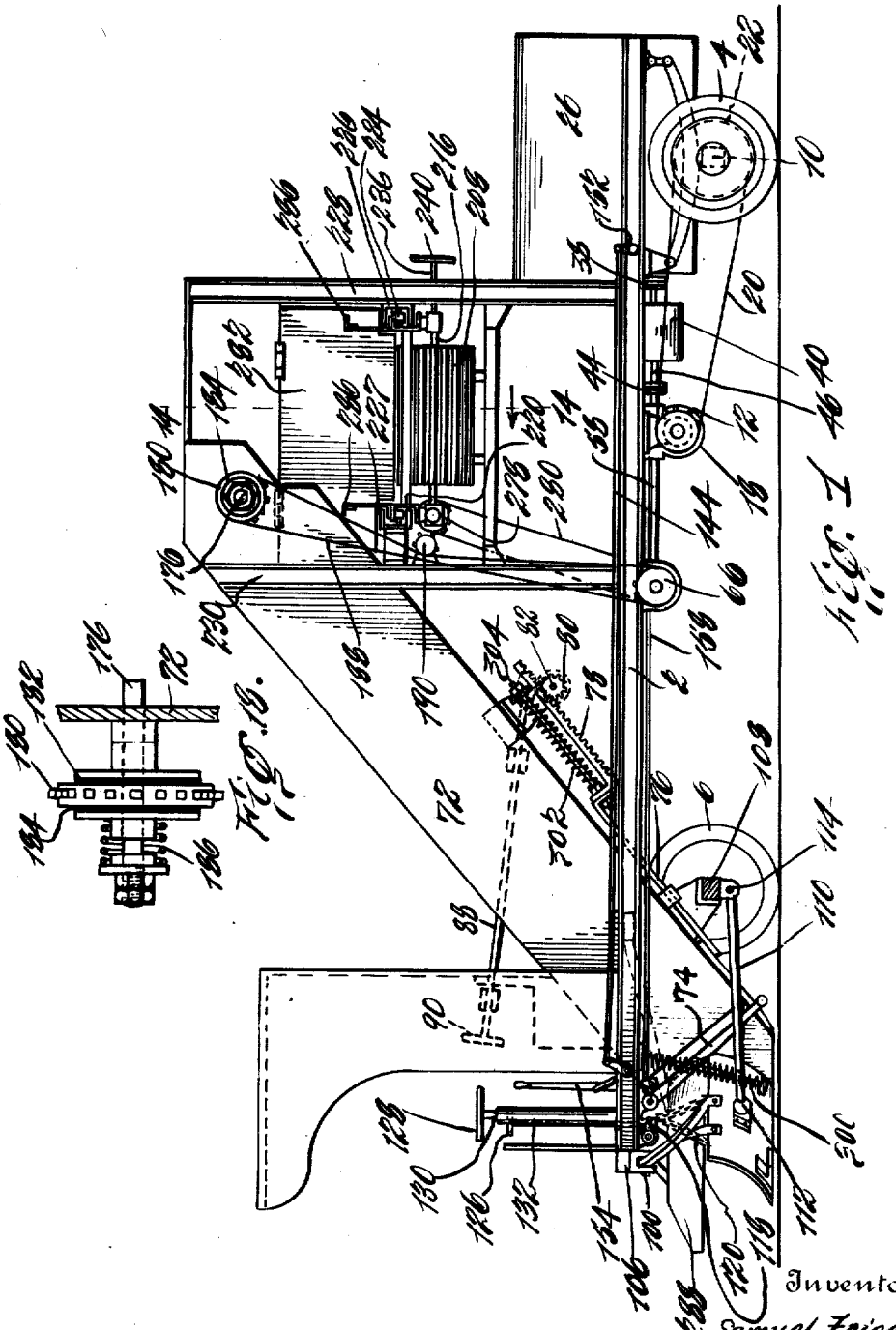
Aug. 11, 1925. **1,549,249**

S. FRIEDMAN

SNOW REMOVING MACHINE

Filed May 25, 1918 5 Sheets-Sheet 1



Inventor
Samuel Friedman
By his Attorney
Emerson R. Newell

Aug. 11, 1925. 1,549,249

S. FRIEDMAN

SNOW REMOVING MACHINE

Filed May 25, 1918 5 Sheets-Sheet 2

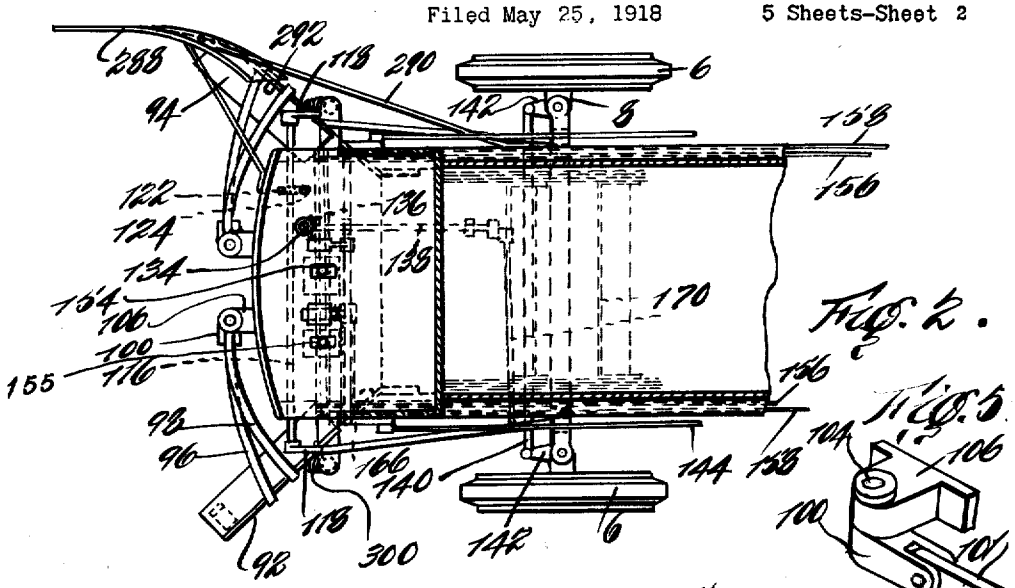


Fig. 2.

