

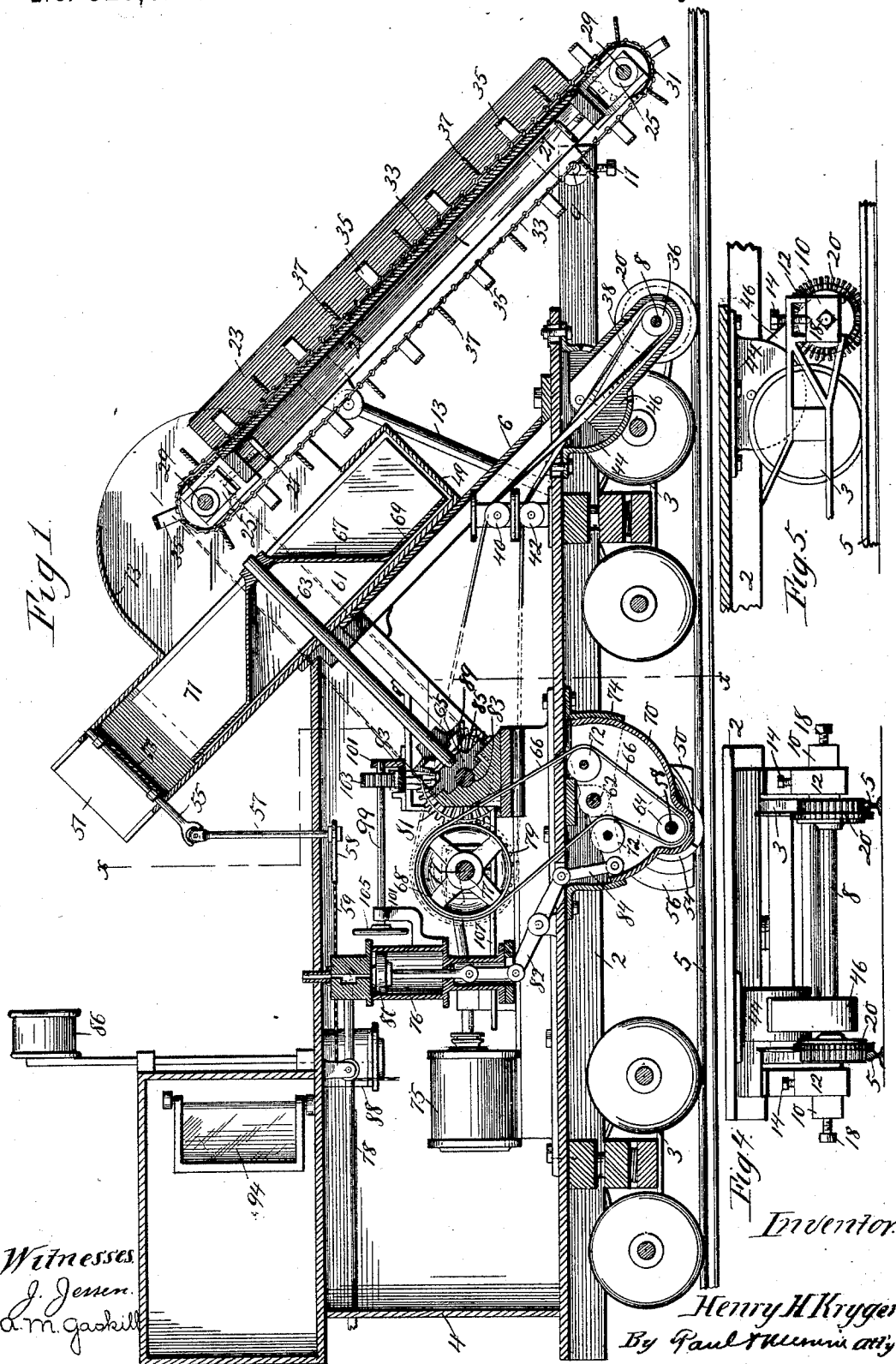
(No Model.)

3 Sheets—Sheet 1.

H. H. KRYGER.
SNOW PLOW.

No. 520,021.

Patented May 15, 1894.



