

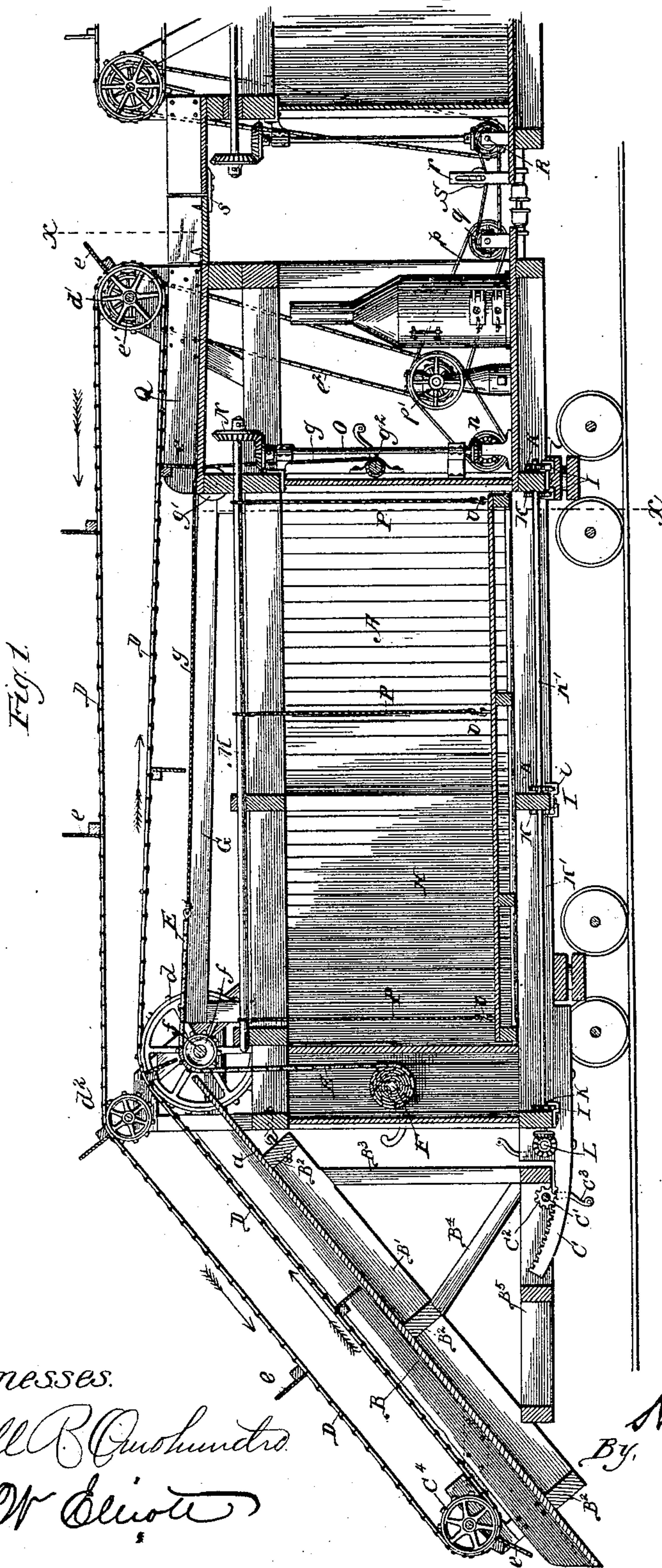
(No Model.)

3 Sheets—Sheet 1.

H. S. ROLLINS.  
SNOW-PLOW.

No. 344,405.

Patented June 29, 1886.



Witnesses:

Will B. Quahndra

W. W. Elliott

Inventor:

N. S. Rollins

By:

Jno. G. Elliott

Atty.