Fig. 5.

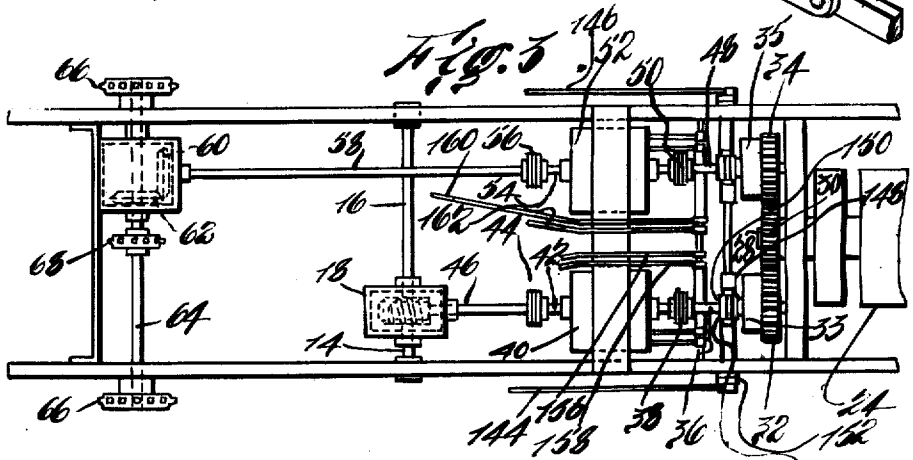


Fig. 3.

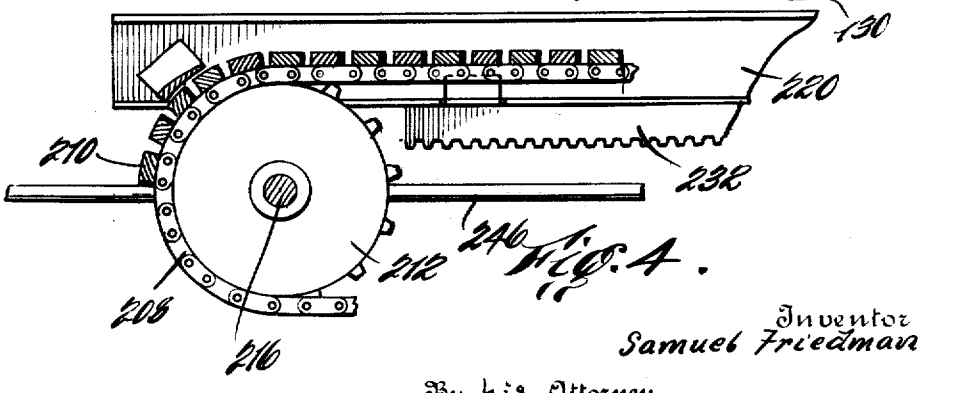


Fig. 4.

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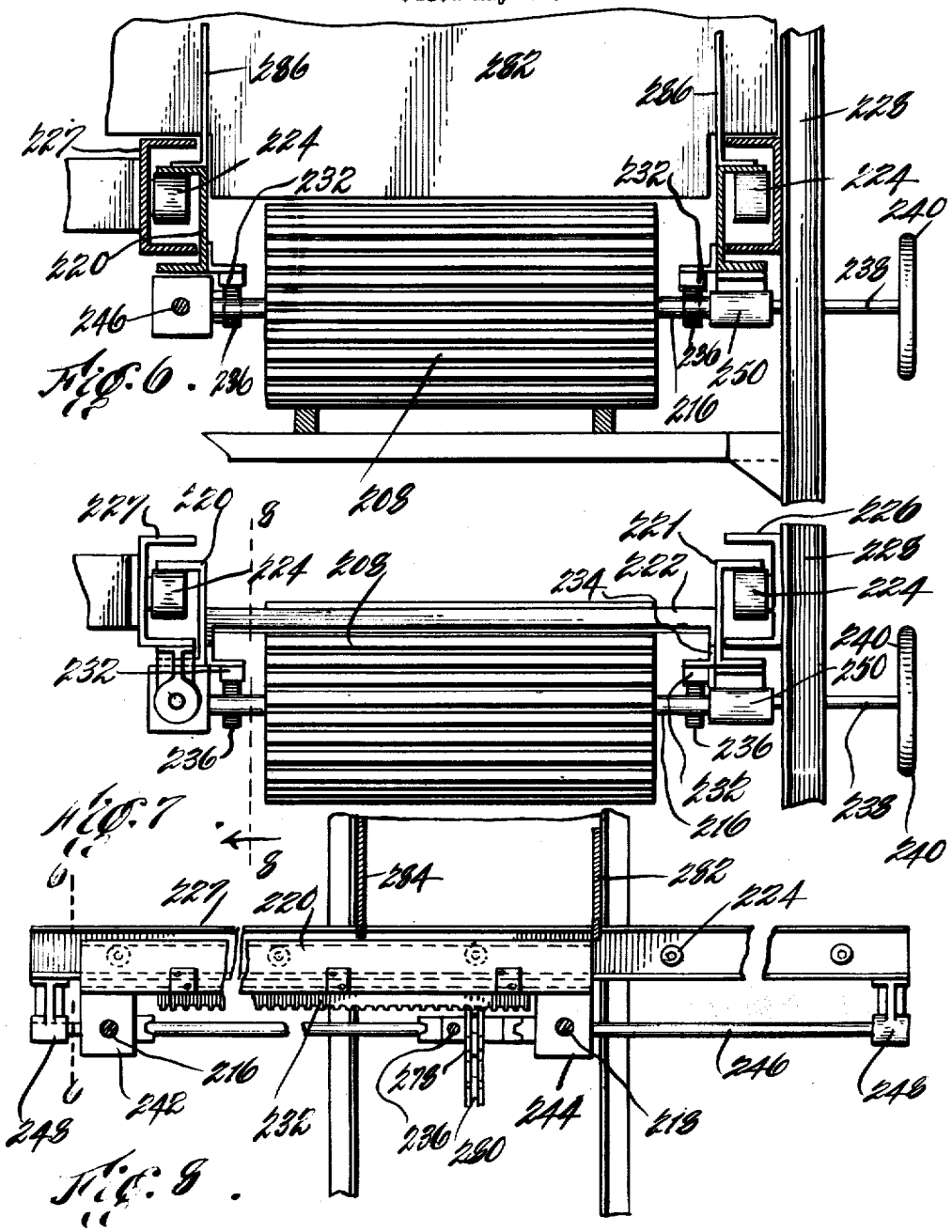
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Aug. 11, 1925. 1,549,249