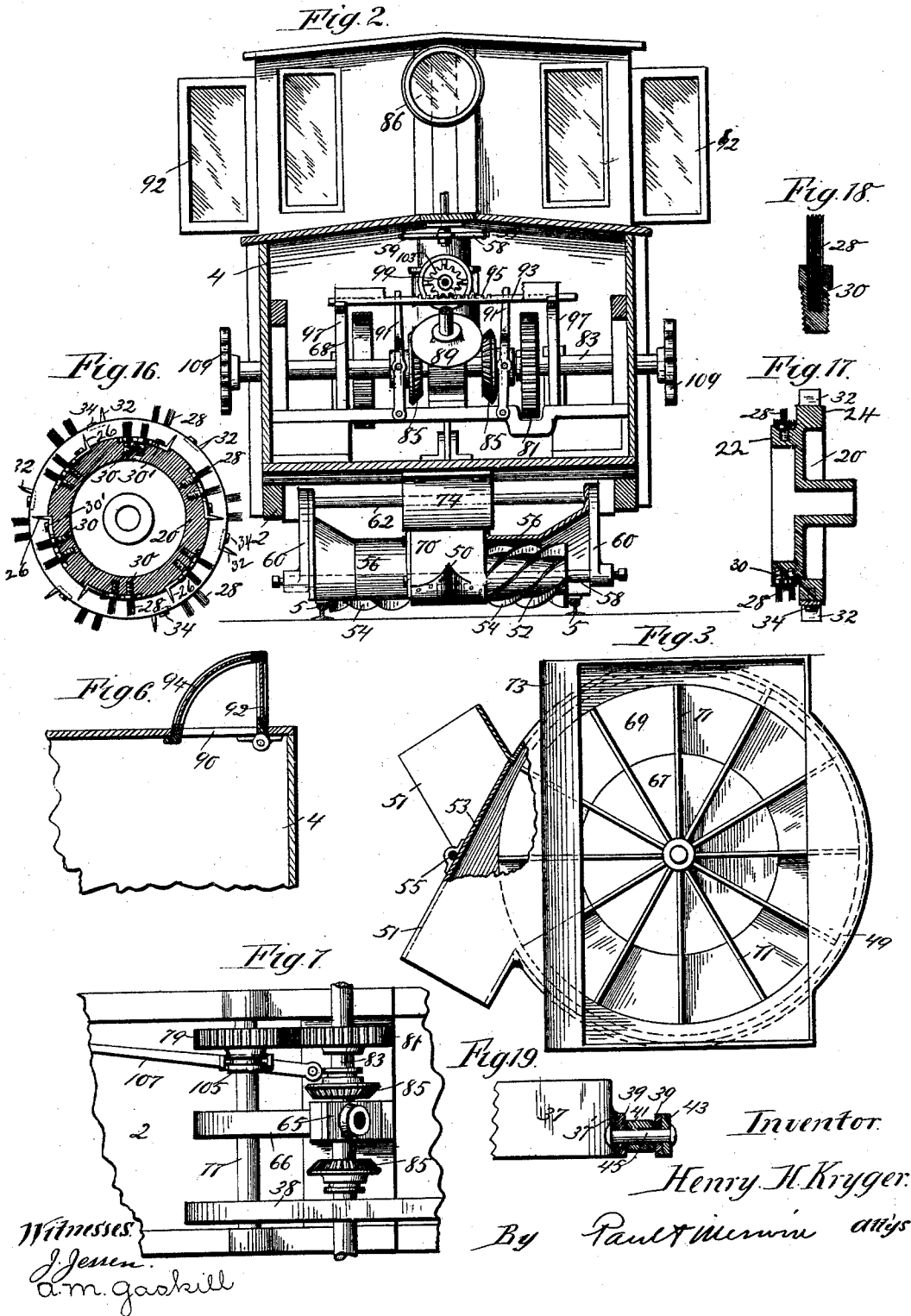
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3 Sheets—Sheet 2.