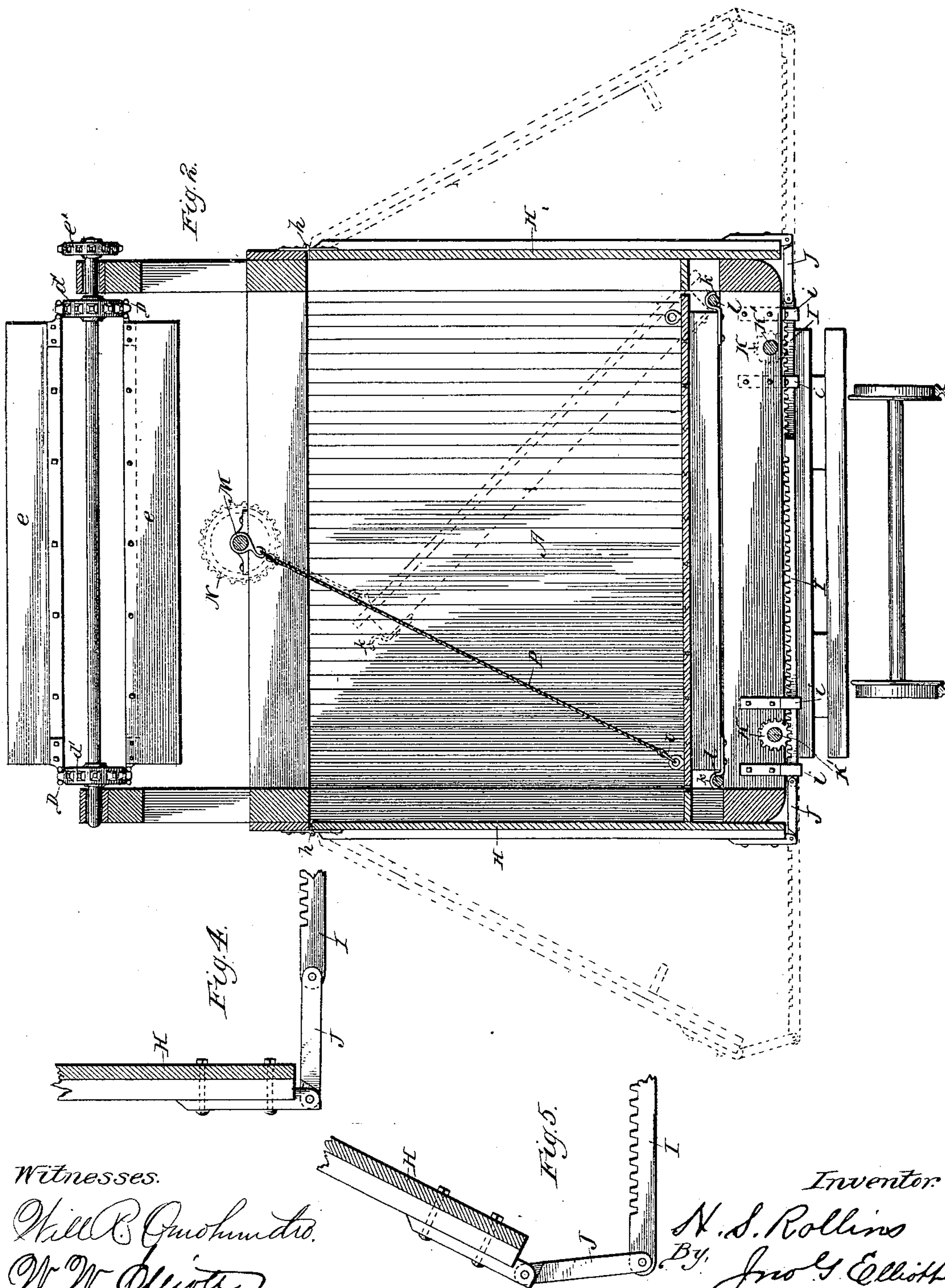
(No Model.)

3 Sheets—Sheet 2.

H. S. ROLLINS.  
SNOW PLOW.

No. 344,405.

Patented June 29, 1886.



Witnesses.

Will B. Guohundro.  
W. W. Elliott

Inventor.

H. S. Rollins  
By Jno. G. Elliott  
Atty.



(No Model.)

3 Sheets—Sheet 3.

H. S. ROLLINS.  
SNOW PLOW.

No. 344,405.

Patented June 29, 1886.

