The apparatus comprises a plurality of open-topped chambers disposed adjacent to each other and adapted to be filled with snow by means of a rotary snow blower. After each chamber is filled, a lid is slid over the open top thereof, following which a compression plate is moved forcefully toward one end of the chamber to compress the snow therein. Immediately after the snow is compressed, the wall at such one end of the chamber is elevated out of position, so that further movement of the compression plate ejects the compressed snow to a discharge chute and conveyor. Thereafter, such wall at the chamber end moves over the forward surface of the compression plate to scrape such surface free of snow. The lid moves back and forth between the adjacent chambers and is automatically scraped of snow in response to such movement. Such lid forms the bottom of a bin which holds excess snow delivered by the snow blower. The side walls of the bin are connected to the chamber side walls by means of knifelike gussets, the arrangement being such that the snow may not pack adjacent the edges of the lid. The invention further comprises the method of performing various one of the above-indicated operations.
APPARATUS AND METHOD FOR COMPACTING AND REMOVING SNOW

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to the field of apparatus and methods for removing snow from roads, parking lots, etc. Stated more definitely, the invention relates to apparatus for first compressing and then removing such snow, in order that the volume of the snow which must be transported to another area will be greatly lessened.

2. Description of Prior Art

The removal of snow from streets, roads, etc., is a great problem, particularly since snow is very voluminous. Accordingly, apparatus has previously been proposed for compacting the snow prior to removal. However, such apparatus has not been practical for various reasons, including the susceptibility of the apparatus to clogging, plugging, and therefore jamming. In addition, prior apparatus has been difficult to clean and has been subjected to excessive icing at critical points. Furthermore, and very importantly, the prior-art apparatus has not been such that the snow is efficiently compressed and then ejected in substantially one continuous operation, with minimum delay in the mechanism, and with complete automatic cleaning of the apparatus preparatory to each loading thereof.

The prior art includes the following United States patents: U.S. Pat. Nos. 852,833, 1,523,012, 1,561,472, 1,562,842, 1,708,428 and 3,149,428.

SUMMARY OF THE INVENTION

In accordance with the method and apparatus of the present invention, an open-topped chamber is defined and is filled with snow. The top is then closed by means of a lid, following which a compression element is pushed through the chamber toward one end thereof. When the snow pressure in the closed chamber becomes high, due to the action of the compression element, the wall at such one end is removed, so that further movement of the compression element ejects the compressed snow to a removal means. Further in accordance with the present method and apparatus, a plurality of such chambers are filled in alternation by a direction-controlled snow blower, in combination with a bin means, the result being a continuous operation such that the blower need never stop.

It is a very important feature of the present method and apparatus that the snow is prevented from jamming and clogging the mechanism, and that freezing is prevented from impeding the operation. Thus, for example, the above-indicated wall at such one end of the chamber moves vertically to the chamber axis, and operates as a scraper to clean the forward surface of the compression element. As another example, means are provided to clean the upper surface of the lid in response to movement thereof back and forth between two adjacent chambers. Sharpened gussets are provided to connect the chamber side walls to bin walls thereabove, in such manner that snow at the lid edges cannot jam the apparatus.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a top plan view of a snow compacting and removal apparatus embodying the present invention; FIG. 2 is a side elevation thereof; FIG. 3 is an enlarged transverse sectional view taken on line 3--3 of FIG. 2; FIG. 4 is an enlarged transverse fragmentary sectional view taken on line 4--4 of FIG. 1; FIG. 5 is a vertical sectional view on line 5--5 of FIG. 3; FIG. 6 is an isometric view of one of the sharpened gussets which supports the bin side walls in non-jamming manner; FIG. 7 is a fragmentary isometric view of the lower portion of one of the vertical elements which serves both as a gate and as a scraper blade; and FIG. 8 is a block diagram schematically representing the hydraulic system of the present apparatus.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

The present snow compacting and removal apparatus is mounted on any suitable vehicle, particularly a vehicle incorporating a rotary-type snow blower. The vehicle shown in FIGS. 1 and 2 has wheels 10 and a cab 11, and incorporates a double-auger or helical screw adapted to convey snow toward the center of the apparatus where it is received by the rotor or impeller 13 (FIG. 2) of the snow blower. Such rotor 13 throws the snow upwardly through a chute 14 having a downwardly curved upper end 15. The chute 14 is mounted for pivotal movement about a vertical axis, pivoting being effected by operation of a hydraulic cylinder 16 which is termed the "chute ram". Such chute ram 16 is mounted on the upper portion of the cab 11.

