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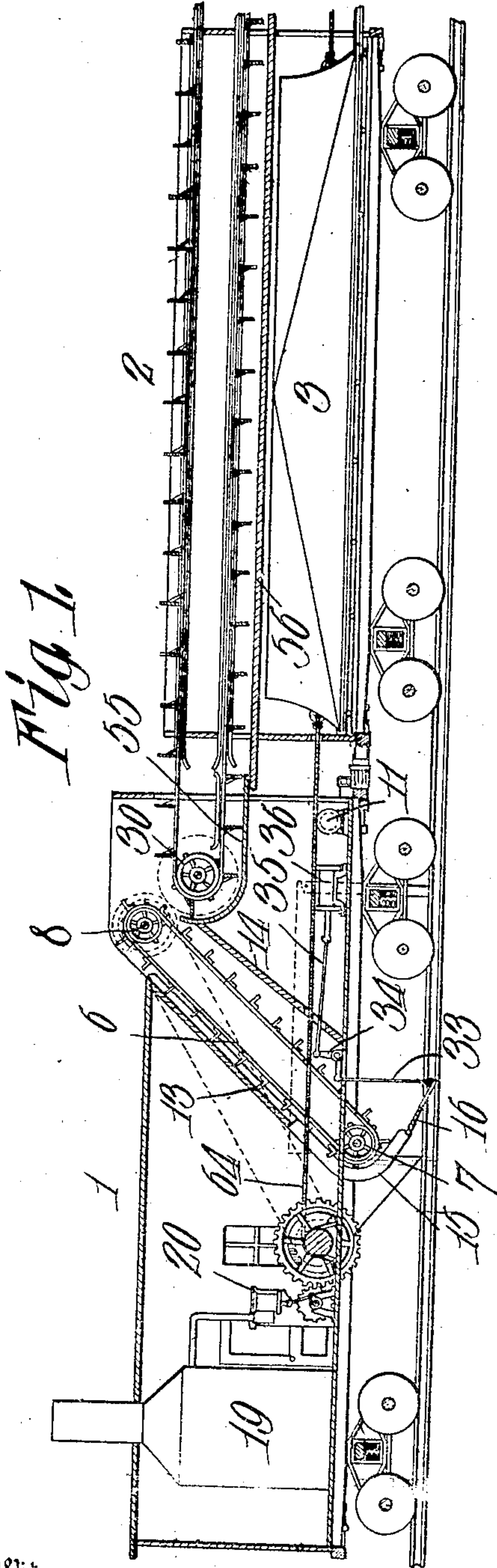
W. A. WARMAN.

PATENTED MAR. 17, 1908.

MACHINE FOR GATHERING AND TRANSPORTING SNOW.

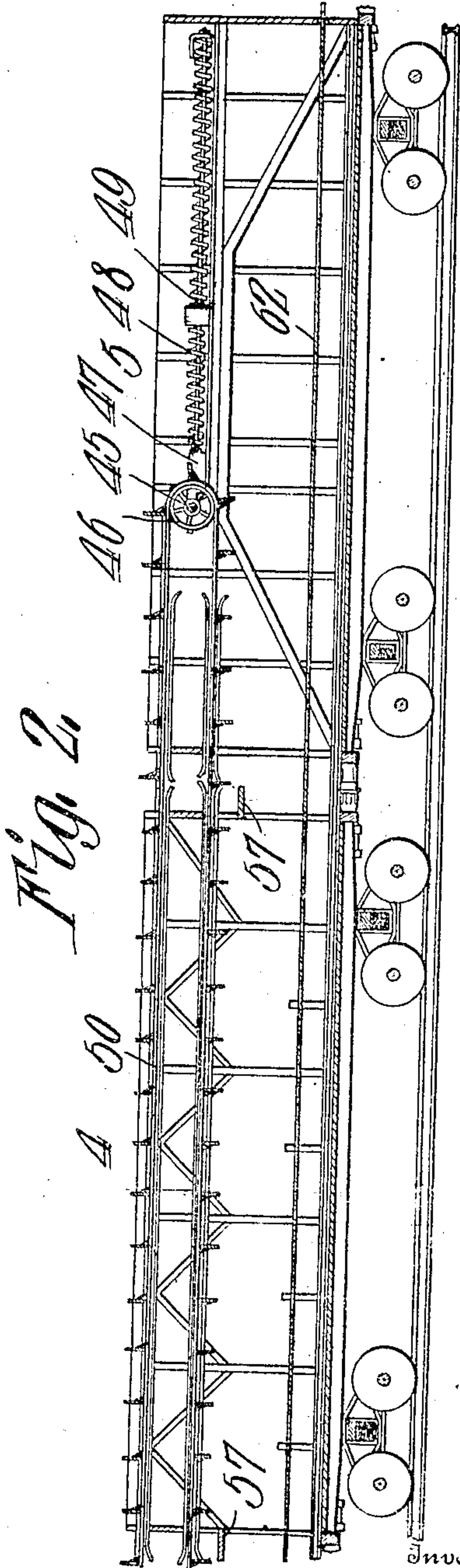
APPLICATION FILED NOV. 2, 1907.

