

H. S. FARQUHAR.
 DEVICE FOR REMOVING SNOW.
 APPLICATION FILED SEPT. 13, 1915.

1,266,930.

Patented May 21, 1918.
 4 SHEETS—SHEET 1.

FIG. I.

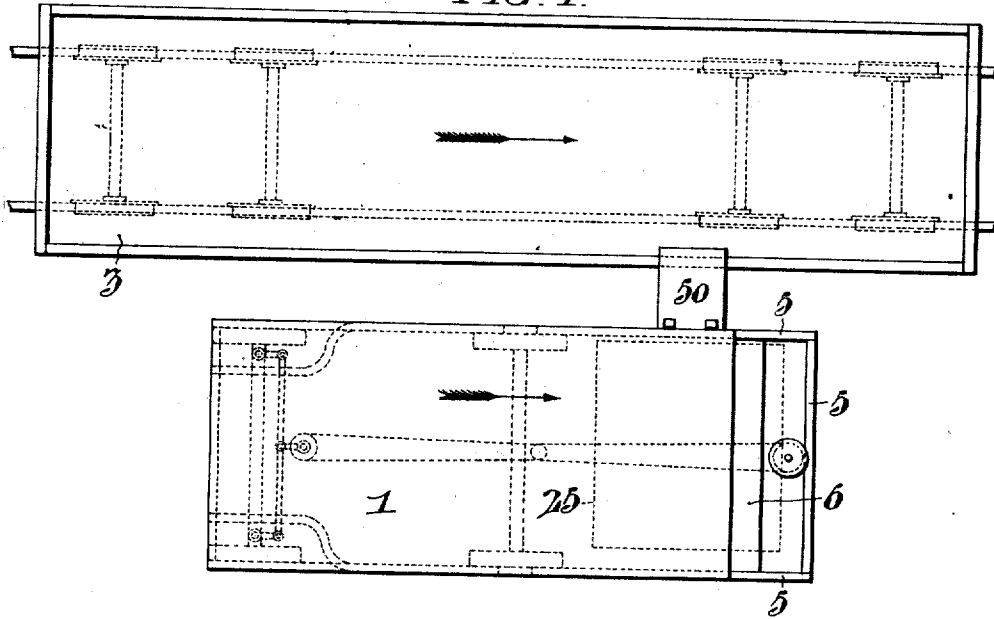
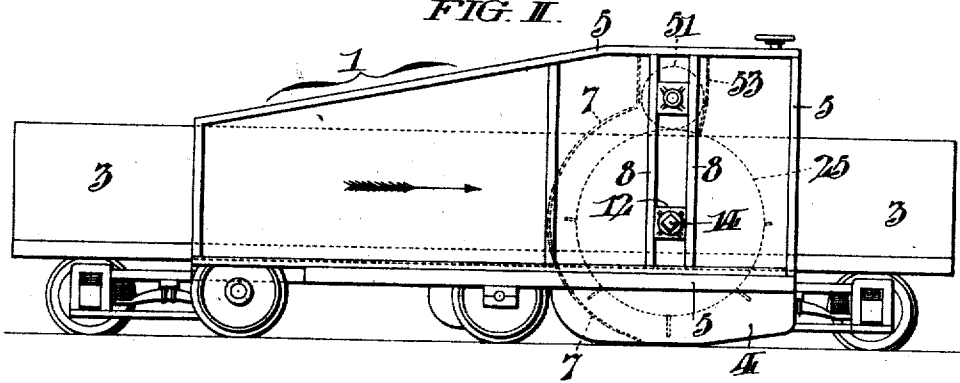


FIG. II.