S. FRIEDMAN

SNOW REMOVING MACHINE

Filed May 25, 1918 5 Sheets-Sheet 3



Inventor
Samuel Friedman

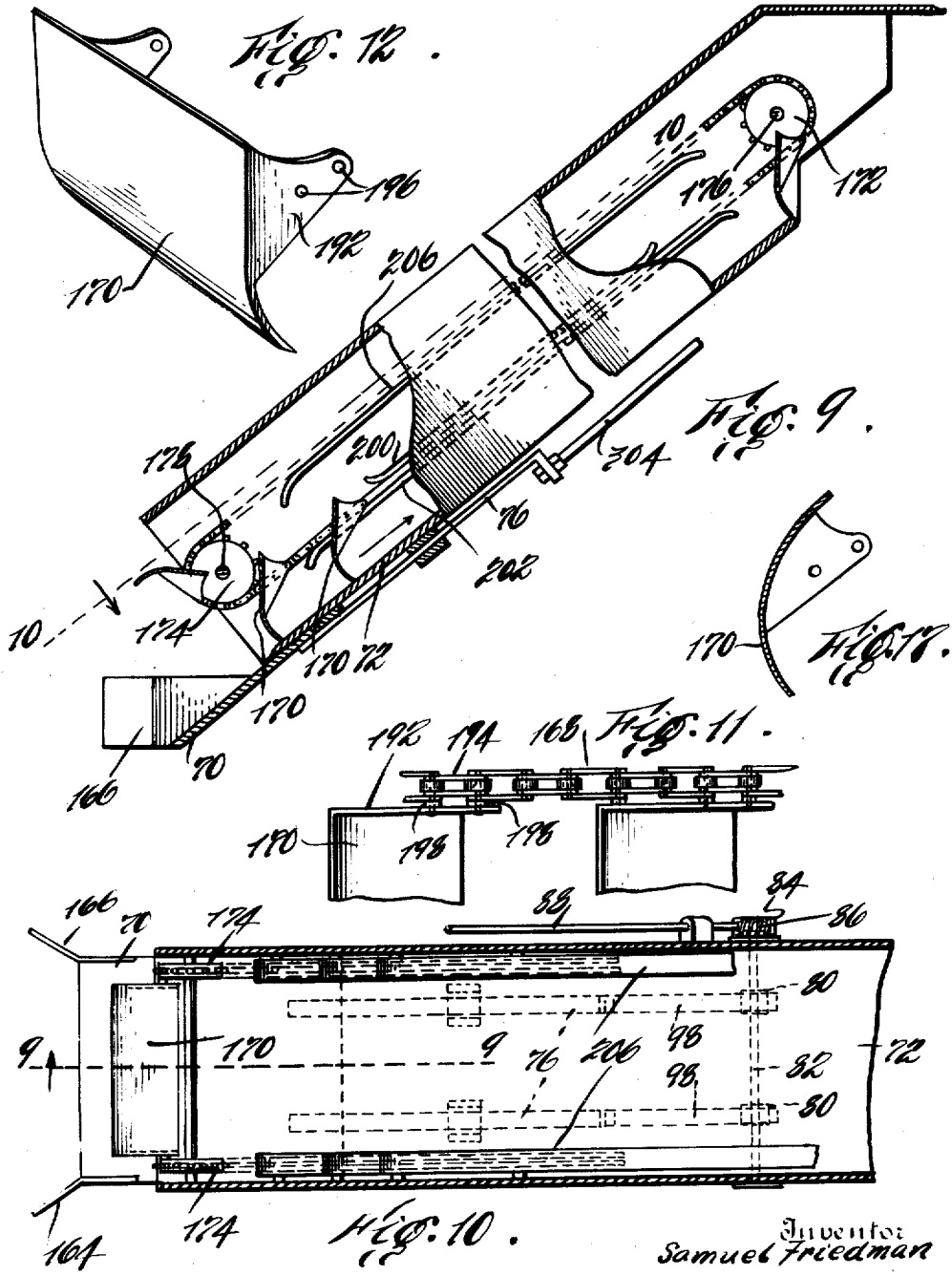
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SNOW REMOVING MACHINE

Filed May 25, 1918 5 Sheets-Sheet 4



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Aug. 11, 1925. 1,549,249

S. FRIEDMAN

SNOW REMOVING MACHINE

Filed May 25, 1918 5 Sheets-Sheet 5

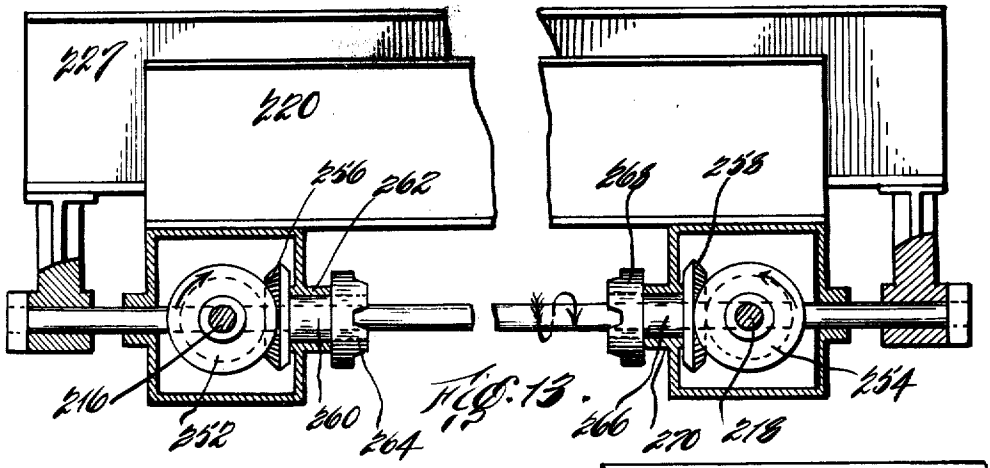


Fig. 13.