3 SHEETS—SHEET 1.



Witnesses

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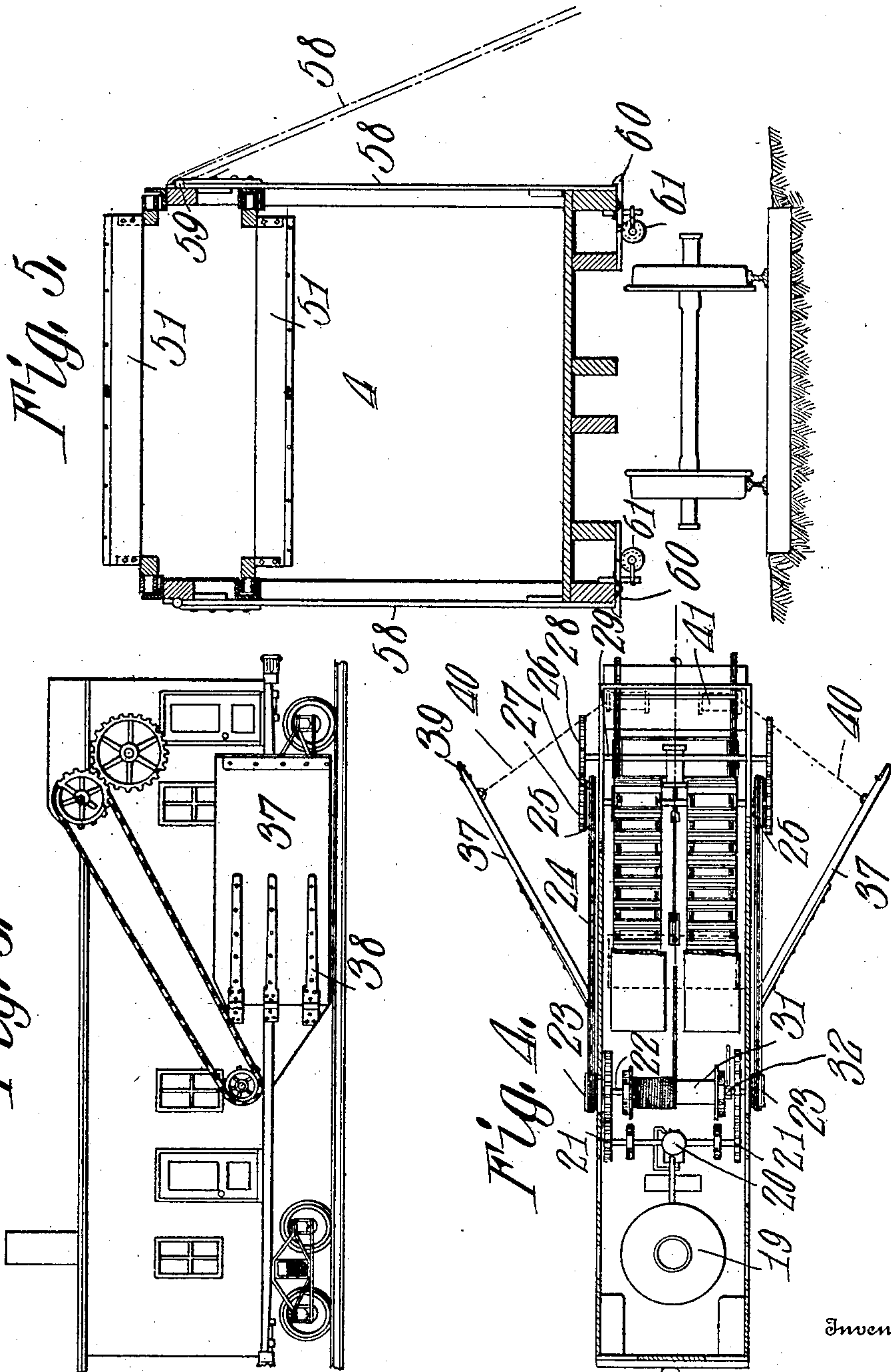
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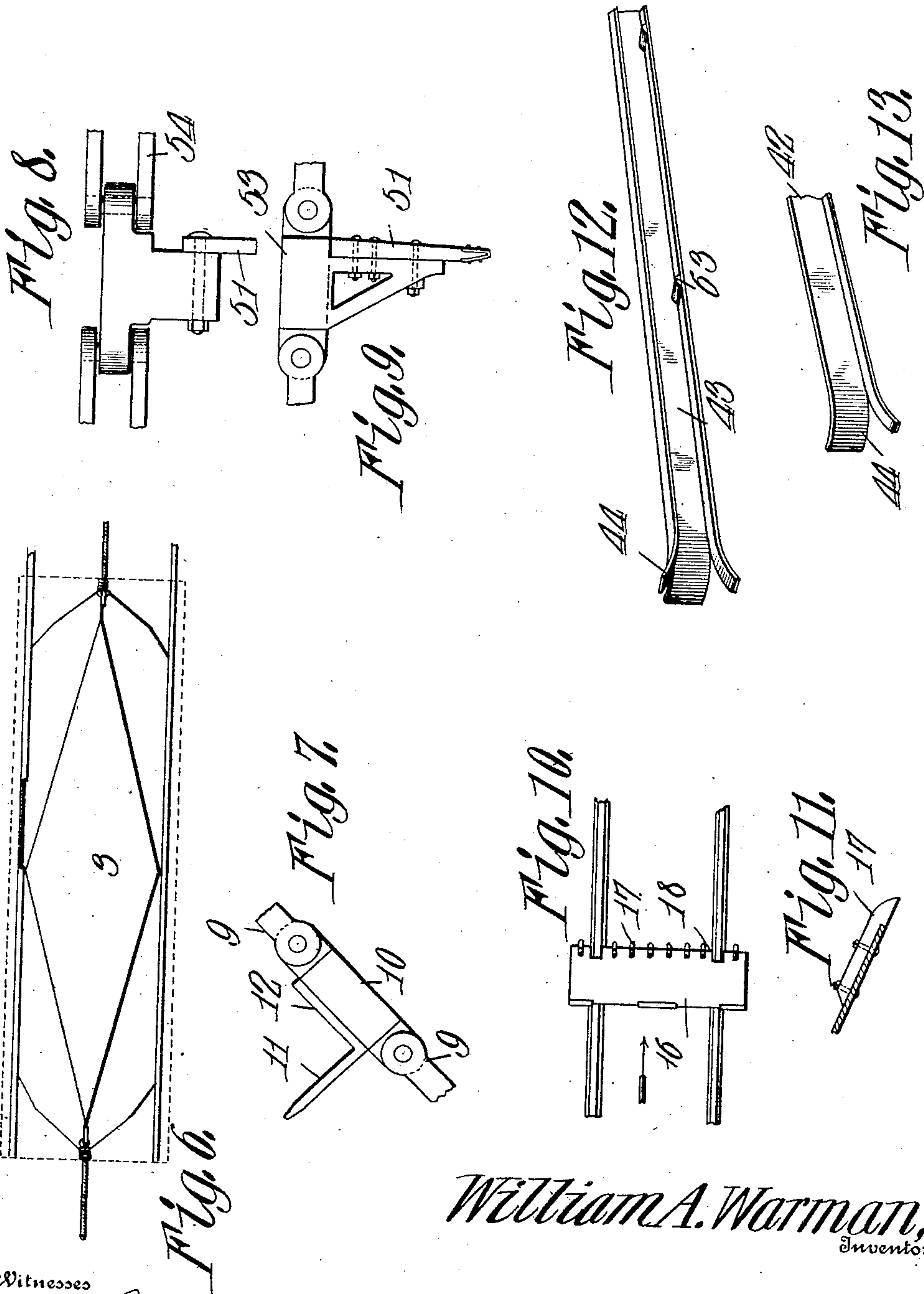
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3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

WILLIAM A. WARMAN, OF MONCTON, NEW BRUNSWICK, CANADA.

MACHINE FOR GATHERING AND TRANSPORTING SNOW.

No. 882,132.

Specification of Letters Patent.

Patented March 17, 1908.

Application filed November 2, 1907. Serial No. 400,415.

