

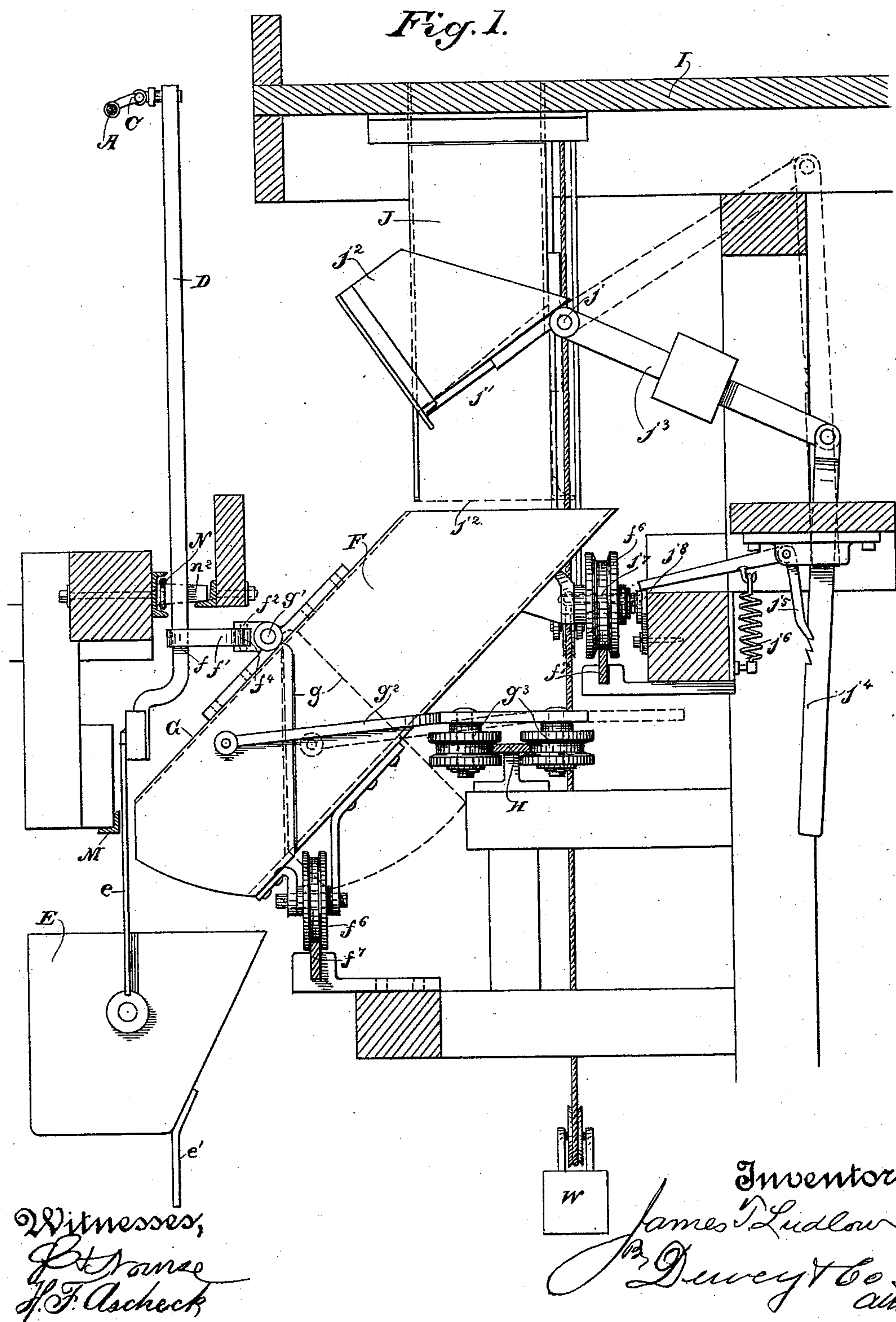
(No Model.)

4 Sheets--Sheet 1.

J. T. LUDLOW.  
WIRE ROPEWAY.

No. 572,305.

Patented Dec. 1, 1896.



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Fig. 4.