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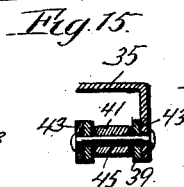
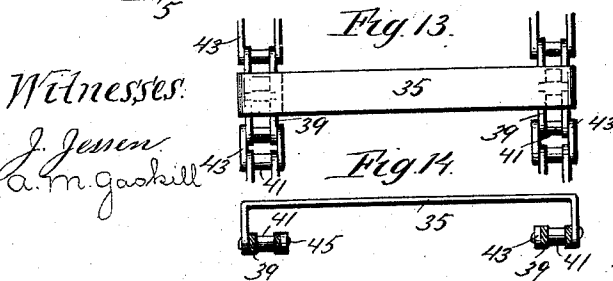
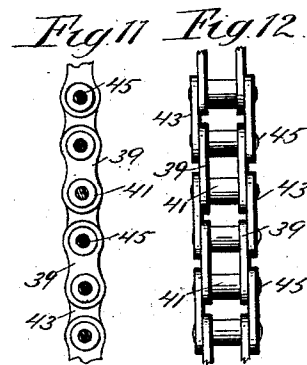
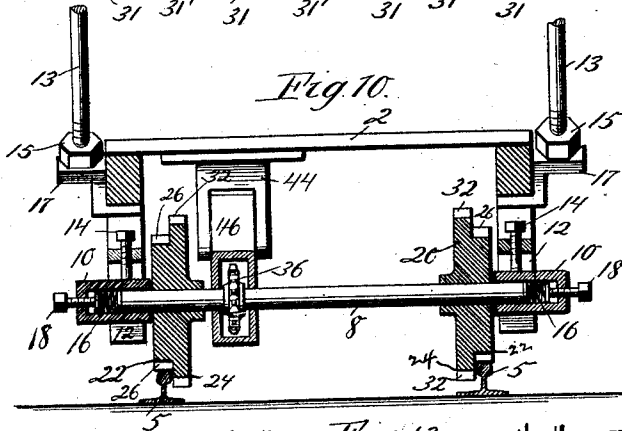
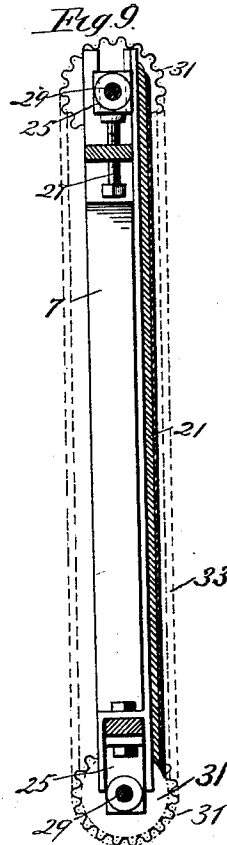
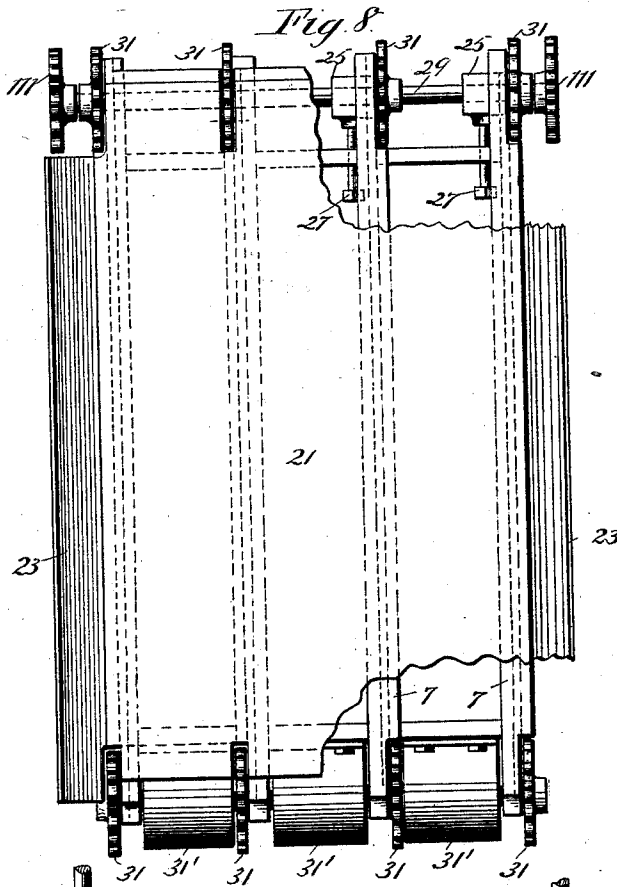
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3 Sheets—Sheet 3.

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Witnesses:

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A. M. Gaskill

Inventor.

Henry H. Kryger.

By Paul & Merwin Attys.

UNITED STATES PATENT OFFICE.

HENRY H. KRYGER, OF MINNEAPOLIS, MINNESOTA.

SNOW-PLOW.

SPECIFICATION forming part of Letters Patent No. 520,021, dated May 15, 1894.

Application filed December 4, 1889. Serial No. 332,608. (No model.)