Suitably mounted on the frame of the vehicle is a generally rectangular housing 17 which incorporates various power and drive units, not shown, adapted to power the rotor 13 and other apparatus.

As best shown in FIGS. 4 and 5, there are mounted on the rear portion of housing 17, in spaced relationship from cab 11, a plurality of wall means to define open-topped compression chambers adapted to be filled with snow from chute 14. Such chambers are preferably elongated and extend longitudinally of the vehicle, as shown and described relative to the present apparatus, but it is to be understood that transversely oriented chambers may be employed if desired.

The illustrated wall means comprise six vertical walls 19--24 which are mounted in spaced, parallel relationship relative to each other (FIG. 4). A single horizontal bottom wall 26 is disposed beneath all of the walls 19--25 and serves to close the bottom of each of the compression chambers. Except when covered by lid means described below, the tops of the chambers are open. One end of each chamber is defined by a gate means, whereas the other end of each chamber is defined by a movable piston or compression plate. Preferably, but not necessarily, a wall 27 (FIG. 5) is provided over the front ends of the elements 19--24.

There are thus defined four open-topped chambers 28--31 adapted to receive snow. A dead chamber 32 is also defined, being disposed in the center of the apparatus beneath a combination scraping, snow-deflecting and hold-down means (element 35 described hereinafter.

In the presently described apparatus, chambers 28--29 operate as a pair, and chambers 30--31 operate as a pair. Thus, the open tops of chambers 28--29 are closed at one time during the cycle, whereas the open tops of chambers 30--31 are closed at a different time,
such closing being effected by means of a reciprocating lid or cover 34. Lid 34 is a horizontal rectangular plate which is sufficiently large to cover not only two adjacent chambers 28–29 or 30–31, but also the dead chamber 32 therebetween (FIG. 4). The lid slides back and forth on the upper edges of walls 19–24, beneath the above-indicated snow-deflecting, scraping and hold-down means 35.

The means 35 is an angle-sectioned element having an upper central vertex edge 36 and lower scraper edges 37 and 38 (FIG. 4), the latter edges 37 and 38 being only a sliding clearance away from the upper surface of lid 34. The means 35 is mounted in fixed relationship, as described below, which means that each reciprocation of lid 34 will cause snow on the upper surface thereof to be scraped by at least one of the edges 37 and 38. The resulting scraped snow drops into the open top of one of the chambers, it being noted that the walls of the element 35 are inclined at a sufficiently steep angle (FIG. 5) that the snow will slide down into whichever adjacent chamber is open.

DESCRIPTION OF THE BIN MEANS, AND OF THE LID-ACTUATING MEANS

Element 35 forms part of what may be referred to as a "bin means", such bin means catching and temporarily retaining any overflow snow which is not immediately thrown into one of the chambers 28–29 or 30–31 by the snow chute from blower rotor 13. The bin means further comprises the lid 34, as well as two upwardly extending side walls 39–40 and a corresponding rear wall 41. Walls 39–41 are sufficiently high to insure that, despite any wind conditions which may be present, discharging snow will not move away from the apparatus but instead will fall into the chambers 28–31, either immediately or after lateral shifting of the lid 34.

It is a feature of the invention that side walls 39 and 40 of the bin means are supported in spaced relationship above chamber walls 19 and 24, by means of a substantial number of vertical gussets 42 which are welded to the outer surface of walls 19–39 and 24–40. The gussets 42 are so mounted that the walls 39 and 40 are spaced above walls 19 and 24, respectively, by distances corresponding to the thickness of lid 34 (with sliding clearance therebetween). As best shown in FIG. 6, each gusset 42 is recessed at the center portion thereof to form a knife edge 43 which faces the interior of the apparatus, that is to say, faces an edge of lid 34.