To all whom it may concern:

Be it known that I, WILLIAM A. WARMAN, a citizen of the United States, residing at Moncton, in the Province of New Brunswick and Dominion of Canada, have invented a new and useful Machine for Gathering and Transporting Snow, of which the following is a specification.

This invention has reference to improvements in apparatus for gathering and transporting snow, being designed more particularly for cleaning snow out of railroad yards and cuttings and from the tracks of street railways in cities, in all of which instances the snow must not only be cleaned from the tracks, but, because of lack of space, must often be transported for considerable distances to be deposited where it will not be in the way.

The invention comprises, essentially, a train made up of a number of cars, one of which is provided with power means for elevating snow gathered by a scoop under the car, and this elevator delivers the snow to a conveyer also driven by the source of power carried by the first car, which conveyer carries the snow so elevated to the more remote cars of the train, to be there deposited on the floors of the cars for transportation to some distant point. Upon the car next to the power car there is located a snow plow, which may be drawn through the succeeding cars when they are filled with snow and have been transported to the dumping place, so as to force the snow out from the side of the car, the snow carrying cars being provided with sides which may be removed laterally to a sufficient distance to permit the snow to fall from the cars to the side of the road-bed.

The train is drawn by a locomotive engine or, in the case of street railways, by a motor car, with the power car before referred to at the rear end of the train. As the train passes over the snow covered tracks, the fallen snow is directed toward the scoop, before mentioned, and it is elevated and carried to the forward cars of the train. After these cars have been filled with snow, the entire train is carried to the snow dump, when the locomotive or motor car is uncoupled from the train and connected to the plow only, which is drawn through the snow filled cars after the manner of removing dirt from dirt laden flat cars of dirt transporting trains. When the plow has completed its work, it is withdrawn to the car upon which it is nor-

mally carried by means of suitable mechanisms carried on the power car. The invention will, however, be best understood from the following detail description, taken in connection with the accompanying drawings forming part of this specification, in which drawings,

Figures 1 and 2, taken *seriatim*, illustrate a snow cleaning train constructed and assembled in accordance with my invention. Fig. 3 is a side elevation of the power car. Fig. 4 is a longitudinal section of the same. Fig. 5 is a cross section, on a larger scale than the other figures, of one of the snow carrying cars. Fig. 6 is a plan view of the snow plow. Figs. 7 to 13, both inclusive, are detail views.

Referring to the drawings, there is shown a car 1 which will be called the power car, another car 2 next in order to the power car, and normally carrying the plow 3, which will be hereinafter described. This car 2 is followed by one or more cars 4 designed to receive the collected snow, and at the end of the train there is a terminal car 5 to which the locomotive engine or motor car, as the case may be, is coupled. The locomotive or other prime mover for the train is not shown in the drawings, but it will be understood that it is coupled to that end of the train remote from the power car, which latter is located at the rear end of the train. The several cars are of the ordinary flat car type, but differ therefrom in certain details, which will appear further on.

In the power car 1 there is an elevator 6 extending around sprocket wheels on a shaft 7 below the floor of the car, and another shaft 8 carrying sprocket wheels at or above the roof of the car. This elevator is composed of a belt made up of a number of chain links 9 with cross bars 10 at intervals carrying blades 11 having angle bases 12 for securing the blades to the bars 10. A small section of the carrier is shown on an enlarged scale in Fig. 7.

In order to provide for certain mechanism which will hereinafter appear, the elevator is made in two parallel sections with a slight space between them, as indicated in Fig. 4. On the elevating side of the elevator belt there is a protecting casing 13 extending from the floor of the car to the roof thereof, and on the return side of the belt there is a similar casing 14.

Below the car, and constituting a continuation in effect of the partition 13, is a curved

apron 15 terminating in a hinged section 16 projecting in the direction of travel of the car when in operation. The hinged portion 16 of the apron consists of a steel plate, best shown in Figs. 10 and 11, having its working edge provided with projecting teeth 17 firmly secured thereto. The apron is wider than the space between the rails of the track and, in order that the working edge of the apron may be brought close to the ground, the section 16 is notched, as shown at 18, to fit over the treads of the rails. It will be seen that with the working edge of the apron close to the ground, that snow lying on the ground will be directed up on the apron as the car moves along in the proper direction until engaged by the elevator 13 when the snow will be carried to the upper part of the car over the drum 8 to be disposed of as will herein- after appear. The teeth 17 serve to loosen up hard snow or ice.