To all whom it may concern:

Be it known that I, HENRY H. KRYGER, of Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain Improvements in Snow-Plows, of which the following is a specification.

The objects of this invention are to provide improved means for clearing railway tracks of snow, and also removing any ice that may have formed upon the tops of the rails, and cutting a channel inside of each rail for receiving the flanges of the wheels and also removing the snow or ice from the space between the rails.

The invention consists generally in the construction and combination hereinafter described and particularly pointed out in the claims.

In the accompanying drawings forming a part of this specification: Figure 1 is a longitudinal vertical section of a machine embodying my invention. Fig. 2 is a transverse vertical section on line $x-x$ of Fig. 1. Fig. 3 is a top view of the fan. Fig. 4 is a front elevation, and Fig. 5 is a side elevation of the lower part of the machine showing the flange. Fig. 6 is a detail of a portion of the cab showing the swinging window. Fig. 7 is a detail of the means for reversing the fan. Fig. 8 is a top view partly broken away and Fig. 9 is a section of the elevator. Fig. 10 is a cross section showing the construction of the flange. Figs. 11 and 12 are details of the driving chain. Figs. 13, 14 and 15 are details of the cutter showing the manner of fastening to the sprocket chain. Figs. 16, 17 and 18 are details of the flanger. Fig. 19 is a detail view of the chain and carriers.

In the drawings 2 represents the frame of the machine which is mounted upon suitable trucks 3 and is adapted to run upon a railway track 5, and 7 is an elevator frame mounted upon an adjustable pivot 9 at the forward end of the frame 2.

The pivot 9 is preferably made adjustable by means of a set screw 11. The upper portion of the frame 7 is supported by rods 13 having their upper ends pivotally connected to the frame 7 and provided at their lower ends with nuts 15 that rest upon suitable brackets 17 secured upon the frame 2. The lower ends of the rods 13 are screw-threaded

where they pass through the nuts 15 so that by turning these nuts the upper portion of the elevator frame may be raised or lowered, and by adjusting the pivots 9 the lower end of the elevator frame may be moved nearer to or farther from the track. The elevator frame is provided with a top covering 21 and with side walls 23. It is also provided both at its upper and lower ends with sliding boxes 25 and adjusting screws 27. Shafts 29 are mounted in the boxes 25 at both ends of the frame and each shaft is provided with a series of sprocket wheels 31. These sprocket wheels project through the slots in the top 21 and the frame 7. Sprocket chains 33 pass around the elevator frame over the wheels 31 and these chains carry a series of open cutters 35 and an alternating series of carriers 37. The sprocket wheels 31 and the chains 33 may be of ordinary construction, as shown in Fig. 1. I prefer, however, to use sprocket wheels having teeth provided with rounded ends and with rounded recesses between the teeth as shown in Figs. 8 and 9, and sprocket chains consisting of short links 39 having between their ends tubular cross bars 41, and short link 43 arranged outside of the links 39 and connected by pins 45 passing through the tubular cross bars 41. This chain fits closely upon the sprocket wheels and can be run at a high rate of speed without any back lash. The cutter 35 has its ends projecting inward and standing at right angles to the main portion of the cutter, and where the cutter is secured to the chain the end of the cutter takes the place of one of the outside links 43, as shown in Figs. 13, 14 and 15.

The frame 2 has erected thereon a super-structure 4 forming a car or casing within which the operating mechanism is arranged. This super-structure is preferably provided with an inclined front wall 6 upon which is supported a fan casing 49 which is open upon top and is provided with the oppositely projecting spouts 51. These spouts are provided with the outer wall 53, which is mounted upon a pivot 55, and is adapted to close either of said spouts and when it closes one of said spouts it forms the wall of the other. The pivot 55 is connected to a shaft or rod 57 that projects into the super-structure 4 and has connected to it a cross bar 58 to which are

attached cords 59 by means of which the rod 57 may be turned so as to open or close either spout of the fan casing.