During the reciprocation of the lid 34, the opposite edges thereof engage, respectively, the knife edges 43 on one side of the apparatus and the knife edges on the other side thereof. It follows that any snow or ice along the edges of the lid 34 will be cut by the edges 43, permitting the ice to break off and drop to the ground. In the latter regard, it is emphasized that the spaced relationship between walls 19–39 and between walls 24–40 (resulting in gaps such as the one indicated at 44 in FIG. 5) prevents any packing of snow or ice but instead permits the cut snow or ice to be ejected and drop to the ground.

When the lid 34 is in the position shown in FIG. 4, it is firmly held down not only by the element 35 but also by the lower edge of bin wall 40. After shifting of lid 34 to the opposite position, such lid is held down by element 35 and by the lower edge of bin wall 39. In addition to these hold-down elements, which prevent upward shifting of the lid despite building up of snow pressure in the chambers 28–29 and 30–31, the forward and rear edges of the lid 34 may ride between horizontal members 46 and 47 which are indicated in FIG. 5 and are suitably welded, respectively, to the walls 27 and 41.

The reciprocation of lid 34 is effected by means of first and second telescoping hydraulic cylinders or rams 48 and 49 (FIGS. 1 and 4). The cylinders 48 and 49 are pivotally connected to the element 35 in a large horizontal slot therein. The rod for one of the cylinders is pivoted to one edge of lid 34, and that for the other cylinder is pivoted to the other edge of such lid (the latter edge being on the opposite side of element 35 from the first-mentioned edge).

With the described arrangement, introduction of hydraulic fluid into one of the cylinders not only extends said cylinder to shift the plate in one direction but, concurrently, collapses the other cylinder. Introduction of fluid into the other cylinder effects the reverse operation, namely, extending such other cylinder and collapsing the previously extended cylinder to drain the former of fluid.

The element 35 is suitably mounted, in fixed relationship as above mentioned, for example by welding the rear end thereof to rear plate 41 of the bin means and by welding the forward end thereof to a suitable bracket which is mounted on the housing 17.

THE COMPRESSION PLATES AND RAMS

The snow in the enclosed chambers 28–29 or 30–31 is compressed, when the lid 34 is in chamber-closing position, by means of pistons which may be referred to as compression plates. Such compression plates are numbered 56, and one is disposed in each of the chambers 28–29 and 30–31. Each compression plate 56 is a sliding fit relative to the adjacent vertical walls of the chamber, and relative to the top wall (lid) 34 and bottom wall 26. To insure against cocking of each plate, vertical flanges 57 are provided thereon parallel to and adjacent the vertical side walls of the chamber. The rear edges of flanges 57 are shown at 58 in FIG. 5.

Each compression plate or piston is operated by a hydraulic ram comprising a cylinder 59 which is fixedly mounted on wall 27 and projects forwardly therefrom. The hydraulic ram further comprises a piston rod 61 which extends slidably through an opening in wall 27 and is pivotally connected at the rear end thereof to lugs 62 (FIG. 5) on the associated compression plate 56.

THE GATE AND SCRAPER MEANS

During the initial period of forward motion of each compression plate 56, the rear end of the associated chamber 28–29 or 30–31 is closed, so that a compressing action will be effected relative to the contained snow. Such closure is effected in each instance by a gate and scraper plate 65 which is movably mounted at the rear end of each chamber for movement in a direction perpendicular to the axis of the chamber. More specifically, the gate and scraper plate 65 for each chamber has edges mounted in vertical channels which are defined by bars 66 (FIG. 3), the latter being fixedly mounted in vertical and parallel relationship on the rear wall 41 of the bin means.

As illustrated in FIG. 7, each gate and scraper plate 65 has rectangularly-sectioned edge portions 67 adapted to fit slidably in the above-mentioned channels
in the channel-defining means 66. Thus, the lower faces of such square edge portions 67 maintain the channels free of snow and ice. A knife edge 68 is formed at the lower edge of each member 65, between the square edge portion 67 thereof, and is disposed closely adjacent (FIG. 5) the face of compression plate 56 when the latter is in its rearmost position shown at 56b in FIG. 5. The knife edge 68 is thus adapted to scrape such face of the compression plate, to clean the same of snow and ice, and is also adapted to insure that a previously compressed block of snow will be cut off and will drop into chute means described hereinafter.