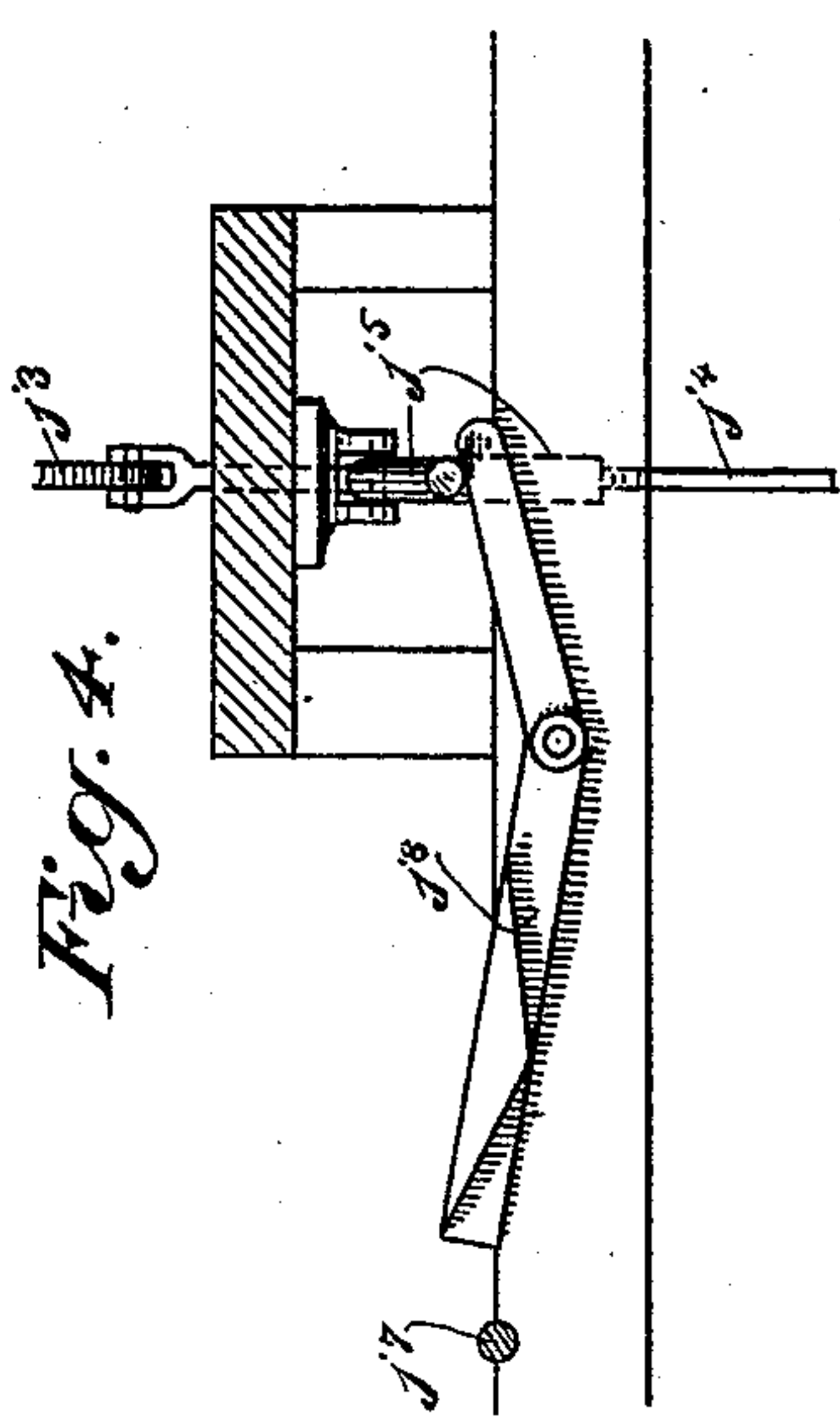