Arranged in the fan casing 49 is a fan 61 5 mounted preferably on the shaft 63 which is seated upon a suitable block 65 upon the frame 2. The fan is provided with a conical center 67 and with a bottom plate 69, and with a series of radial blades 71. The fan 10 casing is arranged upon an incline and with its open top below the upper end of the elevator so that the snow and material carried up by said elevator is deposited within said casing and upon said fan. A hood 73 is preferably arranged over the top of said fan and 15 casing, so as to cause the snow carried by said elevator to be deposited in said casing. A suitable engine 75 is arranged on the frame 2 within the super-structure 4 and drives a 20 shaft 77 mounted in bearings on said frame. The shaft 77 is provided with a gear wheel 79 and this gear wheel engages a gear wheel 81 on a shaft 83. The shaft 83 also carries two bevel gears 85 that are splined thereto 25 and adapted to slide thereon. The fan shaft 63 is also provided with a bevel gear 89 and with this gear either of the bevel gears 85 on the shaft 83 is adapted to engage. A pivoted lever 91 is preferably arranged to engage 30 each of the bevel gears 85 and the ends of these levers are connected to a sliding bar 93 having a series of rack teeth 95, and mounted in suitable standards 97. A shaft 99 is mounted in suitable bearings 101 and 35 is provided with a pinion 103 and with a hand wheel 105. By turning this shaft the pinions on the shaft 83 may be moved and either one brought into engagement with the pinions on the fan shaft. By this means the 40 fan may be rotated in either direction. The gear 79 upon the shaft 77 is preferably provided with a grooved collar 105 and a lever 107 is connected therewith. This lever may be used to throw the gear 79 out of engage- 45 ment with the gear 81 on the shaft 83. By this means the fan and the elevator may be stopped when desired. The shaft 83 is provided with sprockets 109 and suitable chains or belts extend from these wheels to similar 50 wheels 111 on the upper shaft of the elevator. By the means described, as the machine is advanced the snow on the track is taken up and is carried up and then deposited in the fan casing on the rotating fan, and is then 55 thrown out of the fan casing through one of the spouts.

Arranged at the front of the machine but in the rear of the lower end of the elevator is the flanger which is designed to remove the 60 snow and ice from the top of the rails and from the space inside of the rails into which the flanges of the car wheels project. This flanger consists of an axle 8 mounted in boxes 10 that are supported in bearings 12 upon the 65 frame of the machine. Screws 14 are provided for adjusting the boxes 10. The axle 8 projects into the boxes 10 and a spring 16

is arranged in each of said boxes and bears on the end of the shaft, said boxes are also provided with the screws 18 for adjusting the 70 tension of said spring 16.

Wheels 20 are secured upon the axle 8 and each of said wheels is provided with a tread 22 and a flange 24. Secured upon the tread 75 of the wheel are preferably a series of knives 26 and a series of brushes 28. The brushes are preferably secured in suitable screws 30 that are screwed into the tread of the wheel, and independent screws 30' may be used to 80 secure the knives 26 in position, as shown in detail Fig. 16. The flanges of the wheel are of greater depth than the length of the knives 26, so that said flanges extend downward on the inside of the rail and form guides for said 85 wheels. A series of knives 32 are also secured upon the periphery of the flange of the wheel being preferably secured in place by suitable bolts 34. The axle 8 is provided with a pulley or sprocket wheel 36 from which a 90 belt or chain 38 passes around a driving pulley on the shaft 77. This chain is preferably crossed and is kept in the required position by guide pulleys 40 and 42. The belt passes through an opening in the floor of the car and around said axle as described. A 95 casing 44 having a slotted semi-circular periphery is secured to the bottom of the car and surrounds said belt. A casing 46 is pivoted within said casing 44 and extends around said axle 8 inclosing the belt and the 100 pulley or sprocket on the axle. This casing 46 within the casing 44 is of circular form so as to close the slot in the periphery of said casing, while at the same time permitting the casing 46 to turn on its pivot. 105 The casing 44 is capable of being adjusted slightly in the direction of the length of the car thus permitting the axle 8 to be adjusted vertically while the casing 46 turns upon its pivot. By this means the ice and snow will 110 be cleared from the tops of the rails and a channel will be cut inside of each rail to receive the flanges of the wheels. As the axle and the wheels carried by it are controlled by the springs, both the axle and the wheels 115 may have a slight movement thereby permitting the flanger to accommodate itself to irregularities in the track.