The plates 65 are vertically reciprocated by means of gate rams 69 and cylinders of which are mounted on bin wall 41, and the piston rods of which are pivotally connected at lugs 71 to the upper portions of the gate plates 65.

In the illustrated apparatus, the movement of each gate and scraper plate is translational (as distinguished from pivotal or rotational), and is in a plane which is perpendicular to the chamber axis.

**DISCHARGE CHUTE AND CONVEYOR MEANS**

The apparatus further comprises chute and conveyor means to receive the blocks of compressed snow after ejection thereof from each set of chambers 8–29 and 30–31, and to convey the blocks of such snow to a waiting truck for removal to a different area. As best shown in FIGS. 3 and 5, the chute means comprises an inclined wall 72 which extends downwardly and rearwardly from a position beneath the gates 65. The chute means further comprises inwardly-extending inclined walls 73 adapted to cause the blocks of compressed snow to pass toward the longitudinal axis of the apparatus. An opening 74 is formed at such longitudinal axis and is adapted to permit passage of the blocks of compressed snow onto a suitable conveyor belt mechanism 75.

Mechanism 75 carries the blocks upwardly and rearwardly and discharges them, at a discharge region 76, into the back of a waiting truck, not shown, adapted to carry the compressed snow to some remote location. Because of the compression of the snow, the capacity of such truck is vastly increased. Sinch the snow is carried to a remote location, it is not necessary to create enormous mounds of snow at various undesired areas, for example at a road side.

The conveyor means is driven by a suitable power mechanism located, for example, in the portion of the apparatus indicated at 76a in FIGS. 1 and 2.

**THE HYDRAULIC CONTROL MEANS**

Referring next to FIG. 8, the apparatus comprises a hydraulic control circuit 77 which is connected through various hydraulic lines to different ones of the compression rams 59, gate rams 69, lid rams 48–49 and chute ram 16. The hydraulic control 77 includes pump means to drive the hydraulic fluid, drains or vents for the various rams, pressure-responsive and solenoid valves, etc., all adapted to effect operation of the apparatus (and performance of the method) in a continuous automatic manner.

It is emphasized that the control 77 is connected separately to the two rams 69 shown at the left in FIG. 3 and to the remaining two rams 69 shown at the right thereof, it being remembered that the two rams for chambers 28–29 operate conjointly but in alternation to operation of the two rams for chambers 30–31. The same applies to the compression rams 59 for the various chambers 28–29 and 30–31. Similarly, the two lid rams 48 and 49 operate in alternation.

**DESCRIPTION OF THE METHOD**

Let it be assumed that the snow compacting and removal apparatuis is being driven forwardly into a mass of snow, by power supplied to wheels 10, and that the double-auger or screw 12 is being rotated to pull the snow to the center of the apparatus. The rotor or impeller 13 of the snow blower then throws the snow up through the chute 14 for discharge out of the downwardly curved chute end 15.

Let it be assumed that the rotated position of chute 14 is such that the end 15 is initially directed as shown in FIG. 1, namely, toward the open-topped chambers 28 and 29. Let it further be assumed that the lid or cover 34 is initially in the illustrated position, on the opposite side of the apparatus from chambers 28 and 29, cylinder 48 being then extended and cylinder 49 being collapsed. It is to be noted that any snow which does not fall immediately into the open tops of chambers 28 and 29 is deflected by the walls 39–41 and by the snow-deflecting, scraping and hold-down means 35.

The sizes of the chambers are so correlated to the rate of delivery of the snow from rotor or impeller 13 that chambers 28 and 29 will completely fill during the time that compression and ejection actions are occurring on the other side of the apparatus (chambers 30 and 31). Therefore, as soon as chambers 28 and 29 are filled, the hydraulic control 77 (FIG. 8) operates to extend cylinder 49 (FIGS. 1 and 4) to thereby slide the lid 34 to its position over chambers 28 and 29, thus closing the same. Such extension of cylinder 49 effects corresponding collapse of cylinder 48.