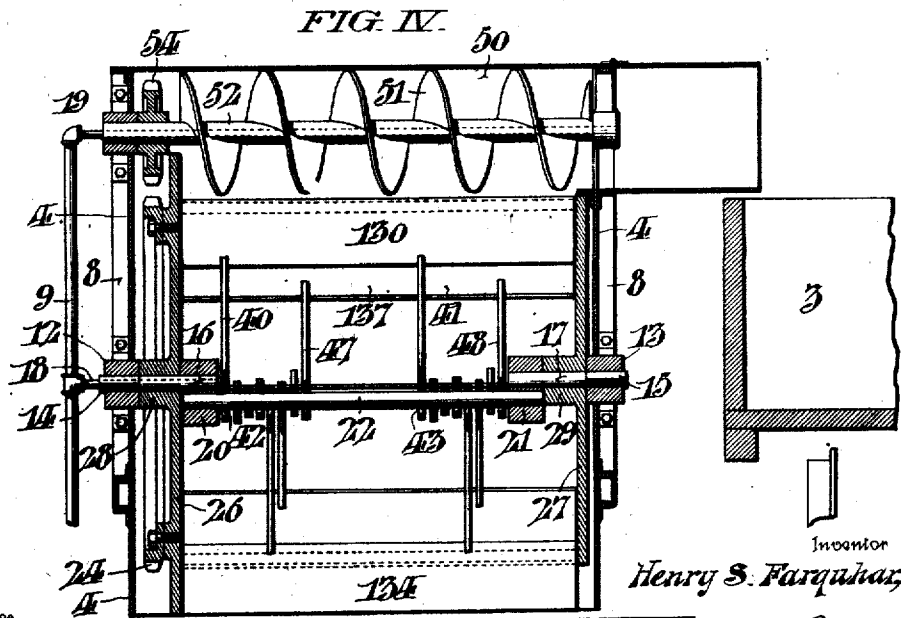
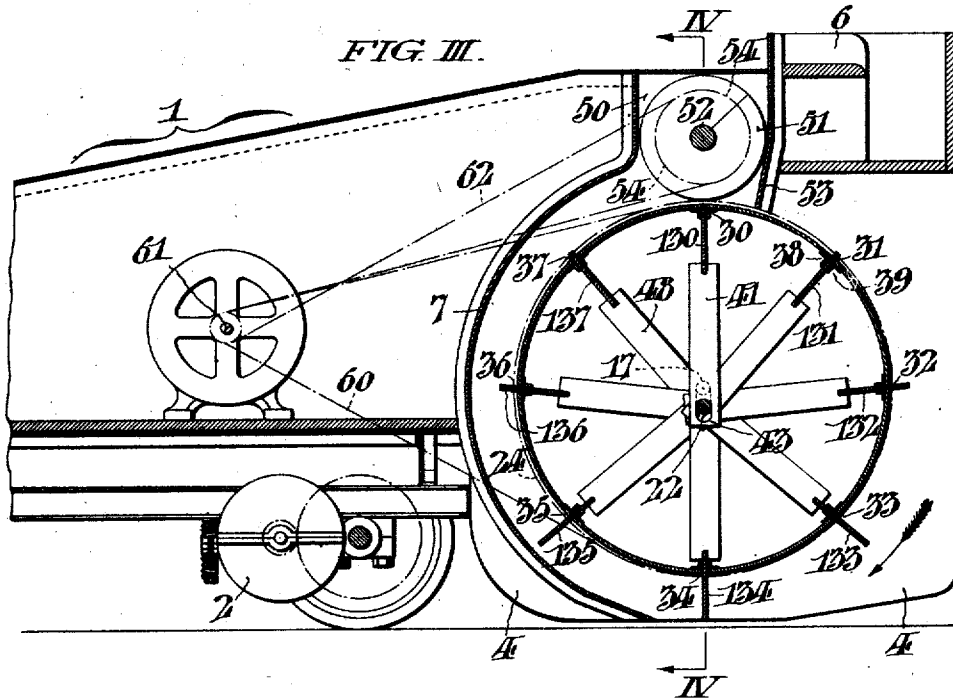
Witnesses
John C. Bergman
James H. Bell

Inventor
Henry S. Farquhar
 By *Wm. H. Paul*
 Attorneys

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Witnesses
 John C. Bergner
 James H. Bell

Inventor
 Henry S. Farquhar

By Fred W. Hall
 Attorneys

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FIG. V.