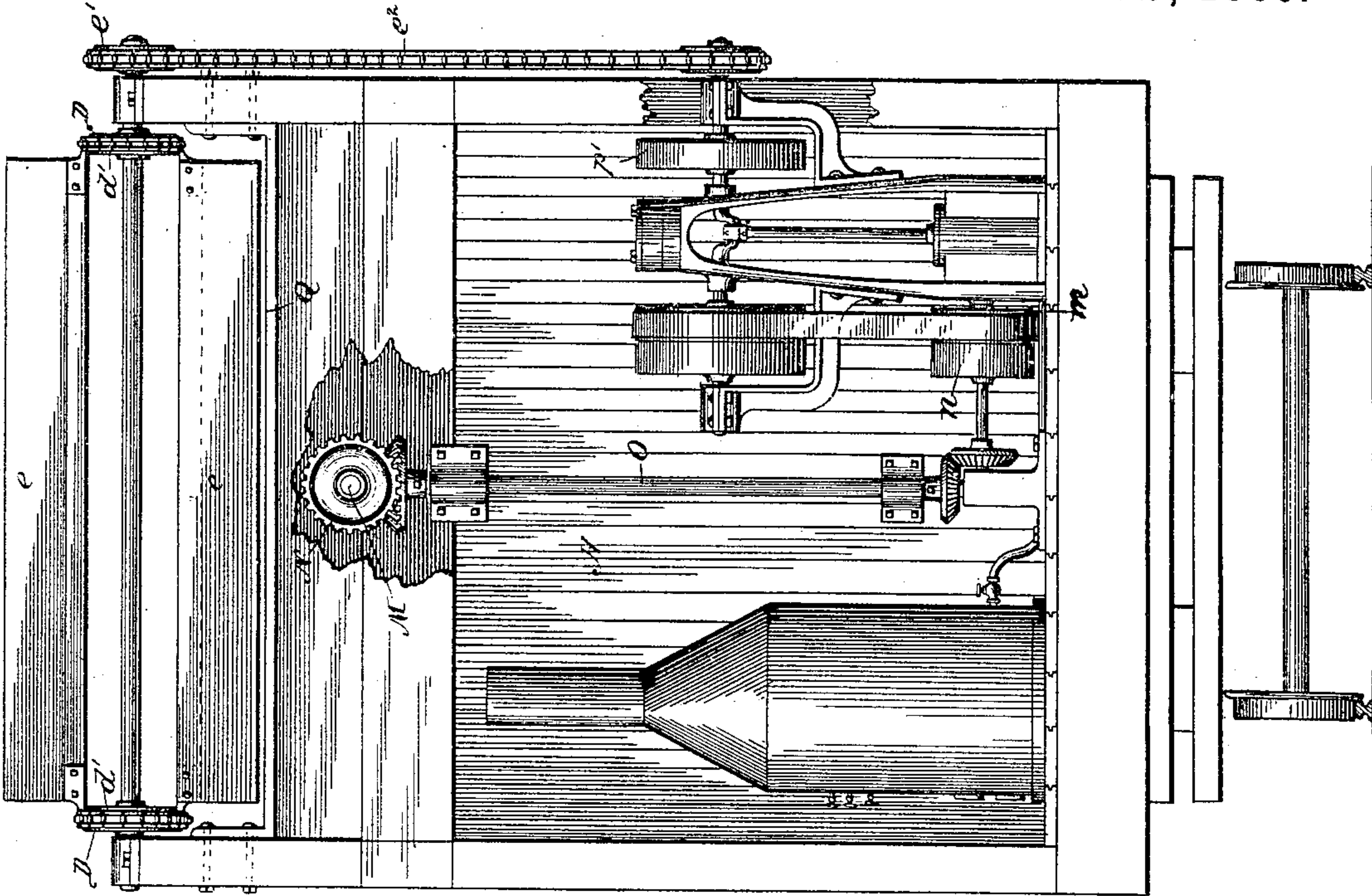


Fig. 3.