Substantially simultaneously with such shifting of lid 34 to its position over chambers 28 and 29, the hydraulic control effects operation of ram 16 to pivot chute 14 about its vertical axis and thus shift discharge end 15 (counterclockwise in FIG. 1) until it is directed toward the now-open chambers 30 and 31. Such chambers 30 and 31 therefore fill during the snow compacting and ejecting action relative to chambers 28 and 29, as next described.

Upon completion of the above-described closing of chambers 28 and 29, the rams 59 associated with such chambers are caused (by hydraulic control 77) to receive hydraulic fluid and thereby extend their associated piston rods 61 to effect rearward shifting of compression plates 56 from the positions shown in solid lines in FIG. 5 to the positions indicated in phantom at 56b. This effects a major amount of compression of the snow in both chambers 28 and 29 and, furthermore, causes the pressure of the snow to the rear of the plates 56 to build up and greatly increase the resistance to further rearward shifting of the piston rods 61. This resistance to further shifting is sensed by control 77, which then operates to divert hydraulic fluid to the two rams 69 associated with the gates 65 for chambers 28 and 29, whereupon such gates are caused to elevate and open the rear ends of the chambers 28 and 29. Stated otherwise, exit openings are thus formed at the rear ends of such chambers.

As soon as the gates for the chambers 28 and 29 are thus opened, pressure is again delivered to the cylinders 59 of the rams for chambers 28 and 29, causing
3,796,147

further rearward shifting of the compression plates from the positions shown at 56a (FIG. 5) to the rear most positions shown at 56b. It is emphasized that the rams only stop moving for a short period of time when the gates 65 are opening, so that the rearward compression and then ejection of the snow is a fast, relatively continuous, and unidirectional operation. The chance for setting of the snow, freezing, etc., is thereby minimized.

The hydraulic control 77 then causes the rams 69 for gates 65 of chambers 28-29 to move downwardly, whereupon the sharp lower edges 68 of such gates 65 cause the snow to be cut off and drop onto the chute means 72-73 for transport to conveyor 75 and thus to the awaiting truck. A block of compressed snow is represented at 78 in FIG. 5. The downward shifting of the gates 65 further effects scraping and cleaning, as stated above, of the rear surfaces of compression plates 56.

The hydraulic control 77 then immediately effects operation of cylinders 59 associated with chambers 28-29 to retract the compression plates 56 therein to the positions shown in solid lines in FIG. 5. Correspondingly, the telescoped cylinder or ram 48 is cause to extend itself and shift the lid 34 back to the position shown in FIGS. 1 and 4. Chambers 28 and 29 are thus open again and are positioned to receive snow from chute 14, the cylinder for which is operated to pivot the chute back to the FIG. 1 position to effect initiation of the above-specified cycle of operation.

The operations of the various rams associated with the chambers 30 and 31 are identical to those described relative to the rams associated with chambers 28 and 29, except that they are in alternation relative to the rams for chambers 28 and 29 so that the chute 14-15 may discharge snow continuously without effecting overburdening of either side of the apparatus and in perfectly timed relationship relative to the compression and ejecting functions.

Referring to FIG. 4 in particular, it is pointed out that, for maximized efficiency of operation, each chamber 28 and 29 should be somewhat overfilled, thus causing a slight mounding of the snow as shown at 80. The snow which forms the small mound 80 is delivered directly from the chute 14-15, and/or is bounced off the walls 39-41 as well as being diverted by the inclined sides of the element 35.

Because of the presence of the above-described gussets 42, the presence of the mound 80 does not create any problem relative to the sliding of the lid 34 from the position shown in FIG. 4 to the reverse position (at which gussets 42 at the left of the apparatus are engaged by the left edge of the lid 34). Thus, when the lid 34 is shifted to the left in FIG. 4, it forces a small amount of snow in front of it but any such snow is merely compressed slightly and then ejected through the gap 44 (FIG. 5) between the gussets. As soon as the edge of the lid 34 engages the sharp edges 43 (FIG. 6) of the gussets, such edges break the snow and permit the same to fall to the ground. Thus, there is no jamming.

A small amount of snow remains on top of the lid 34 after completion of the above-described leftward-shifting operation, but this does not present any problem. Instead, such small amount of snow immediately drops into the voided chambers 28 and 29 during the next cycle, and as the lid 34 shifts to the right (FIG. 4), it being remembered that the edge 38 of element 35 scrapes the upper surface of the lid 34 as such lid shifts to the right.