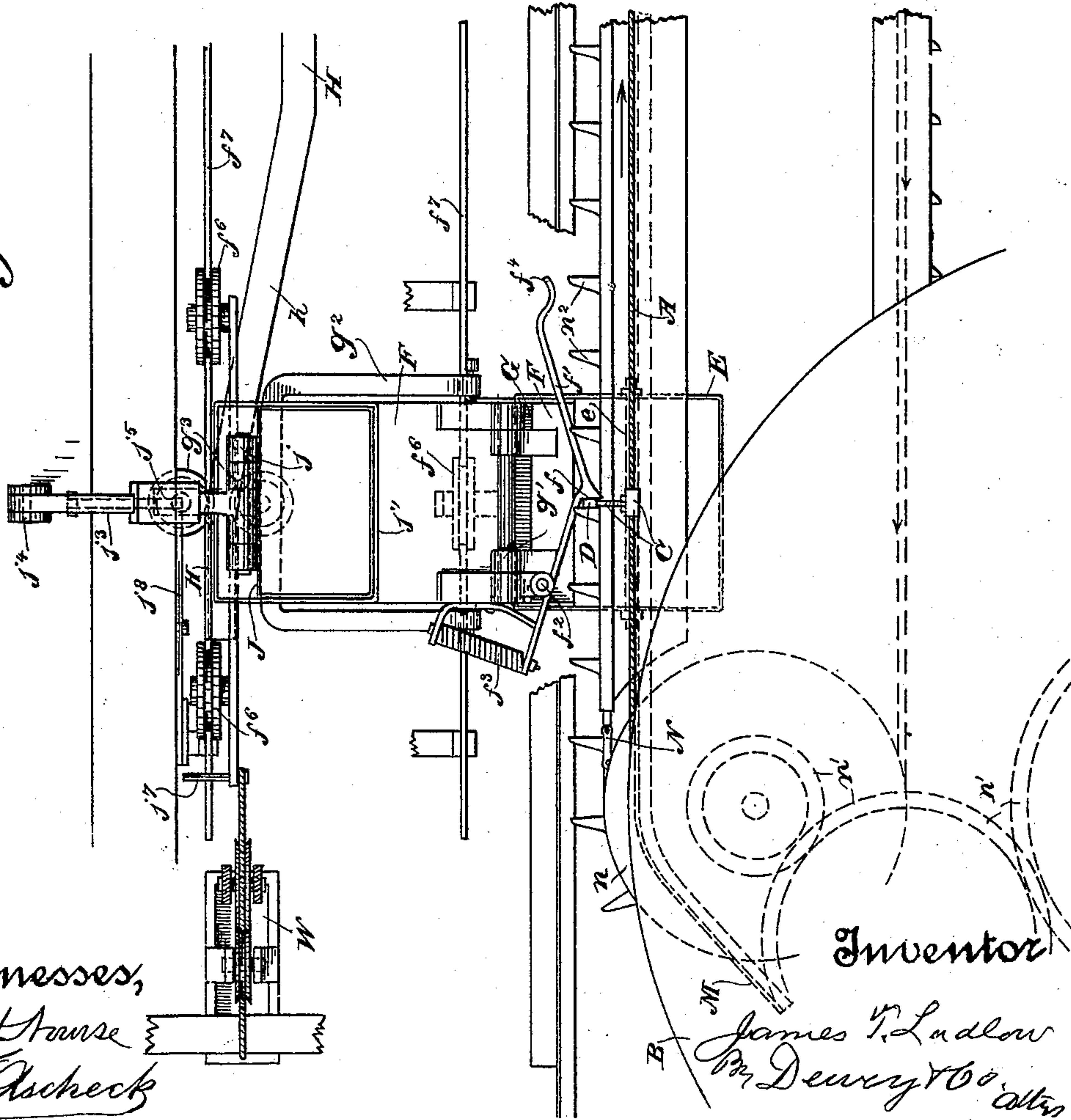


