawings:

Figure 1 is a plan view of a motor driven truck equipped with apparatus embodying my invention.

Figure 2 is a side elevation of the same with the auxiliary ice breaker in a raised position.

Figure 3 is a plan view, showing the rake for removing snow from the top of a drift, when extended in a position for use and with the auxiliary ice breaker and other non-related parts omitted.

Figure 4 is a side elevation of the parts as shown in Figure 3.

Figure 5 is a detail side view of the connection between the rake and the plow frame.

Figure 6 is a sectional view on line 6—6 of Figure 5.

Figure 7 is a front elevation of the rotary plow.

Figure 8 is a sectional view on line 8—8 of Figure 7.

Figure 9 is a sectional view on line 9—9 of Figure 8.

Figure 10 is a sectional view on line 10—10 of Figure 1.

Figure 11 is a sectional view on line 11—11 of Figure 1.

Figure 12 is a fragmentary view of the

main hinge connection between the plow frame and the main frame, together with associated parts.

Figure 13 is a detail view of one of the main ice breaker blades.

Figure 14 is a detail view of the detachable connection between the hub of the main ice breaker and one of the shafts of the rotary plow.

Like parts are identified by the same reference characters throughout the several views.

An ordinary motor driven truck, with main frame 1, wheels 2, and motor 3 may be utilized to transport and support my improved apparatus in operative position. A channel-shaped cross bar 4 (Figures 2 and 3) has a pivot shaft 5 journaled therein at 6 and the side bars 7 of the plow frame are clamped to the pivot shaft 5 at 8. A cross bar 9 connects the side bars of the plow frame above or closely adjacent to the pivot shaft 5 to prevent the plow frame from spreading. An auxiliary plow operating motor 10 is supported from the bar 9 and the rear cross bars 11 of the plow frame by the engine supporting frame bars 12 and brackets 13.

At or near the front end of the main frame, a cross bar 16 is provided which projects laterally therefrom and is provided with upstanding guide brackets 17 (Figure 10) along the outer surfaces of which the side bars 7 of the plow frame may move in a vertical plane. The bars 7 are connected with each other at this point by a cross bar 20 which carries blocks 21 with which a set of adjusting screws 22 have threaded connection, whereby the front end of the plow frame may be raised or lowered, the frame swinging upon the pivot shaft 5. The plow motor 10 serves as a counter-balance for the plow, and therefore this adjustment may be manually made through the hand wheel 25, shaft 26, worm 27 and worm wheel 28, the latter being secured to one of the screws 22 and the two screws 22 having sprocket wheels 29 connected by a chain 30.

The plow casing 35 is supported from the side bars 7 of the plow supporting frame at 36, and also by the obliquely disposed brace bars 37 which connect the bars 7 with lower portions of the casing. Below these braces 37 the casing wall curves inwardly and downwardly to a bottom plate 38 having a series of runners 39 with ends upturned, as is

usual with sled runners. The casing has a central partition wall 40 extending upwardly from the runner bar to about the level of a set of rotary plow supporting shafts 41 and casing wing walls 42 slope downwardly, laterally and forwardly from the front margin of this partition to form a double plow point 43 near the front end of the central runner as best shown in Figures 7 and 8. The bottom 38 of the casing slopes forwardly and downwardly from the cylindrical side walls to the runners between the lower front corners of the wing walls 42. A rear reinforcing wall 44 curves backwardly and upwardly to the side bars 7 of the plow frame and with side walls 45 forms a supporting shoe to ride upon the snow when backing and to protect the machinery from snow.

The plow comprises sets of scoop-shaped radial arms 50, one margin of each such arm being secured to a supporting disk 51 adjacent to the vertical rear wall 52 of the casing. The arms 50 and disk 51 of each rotary member of the plow are secured to a sleeve 53, keyed to the associated plow shaft 41, and the latter has a reduced end which receives a detachable hub 55, having ice breaking arms or blades 56 which may be detachably secured to the shaft by a bolt 57 and nut 58.

The sleeves 53 are journaled in the rear casing wall 52 and the shafts 41 in bearings 60 carried by a frame cross bar 61. The shafts 41 are each provided with a sprocket wheel 62 and these sprocket wheels are connected by a chain 63. Power is transmitted to one of the shafts 41 from the auxiliary or plow operating motor 10 through the driven shaft 65 of the motor transmission mechanism, clutch 66, sprocket wheel 67, chain 68, sprocket wheel 69, shaft 70, sprocket wheel 71, chain 72 and sprocket wheel 73, the latter being mounted on the right hand shaft 41 in the construction as illustrated in Figure 1.