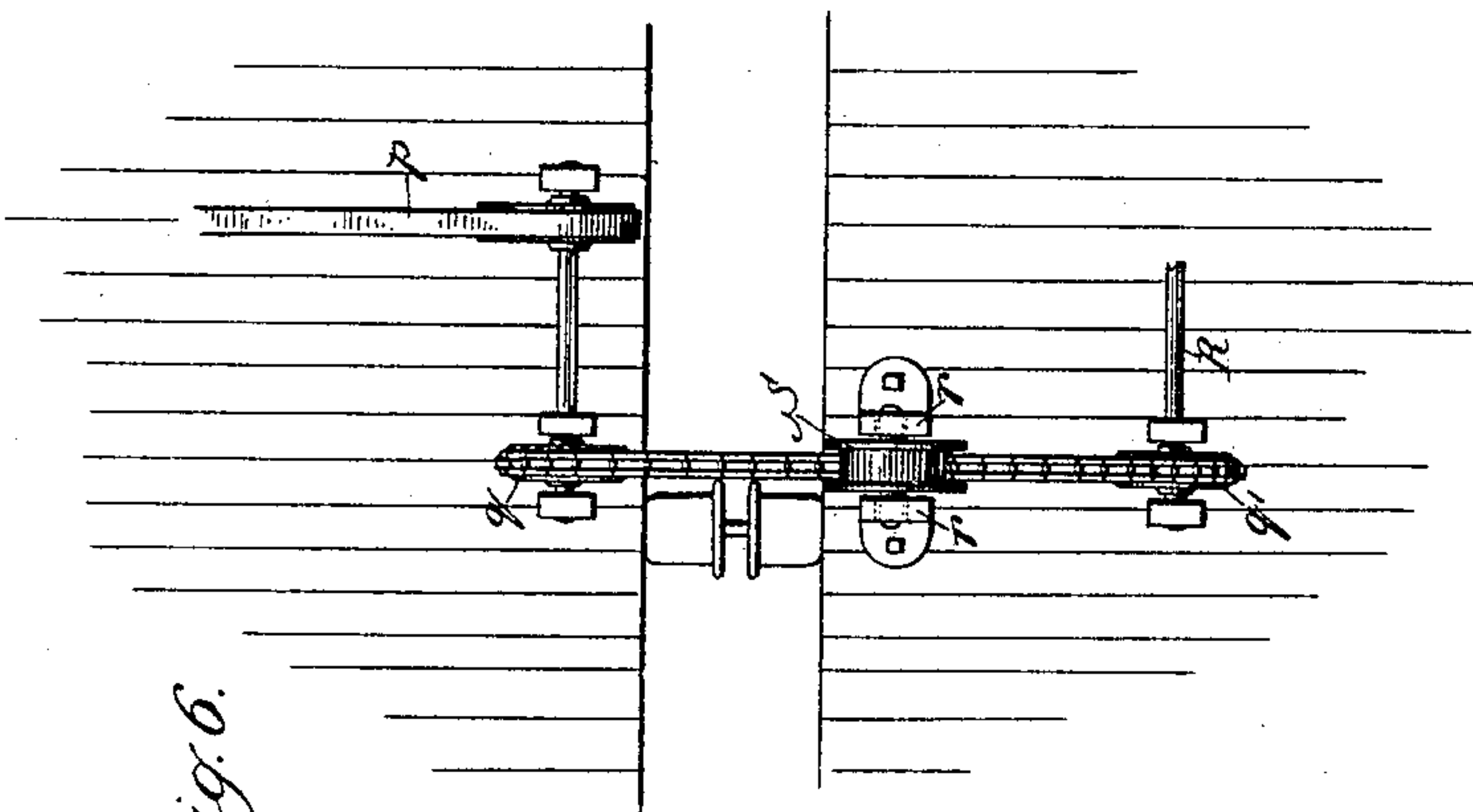


Fig. 6.

Witnesses.

Will B. Quahndro.  
W. W. Elliott

Inventor.

H. S. Rollins  
By Jno. G. Elliott  
Atty.



# UNITED STATES PATENT OFFICE.

HARRISON S. ROLLINS, OF CHICAGO, ILLINOIS.

## SNOW-PLOW.

SPECIFICATION forming part of Letters Patent No. 344,405, dated June 29, 1886.

Application filed September 5, 1885. Serial No. 176,222. (No model.)

*To all whom it may concern:*

Be it known that I, HARRISON S. ROLLINS, a citizen of the United States, residing in Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Snow-Plows, of which the following is a specification.

This invention relates to improvements in snow-plows, in which a suitably-constructed car or vehicle is propelled by a locomotive, and provided with mechanism adapted to take up and elevate the snow and deposit it in the said car and other cars coupled therewith, to be unloaded at some point remote from the place of loading.

The objects of this invention are to produce a machine which shall automatically take up the snow from railway-tracks, cuts, &c., and load it into a car or number of cars by the employment of but one elevating-plow; to provide means for transmitting power to all the operating parts of the several cars from one source; to provide means for preventing the snow from packing in the car while being loaded; to provide means to facilitate the unloading of the cars, and to provide certain details of construction hereinafter described and illustrated in the accompanying drawings, in which—

Figure 1 is a vertical longitudinal section through a car and plow embodying my invention, showing the manner of transferring power to the next car attached thereto; Fig. 2, a transverse vertical section on line  $x x$ , Fig. 1; Fig. 3, a rear elevation of the car, showing the manner of applying power to the operating parts thereof; Figs. 4 and 5, enlarged detail views of the adjustable connection between the hinged sides and the actuating rack-bar thereof; Fig. 6, a detail plan view of a portion of the adjoining platforms of two cars, showing the manner of transferring power from one car to another.

Similar letters of reference indicate the same parts in the several figures of the drawings.

A indicates a car or vehicle in which the snow is designed to be carried, the construction of which will hereinafter be more fully explained. Hinged to the front end toward the top of this car at  $a$  is a plow or inclined chute, B, up which it is designed to force the

snow previous to being deposited in the car. This chute or plow, forward of its hinge-connection with the car, has on its under side a frame composed of parallel side bars,  $B'$ , and transverse bars  $B''$ , through the upper one of which is passed an eyebolt, constituting one-half of the hinged connection between the plow and car. Suspended below and from this frame by a perpendicular standard,  $B^3$ , and oblique braces  $B^4$  is a horizontal rectangular frame,  $B^5$ , composed of side and cross bars, like the frame just above described, the two said frames and the standard  $B^3$ , as a whole, and in side elevation forming a triangle. Secured to and projecting from the under side of the car is a segment rack-bar, C, and passing transversely through the frame  $B^5$  is a shaft,  $C'$ , on which is a pinion,  $C^2$ , meshing with the rack, which by this means constitutes a base-support for the triangular-frame, and hence the plow, and provides for swinging the plow on its hinged connection with the car, so as to adjust the plow relative to the plane of the road-bed. This arrangement is designed to render the elevating-chute adjustable, in order that its point of entrance into the snow may be varied, whereby the plow may be adapted for working upon snow of differing depths, and also that the capacity of the buckets in elevating may not be so much exceeded by the quantity of snow supplied thereto as to interfere with their perfect operation.