Fig. 2.



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By Deury & Co. atty

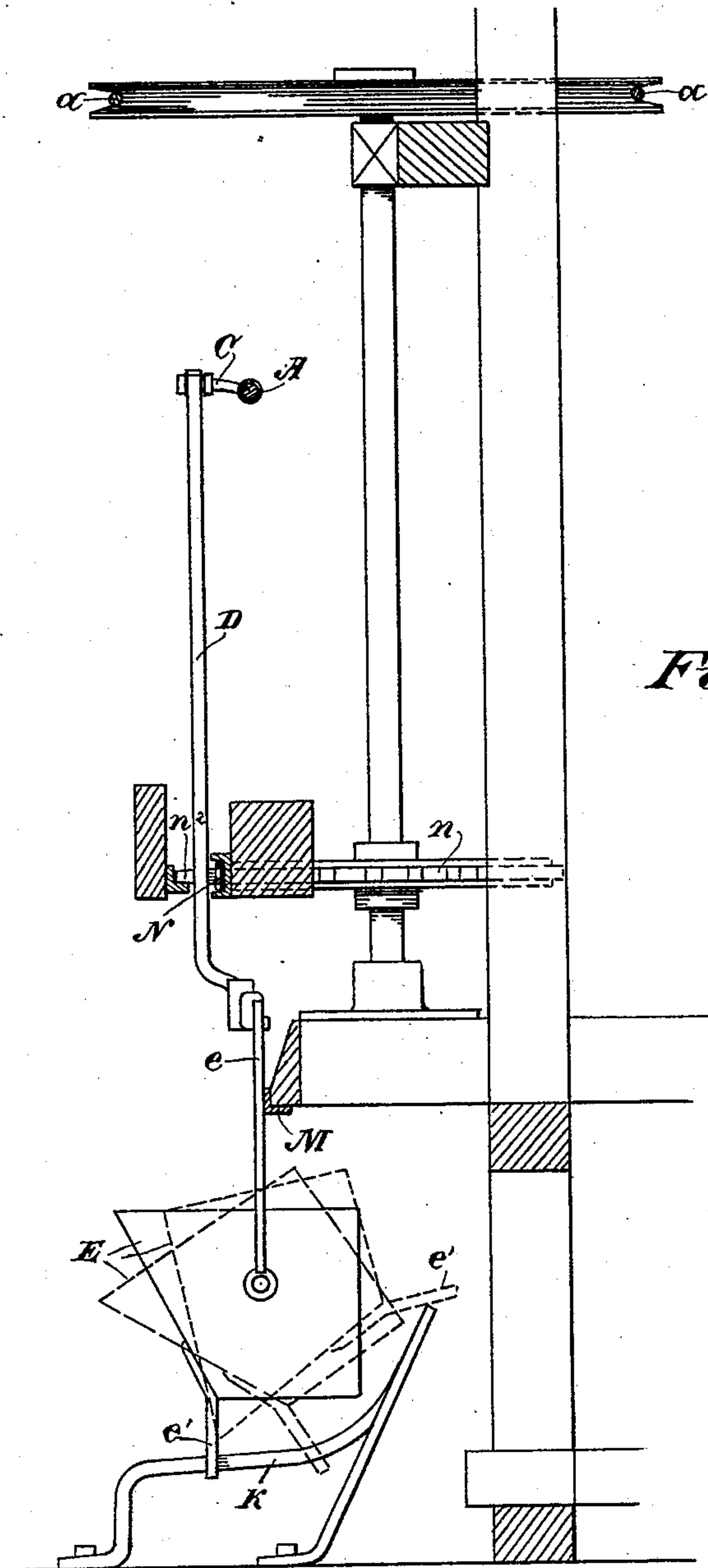
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*Fig. 3.*

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(No Model.)