Because the chambers are thus fully charged with snow prior to each compression operation, the compression operations are relatively uniform and the efficiency of the entire apparatus is maximized.

Such expressions as "open-ended chamber", "open-ended chamber", "open-topped chamber means", etc., are employed in the appended claims to denote chambers (or chamber-defining means) which are not closed, but which instead have omitted or missing top or side walls so that snow may be rapidly introduced therein.

The foregoing detailed description is to be clearly understood as given by way of illustration and example only, the spirit and scope of this invention being limited solely by the appended claims.

What is claimed is:

1. A method of compacting snow, which comprises: providing walls defining an open-topped chamber, introducing snow into said chamber through the open top thereof, moving a lid in a substantially horizontal direction over the open top of said chamber to thus close said top, moving a piston from a starting position and in a predetermined and substantially horizontal direction through said chamber toward one wall thereof, whereby to compact snow in said chamber between said piston and said one wall, removing said one wall to thereby provide an exit opening from said chamber, continuing the movement of said piston in said predetermined direction to thereby eject compacted snow from said chamber through said exit opening, moving said piston a direction opposite to said predetermined direction and back to said starting position, and moving said lid in a substantially horizontal direction and back to a predetermined position at which the top of said chamber is again open for introduction of additional snow.

2. The invention as claimed in claim 1, in which said method further comprises effecting said removal of said one wall by moving the same in a plane which is perpendicular to said predetermined direction, in which said method also comprises continuing said piston movement in said predetermined direction until said piston is immediately adjacent said opening, and in which said method additionally comprises moving said one wall in said plane back to its original chamber-defining position, said last-named movement causing said one wall to effect cleaning of snow from the face of said piston.

3. The invention as claimed in claim 2, in which said method further comprises causing all of said movements of said one wall to be translational.

4. The invention as claimed in claim 1, in which said method further comprises effecting cutting-off of the compacted snow which extends outwardly through said exit opening.

5. The invention as claimed in claim 1, in which said method further comprises effecting said step of continuing the movement of said piston in said predetermined direction substantially immediately after said removal of said one wall, whereby the compacted snow
is caused to remain in said chamber for a minimum period of time.

6. The invention as claimed in claim 1, in which said method further comprises effecting scraping of the upper surface of said lid in response to said movement thereof.

7. The invention as claimed in claim 1, in which said method further comprises causing said one wall to be adjacent one edge of said lid, whereby to minimize the necessary length of movement of said piston.

8. Apparatus for compacting snow, which comprises: first open-topped chamber means, one wall of said first chamber means being a first gate,
second open-topped chamber means disposed laterally adjacent said first chamber means, one wall of said second chamber means being a second gate,
lid means adapted when in a first position to close the top of said first chamber means, and when in a second position to close the top of said second chamber means,
said lid means being movable in a generally horizontal direction between said first and second positions, and being such that the top of said second chamber means is open when said lid means is in said first position, and the top of said first chamber means is open when said lid means is in said second position,
means to introduce snow into said first chamber means through the open top thereof when said lid means is in said second position, and to introduce snow into said second chamber means through the top thereof when said lid is in said first position,
first piston means mounted in said first chamber means for movement therethrough toward said first gate,
second piston means mounted in said second chamber means for movement therethrough toward said second gate,
means operative when said lid means is in said first position to shift said first piston means in a predetermined direction toward said first gate, thus compacting snow between said first piston means and such gate,
said last-named means being thereafter operative to open said first gate and cause additional shifting of said first piston means in said predetermined direction to eject the compacted snow from said first chamber means through said first gate, and
means operative when said lid means is in said second position to shift said second piston means in a predetermined direction toward said second gate, thus compacting snow between said second piston means and said second gate,
said last-named means being thereafter operative to open said second gate and cause additional shifting of said second piston means in said last-mentioned predetermined direction to eject the compacted snow from said second chamber means through said second gate.