The adjustments of the chute may easily be accomplished by operating the crank-handle  $C^3$ , secured on one end of the cross-shaft  $C'$ , for when this shaft is rotated the pinion  $C^2$ , rigidly secured thereon, will work and travel upon the segment rack-bar C, and thereby cause the triangular-shaped frame supporting the chute to swing upon its pivot or hinged connection between it and the frame of the car, and elevate the lower forward end of the chute.

Journaled in suitable bearings provided at the lower forward end of the chute are sprocket-wheels  $C^4$ , around which pass endless sprocket-chains D, said chains passing thence up the incline in a plane approximately parallel to the floor of the chute, and continuously over and around sprocket-wheels  $d d' d^2$ , suitably journaled in a fixed portion of the frame of car A. This chain D is provided at intervals with buckets  $e$ , rigidly secured thereto, and



extending transversely across the machine, which buckets are adapted to work between the sides of the chute, in order to force the snow up the chute and into the body of the car, and said chain is caused to travel around the sprocket-wheels before mentioned by means of power applied to the shaft of the wheel  $d'$ , located at the rear of the car, through the medium of a sprocket-wheel,  $e'$ , and chain  $e^2$ , geared or connected with a stationary engine located on the rear platform of the car, as more clearly illustrated in Fig. 3. The direction of travel of this bucket-chain is indicated by arrows in Fig. 1, and several important advantages are derived from such travel, as I will now proceed to explain.

In machines as at present constructed the bucket-chain travels in a direction the reverse to that shown herein, and in consequence the buckets enter the snow with a rising or upward movement, lift the snow, and carry it bodily up to the point of discharge. Several objections arise in consequence of such manipulation of the snow which my device is designed to overcome, among which are that in a light fall of snow such a machine would be virtually useless, as by reason of the direction of travel of the buckets they would simply act as fans or shovels to force a part of the snow along until possibly enough might finally be heaped up to partially fill the bucket. Although the buckets might be made to dip and travel dangerously close to the track, still such means would not overcome the objection cited, nor render the machine of any practical value. Then, again, even should the buckets succeed in picking up the snow, as they undoubtedly would in a deep snow, they can only discharge at the end of the carrier, and hence the point of delivery to the car is fixed, and some auxiliary actuating means must be employed to distribute the snow or discharge it at some remote point, and without such auxiliaries it would be impossible to load a car with any degree of uniformity or avoid packing the snow. Now, it is obvious that by the use of my device in connection with the apron about to be described, all of these objections will be overcome, for the direction of travel of my bucket-chain is such that the buckets do not lift the snow bodily, as occurs in the above-described machine, but, on the contrary, immediately after their entrance into the snow and throughout the time intervening between that time and the discharge of the snow into the car, they force or rather push all the snow coming within the radius of their travel or turn about their forward axis on the sprocket-wheel secured to the forward end of the chute up the incline chute and along the apron or way, as hereinafter described, and in addition to this the snow can be discharged from the buckets at any point along the length of the car, or be carried entirely over the car by means of the aforesaid apron and way and deposited in the next adjoining car or any car connected therewith.

The snow after being forced up the incline would ordinarily, after reaching the end of the incline, be precipitated into the body of the car, falling first and filling the forward end of the car until the top of the snow reached the level of the bottom of the buckets  $e$ , after which each additional bucketful would slide along the top of the snow until it reached the rear inclined side of the snow already loaded. Of course by this means the snow would soon become so tightly packed in the body of the car that it would be difficult of removal therefrom. In order to obviate this difficulty and thereby render the snow easy of removal from the car, I have provided an adjustable apron,  $E$ , stored upon a suitable windlass,  $F$ , within a chamber at the forward end of the car. This apron is preferably composed of narrow slats secured at either end to sprocket-chains, and is of a width to extend entirely across the body of the car transversely, the said sprocket-chains engaging small sprocket-wheels  $f$ , loosely hung upon the shaft of sprocket-wheel  $d$ . After passing around these sprockets  $f$  the ends of the slats bear and slide upon longitudinal beams or stringers  $G$ , secured to a stationary portion of the car-frame, and the weight of the snow sliding over the apron will thus be taken up and sustained by the car-frame and the snow contained in the car relieved from the said weight.