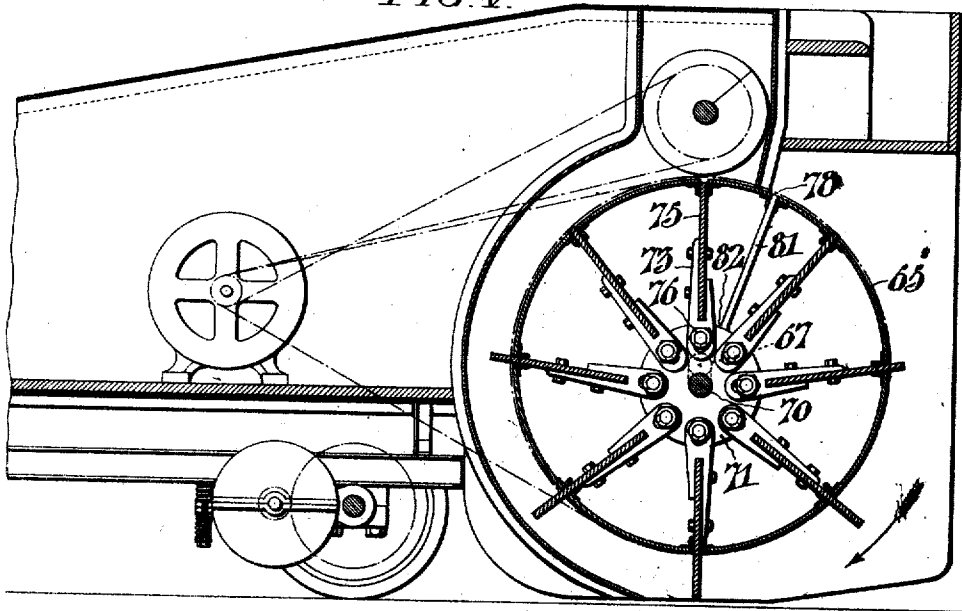
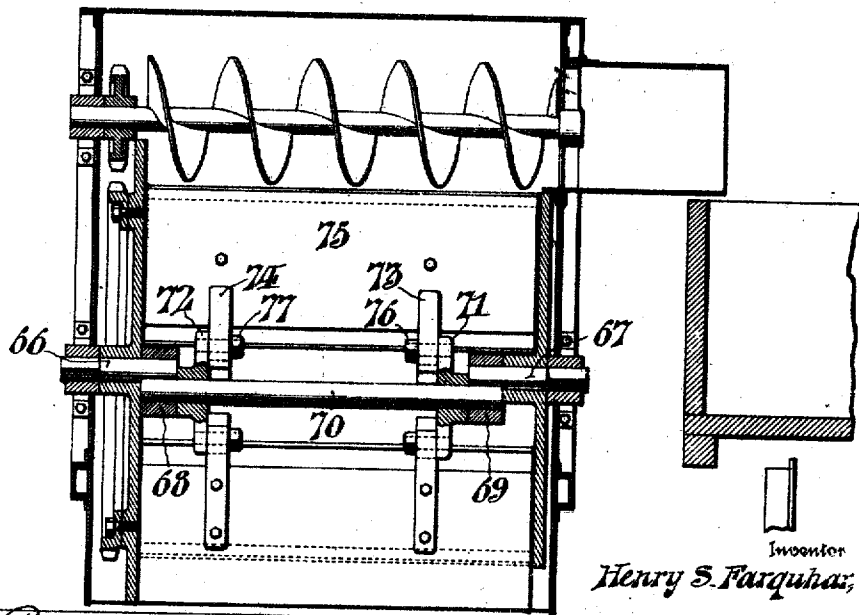


FIG. VI.



Witnesses
John C. Bergner
James H. Bell

Inventor
Henry S. Farquhar
W. Haly & Paul
 Attorneys

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FIG. VII.