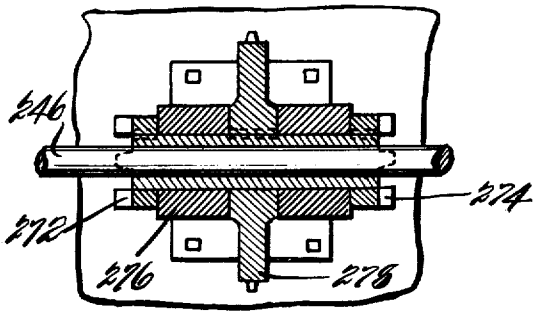


Fig. 16.

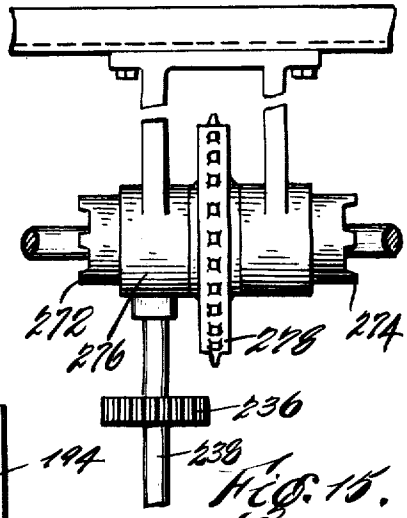


Fig. 15.

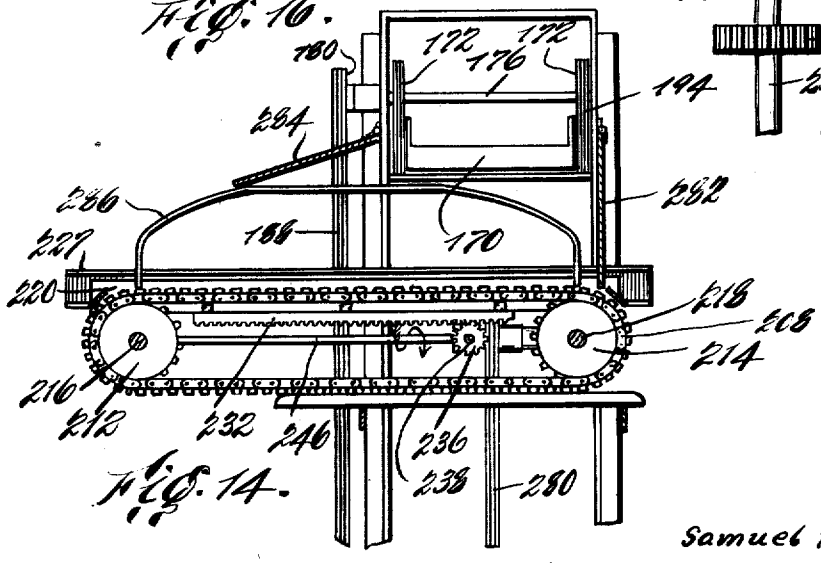


Fig. 14.

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Patented Aug. 11, 1925. 1,549,249

UNITED STATES PATENT OFFICE.

SAMUEL FRIEDMAN, OF NEW YORK, N. Y.

SNOW-REMOVING MACHINE.

Application filed May 25, 1918. Serial No. 236,561.

To all whom it may concern:

Be it known that I, SAMUEL FRIEDMAN, a citizen of the United States, residing at 67 East 93rd Street, New York city, N. Y., have invented certain new and useful Improvements in Snow-Removing Machines, of which the following is a clear, full, and exact description.

This invention relates to machines for gathering up material in the paths of movement of the machines, and particularly to machines for gathering up snow from city streets, and is herein shown as embodied in a machine for collecting snow, elevating it and discharging it at one side of the machine, either into another vehicle located at the side of the machine, or upon the ground at one side of the path of travel of the machine. It will be understood, however, that the invention is not restricted to the embodiment and uses herein illustrated and described, that many features of the invention are of general applicability in the art to which the invention relates.

Up to the present time very little has been done in the way of providing machinery which will reduce the amount of manual labor required in removing snow from city streets. Numerous attempts have been made to provide machines for facilitating the removal of the snow, but these attempts have resulted for the most part in almost complete failure, because of a lack of appreciation of the peculiar problem presented by the characteristics of the material to be handled.

In my United States Letters Patent #1,242,433, granted October 9, 1917, is shown a successful machine for gathering snow, in which I have successfully solved the problem of elevating the snow, after it is raised from the street by a gathering plow, by providing an elevating conveyor having snow-engaging shovels of novel shape and arrangement. One of the objects of the present invention is to provide an improved machine embodying an elevating conveyor of the type disclosed in the said Letters Patent.

Another object of the invention is to provide a machine of the general type of that disclosed in said Letters Patent in which, by reason of the provision of improved means for gathering up the snow from the street and by reason of the provision of novel means for collecting and discharging the snow thus gathered up, there will be greater capacity for handling snow, and thus the efficiency of the machine will be materially increased.

A further object of the invention is to provide a machine which will meet all of the conditions of snow removal found upon city streets, such, for example, as the conditions resulting from the temporary removal of snow from certain portions of the streets or walks and its accumulation in piles upon other portions of the streets or walks.

An important feature of the invention is the provision of means for propelling the machine by power and means for independently driving the elevating and conveying means by power, whereby the speed of operation of these means may be varied relatively to the speed of travel of the machine, and whereby, moreover, the elevating and discharging means may be operated when the machine is not being propelled over the street.