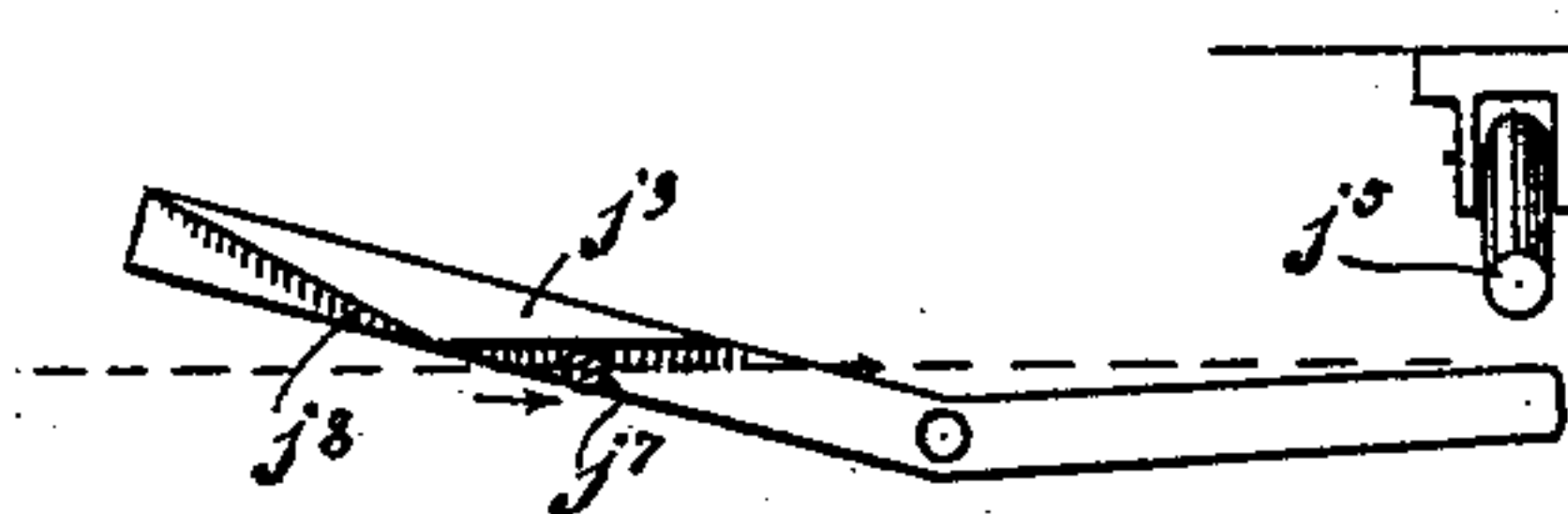
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J. T. LUDLOW.  
WIRE ROPEWAY.

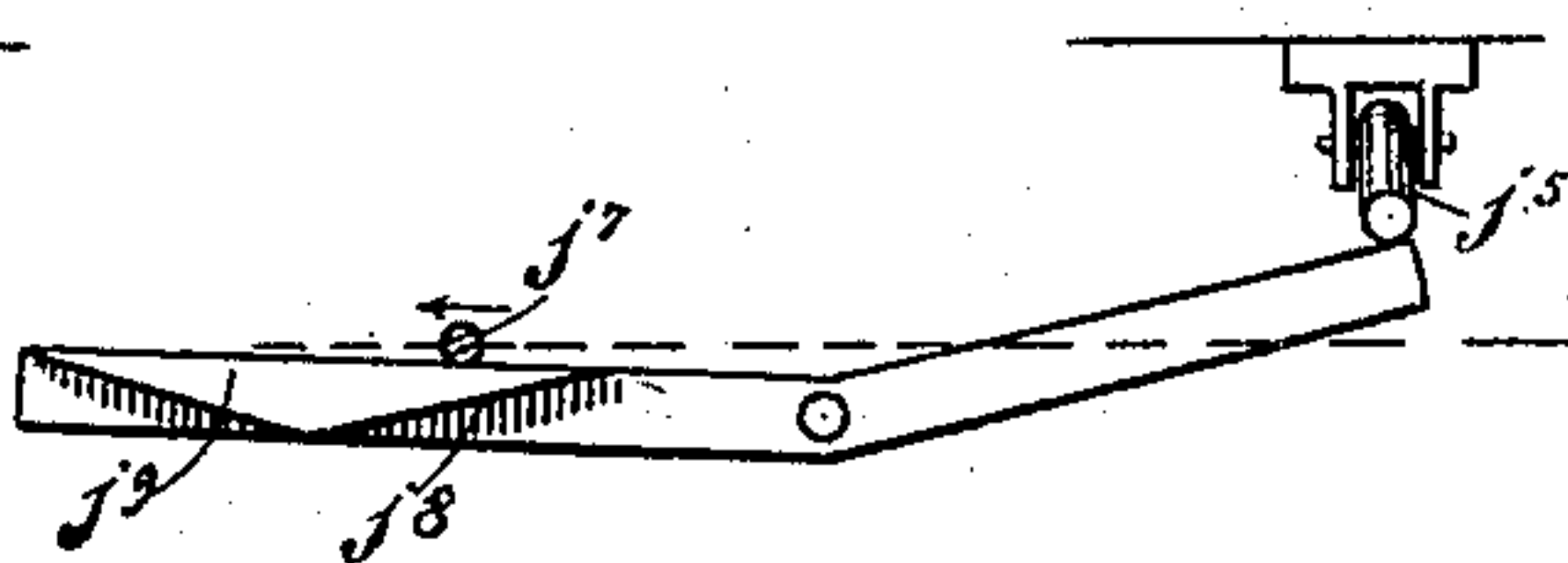
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*Fig. 5.*