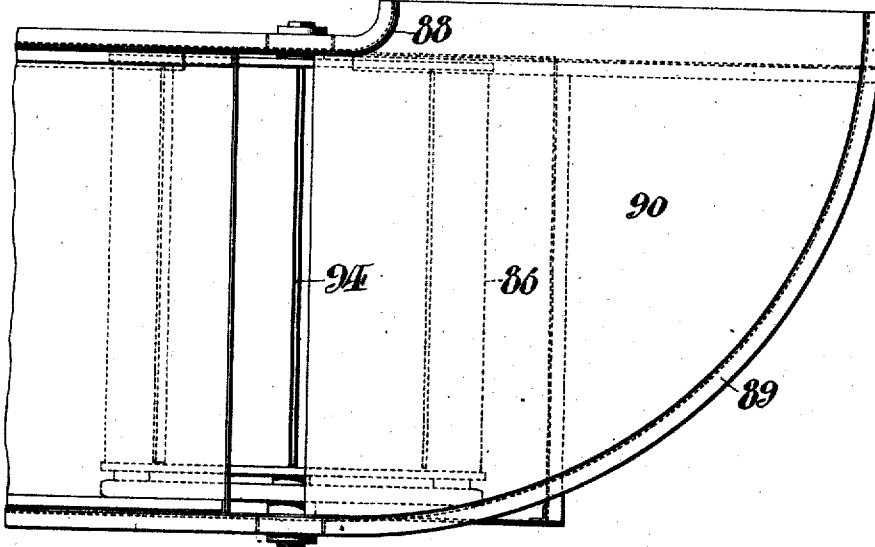


FIG. VIII.

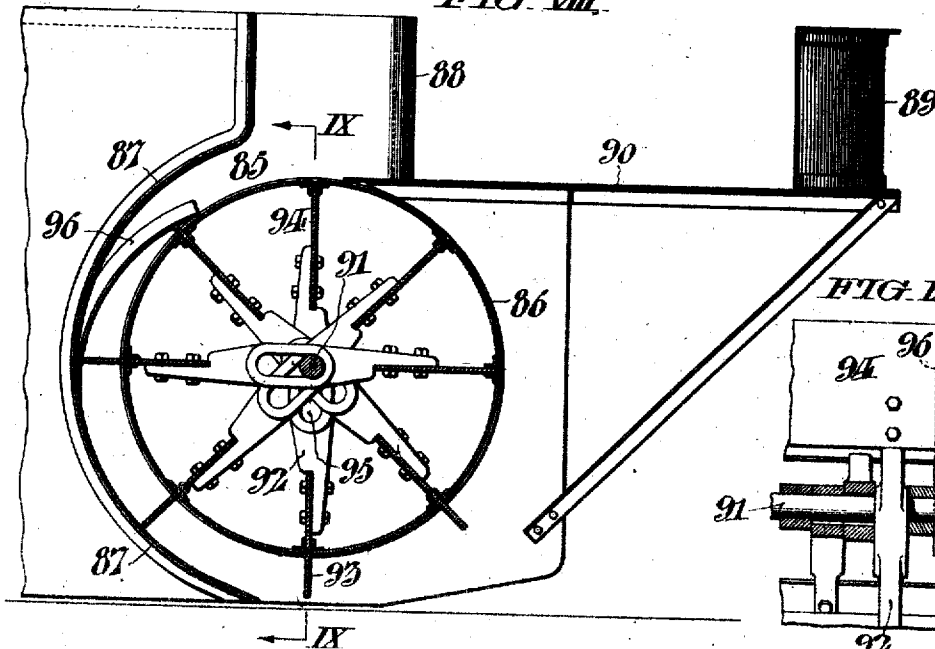


FIG. IX.

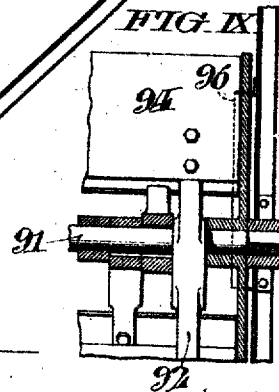
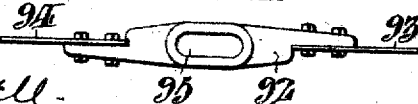


FIG. X.



Witnesses
 John C. Bergman
 James C. Bell.

Inventor
 Henry S. Farquhar,
 By Tracy & Paul,
 Attorneys

UNITED STATES PATENT OFFICE.

HENRY S. FARQUHAR, OF WAYNE, PENNSYLVANIA.