The sprocket chain 63 connects the two shafts 41, whereby both rotary plows are driven in the same direction, the plow shown at the right in Figure 7 discharging the material,—snow, ice, etc.—through the chute 75 and the one at the left discharging through the shorter chute 76. The end of the chute 75 is provided with upper and lower baffle walls 77 and 78 connected by links 79 and hinged to the walls of the chute at 80 and 81 respectively. A lever 82 may be used to adjust these baffle walls to the desired inclination, the lever being then secured by a pin 84 to the segmental bracket 85.

If the snow is of considerable depth, or encrusted, an overhead rotary breaker having blades 90 is employed. These blades are pieces of twisted sheet steel and are operated to throw the snow rearwardly and

downwardly to the plows, their outer extremities being disposed transversely to their plane of rotation. The blades 90 have their inner ends disposed with their flat surfaces in the plane of rotation and mounted on a cross shaft 91 which is journaled to supporting arms 93 detachably pivoted at 94 to plow frame bearing brackets 95. The arms are elevated by a winding drum 96, cable 97 and yoke 98. The drum is supported above the plow casing and is actuated by a crank 98, crank shaft 99 and gear wheels 100 and 101, the latter being fast on the drum shaft. A dog 102 may be used to hold the drum from unwinding, but normally the breaker may be allowed to rest upon the snow and it may be lowered to a point where it may be utilized to break up ice upon the roadway preparatory to the action of the breaker arms 56.

Stops 102' limit the downward movement of the arms 93. The cross shaft 91 of the overhead rotary breaker is actuated from shaft 70 through sprocket wheels 104 and 105, chain 106, shaft 107, bevel gear wheels 109 and 110, shaft 111, sprocket wheel 112, chain 113 and sprocket wheel 114, the latter being fast on shaft 91.

In cases where the depth of the snow makes the operation of the breaker impractical in a raised position, or as an overhead rake, it may be lowered or removed, and an overhead rearwardly acting scraper employed. This scraper comprises a swinging blade 120 (Figure 4) hinged at 121 to a cross bar 122 of a frame having side bars 123, each secured to a bracket 124 pivoted to a traveling nut 125 carried by a screw 126 journaled to a side bar 7 of the plow frame (Figures 5 and 6). The bars 123 are pivoted to the brackets at 124 by pivot shafts 128 upon which are journaled rollers 129 which run between the upper and lower flanges of the channel shaped side bars 7 of the plow frame. Each bracket 124 has an arm 134 which projects downwardly on the inner side of the associated frame bar 7 to hold the roller 129 in the channel of such bar. The screws 126 are connected with each other by a sprocket chain 130. They may be driven from the shaft 70 through the gear wheel 131 and a gear wheel 132 on the adjacent screw shaft. Gear wheel 131 is splined on shaft 70 and may be moved into or out of mesh with the gear wheel 132 as occasion may require.

Each of the supporting frame arms or bars 123 is intermediately supported by a roller 135 which in turn is supported from the plow casing. A lifter bracket on the under side of each bar has a straight roller track 136 parallel to the bar and a relatively inclined track member 137 converging rearwardly from track 136 to the associated bar. In Figures 3 and 4 the scraper 120 is illustrated in the extended position which it

occupies when in use. By moving the truck forwardly and backwardly the scraper 120 swings upon its hinge connection during the forward movement and engages the snow during the backward movement of the truck, thereby drawing a portion of the snow from the top of the bank downwardly into the cleared portion of the roadway. The lower margin of the blade 120 swings freely to the rear during the forward movement of the truck if said blade is in contact with a bank of snow. But during the rearward movement of the truck, the blade is prevented by the cross bar 139 from swinging forwardly beyond a vertical position. The screws 126 will of course not be actuated while the scraper is being thus operated. But after the scraper has performed its functions in this regard, it may be moved to an inoperative position by actuating the screws 126 to retract the bars 123 until the scraper blade 120 is drawn backwardly to a point near the plow casing 35. The lifting bracket with its trackways 136 and 137 will then operate to lift the outer end of the frame bars 123 and support the scraper blade 120 at a point where it will not interfere with the operation of the plows.