For the purpose of adjusting the apron so that the snow may be deposited in the body of the car at any desired point, and thus permit the uniform filling or loading of said car, I have provided cords or cables  $g$ , secured at one end to the rear end of the apron  $E$ , and extending rearwardly over pulleys  $g'$  down to a cross-shaft or windlass,  $g^2$ , located at some suitable point on the rear end of the car and operated preferably by a crank-handle, as shown. By this means the operator can watch the loading of the car, and as the forward end of the car fills, by operating the crank-handle, he can cause the end of the apron to advance in the direction of travel of the bucket, and thereby change the point of delivery of the snow to the car as often as desired, so that the car may be filled evenly from end to end without packing the snow therein.

After the apron is drawn out to extend over the full length of the car, and it is desired to withdraw or store the apron again, the windlass  $F$ , upon which it is secured, may be operated by the crank-handle secured to the end thereof, and the apron snugly wound into its place upon the windlass; or, as hereinafter described, the apron may be used as a continuation of the chute, over which, after the first car is filled, the snow may be moved rearwardly to and discharged into the next car. I consider the employment of this apron a very essential feature of my invention in rendering it a practical success, and therefore do not limit myself to the particular form of apron herein described; nor do I limit myself to the mechanisms shown for operating it, for I deem



any form of apron or means for operating it for the purpose herein described to come within the scope of my invention.

To facilitate the unloading of the car after being loaded in the manner described, the sides H of the car are hinged at their upper edge to the frame at h, as shown in Fig. 2, and adapted when actuated to swing outwardly from the car to the position shown by dotted lines in said figure. This is accomplished by means of rack-bars I, sliding in suitable guides, i, secured to the under side of a cross-timber of the frame, said bars being connected with the sides at their outer ends by a hinged connection composed of links J, having offsets near their upper ends adapted, when in the position shown in Fig. 5, to abut against corresponding shoulders formed on the other member of the said hinged connection, and thus limit the outward movement of the rack, and consequently the sides. Any desired number of these rack-bars may be provided, secured at suitable points to the timbers of the car-frame, and all may be actuated simultaneously by pinions K, secured at corresponding intervals upon shaft K', extending the length of the car. In Fig. 1 I have shown this shaft projecting sufficiently forward of the frame to have secured thereon a bevel-gear, into which meshes a corresponding gear secured upon a cross-shaft, L, to the end of which cross-shaft is secured a crank-handle, with which to actuate the shaft by hand; but it is obvious that steam-power might be applied to this shaft in any well-known manner, and hence such change would be no departure from the spirit of my invention.

When the sides are swung out upon their hinges, as shown by the dotted lines in Fig. 2, a part of the snow will, by reason of its gravity, be precipitated through the opening thus formed; but a part of the snow will still remain on the bottom or floor of the car, and in order to expel this remaining snow through one of the said side openings and without the employment of hand-power in shoveling, &c., the bottom of the car is constructed so as to tilt up from either side when sufficient power is applied thereto, as hereinafter explained, and thus form an inclined plane, down which the remaining snow will slide by reason of its gravity. To accomplish this object, the bottom is provided with hooks k, bearing upon and partly encircling longitudinal shafts or rods l, secured to a stationary portion of the frame, thus constituting a hinge-connection between the bottom and the frame, the two parts of which hinge are separable from each other, and hence either pair of members may act in turn as a hinge, upon which the bottom may swing, as illustrated by dotted lines in Fig. 2.

In order to lift the bottom and swing it upon its hinge to discharge the snow remaining thereon, considerable power is required, and to supply which I have provided a shaft, M, located near the top and in the center of the

car, having its bearings at suitable points upon the frame of the car, and carrying upon its end a bevel-gear, N, meshing with a corresponding gear provided upon the upper end of a vertical shaft, O, as more clearly illustrated in Fig. 3. A rotary movement is imparted to the shaft from the stationary engine located on the rear platform of the car, which is connected with the said shaft in any suitable or well-known manner, but for the purpose of illustration I have shown the lower end of said shaft provided with a beveled gear meshing with a corresponding gear on a short horizontal shaft, said shaft having on its other end a belt-pulley, which is driven from a belt-pulley secured upon the drive-shaft of the engine.