DEVICE FOR REMOVING SNOW.

1,266,930.

Specification of Letters Patent.

Patented May 21, 1918.

Application filed September 13, 1915. Serial No. 50,345.

To all whom it may concern:

Be it known that I, HENRY S. FARQUHAR, of Wayne, in the county of Delaware and State of Pennsylvania, have invented certain new and useful Improvements in Devices for Removing Snow, whereof the following is a specification, reference being had to the accompanying drawings.

In said drawings, I have illustrated the particular group of devices which forms the immediate subject of this application, in connection with other elements appropriate for an organized system or method (also of my invention), for removing snow from thoroughfares. While such general system is not claimed herein, I do not, by describing it, abandon my right thereto, but reserve it for a separate application.

Broadly speaking said system involves the use of a motor-driven, snow-collecting vehicle, provided with means for gathering the snow from the path in which it progresses, elevating it to a convenient height, transferring and delivering it preferably laterally, in conjunction with a plurality of transporting vehicles traveling side by side with the first mentioned one, at a rate somewhat in excess of the rate of travel thereof, and across the point of lateral discharge of the snow, so that each secondary or transporting vehicle may be progressively filled from end to end, after which it is run ahead and removed to a dumping point, its place being taken by another transporting vehicle. The present application relates specifically to the construction and mode of operation of the snow-collecting vehicle and its operative elements.

Referring to the accompanying drawings, Figure 1, illustrates diagrammatically, in plan view, the positions and relative arrangements of the snow-collecting vehicle and one of the transporting vehicles.

Fig. II, being a side elevation thereof, also diagrammatic in its character.

Fig. III, is a view, in vertical fore and aft section, through that portion of the snow-collecting vehicle which comprises the main working parts.

Fig. IV, is a vertical transverse section through such vehicle, also showing in section a portion of the adjacent transporting vehicle, the plane of section and direction of view being indicated by the lines and arrows IV, IV, in Fig. III.

Figs. V, and VI, are vertical fore and aft and transverse sectional views showing a modified type of the elevating devices.

Fig. VII, is a top or plan view indicating a modified arrangement of the transferring delivering means.

Fig. VIII, is a fore and aft sectional view indicating another modified type of elevating devices.

Figs. IX, and X, being, respectively, a partial section, and a side view of details of the type of device shown in Fig. VIII.

Referring now to the embodiment of the invention shown in Figs. I, II, III, and IV, a conventionally represented motor vehicle 1, driven by means, such as an electric motor, in the casing 2, is adapted to travel in parallel relation to a transporting vehicle, indicated at 3, and there conventionally represented as a box car, traveling upon a railway track.

The gathering, elevating and discharging devices of the vehicle 1, are mounted in an extension frame shown at 5, in Figs. I, and II, said frame being open at the bottom and lower portion of the front end, and carrying preferably a seat 6, for the driver of the vehicle in a convenient position to control the steering gear which is conventionally indicated in Fig. I.

The sides of the frame 5, are closed by substantially vertical plates 4, which form the sides of a snow gathering element, or scoop, whose bottom and back are formed by the approximately semi-cylindrical plate 7, shown in dotted lines in Fig. I, and in section in Fig. III. The lower edge of the scoop is arranged at a short distance above the street level.

Coöperating with this scoop are elevating and transferring devices mounted and constructed as follows:

Pairs of uprights 8, 8, applied upon the outside surfaces of the sides 4, 4, afford housings for blocks 12, and 13, rigidly mounted therein, said blocks respectively having squared horizontal holes to receive the correspondingly squared end portions 14, and 15, of stub bearings 16, and 17, extending for some distance inward.

The stub bearing 16, is preferably hollow, to form a duct connected with the branch pipe 18, of a conduit 9, and opening at the inner end of the stub bearing 16. Steam or hot air may be supplied to the conduit 9,

from any convenient source carried upon the vehicle 1.