I also provide means for removing the snow from the space between the tracks and throw- 120 ing it outside of the rails. This device consists of a narrow plow 50 arranged at the center of the machine and drums 52 having spiral blades 54 arranged upon opposite sides of said plow. The blades upon one drum run in the 125 opposite direction from those on the other. The snow at the center is thrown toward the rails by the plow 50, and the revolving drums which are arranged in a suitable casing 56 carry the snow to and throw it over the rails. 130 The drums 52 are secured upon a shaft 58 that is mounted in suitable arms 60 pivoted upon the shaft 62. The casing 56 which has preferably flaring ends is also secured upon

said shaft. The shaft 58 is provided with a driving pulley 64, preferably arranged at the center of the shaft. A belt or equivalent device 66 passes around said pulley, being driven by a pulley 68 on the shaft 77. The pulley 64, and the portion of the belt that comes below the frame 2 is inclosed in a casing 70 that is also mounted upon the shaft 62. The upper portion of this casing is of curved form, the center of the curve being the center of the shaft 62. This casing swings upon or turns with this shaft in unison with the arms 60 carrying the shaft 58. The inner ends of the casing 56 are also secured to the sides of the casing 70, as shown in Fig. 2, and the narrow plow 50, hereinbefore referred to, is also secured to the front of said casing. The casing 70 also carries the guide pulleys 72 over which the belt 66 passes. A stationary casing 74 is secured to the under side of the frame 2 and extends down and incloses the upper edges of the casing 70, thereby preventing the snow from getting in to the interior of said casing. As the casing 70 is turned upon its axis, the shaft 58 and the drums and plow are raised or lowered. For the purpose of moving these parts, and also holding the drums and the plow to their work with a yielding pressure, I prefer to provide a cylinder having a piston fitting therein and connected with said frame, and arranged to have said piston moved in the cylinder by the introduction of compressed air to the cylinder. For this purpose I prefer to arrange a cylinder 76 within the super-structure or car, and to provide it with a pipe 78 by means of which compressed air may be introduced from any suitable source of supply. A piston 80 is arranged within this cylinder and is connected to a pivoted lever 82 which is connected by a link or rod 84 with the casing 70. By this means when it is desired to raise the casing 70 air is forced into the cylinder above the piston and forces said piston down and raises the frame or casing and the shaft carried by it. When it is desired to lower the shaft and the drums the air is exhausted from said cylinder or air is forced into the cylinder under the piston, and thereby the plow and the cutters on the shaft are held down to the work while they are at the same time capable of yielding slightly if the plow or the cutters strike a very hard substance by which they might otherwise be injured.

I also prefer to provide an adjustable head-light 86 arranged upon the super-structure in the rear of the elevator and fan casing and capable of being raised so as to be above the top of the fan casing and of being lowered when it is necessary to pass under the bridges. A cylinder 88 is preferably arranged within the car, and this may be provided with a piston and operated by means of compressed air for the purpose of raising and lowering the light, or any other suitable means may be used for raising and lowering this light.

I also prefer to provide means permitting

the pilot to look out beyond the side of the elevator. For this purpose I provide an opening 90 in the wall of the car, and I provide a swinging window 92 that is arranged to swing out at right angles with the wall of the car, as shown in Figs. 2 and 6, or to swing in so as to stand in line with said wall. A curved window 94 is secured to the window 92 and together they form an inclosure substantially in the shape of a quadrant. When the pilot desires to look beyond the elevator the quadrant shaped window is swung out in the position shown in Figs. 2 and 6, and the pilot can then look out through this window either to the front or to the rear of the machine.

In some instances I prefer to construct the carriers 37 of the elevator with ends turned at right angles to the main portion of the carrier and permitting said ends to take the place of the inner links 43 of the chain, as shown in detail in Fig. 19.

The operation of this machine will be readily understood from the foregoing detailed description of the construction.

The main body of the snow is removed by the elevator which carries it up and deposits it in the revolving fan by which it is thrown to the side of the track. The fan may be rotated in either direction and the snow discharged at either side of the track preferred. The rotary flanger arranged at the front of the machine and each side thereof cleans the snow from the tops of the rails and cuts a channel inside of each rail to receive the flanges of the wheels. The rotating shaft provided with the spirally arranged cutters or blades takes up the snow from between the rails and throws it over the rails.

In some instances instead of making the sprocket wheels at both ends of the elevator adjustable, I may make the shaft at the lower end of the elevator stationary, as shown in Figs. 8 and 9, and arrange upon said shaft between the sprockets a series of drums 31', as shown in Fig. 8. These drums prevent the snow from dropping between the sprocket wheels as it is being carried up by said elevator. I may also, if preferred, provide the carrier 37 with an end 37' extending at right angles to the main portion of the carrier and secured to the driving chain so as to take the place of one of the inside links 43, as shown in detail in Fig. 19.