Another important feature of the invention is the novel means for discharging the snow or other material gathered up to either side of the machine, this means comprising preferably means for effecting a transverse adjustment of the discharging means with respect to the machine, and means whereby such adjustment automatically effects the appropriate driving connection to cause the snow, or other matrial, to be discharged to the selected side of the machine.

Other important features of the invention are the novel mounting of the conveyor shovels, whereby an even, positive pull upon each shovel is obtained, substantially in the line of movement of the conveyor chain; the novel means for removing a vertical layer of snow when the machine is operating adjacent to a pile of snow; the novel means for effecting an adjustment of the main snow gathering plow and securing said plow in its adjusted positions, and means for independently driving and reversing the elevating conveyor, whereby any material which tends to clog the operation of the conveyor may quickly be removed. Other important features of the invention and objects

attained thereby will be apparent from the following description and claims when considered in connection with the accompanying drawings, in which—

Figure 1 is a side elevation of a snow gathering machine embodying the present invention;

Figure 2 is a plan view of the front part of this machine;

Figure 3 is a plan view of the driving connections between the motor and the propelling and the conveyor operating mechanisms;

Figure 4 is a sectional detail of the transverse conveyor;

Figure 5 is a perspective detail of one of the side plow connections;

Figure 6 is a section through the transverse conveyor mechanism on the line 6—6 of Figure 8;

Figure 7 is an end view of the transverse conveyor mechanism;

Figure 8 is a section on the line 8—8 of Fig. 7;

Figure 9 is a longitudinal section of the inclined conveyor on the line 9—9 of Figure 10;

Figure 10 is a section on the line 10—10 of Figure 9;

Figure 11 is a detail showing the construction of the conveyor chain and the mode of connection of the shovels to the chain;

Figure 12 is a perspective view of one of the shovels detached from the chain;

Figure 13 is a broken sectional view illustrating the driving connections at the ends of the path of adjustment of the transverse conveyor, a portion of the structure being broken away;

Figure 14 is a longitudinal section through the transverse conveyor on the line 14—14 of Figure 1, illustrating particularly the means for effecting the transverse adjustment of said conveyor;

Figure 15 is a plan view of the driving sprocket and the associated driving clutch members of the transverse conveyor driving mechanism;

Figure 16 is a longitudinal section through the structure shown in Figure 15;

Figure 17 of the drawing shows a modified form of conveyor shovel; and

Figure 18 illustrates the frictional driving connection to the inclined conveyor.

The illustrated machine comprises a power driven vehicle having a main frame 2, driving wheels 4 and steering wheels 6, the steering wheels 6 being carried upon ordinary steering spindles 8, and the driving wheels 4 being mounted upon a stationary rear axle 10 and being driven from sprockets 12 connected by horizontal shafts 14 and 16 to a driving differential 18, all carried upon the frame 2. The sprockets 12 are connected by driving chains 20 to larger sprockets 22 upon each of the driving wheels.

The means for propelling the vehicle and operating the various mechanisms carried thereon may comprise any suitable motor 24, such, for example, as an internal combustion engine of the required power, which is preferably mounted upon the rear end of the vehicle within the hood or housing 26. The motor 24 is preferably mounted midway between the sides of the vehicle so that its driving shaft 28 preferably extends along the longitudinal axis of the vehicle, this shaft being preferably connected by a pinion or gear 30 to gears 32 and 34, the gear 32 being mounted upon a shaft 36 connected by a flexible connection 38 to speed changing gearing within a gear housing 40, the driven member of this gearing being connected to a shaft 42 having a flexible connection 44 with a worm shaft 46 arranged to drive a worm gear in the differential 18 hereinabove referred to. By a clutch 33 a driving connection between the gear 32 and shaft 36 may be effected.

The other gear 34, with which the motor-driven gear 30 meshes, is mounted upon a shaft 48 having a flexible connection 50 with speed changing gear mechanism contained in a gear housing 52, the driven member of this mechanism being connected to a shaft 54, having a flexible connection 56 with a shaft 58, carrying at its other end a bevel pinion 60 engaging a bevel pinion 62 on a cross-shaft 64 carrying inclined conveyor driving sprockets 66 at its ends and a transverse conveyor driving sprocket 68 between its ends. By a clutch 35 a driving connection between the gear 34 and shaft 48 may be effected.

At its forward end the machine is provided with an adjustable snow gathering plow 70 shaped and arranged to gather up the snow from the street and to bring the snow into position to be operated upon by an endless conveyor in an inclined chute 72, on the underside of which the plow 70 is adjustably mounted. Links 74 extending from the two sides of the frame to the sides of said plow support said plow against the strains of the snow gathering operation and at the same time permit the adjustment of the plow up and down upon the chute 72 to bring the plow to different elevations with respect to the street.

The means for adjusting the plow 70 is preferably arranged to be controlled from the seat of the operator of the machine, and in the illustrated construction this means comprises rods 76 connected at their upper ends to racks 78 meshing with pinions 80 upon a cross-shaft 82, having at one end a worm gear 84 meshing with a worm 86 on a shaft 88 mounted upon one side of

the chute 72, and having at its forward end a wheel 90 within convenient reach of the operator of the machine.

Cooperating with the plow 70 are side plows 92, 94, inclined both horizontally and vertically with respect to the main plow 70 and so arranged that they gather snow at the sides of the path of travel of the plow 70 and direct this snow into the field of action of the plow 70. The lateral extent of these plows 92 and 94 is preferably sufficient to bring them in front of the wheels of the vehicle so that they clear a path for the travel of these wheels.

The side plows 92 and 94 are supported at their upper edges by brace rods 96 and 98 connected to a common rod 100, having a horizontal pivotal connection with a member 102 vertically swiveled at 104 in a bearing bracket 106 upon the front of the frame. Each of the plows is also connected to the front axle 108 of the machine by a link 110, having at its front end a ball and socket connection 112 with the rear face of the side plow and at its rear end a pivotal connection 114 with the underside of the axle 108.