Rotatively mounted upon the stub bearings 16, and 17, and immediately adjacent to the blocks 12, and 13, are two large metallic disks 26, and 27, respectively, which form the ends of a rotating drum having a cylindrical periphery 25. The radial extent of the drum thus formed is considerably less than the radius of the curved bottom and back portion 7, of the scoop, so as to leave an interspace, the periphery of the drum constituting, together with the back and sides of the scoop, an inclosed ascending channel. In the illustration here given the curvature of the drum's periphery is substantially concentric with the curvature of the bottom and back of the scoop, but, I do not limit myself to this embodiment. The periphery 25, of the drum is slotted at intervals in a direction parallel with its axis, the number of slots in this instance being eight and the locations thereof being indicated by the numerals 30, to 37, both inclusive. At the edges of the slots the metal is reinforced by angle irons such as those indicated at 38, and 39, in connection with the slot 31, and represented, but without numerals, at the other slots.

At the inner ends of the stub bearings 16, and 17, downwardly depending blocks 20, and 21, respectively, are rigidly attached thereto, said blocks being provided with horizontal openings to receive a rod 22, which extends parallel to the axis of the drum, but at a substantial distance therefrom.

Said rod 22, carries a number of snow-pushing elements, preferably scraper-blades, or "flights," rotatably mounted thereon and constructed and arranged as follows:

Within each of the slots 30, to 37, in the drum's periphery, is arranged an elongated metallic plate fitting freely within the slots, and co-extensive therewith in length, said plates, which constitute the flights, are indicated by the numerals 130 to 137 both inclusive, the respective numerals of the slots being thus raised by 100 to indicate the corresponding flights.

Said flights are mounted upon the outer extremities of arms, supported for free rotation upon the rod 22, and as all of the arms are similar, except in the position of the points of attachment to their respective flights, it will only be necessary to describe one pair thereof.

Thus, the flight 130, which is the uppermost one in Fig. III, is provided with the arms 40, and 41, which extend radially inward beyond the rod 22, elongated openings 42, and 43, being formed near the inner extremities of the arms to receive said rod freely, and also to permit a limited radial play with relation thereto, sufficient under

ordinary circumstances, to enable the flight by shifting radially inward, to clear any obstacle that it may encounter in operation, and which it is incapable of removing.

As will be seen in the sectional view in Fig. IV, the arms 40, and 41, are arranged unsymmetrically to the longitudinal dimensions of the flight 130. The arms 47, and 48, which support the flight 137, next in rear of the flight 130, are arranged at the same distance apart as the arms 40, and 41, but in staggered relation thereto, and the intervening pairs of arms (not indicated by numerals), are similarly staggered, as show in Fig. IV.

It will be noted that if the drum 25, be rotated upon the axis of the stub shafts 16, and 17, such rotation will compel the rotation of the flights 130, to 137, upon the axis afforded by the rod 22, but as this axis is eccentric to the axis of the drum, the circular paths described by the flights will be eccentric to the circle of the drum's periphery, and consequently said flights will be progressively protruded beyond the outer surface thereof, throughout one-half of a revolution and then progressively retracted throughout the remaining half.

Referring to Fig. III, it will be noted that the flight 130, which is there at its highest vertical point, is retracted to its innermost position, so that its edge is flush with, or slightly within, the outer edges of the slot 30; the flight 131, is slightly protruded outward, the flights 132, and 133, being progressively more and more protruded as they descend, until the lowest vertical position is reached, where the flight 134, is protruded radially to its full extent. The continued rotation from that point progressively retracts the flights, as indicated, until the position of the one shown at 130, is again reached.

The drum is positively driven by means of a sprocket wheel 24, mounted upon the exterior side of the disk 26, power being applied to said sprocket by means of a chain 60, driven from a motor-actuated shaft 61.

At the top of the device a conduit 50, is provided, communicating freely with the upper extremity of the ascending channel, between the scoop and the periphery 25, of the drum, but also having a surface, or wall 53, at what may be termed the far side of the region of communication, in close proximity to the periphery 25, of the drum. Said conduit is extended for some distance laterally beyond the side of the vehicle 1, and is provided in this instance with a screw conveyor 51, mounted upon the shaft 52, which is preferably hollow to admit a heated medium through the branch pipe 19, from the main 9. Said shaft 52, is driven by means of a sprocket wheel 54, and chain 62, actuated from the shaft 61. It will be noted that the radial extent of the disk 26, is of sufficient

extent to shield the sprocket wheels 24, and 54, from snow elevated into the trough 50.