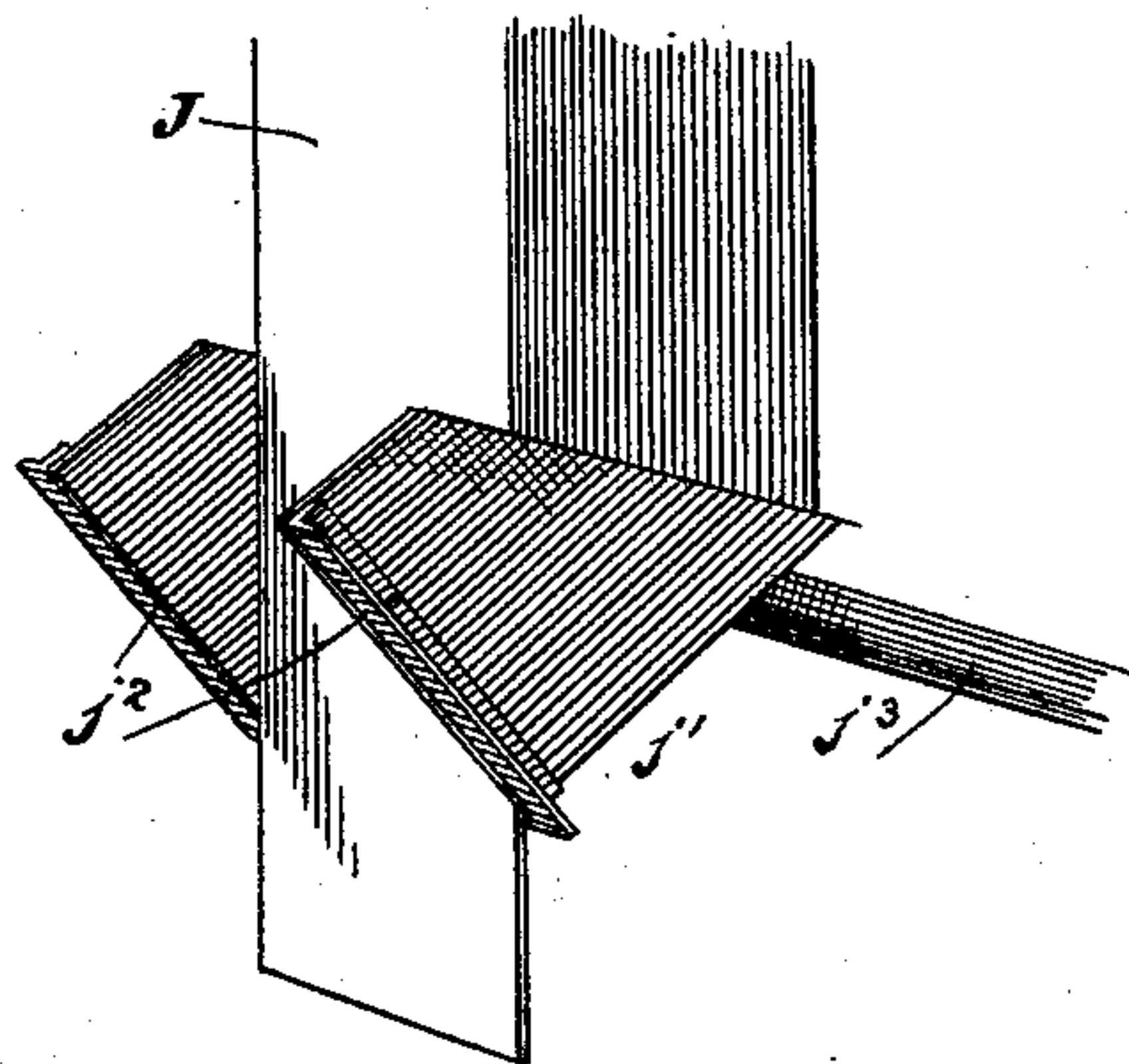


*Fig. 6.*

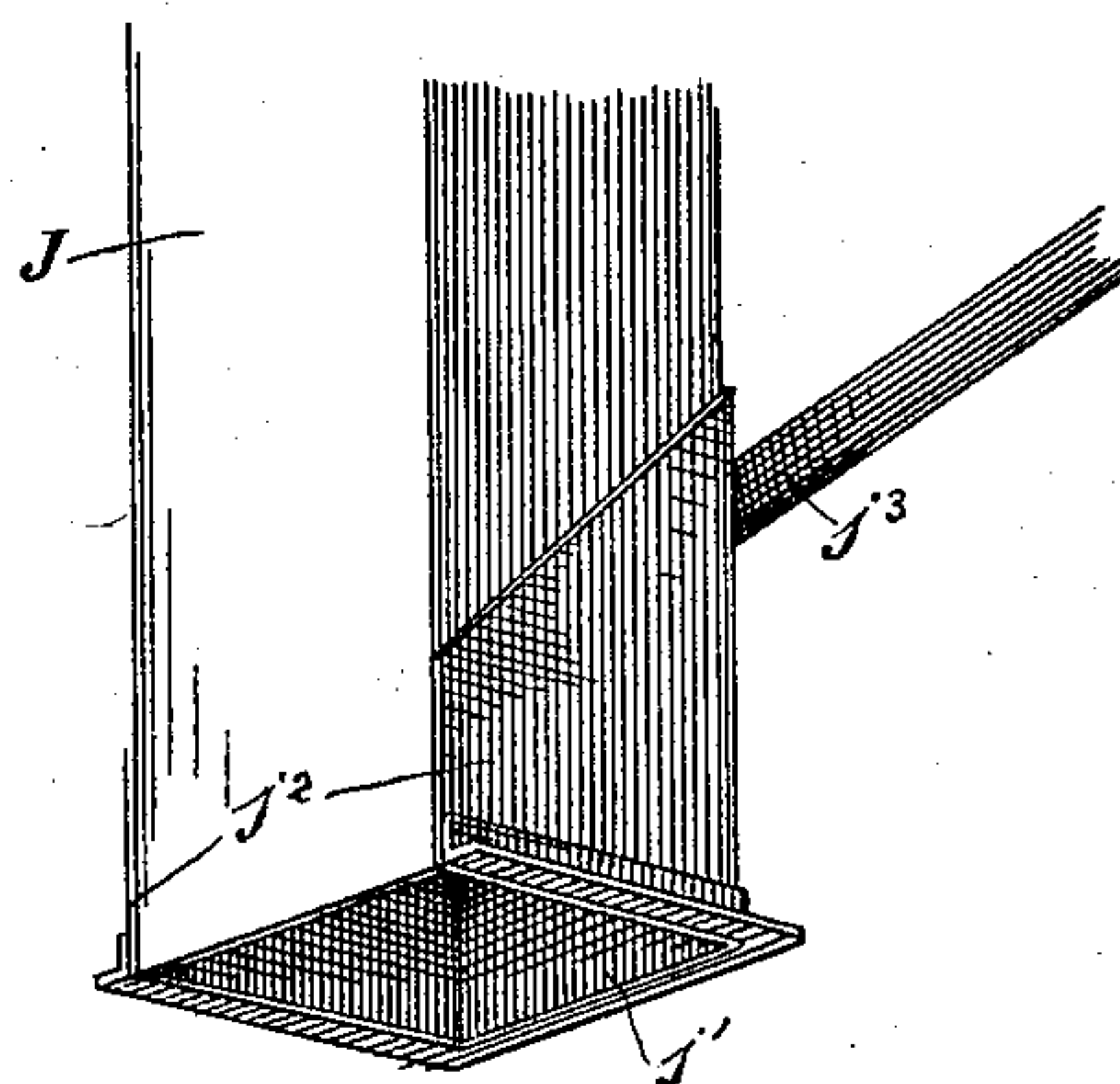


*Fig. 7.*

*Fig. 8.*



*Fig. 9.*



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# UNITED STATES PATENT OFFICE.