The side plows 92 and 94 may be adjusted both with respect to the main plow 70 and with respect to the surface over which the vehicle is traveling. The means for effecting such an adjustment comprise a transverse shaft 116 mounted in bearings on the underside of the vehicle frame and having at its ends arms 118 connected by chains 120 to the upper edges of the plows 92 and 94. A worm-gear 122 on the shaft 116 is arranged to be engaged by a worm 124 on a vertical shaft having at its upper end a hand wheel 126 in convenient reach of the driver of the vehicle.

The steering wheels 6 are controlled from a hand-wheel 128, connected to a vertical steering shaft 130 in a steering post 132, said steering shaft being connected at its lower end by bevel gears 134 and 136 to a longitudinal shaft 138 connected in any suitable manner, as by link 139, to a cross-bar 140 extending between the arms 142 of the steering knuckles 8.

Also carried in convenient reach of the operator are levers for shifting the gears in the gear boxes 40 and 52 and for operating the clutches 33 and 35, some of these levers being omitted from the showing to avoid confusion. The clutch shift levers are connected respectively to the rods 144 and 146, associated with the clutches 33 and 35 respectively, the rod 144 acting upon the clutch 33 through a yoke 148 and a collar 150, the yoke at its outer end having a crank arm 152 with which the rod 144 is connected, and the rod 146 acting upon the clutch 35 through similar connections.

The speed-changing and reverse gearing in the gear box 40 is adapted to be controlled from a suitable lever 154 in reach of the operator, which may be connected by a speed-changing rod 156 to the speed-changing gears and by a reverse rod 158 to the reversing gear. Through similar mechanism connected by the speed-changing rod 160 to the speed-changing gears and the reverse rod 162 to the reversing gear, the gear mechanism in the gear box 52 may be controlled.

The snow gathered up by the main plow 70 is carried up on the inclined chute 72 by an endless conveyor of novel construction now to be described. The plow 70 may have side wings 164 and 166 which co-operate with the side plows 92 and 94 to direct the snow gathered by the side plows upon the main plow 70. The chute 72 is preferably enclosed as shown, and so inclined as to carry the snow to the proper elevation for accumulation upon a transverse conveyor hereinafter to be described, by which it may be discharged into vehicles drawn up alongside the machine of the present invention.

The endless conveyor, by which the snow is carried up the chute, comprises side sprocket chains 168 between which are carried the snow-engaging and conveying shovels 170, these shovels being substantially of the novel transverse contour of those shown in my Letters Patent #1,242,433, hereinabove identified. The sprocket chains 168 pass over sprocket wheels 172, 174, on transverse shafts 176 and 178 having their bearings in the chute 72, the upper shaft 176 extending outside the chute and having upon its outer ends sprocket wheels 180 driven from the sprocket wheels 66 on the transverse shaft 64 carried by the frame 2. The sprocket wheels 180 are frictionally connected to the transverse shaft 176, as shown in Figure 18 of the drawings, the sprocket wheel 180 being mounted to turn freely upon the shaft 176 and being engaged upon its opposite faces by friction disks 182, 184, the disk 182 being rigidly connected with the shaft 176 and the disk 184 being pressed by a spring 186 into engagement with the side of the sprocket wheel 180 opposite to that which the disk 182 engages. The sprockets 66 and 180 are connected by sprocket chains 188 which pass over idlers 190. This frictional connection permits the endless conveyor to stop without injury to the driving connections in the event of clogging.

The shovels 170, which are curved in transverse section in such manner that as they move about the lower sprockets 174 into engagement with the snow gathered up by the shovel 70, they will cut through and take a bite out of the mass of snow in the manner set forth in my Letters Patent hereinabove identified, are attached to the conveyor chains 168 in a novel manner, this novel at-

tachment increasing considerably the efficiency of the conveyor and its durability. Referring particularly to Figures 9, 11 and 12, it will be seen that each of the shovels 170 is provided at its lateral ends with arms 192 which may be formed integral with the shovels, these arms extending sufficiently down the blade of the shovel to exert the proper pull upon the shovel, and each arm being directly connected to a link of the associated conveyor chain. From an inspection of Fig. 11 of the drawings, it will be seen that the arm 192 is directly connected to the pivots of the associated link 194, the arm 192 being provided with two pivot-receiving holes 196, through which the extended pivots are passed, these pivots being riveted or otherwise fastened upon the inside face of the arm 192, and the arm 192 being spaced from the chain links by washers 198. By this mode of attachment the shovel 170 is made to follow the movement of the associated links 194 as the chains 168 pass about the sprocket wheels.

The holes 196 in the bracket shaped arms 192 are so located that a part of the blade of the shovel 170 projects above the chains when the shovel has been attached to the chains, whereby some of the pressure exerted upon the pushing face of the shovel is exerted above the points of attachment to the chain, and thus tends to counter-balance the pressure exerted below these points. Moreover, by this construction and arrangement of the shovel and its connection to the conveyor chains, the pull of the chains is exerted more directly upon the load to be carried.

In order still further to insure a direct pulling action upon the conveyor shovels, the conveyor chains are preferably confined between upper and lower guides 200, 202, the chains being provided with rollers 204 adapted to travel upon the faces of the guides 200, 202. From an inspection of Figure 9 of the drawings, it will be seen that the upper guides 200 do not extend to a point as close to the sprocket wheels 174 as do the lower guides 202; in other words, do not extend as close to the snow-engaging point in the path of travel of the conveyor, the purpose of this being to permit a slight yielding of the conveyor chains at the beginning of their conveying movement while the shovels are adjusting themselves to the loads which they have picked up from the plow 70. A support 206 is preferably also provided along the upper path of travel of the conveyor chains.

The shovels shown in Figures 9 and 12 of the drawings have the upper parts of their blades substantially straight and the lower parts curved in the manner set forth in the Letters Patent hereinabove identified, but the invention is not necessarily restricted to a shovel of this transverse contour. In Fig. 17 is shown a slight modification of the transverse contour of the shovel in which the upper part of the blade is also slightly curved in the direction of travel of the conveyor.