The preferred mode of operation of the device in the embodiment just described is as follows:

Assuming that it is to be used upon a highway occupied in part by a railway track, the snow is first swept from said track to one side, by means such as the rotating snow sweepers employed upon street railways. Ordinarily also in the case of a city street, the snow thus piled to one side of the track, is augmented by that shoveled from pavements, so that a considerable body of snow is accumulated.

The vehicle 1, is driven alongside of the track at such a distance therefrom as will permit the end of the conduit 50, to overhang the side of the transporting car 3, which is run upon the track side by side with the vehicle 1, but at a slightly greater rate of speed.

As the vehicle 1, progresses, the lower edge 7, of the scoop engages with the snow, close to the level of the ground, and thus gathers it; the rotating flights positively push the snow into and up within the scoop, ultimately elevating it to the level of the conduit 50, where it is carried off laterally by the conveyer 51, and deposited along the transporting car until the latter is filled from end to end, whereupon said car is removed and replaced by another.

It will be noted that the flight 134, which is represented at the bottom of the drum at that point of its rotation, is protruded to its greatest extent, and therefore, engages the snow throughout practically the whole depth of the flight. Although the flights in their rotative ascent are retracted inwardly, they assist the elevation of the snow throughout a considerable portion of the ascending arc, but apart from this, the progressive accumulation of the snow in the scoop results in its being continuously elevated and delivered.

By the time each flight reaches the point of its juxtaposition with the screw conveyer, it has been retracted radially inward so as to completely clear the latter, as well as the far side 53, of the conduit 50.

The play afforded to the flight-supporting arms, by reason of their slotted engagement with the rod 22, permits the flights, during their rotation, to move radially inward, in case they encounter an obstacle.

Referring now to the modified type of elevating device shown in Figs. V, and VI, it is not necessary to describe the general organization and relation to the other parts, since they may be, and in this instance are, similar to that just set forth in detail. The variation in this instance resides wholly in the character and mounting of the flights.

The slotted drum, (in this instance indi-

cated by the numeral 65) rests upon the stationary stub bearings 66, and 67, whose inner extremities carry downwardly depending blocks 68, and 69, in which is rigidly mounted the rod 70, whose axis is parallel to that of the stub bearings 66, and 67, but at a substantial distance below the same. A pair of disks 71, 72, having hubs, as shown, are rotatively mounted thereon. The arms 73, and 74, of the flight 75, are mounted upon stubs 76, and 77, play in a radial direction, for clearing ordinary obstacles being afforded by elongating the apertures in the inner extremities of said arms through which the rod 70, passes. The flight 75, is riveted or otherwise secured to its arms.

As the arrangement of the remaining flights and their respective arms is similar to that just described, it is not deemed necessary to repeat it in connection with each thereof.

Between two of the slots provided for the respective flights 75, etc., openings such as that indicated at 78, are formed through the periphery of the drum, at points corresponding with the axial positions of the disks 71, and 72, and bars, such as 81, whose outer ends move freely in said openings, are attached to the disks 71, and 72, (as indicated at 82, in the case of the disk 71), so that said disks are positively rotated upon the axis afforded by the rod 70, and thus cause the flights to travel in proper relation to the rotary movement of the drum.

Since said rod 81, is free to move radially inward and outward in the slot 78, the rotation of the disks upon an axis eccentric to that of the drum is permitted, and said rod is itself retracted inwardly during the upper part of the arc of rotation so as to clear the screw-conveyer, and the far wall of the conduit.