Hooks 140 are provided on the arms or bars 123 whereby, when the blade 120 is not in use, it may not only be retracted as above explained but may be swung backwardly and upwardly and engaged by these hooks. The hooks may also be used in connection with any suitable tackle to connect the arms 123 with any heavy objects, such as the trunks of trees or stalled vehicles, whereby such objects may be lifted from the snow by the arms 123. When so used, the outer ends of the arms may be connected by the cable 97 and yoke 98 with the hoisting drum 96 so that the arms may be used as derrick arms. The drum 96 and its actuating crank shaft 99 are mounted upon a plate 153 hinged to a connecting bar 154, whereby the drum and associated crank shaft may be swung backwardly to the position in which it is shown in Figure 4 to allow the cross bar 156 to move over the plow casing when the arms 123 are retracted by the screws 126. It will of course be understood that in such case the rotary breaker rake 90 will have been lowered from the position in which it is shown in Figure 2 or removed by disengaging the arms 93 from the plow frame.

It will be observed in Figure 7 that the rotary plows cut a channel of considerably greater width than the distance between the wheels of the truck, the forward truck wheels being indicated by dotted lines in said Figure 7. The bottom 38 of the plow casing with its downwardly and forwardly inclined portion constitutes a shovel plow cooperating with the central plow point 43

to provide a trackway of slightly greater width than the distance between the truck wheels. The portions 150 of the sides of the plow casing converge downwardly and inwardly from the horizontal plane of the plow shafts to the shovel plow formed by the bottom 38 of the casing and reenforced by the runners 39. This curving portion 150 of the plow casing wall is concentric and closely adjacent to the circle traversed by the outer ends of the plow scoops 50. The braces 37 lie slightly beyond or lateral to the path cleared by the plow scoops, but these braces are sufficiently elevated to prevent them from encountering solid masses of snow which would materially impede the forward movement of the machine. By curving the walls 150 downwardly and inwardly to points underneath the central portions of the rotary members of the plow and to the ends of the shovel plow formed by the bottom 38 of the casing, it is obvious that the solid masses of snow and ice on the roadway which lie beyond the range of the plow scoops 50 will not impede the forward movement of the machine but may be left in position. This not only increases the efficiency of the machine, but by leaving these portions of snow and ice at the sides of the cleared trackway, less difficulty is encountered by falling masses of superposed snow such as would otherwise drop into the roadway behind the plow casing if a vertical cut were made through the drift from top to bottom.

The operation of the plow motor or engine may be controlled from the driver's seat 146 of the truck by means of levers 147, 148 and 149. Lever 147 controls the clutch through oscillatory shaft 148, arm 149, link 150 and clutch shifting crank shaft 151, whereby the shaft 70 and associated parts may be disconnected at will from the source of power.

Similarly, lever 148 is utilized to adjust the change speed and reversing gears in the transmission case 154 and the third lever 149 controls the engine throttle. The transmission mechanism and the throttle valve are of ordinary construction and therefore are not illustrated. The hand wheel 25 and also levers 147, 148 and 149 will preferably be operated by a person sitting at the side of the driver of the truck, the wheel 155 being the truck steering wheel.

From the foregoing description it will be understood that the plow frame may be lifted to allow a truck to be driven beneath it. The plow frame may then be lowered into position and the cross bars 4 and 9 thereof secured to the truck frame. The plows and runners may then be lifted by the screws 22, whereupon the truck will transport the plow to the place or road from which snow is to be removed. The front end of the frame will then be lowered until the runners 39

rest upon the roadway, whereupon the plow operator shifts lever 147 to adjust clutch 66 for power transmission to the plows, engine 10 having previously been set in operation.

- 5 The truck driver will then operate the truck and the plow operator will raise and lower the plows and regulate their speed in accordance with requirements. Adjustments of the ice breakers and also their removal
10 and replacement will of course be accomplished when the parts are at rest. The same is true as to the adjustment and use of the overhead scraper.

I claim:

- 15 1. The combination with a supporting frame adapted to be detachably connected with a truck, of a superposed set of rotary plow members, a second frame mounted for swinging movement relative to said supporting frame, and a scraper blade carried there-
20 by in a position to engage in the top of a snow bank to draw snow rearwardly during backward movements of the truck.

- 25 2. In a snow plow mechanism, the combination with a truck, of a frame, a rotary snow plow supported thereby, a set of forwardly extending arms in moving pivotal connection with the frame, and a depending scraper blade adapted to be moved over
30 a snow bank to engage an upper layer of snow and draw it rearwardly into a cleared portion of the roadway.

3. In a snow plow mechanism, the combination with a motor driven truck, of an auxiliary motor carried thereby, a shovel plow dependent for operation upon the movement of the truck, a rotary plow operatively connected with the auxiliary motor, a rear-
35 wardly acting scraper adapted to be pushed over a snow bank by the truck, and means connected with the auxiliary motor for adjusting the scraper into and out of position for use.