The snow elevated by the endless conveyor in the chute 72 is discharged upon a transverse conveyor of the ordinary slat and chain type, the illustrated conveyor comprising side sprocket chains 208 carrying slats or cross-bars 210, upon which the snow or other material gathered up is deposited by the inclined conveyor, the sprocket chains 208 passing over sprocket wheels 212 and 214 carried upon shafts 216 and 218 at the respective ends of the transverse conveyor.

The transverse conveyor is arranged to be driven in either direction according to the side of the snow gathering machine upon which it is desired to discharge the snow, and to facilitate the discharge of the snow into another vehicle drawn up alongside of the machine, the transverse conveyor is preferably bodily adjustable across the machine to bring it into proper discharging position over the adjacent vehicle. To effect the driving of the transverse conveyor in the two directions, means is provided whereby power is transmitted to the shaft 216 to drive the conveyor in one direction, and whereby power is transmitted to the shaft 218 when it is desired to drive the conveyor in the other direction. The alternate driving connections are also preferably arranged to be automatically effected when the conveyor is adjusted to its alternate discharging positions.

The conveyor is supported for adjustment to its respective discharging positions upon a frame, comprising side channel irons 220 and 221 connected by end cross-bars 222, the channels in the channel irons receiving supporting rollers 224 carried in cross frame channels 226 and 227 on the uprights 228 and 230 of the vehicle frame. In order to effect the adjustment of the conveyor to its respective discharging positions, rack bars 232 are carried by angle irons 234 upon the inner faces of the channel irons 220 and are arranged to be engaged by pinions 236 upon a cross-shaft 238 having at one end a hand-wheel 240.

Attached to the underside of the side channel iron 220 are guide and bearing supports 242 and 244, these supports receiving a guide shaft 246 carried in brackets 248 depending from the cross frame bar 227. The transverse conveyor shaft 216 has its bearing in the supports 242, and the shaft 218 has its bearing in the supports 244, these shafts at their other ends being carried in bearing brackets 250 upon the underside of the side channel 221. Within the casings of the bearing supports 242 and 244, upon their respective shafts 216 and 218, are bevel

gears 252 and 254 meshing respectively with other bevel gears 256 and 258, the bevel gear 256 being attached to a sleeve member 260 upon the guide shaft 246, and said sleeve member having a bearing 262 in the bearing support 242 and carrying outside said support a clutch member 264. The bevel gear 258 is connected by a similar sleeve 266 to a similar clutch member 268, and has a similar bearing 270 in the bearing support 244, the clutch members 264 and 268 being opposed and being adapted to co-operate respectively with clutch members 272 and 274 upon the opposite ends of a sleeve 276 rotatably mounted upon the guide shaft 246 and connected to a sprocket wheel 278, driven by a sprocket chain 280 from the sprocket wheel 68 on the shaft 64, carried by the main frame 2.

From the foregoing description and from a study of Figures 8, 13, 14, 15, and 16, it will be seen that when the conveyor is adjusted toward the left in Figures 8, 13 and 14, the clutch member 268 will be brought into engagement with the clutch member 274, and the bevel gear 254 carried by the shaft 218 will be driven in the direction indicated by the arrow in Figure 13, and will thus drive the conveyor to discharge the accumulated material upon the left-hand side of the machine. In a similar manner when the conveyor is adjusted toward the right in Figures 8, 13 and 14, the clutch member 264 will be brought into engagement with the clutch member 272 and the bevel gear 252 carried by the shaft 216 will rotate said shaft in the direction shown by the arrow in Figure 13, thus driving the conveyor to discharge the material upon the right-hand side of the machine. Between the two extreme positions of adjustment, the clutch members 264 and 268 are out of engagement with the clutch members 272 and 274 respectively, and the transverse conveyor will not be driven. This intermediate position of the conveyor is utilized for accumulating a load sufficient to fill a truck in which the snow is to be carted away from the machine, and not only permits the machine to continue to travel along when it is not discharging into other vehicles, but also permits the cross conveyor to be stopped when one receiving vehicle is moving out of position and another is moving into position.

It will be understood that the machine may be operated either to discharge into a vehicle traveling alongside the machine when the machine is traveling, or to clear an initial path by discharging to one side of the path cleared, and that it may also be operated, when stationary, to discharge snow that has been accumulated while it is traveling. In order to prevent snow thrown upon the cross-conveyor by the inclined conveyor from falling off the cross-conveyor upon the side of the machine upon which it is not desired to discharge the snow, protecting gates 282 and 284 are preferably provided, the gate 282 being adapted to prevent the snow from falling off upon the right-hand side of the machine when the conveyor is adjusted to discharge upon the left-hand side, and the gate 284 being adapted to prevent the snow from falling off upon the left-hand side when the conveyor is discharging upon the right-hand side. A cam bar 286, carried by the conveyor frame is adapted to open one gate and permit the other to close as the conveyor is adjusted from one side of the machine to the other.

From the foregoing description it will be seen that the operation of the machine and the operation of the conveyors may be controlled independently; that the speed of travel of the machine over the ground may be varied with respect to the speed of travel of the conveyors; that one conveyor may be driven without driving the other; that each conveyor may be driven in opposite directions, the advantage of this, in the case of the elevating conveyor, being to reverse it in the event of clogging; that, moreover, in the event of clogging in the inclined conveyor, the frictional connection between the power and said conveyor will permit the conveyor to stop without injury to its driving connections, and that either or both of the conveyors may be operated when the machine is stationary. It will moreover be noted that by a simple adjustment of the transverse conveyor from one side of the machine to the other, it not only is brought into position to discharge the material brought up by the elevating conveyor upon the desired side of the machine and into any suitable vehicle drawn up or traveling alongside of said machine, but, moreover, the appropriate driving connection is automatically effected. Furthermore, by an adjustment of this transverse conveyor to a position intermediate between its two discharging positions, it is brought to rest and permitted to accumulate a load.