Referring now to the modified type of device shown in Figs. VII, VIII, IX, and X, the features of difference relate both to the snow delivering devices and to the construction of the flights and their carriers. By reference to the upper portion of Fig. VII, it will be seen that no screw-conveyer is employed, but that the end 85, of the ascending passageway between the drum 86, and rear surface 87, of the scoop, communicates with a wide, open-top, deep trough, whose sides are represented at 88, and 89, and whose bottom is represented at 90. Said trough is represented as curved horizontally throughout a right angle, and its delivery end may be projected laterally to the desired extent. In this instance the arms of the flights are carried upon a rod 91, which is co-axial with the drum, the necessary radial movement for according protrusion and retraction of the flights being obtained in the following manner:

The arms of the flights, instead of being

only slightly in excess of the radius in length, are extended diametrically as indicated at Fig. X, where it will be noted that the arm 92, carries at its respective extremities the flights 93, and 94, secured against oppositely-facing, recessed extremities of the arm, the central region of the arm being provided with elongated slot 95, having rounded ends adapted to engage freely with the rod 91. The longitudinal extent of these slots corresponds to the proper range of protusion and retraction of the flights carried thereby.

Hence, when the drum 86, is rotated, the flights will be actuated in the manner hereinbefore described, their paths of movement, with relation to the path of movement of the periphery of the drum, being the equivalent of that attained in the case of the device previously described by eccentric mounting of their axis of rotation.

Ordinarily in this type of carrier device, gravity would be sufficient to effect the described radial movement of the flights, but to insure their retraction, I may provide a cam-piece or pieces, such as that shown at 96, curving inward eccentrically, to the periphery of the drum during the upper region of its arc of rotative ascent, so that the flights will be forced positively inward, as their outer edges move along said cam piece 96. The elevation of the snow is effected in the same manner as that previously described, but its lateral delivery is attained without the use of a screw-conveyer, by reason of the fact that the transferring conduit is of considerable depth and as the snow accumulates therein, it is pushed by the increments delivered from the elevating devices, so as to travel along the conduit.

The use of steam or other hot medium admitted to the interior of the drum and to the shaft of the conveyer, as above described, is not intended for the primary purpose of actually melting the whole body of snow but may be found useful if employed only to an extent sufficient to prevent clogging of the moving parts by freezing of water thereon.

Having thus described my invention, I desire to state that I do not claim broadly the use of a series of traveling pushing devices, either in themselves, or in conjunction with a scoop for the removal of snow. For instance, such devices have been suggested for use where the characteristic feature of operation is the compression of the snow into a bulk much smaller than that of its natural size.

While compression is not inconsistent

with the use of my present invention, my primary purpose is to pick up the snow in a loose condition, and, without the delay required for very substantial compression, to elevate and then transfer it away in a rapidly flowing stream of large volume to an adjacent point of delivery, preferably a laterally located transporting car, as above stated. For this purpose the vanishing of the flights as they approach the point where the transfer action commences, is a very important feature, and it will be noted from the above description that it may be accomplished in several ways, which are mutually equivalent.

It will also be obvious that the specific form of the elevating devices and of their mounting for traveling in a path which is the equivalent of eccentric rotation with relation to the rotary movement of the drum, may be greatly varied, as indicated by the several different instances which I have shown as typical. I therefore do not desire to restrict my claim in this direction by close adherence to the details of the mechanism for producing such eccentric travel.

I claim:

In a snow-remover, the combination, with a vehicle; of a projecting scoop having a curved back and substantially vertical sides, a rotatable drum having its periphery arranged to form, in conjunction with the back and sides of the scoop, an ascending inclosed channel, the periphery of the drum being provided with transverse slots; stub-bearings for said drum; a bearing rod mounted upon said stub-bearings at points within the drum, and extending axially across the drum in a direction parallel to, but substantially lower, than the axis of the stub-bearings; a plurality of pushing devices radially movable within the slots of the drum; carriers for said pushing devices, having elongated openings of a diameter sufficient to afford true rotative engagement with said bearing rod, while permitting play in a radial direction; a transferring conduit having an opening communicating with the upper extremity of the ascending channel, but having a wall, at the far side of said opening, arranged in close proximity to the periphery of the drum; and means for rotating said drum.

In testimony whereof, I have hereunto signed my name at Philadelphia, Pennsylvania, this eleventh day of September, 1915.

HENRY S. FARQUHAR.

Witnesses:

JAMES H. BELL,
E. L. FULLERTON.