9. The invention as claimed in claim 8, in which means are provided to reciprocate said lid means back and forth between said first and second positions and in timed relationship to operation of said first piston means and said second piston means, the relationship being such that said lid means is in said first position during operation of said first piston means to compact snow, and is in said second position during operation of said second piston means to compact snow.

10. The invention as claimed in claim 8, in which said first and second chamber means are elongated and rectangularly-sectioned chambers, in which said first and second piston means are rectangular compression plates each forming one wall of one of said chambers, and in which said means to shift said first piston means and said second piston means comprise hydraulic rams.

11. The invention as claimed in claim 8, in which said means to introduce snow into said first chamber means and said second chamber means includes a rotary snow blower which communicates with a snow-throwing chute, and in which means are provided to direct said chute selectively toward the open tops of said first and second chamber means.

12. The invention as claimed in claim 8, in which said first and second gates comprise plates mounted perpendicularly to the direction of movement of said first piston means and said second piston means, said plates closing the ends of said first and second chambers during compacting of snow therein, and in which means are provided to shift said gate plates perpendicularly to said direction of movement of said piston means to thereby effect opening of said gate.

13. The invention as claimed in claim 12, in which said shifting means effects movement of said first piston means and said second piston means all the way to the openings created by opening of said first and second gates, in which said gate plates have sharpened edge portions adapted to act as scrapers, and in which said means to shift said gate plates effects shifting thereof back to chamber-closing positions and adjacent the faces of said first and second piston means to thereby clean such faces.

14. The invention as claimed in claim 8, in which chute and conveyor means are provided to convey away from the apparatus the compressed snow ejected from said first and second chamber means.

15. Apparatus for compacting snow, which comprises:
first open-topped chamber means,
one wall of said first chamber means being a first gate,
second open-topped chamber means disposed adjacent said first chamber means,
one wall of said second chamber means being a second gate,
lid means adapted when in a first position to close the top of said first chamber means, and when in a second position to close the top of said second chamber means, whereby the top of said second chamber means is open when said lid means is in said first position, and whereby the top of said first chamber means is open when said lid means is in said second position,
said lid means being a plate disposed in a generally horizontal plane, snow-deflecting, scraping and hold-down means mounted over said plate and adjacent thereto, whereby movement of said plate back and forth between said first and second positions causes scraping of the upper surface of said plate to
clean the same and to aid in filling said chamber means,
means to introduce snow into said first chamber means through the open top thereof when said lid means is in said second position, and to introduce snow into said second chamber means through the open top thereof when said lid is in said first position,
first piston means mounted in said first chamber means for movement therethrough toward said first gate,
second piston means mounted in said second chamber means for movement therethrough toward said second gate,
means operative when said lid means is in said first position to shift said first piston means in a predetermined direction toward said first gate, thus compacting snow between said first piston means and such gate,
said last-named means being thereafter operative to open said first gate and cause additional shifting of said first piston means in said predetermined direction to eject the compacted snow from said first chamber means through said first gate, and
means operative when said lid means is in said second position to shift said second piston means in a predetermined direction toward said second gate, thus compacting snow between said second piston means and said second gate,
said last-named means being thereafter operative to open said second gate and cause additional shifting of said second piston means in said last-mentioned predetermined direction to eject the compacted snow from said second chamber means through said second gate.
16. The invention as claimed in claim 15, in which said snow-deflecting, scraping and hold-down means has steeply inclined side walls adapted to deflect snow into said first chamber means and said second chamber means, in which said snow-deflecting, scraping and hold-down means is disposed between said first chamber means and said second chamber means, and in which said plate is sufficiently wide that a portion thereof is always directly beneath said snow-deflecting, scraping and hold-down means.
17. Apparatus for compacting snow, which comprises:
first open-topped chamber means,
one wall of said first chamber means being a first gate,
second open-topped chamber means disposed adjacent said first chamber means,
one wall of said second chamber means being a second gate,
bin means provided over said first and second chamber means to said in loading the same and to prevent loss of snow,
said bin means including upwardly extending wall means
lid means adapted when in a first position to close the top of said first chamber means, and when in a second position to close the top of said second chamber means,
whereby the top of said second chamber means is open when said lid means is in said first position, and whereby the top of said first chamber means is open when said lid means is in said second position, said lid means being a generally horizontal plate which forms the bottom wall of said bin means,
said bin means communicating with said first chamber means when said plate is in said second position, and communicating with said second chamber means when said plate is in said first position,
first piston means mounted in said first chamber means for movement therethrough toward said first gate,
second piston means mounted in said second chamber means for movement therethrough toward said second gate,
means operative when said lid means is in said first position to shift said first piston means in a predetermined direction toward said first gate, thus compacting snow between said first piston means and such gate,
said last-named means being thereafter operative to open said first gate and cause additional shifting of said first piston means in said predetermined direction to eject the compacted snow from said first chamber means through said first gate, and
means operative when said lid means is in said second position to shift said second piston means in a predetermined direction toward said second gate, thus compacting snow between said second piston means and said second gate,
said last-named means being thereafter operative to open said second gate and cause additional shifting of said second piston means in said last-mentioned predetermined direction to eject the compacted snow from said second chamber means through said second gate.
18. The invention as claimed in claim 17, in which said bin means further comprises a snow-deflecting, scraping and hold-down means disposed between said first and second chamber means over and adjacent said horizontal plate, said snow-deflecting, scraper and hold-down means having inclined side surfaces adapted to cause snow to pass into said chamber means in response to the scraping action effected upon movement of said lid between said first and second positions.
19. Apparatus for compacting snow, which comprises:
first open-topped chamber means,
one wall of said first chamber means being a first gate,
second open-topped chamber means disposed adjacent said first chamber means,
one wall of said second chamber means being a second gate,
lid means adapted when in a first position to close the top of said first chamber means, and when in a second position to close the top of said second chamber means,
whereby the top of said second chamber means is open when said lid means is in said first position, and whereby the top of said first chamber means is open when said lid means is in said second position,
3,796,147