Housed in the rear end of the car 1 is a steam boiler 19 supplying steam to an engine 20 from which, by means of suitable gearing 21, motion is transmitted to a shaft 22 extending laterally through the car and beyond the sides of the same, and supported upon suitable journal bearings. Exterior to the car the shaft 22 carries at each end sprocket wheels 23 coupled by sprocket chains 24 to other sprocket wheels 25 upon the end of a shaft 26 carrying the drum 8. The shaft 26 likewise carries gear wheels 27 meshing with other gear wheels 28 upon another shaft 29 extending laterally through the car and carrying sprocket wheels 30 within the car and substantially of the same width as the car. The shaft 22 likewise carries a winding drum 31 which may be coupled to the shaft 32 through a suitable controlling clutch 32 when necessary. The purpose of this drum will presently appear. Since it is necessary at times to lift the hinged portion 16 of the apron this is coupled by a link 33 to a bell crank lever 34, which latter, in turn, is connected by a link 35 to the piston of a cylinder 36.

There are provided two wings 37, 37 on each side of the car secured by hinges 38 at one end to the car so as to move laterally with relation to the car. These wings 37, if made of wood, have their free edges metal bound, as shown at 39. These wings are connected by chains 40 to suitable winding engines, indicated diagrammatically by the cylinders 41. The cylinder 36 and the cylinders 41 may, of course, be operated by steam power, but, since they are used only occasionally, the steam used might ultimately condense and freeze. Therefore, since air pressure, either from the locomotive or from a special air compressor driven by the engine 20 is available, it is preferred to operate the parts driven by the cylinders 36 and 41 by air pressure. When the car 1 is

in motion in the direction already noted, the chains 40 are let out as far as desired, so that the wings spread laterally as far as may be necessary to gather the snow for a considerable distance on each side of the rails, and these wings direct the snow toward the scoop 15, to be ultimately carried by the conveyers 6 to the top of the car.

Cars number 2, 3 and 4, designated by the reference numerals 2, 4 and 5, have no roofs. In each of these cars on each side near the top is an L-shaped guide strip 42 shown in detail in Fig. 13, and below the guide strip and spaced therefrom, but parallel therewith, is a similar guide strip 43 of U-shape. At each end of the car where the guide strips 42 and 43 terminate they are expanded, as shown at 44.

In car 5 there is a shaft 45 extending laterally across the car and carrying sprocket wheels 46. The shaft 45 is mounted in bearings 47 fast on the ends of rods 48 sliding in suitable blocks on ledges on the inner faces of the sides of the car. There is a rod 48 on each side of the car, and surrounding these rods are springs 49 tending to draw the bearings and the shaft 45 toward the front end of the car, that is, in the direction away from the other cars. The strips 42 form the upper supports and the strip 43 the lower supports for an endless carrier 50 passing around the sprocket wheels 30 in car 1 and extending to and around the sprocket wheels 46 in car 5. This conveyer 50 is composed of a number of equally spaced lateral blades or strips 51, preferably of wood bolted to brackets 52 on link blocks 53, which latter are connected by other links 54. The links 53 and 54 on the two sides of the train constitute sprocket connections for the blades 51, which sprocket connections or chains travel on the guides 42 and in the guides 43, and these chains receive motion from the sprocket wheels 30 connected, as before described, to the engine 20.

In the car 1 partially surrounding the sprocket wheels 30 and concentric therewith, and then extending horizontally to the end of the car, is a conduit 55 beneath the lower run of the conveyer 50. Extending throughout the length of the car 2, and close to but beneath the under run of the conveyer 50, is another conduit 56. The snow which is carried up on the elevator 6 and passes over the drum 8 falls upon the conveyer 50 which extends into the car 1, and the under run of which travels toward the front of the train. The snow is therefore carried in the conduit 55—56 through the car 2, but, when the car 4 is reached, there being no conduit in the way, the snow falls to the floor of said car and ultimately fills the same.

If the train be provided with a number of snow receiving cars 4, then the space between the cars beneath the conveyer 50 will be provided with short bridging conduit sec-

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tions, so that after the first car has been filled with snow, the succeeding cars will become filled with the snow without danger of the snow falling between the cars. For this purpose, each snow receiving car 4 may be provided with a short conduit section 57 which would match a similar conduit section of another like car, and these sections may be differently placed on the two ends of the car so that when the cars come together, the sections will overlap and allow for the stretching and bunching of the cars due to the coupler springs. This is also provided for by the springs 49 which permit the train to stretch or bunch without bringing undue strain or producing undue slackness of the conveyer 50. Now, let it be assumed that the snow gathering train has been used in the railroad yards or in a railroad cutting or upon the car tracks of the city, and the snow receiving cars are full of snow. Under these conditions, the wings 37 are brought against the sides of the car 1, and the apron section 16 is lifted out of the way and the train is drawn by the locomotive or motor car to a suitable dumping point.