I claim—

1. The combination in a snow plow, of an inclined elevator arranged at the forward end of the plow, a fan casing arranged beneath the upper end of said elevator, and provided with an open top and with oppositely extending discharge spouts, a valve or cut-off arranged to close either of said spouts, a fan arranged in said casing and means for rotating said fan in either direction.

2. In a snow plow the combination with an inclined elevator, of an inclined fan casing arranged beneath the upper end of said elevator and provided with an open top, and

with oppositely extending discharge spouts, a valve or cut-off arranged to close either of said spouts, and a fan arranged in said casing and adapted to be rotated in either direction.

3. In a snow plow the combination of the inclined adjustable elevator frame provided with sprocket wheels at its upper and lower ends, and provided with endless chains passing around said sprocket wheels, and having suitable cutters and carriers attached thereto, a fan casing arranged beneath the upper end of said elevator frame and provided with an open top, and with oppositely extending discharge spouts, a valve or cut-off arranged to close either of said spouts and a fan arranged within said casing and adapted to be rotated in either direction, substantially as described.
4. The combination with a suitable car, of means for cleaning the snow or ice from the tops of the rails of the track consisting of suitable wheels 20 provided upon their periphery with a series of knives arranged over the tops of the rails, and a laterally movable spring controlled shaft upon which said wheels are mounted, and means for rotating said wheels.
5. The combination with a suitable car, of means for clearing the snow or ice from the tops of the rails and cutting channels inside of the rails for receiving the flanges of the wheels consisting of suitable wheels 20 provided with the flanges 24 arranged to project inside of the rails and provided with a series of knives upon the periphery of said flanges, and with another series of knives upon the periphery of the main portion of the wheels over said rails, the length of said last named series of knives being less than the depth of said flange, and means for rotating said wheels, substantially as described.
6. The combination with a suitable car, of a rotating flanger adapted to cut channels inside of the rails of the track, and a shaft by which said flanger is carried suitable springs engaging said shaft and permitting a lateral movement thereof, substantially as described.
7. The combination with a suitable car, of the flanger consisting of the wheel 20 having a series of cutters and a series of brushes arranged upon its periphery, and provided with the flange 24 also having upon its periphery a series of cutters and a series of brushes, and a laterally movable spring controlled shaft upon which said wheels are mounted substantially as described.
8. The combination with the axle 8 mounted in the adjustable boxes 10 and provided with the driving wheel 36, of the pivoted casing 46

inclosing said driving wheel, and a belt or chain extending around said wheel and also inclosed by said casing.

9. The combination with the frame 2, of the axle 8 supported in adjustable bearings on said frame and provided with the flanger wheels 20, of the casing 44 secured to said frame, the casing 46 pivoted in said casing 44, the driving wheel 36 on said axle arranged within said casing 46, and a suitable driving belt or chain passing around said driving wheel and inclosed by said casing.

10. Means for removing the snow from the space between the rails of railway tracks comprising in combination a suitable frame a transverse shaft arranged below said frame and provided with spirally arranged knives or cutters adapted to project into the space between said rails, and means for rotating said shaft, substantially as described.

11. The combination with the frame 2, of the transverse shaft 62 arranged below said frame, the arms 60 and the casing 70 supported upon said shaft, shaft 58 mounted in said arms 60 and provided with the spiral knives 54, a pulley on said shaft within said casing, and a chain or belt passing through said casing and around said pulley, substantially as described.

12. The combination with the frame 2, of the transverse shaft 58 mounted in swinging arms beneath said frame, and provided with the two series of oppositely arranged spiral blades or cutters, and means for rotating said shaft, substantially as described.

13. The combination with the plow having the super-structure 4 provided with openings in its side wall, and the quadrant shaped windows pivoted in said openings, substantially as described.

14. The combination in a device of the class described, of a transverse shaft provided with spirally arranged knives or cutters, a swinging support in which said shaft is mounted, an air cylinder and a piston arranged therein and connected with said swinging support for the purpose specified.

15. The combination in a device of the class described, of a transverse shaft provided with knives or cutters, a swinging support in which said shaft is mounted, an air cylinder and a piston arranged therein and connected with said swinging support, as and for the purpose specified.

In testimony whereof I have hereunto set my hand this 25th day of November, 1889.

HENRY H. KRYGER.

In presence of—

A. C. PAUL,
BESSIE BOOTH.