As the shaft M is designed to be actuated only at intervals when desired, some means must be provided for effecting this result, and to this end I have shown loose pulley m and a fixed pulley, n, upon the short horizontal shaft, upon either of which the actuating-belt may readily be shifted when so desired, and thus render the device capable of operation at will and during the continuous operation of the said engine. Depending from the shaft M are cords or cables P, rigidly secured thereto, and having secured to their free ends hooks o, adapted to engage eyebolts secured to the bottom at convenient points upon either side thereof. These hooks may readily be inserted in the eyebolts upon either side of the bottom, and thereby enable the operator to discharge the snow from either side of the car. When the shaft M is actuated as before described, the cord or cable will be wound upon the said shaft, and thereby elevate the floor or bottom of the car on the side to which said cable is attached, the hooks and rod upon the opposite side constituting a hinge upon which the bottom swings, as clearly illustrated by dotted lines in Fig. 2.

It may here be stated that when so desired the snow contained in the cars may be unloaded at one side of the car only, to the exclusion of the other side, by opening one side of the car only and tilting the bottom of the car in that direction.

The rearward extension of the platform of the car supporting the aforesaid stationary engine is housed over, to form a passage or way, Q, in which to conduct the snow from this car to the next adjoining car, for when the forward car to which the plow is attached is entirely filled, and the apron extends completely over the full length of the snow-receiving chamber in said car, the balance of the snow, after being elevated onto the apron, will be forced to slide over said apron until it enters this way or passage leading to the next car, along which it will be forced by the travel of the buckets, the intervening space between the two cars forming little or no impediment to the passage of the snow across the said space, as each succeeding bucketful will force the preceding bucketful across the intervening space, and within reach of the traveling buckets operating upon the next car.



As before mentioned, this machine is designed to load any number of connected cars, and, in order to accomplish this result, each car must be equipped with a traveling bucket-chain, an apron, hinged sides, and tilting bottom; but all of these parts, and, in fact, the same parts on every car, can readily be operated simultaneously from the one stationary engine located on the rear platform of the forward car, and the transfer of power from one car to another may be readily accomplished in the following manner: A short shaft is provided on the end of the rear platform of each car, but only one, and that one on the forward car, will receive its power from a belt, *p*, driven from a belt-wheel, *p'*, on the driving-shaft of the stationary engine, and from this source of power all the mechanisms on the balance of the cars will be operated. The said short shaft carries upon one end a sprocket-wheel, *q*, connected with and actuating a similar sprocket-wheel, *q'*, secured upon one end of a horizontal shaft, *R*, located on the forward platform of the next adjoining car. From this shaft power is applied to the bucket-chains and bottom-tilting shaft in any well-known manner; but, for the purposes of illustration, I have shown these parts as similar in character to those applied to the forward car.

There is always more or less endwise movement between two cars, and hence ordinarily the chain connecting the sprocket-wheels upon the two platforms would have a tendency to kink or skip, and thereby be rendered at times inoperative and useless. To obviate this difficulty, the flanged idle-pulley *S* is employed, as illustrated in Figs. 1 and 6, the trunnions of which work in suitable grooves provided in uprights *r*, thereby permitting a vertical movement of the said flanged idle-pulley, which, by reason of its gravity, rests upon and takes up the slack in the chain whenever the two cars approach each other, but which readily rises out of the way when the chain is drawn taut by the receding or pulling apart of the cars. A short trough or way is built out extending forwardly from the upper part of the frame of the rear car corresponding with the way built over the rear platform of the forward car, in order to form a continuous passage for the snow across the space intervening between the two cars. A portion of the way projecting rearwardly from the forward car is hinged to said way, and has hinged sides whereby when the car is not in use this extension may be folded upon the way within the compass of the car and out of the way of the extension on the rear car, while the cars are being coupled together; but the more especial purpose of hinging this section is to accommodate the rise and fall of the cars produced by their springs while in motion, in order to relieve the strain upon the overlapping sections of the way, so that a continuous way may at all times be preserved; and to further this object a lip, *s*, is also formed on the forward extension of the rear car extending entire-

ly across the bottom of the way, and upon which the hinged section rests when in operation, thereby permitting both the up and down and endwise movement between the cars while at all times preserving a continuous passageway between the cars. Instead, however, of providing this projecting lip, as before described, the extension of the way attached to the forward part of the rear car may be made to project sufficiently forward to have the hinged section project over and rest thereon; but the particular means herein shown and described for forming a continuous passageway between two cars is not essential to the perfect operation of my invention, as the same object may be accomplished in various ways without departing from my invention.

I am aware that prior to my invention an independent inclined chute has been provided attached to the forward end of a car or vehicle having a traveling apron working therein; but in such construction the chute has not been adjustably hinged to and supported by said car or vehicle, as in my invention, but has been supported and adjusted upon an independent frame carried by suitable track-wheels, nor has the direction of travel of the carrier working in said chute been the same as herein shown and described or its operation similar, but as a matter of fact just the reverse.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. A car or vehicle and the inclined chute hinged thereto, in combination with an endless traveling chain connecting said car and chute, and a series of buckets fixed at intervals on said chain, substantially as described.