The sides 58 of each car 4 are hinged to the car near the top thereof, as shown at 59, while the bottom of these side members are held normally in place by latches 60 under the control of air cylinders 61. Now, when the loaded cars are brought to the dumping place, the latches 60 are unhooked from the door 58 and the snow plow 3 is drawn through the loaded car or cars by means of a chain or cable 62 which is secured to the locomotive or motor car after such locomotive or motor car is uncoupled from the train.

The snow plow 3 is shown with a broad base which serves to properly guide the plow through the cars and the sides slope from a sharp prow toward the other end of the plow, so as to force the snow sidewise when drawn through the cars or cars. The result is that the snow is forced out of the cars through the open sides thereof. Should the dump permit the deposition of the snow on one side only of the track, then the plow will be shaped to force the snow out one side only of the snow carrying car or cars. The car 2 is made without a floor, so that there is practically no danger of the plow freezing fast to the car as there might be if there was a floor present. The plow is supported on rollers suitably journaled in the sills of the car. At intervals along the guide strips 43 upon the supporting parts thereof are obstructing lugs 63, so that the conveyer 50 will receive shocks and jars as it travels along, acting to dislodge therefrom any snow which may tend to cling to such conveyer. After the cars have been relieved of the snow, the plow 3 may be returned to the car 2 by means of a chain or cable 64 connected to the plow and leading to the drum 31, which may then be coupled

up to the engine 20. It is, of course, evident that a suitable tender may be coupled to the rear of the train for supplying the boiler 19 with water and fuel. In the case of an electric road, the engine 20 and boiler 19 may, of course, be replaced by a suitable electric motor, and the several air cylinders may also be replaced by electric motors.

I claim: —

1. A snow gathering equipment for railways comprising a power car designed to be located at the rear of a train of cars and provided with a scoop beneath it and an elevator for conveying the snow gathered by the scoop to the top of the car, a car next adjacent to the power car and normally housing a snow plow, other cars connected to the plow car, and a conveyer receiving motion from the power car, said conveyer extending through but inoperative to the plow car and also extending through and in operative relation to the snow receiving cars.

2. A snow collecting and conveying equipment for railroads comprising a power car provided with a snow scoop and snow elevator leading therefrom to the top of the car, another car connected to the power car and housing a snow plow, still other cars for receiving snow and through which the plow is adapted to move, a conveyer extending through the several cars from the power car, said conveyer being inoperative to the plow car but in operative relation to the snow receiving cars, and a tension means for maintaining the conveyer in taut condition irrespective of the stretching or bunching of the train.

3. In a snow gathering equipment for railways, a power car provided with a snow scoop, operative in the active direction of travel of the car and having the end adjacent to the ground movable to and from the same and also provided with teeth on its active edge, means on the power car for elevating or depressing the movable section of the scoop without disturbing the remainder thereof, and an elevator for the gathered snow inclined upwardly toward the top of the car in the direction of active travel of said car.

4. In a snow gathering equipment for railways, a power car provided with a snow-gathering scoop, adjustable side wings for directing snow toward the scoop from the sides of the track, and an elevator leading from the scoop upwardly through the car in the direction of the active travel of the car.

5. In a snow gathering equipment for railways, a car without flooring for housing a plow adapted to be moved through the other cars containing snow, a conduit on said car above the space reserved for the plow, and means throughout the length of the conduit for supporting a conveyer therein.

6. In a snow gathering equipment for railways, box cars for receiving and conveying

snow, said cars having open ends and hinged sides, and having the top open and there provided with longitudinal ways for a conveyer.

7. In a snow gathering equipment for rail-
5 ways, a snow receiving and conveying car provided near its upper portion with tracks or guides from an endless conveyer with the guides for the lower runs of such conveyer provided with obstructing bosses for impart-
10 ing shocks and jars to said conveyer.

8. In a snow gathering equipment for rail-

ways, a car without flooring and provided with rollers in place of the flooring, for housing a plow adapted to be moved through other cars containing snow.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

WILLIAM A. WARMAN.

Witnesses:

R. A. FREELUT,

GUSTAVE BEUTELSPACHER.