The machine is designed to be managed by two operators, and it will be seen that one of the operators may conveniently control the driving, steering and gathering functions of the machine, while the other, stationed upon a platform provided upon the housing 26, may conveniently control the discharging functions of the machine. The operator at the front of the machine controls the driving and steering of the machine, the adjustment of the plows to the conditions which he observes, the operation of the elevating or inclined conveyor, its speed with respect to the speed of the vehicle, and its reversal, if necessary.

When working on city streets in which snow removed from car tracks by ordinary

plows or shoveled from the sidewalks has been accumulated in piles, it is sometimes desirable to have means for removing a vertical section of one of such piles alongside of which the machine may be operated, and to this end I provide a plow 288 of the form shown in Figure 1 of the drawings, this plow having a vertical leading blade, as shown in Figure 2 of the drawings, provided with an inclined upper edge and being curved in toward the adjacent side plow above which it is located, as shown in Figure 2 of the drawings, to discharge the vertical layer of snow, which it separates from the adjacent pile, into the field of operation of the adjacent side plow. This plow 288 is connected to the vehicle frame by brace rods 290 and 292. Although it is shown in Figures 1 and 2 of the drawings as mounted upon the right-hand side of the machine, it will be understood that the invention is not restricted in this respect. It will also be understood that, if desired, suitable power-operated means located in front of the main plow 70 may be provided for facilitating the movement of the snow upon said plow 70, and that the invention is not restricted to the driving of the conveyors and the propelling of the machine from a single motor.

The term "snow" as used herein is intended to cover its usual variants with which one has to deal in cleaning city streets in the winter time.

What I claim as new is:—

1. In an apparatus of the class described, an endless inclined conveyor, comprising shovels curved with respect to the material-receiving travel of said conveyor to cut through the material edgewise and so supported upon said conveyor that they are substantially vertical throughout the inclined travel of said conveyor, and a chain to which said shovels are directly connected intermediate between the upper and lower ends of their material pushing faces, said connections comprising braces between said chain and the parts of said shovels above and below said chain, and said braces being connected to said chain at a plurality of points along said chain.

2. In apparatus of the class described, an endless inclined conveyor comprising shovels curved with respect to the material receiving travel of said conveyor to cut through the material edgewise and so supported upon said conveyor that they are substantially vertical throughout the inclined travel of said conveyor, and a chain to which said shovels are directly connected intermediate between the upper and lower ends of their material pushing faces, said shovels having arms rigid therewith and extending directly along the path of travel of said chain and connected to said chain at a plurality of points.

3. In apparatus of the class described, material gathering means, and an endless inclined conveyor for elevating the material gathered, said conveyor comprising a series of shovels, each curved with respect to the material receiving travel of said conveyor to cut through said material edgewise and so supported upon said conveyor that it is substantially vertical throughout the inclined travel of said conveyor and a chain, said shovels being rigidly connected at a plurality of points to separate links of said chain intermediate between the upper and lower ends of their material pushing faces, and being braced both above and below said chain against movement relative to the points of connection.

4. In a machine of the class described, the combination with a vehicle frame, snow gathering means comprising a plow, and an inclined conveyor adapted to elevate the snow gathered by said plow, said plow being adjustable lengthwise of said conveyor, of radius rods connecting said plow to said vehicle frame in such manner as to permit the adjustment of said plow on said conveyor but to support said plow against the snow gathering strain.

Signed at New York city, N. Y., this 16th day of May, 1918.

SAMUEL FRIEDMAN.

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What I claim as new is:—

1. In an apparatus of the class described, an endless inclined conveyor, comprising shovels curved with respect to the material-receiving travel of said conveyor to cut through the material edgewise and so supported upon said conveyor that they are substantially vertical throughout the inclined travel of said conveyor, and a chain to which said shovels are directly connected intermediate between the upper and lower ends of their material pushing faces, said connections comprising braces between said chain and the parts of said shovels above and below said chain, and said braces being connected to said chain at a plurality of points along said chain.

2. In apparatus of the class described, an endless inclined conveyor comprising shovels curved with respect to the material receiving travel of said conveyor to cut through the material edgewise and so supported upon said conveyor that they are substantially vertical throughout the inclined travel of said conveyor, and a chain to which said shovels are directly connected intermediate between the upper and lower ends of their material pushing faces, said shovels having arms rigid therewith and extending directly along the path of travel of said chain and connected to said chain at a plurality of points.

3. In apparatus of the class described, material gathering means, and an endless inclined conveyor for elevating the material gathered, said conveyor comprising a series of shovels, each curved with respect to the material receiving travel of said conveyor to cut through said material edgewise and so supported upon said conveyor that it is substantially vertical throughout the inclined travel of said conveyor and a chain, said shovels being rigidly connected at a plurality of points to separate links of said chain intermediate between the upper and lower ends of their material pushing faces, and being braced both above and below said chain against movement relative to the points of connection.

4. In a machine of the class described, the combination with a vehicle frame, snow gathering means comprising a plow, and an inclined conveyor adapted to elevate the snow gathered by said plow, said plow being adjustable lengthwise of said conveyor, of radius rods connecting said plow to said vehicle frame in such manner as to permit the adjustment of said plow on said conveyor but to support said plow against the snow gathering strain.

Signed at New York city, N. Y., this 16th day of May, 1918.

SAMUEL FRIEDMAN.

Certificate of Correction.

It is hereby certified that in Letters Patent No. 1,549,249, granted August 11, 1925, upon the application of Samuel Friedman, of New York, N. Y., for an improvement in "Snow-Removing Machines," errors appear in the printed specification requiring correction as follows: Page 3, line 94, after the word "conveying," and line 95, after the word "these," insert the words *blades or;* and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 13th day of October, A. D. 1925.

[SEAL.]

KARL FENNING,
Acting Commissioner of Patents.

Certificate of Correction.

It is hereby certified that in Letters Patent No. 1,549,249, granted August 11, 1925, upon the application of Samuel Friedman, of New York, N. Y., for an improvement in "Snow-Removing Machines," errors appear in the printed specification requiring correction as follows: Page 3, line 94, after the word "conveying," and line 95, after the word "these," insert the words *blades or;* and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

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[SEAL.]

KARL FENNING,
Acting Commissioner of Patents.