2. A car or vehicle and a segment-rack secured thereto, in combination with a chute hinged to said car, and having a pinion engaging said rack, substantially as and for the purpose described.

3. A car or vehicle, a chute hinged thereto, and an endless traveling chain connecting said car and chute and having buckets whereby the snow is forced up said chute, in combination with an adjustable apron forming a continuation of the chute, whereby the point of discharge of the snow into the car may be varied, substantially as and for the purpose described.

4. A car or vehicle, an adjustable chute hinged thereto, an endless traveling bucket-chain extending over the length of the car connecting said car and chute, and a rearwardly-projecting passage-way connecting said car with the next adjoining car, in combination with an adjustable apron adapted to extend entirely over the snow-receiving chamber in said car and connect said chute and rearwardly-extending passage-way, substantially as described.

5. In a snow-plow, an adjustable apron adapted to project over and partly or wholly cover the snow-receiving chamber, whereby



the point of delivery of the snow to the said chamber may be varied, substantially as described.

6. A car or other receptacle having its sides hinged thereto at their upper edges, in combination with actuating rack-bars connecting said car and sides at the bottom thereof, substantially as described.

7. In a snow-plow, a car, or vehicle, the hinged sides thereof and rack-bars connecting said sides and car at their lower edges, in combination with pinions on a shaft journaled in the car-frame, and means for actuating the said shafts, whereby the said sides may be swung upon their hinges, substantially as described.

8. In a snow-plow, a car, or vehicle, the hinged sides thereof and the actuating rack-bars of said sides, in combination with a hinged or adjustable connection between said sides and bars, whereby the said sides may swing in the arc of a circle when forced outwardly in a straight line by the said rack-bars, substantially as described.

9. In a snow-plow, a car, or vehicle, the hinged sides thereof and the actuating rack-bar of said sides, in combination with a shouldered hinged connection between said sides and rack-bars, whereby the outward movement of the rack-bar and sides will be limited, substantially as described.

10. In a snow-plow, car, or vehicle, the floor and the supporting-frame thereof, in combination with detachable hinge-connections between the opposing side edges of said floor and the frame, whereby said floor may be swung upon either of said hinges independently of each other and of the body of the car, and its contents be discharged at will upon either side of the car, substantially as described.

11. In a snow-plow, a car, or vehicle, and longitudinal shafts or rods secured on either side thereof, in combination with the tilting floor having open hooks on its under side, adapted to engage and partly encircle said shafts or rods, whereby either rod and hooks will act as a hinge or pivot for the floor, substantially as and for the purpose described.

12. In a snow-plow, a car, or vehicle, the hinged sides and tilting bottom thereof, in combination with a revolving shaft in a plane above said bottom, a cable-connection between

the shaft and bottom, and means, substantially as described, for actuating the said shaft at intervals, to wind the cable thereon and tilt the bottom, as set forth.

13. In a snow-plow, a loading mechanism consisting of an endless traveling bucket-chain, an inclined chute, and an apron, and an unloading mechanism consisting of a car or vehicle having hinged sides and a tilting bottom, in combination with a power mechanism intermediate of, connecting, and actuating said loading and unloading mechanism, substantially as described.

14. In a snow-plow, the herein-described mechanisms for transmitting power from one car to another, consisting of an actuating-shaft on one platform carrying a sprocket-wheel thereon, a corresponding shaft on the other platform for receiving and transmitting the power to the operating parts of the car to which it is attached, also carrying a sprocket-wheel and a sprocket-chain connecting said sprocket-wheels, said sprocket-chain having a flanged idler-pulley bearing thereon, intermediate said wheels and free to move vertically upon its bearings, substantially as and for the purpose described.

15. In a snow-plow, a passage-way extending rearwardly from the forward car, and a corresponding passage-way extending forwardly from the rear car, in combination with a hinged section of the way intermediate the ends of said passages hinged to one of said extensions and overlapping the other, substantially as described.

16. In a snow-plow, two coupled cars having endless traveling bucket-chains connected together and operating simultaneously by means of the herein-described mechanisms for transmitting power from one car to another, in combination with a rearwardly-projecting passage-way from the forward car, a corresponding forwardly-projecting passage-way from the rear car, and a hinged section intermediate of the two ways and overlapping one of them, thereby permitting both an endwise and up and down movement of the cars, so as to at all times preserve a continuous passage between said cars, substantially as described.

HARRISON S. ROLLINS.

Witnesses:

WILL R. OMOHUNDRO,  
W. W. ELLIOTT.