and whereby the top of said first chamber means is open when said lid means is in said second position.

bin means provided over said first and second chamber means to aid in loading the same and to prevent loss of snow,
said bin means including upwardly extending wall means,
the wall means of said bin means being spaced upwardly from said first and second chamber means to provide gaps adjacent the edges of said lid means when in said first and second positions, and through which snow may discharge to prevent packing of snow adjacent the edges of said lid means,

means to introduce snow into said first chamber means through the open top thereof when said lid means is in said second position, and to introduce snow into said second chamber means through the open top thereof when said lid means is in said first position,

first piston means mounted in said first chamber means for movement therethrough toward said first gate, second piston means mounted in said second chamber means for movement therethrough toward said second gate,

means operative when said lid means is in said first position to shift and first piston means in a predetermined direction toward said first gate, thus compacting snow between said first piston means and such gate,
said last-named means being thereafter operative to open said first gate and cause additional shifting of said first piston means in said predetermined direction to eject the compacted snow from said first chamber means through said first gate, and

means operative when said lid means is in said second position to shift said second piston means in a predetermined direction toward said second gate, thus compacting snow between said second piston means and said second gate,

said last-named means being thereafter operative to open said second gate and cause additional shifting of said second piston means in said last-mentioned predetermined direction to eject the compacted snow from said second chamber means through said second gate.

20. The invention as claimed in claim 19, in which said upward spacing of said wall means is effected by gussets connected between said wall means and said chamber means, said gussets having sharpened edge portions facing the edges of said lid means and adapted to cut snow and ice therefrom.

21. Snow compaction and removal apparatus, which comprises:

first and second open-topped chambers disposed laterally adjacent each other,

bin means provided over said chambers, means to deliver snow to said bin means,
said snow-delivery means delivering snow alternately to a bin region over said first chamber and to a bin region over said second chamber,

snow deflection and scraping means mounted between said first and second chambers at the lower region of said bin means,

a cover or lid member mounted beneath said snow deflection and scraping means for movement from a first position over said first chamber to a second position over said second chamber,

means to cause said cover member to be in said first position when said snow-delivery means is delivering snow to said bin region over said second chamber, and to be in said second position when said snow-delivery means is delivering snow to said bin region over said first chamber, and

piston means to compress the snow in each of said chambers at a time when said cover member is disposed thereover to close the same,

whereby said snow deflection and scraping means aids in filling each of said chambers and also effects removal of snow from over said cover member.

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