4. In a snow plow mechanism, the combination with a plow supporting frame, a rotary plow connected therewith, a truck adapted to be detachably connected with said frame, a rearwardly acting scraper operative
45 in front of the plow to draw snow from the top of a bank rearwardly during rearward movements of the truck, screw connections for adjusting said scraper forwardly and backwardly into and out of operative position, and an auxiliary motor on the plow
50 frame having releasable connections for operating the plow and adjusting said screws.

5. In a snow plow mechanism, the combination with a motor driven truck, of a plow frame adapted to be supported thereby and provided with channel shaped side bars having
60 outwardly projecting upper and lower flanges, an auxiliary frame having side bars provided at their rear ends with rollers engaged between said flanges, adjusting screws mounted on the plow frame and having trav-

eling nuts pivotally connected with the rear ends of the auxiliary frame side bars to adjust the latter forwardly and backwardly, means for supporting the auxiliary frame side bars at intermediate points, and a
70 scraper blade in hinged connection with the forward end of the auxiliary frame, said blade being adapted to swing rearwardly from a vertical position but being supported against forwardly swinging movements,
75 whereby the truck may be utilized to push the blade in a trailing position over a snow bank and then draw it rearwardly in engagement with a mass of snow.

6. In a snow plow mechanism, the combination with a motor driven truck, of a plow
80 frame adapted to be supported thereby, a rotary plow having a casing secured to the forward end of said frame, a set of rollers mounted at the sides of said casing, a set of
85 forwardly projecting arms supported by said rollers and having their rear ends pivotally and adjustably connected with the plow frame.

7. In a snow plow mechanism, the combination with a motor driven truck, of a plow
90 frame adapted to be supported thereby, a rotary plow having a casing secured to the forward end of said frame, a set of rollers mounted at the sides of said casing, a set of
95 forwardly projecting arms supported by said rollers and having their rear ends pivotally and adjustably connected with the plow frame, said forwardly projecting arms having depending brackets provided with
100 trackways adapted to travel upon said rollers to progressively elevate said bars when the latter are drawn rearwardly along the plow frame.

8. In a snow plow mechanism, the combination with a plow adapted to deliver snow
105 laterally, of a set of forwardly and upwardly projecting arms, a scraper blade depending from the forward end portions of said arms and adapted to fold rearwardly, and means
110 for releasably supporting said scraper blade in its rearwardly folded position when not in use, said blade being adapted to move snow rearwardly during rearward move-
115 ments of the plow, whereby banks of snow too deep for the plow may be reduced preparatory to the operation of the plow on the lower portions thereof.

9. The combination with a truck having a frame, of a plow frame pivotally mounted
120 upon the rear portion of said truck frame and extending forwardly of said truck, a plow carried by said plow frame in front of said truck, and a scraper blade carried by said plow frame forwardly of said plow.
125

10. The combination with a truck having a frame, of a plow frame pivotally mounted
upon the rear portion of said truck frame and extending forwardly of said truck, a plow carried by said plow frame in front of
130

said truck, and a scraper blade carried by said plow frame forwardly of said plow and adjustable vertically relative to said plow frame.

5 11. The combination with a truck having a frame, of a plow frame pivotally mounted upon the rear portion of said truck frame and extending forwardly of said truck, a plow carried by said plow frame in front of
10 said truck, a scraper blade carried by said plow frame forwardly of said truck and adjustable vertically relative to said plow frame, and means for adjusting said scraper blade vertically relative to said plow frame.

15 12. The combination with a truck, of a plow frame including a pair of side bars spaced apart to extend along the sides of a truck from the front to the rear thereof and having a pivot intermediate its ends provided with means for detachably connecting
20 said pivot to the rear portion of said truck, a rotary plow carried by said frame upon one side of said pivot and adapted to be positioned in front of said truck when said
25 frame is attached thereto, a motor connected

with said rotary plow for actuation thereof and carried by the frame upon the other side of said pivot, and vertically extending guides carried by said truck and each engaging one of the plow frame bars adjacent
30 said plow.

13. The combination with a truck, of a plow frame including a pair of side bars spaced apart to extend along the sides of a truck from the front to the rear thereof and
35 having a cross bar pivoted to said side bars intermediate the ends thereof and adapted to be detachably connected with the rear portion of said truck, a rotary plow carried by said frame upon one side of said pivot
40 and adapted to be positioned in front of said truck when said frame is attached thereto, a motor connected with said rotary plow for actuation thereof and carried by the frame
45 upon the other side of said pivot, and vertically extending guides carried by said truck and each engaging one of the plow frame bars adjacent said plow.

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