JAMES T. LUDLOW, OF SAN FRANCISCO, CALIFORNIA.

## WIRE ROPEWAY.

SPECIFICATION forming part of Letters Patent No. 572,305, dated December 1, 1896.

Application filed February 17, 1896. Serial No. 579,527. (No model.)

*To all whom it may concern:*

Be it known that I, JAMES T. LUDLOW, a citizen of the United States, residing in the city and county of San Francisco, State of California, have invented an Improvement in Wire Ropeways; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to that class of devices in the art of wire-rope transmission commonly known as "wire ropeways" and in which a traveling cable extending between terminal points is adapted to receive and transport loads of material, such as ore, coal, &c., said material being carried in buckets suspended from the traveling cables by means of hangers and clips.

My invention consists in the novel means of holding the suspending hanger of the bucket during the periods of its loading and unloading.

It also consists in the novel means of loading the buckets, all of which I shall hereinafter describe by reference to the accompanying drawings, in which—

Figure 1 is an elevation of the loading mechanism. Fig. 2 is a top view of same below the platform. Fig. 3 is an end view of the unloading mechanism. Fig. 4 is a detail of the charge-hopper-gate-controlling mechanism. Fig. 5 is a top view showing the charge-hopper-gate-controlling mechanism. Fig. 6 is a side view showing the pin  $j^7$  traveling under the pivoted track  $j^8$  as the loading-car moves forward. Fig. 7 is a similar view showing the pin  $j^7$  traveling on top of said track as the car returns. Fig. 8 is a perspective view of the lower end of the hopper J, showing its gate  $j'$  closed. Fig. 9 is a view of same, showing gate  $j'$  open and its wall continuing the side walls of the hopper.

The cable A may be supposed to extend between any terminal points, such, for example, as is represented at one end by a sheave B, Fig. 2, and at the other end by another sheave, (unnecessary herein to show,) and said cable may be supposed to be driven by any suitable means.

Suspended from the cable by means of a suitable clip, such as is represented by C, is a hanger D, the lower end of which is connected with the bail  $e$  of the bucket E.

Throughout the length of the cable there may be as many of these hangers and buckets as are required.

At one point in the course of travel of the empty bucket, usually just after it passes around the terminal sheave B, (see Fig. 2,) its hanger D comes in contact with a shoulder  $f$  of a trip-arm  $f'$ , pivoted to the loading-car F at  $f^2$  and controlled by a spring  $f^3$ , so that its shoulder is held normally in the path of the hanger. The loading-car F is mounted at an inclination upon wheels  $f^6$ , traveling on tracks  $f^7$ , Fig. 1, there being two wheels above and one below Fig. 2. The lower end of this loading-car is provided with a gate G, which, when closed, retains the material in the car, and, when opened, allows it to flow by gravity into the bucket E below.

The gate G has side flanges  $g$ , which, when the gate is open, continue the side walls of the car nearly down to the bucket. This gate G is hung from the point  $g'$  at its top, and is held in a closed position against the weight of the load above it by means of a rod  $g^2$ , the other end of which has wheels  $g^3$ , which travel on each side of the cam-track H, which at one portion  $h$  of its length (see Fig. 2) is inclined toward the line of travel of the bucket, whereby, as the wheels  $g^3$  travel on said inclined portion, the gate G is swung open to discharge the contents of the car into the underlying bucket. When this delivery is accomplished, the trip-arm  $f'$  is released from the hanger D of the bucket by reason of the forward end  $f^4$  of said arm coming in contact with and traveling outwardly on the inclined plane  $f^5$ , which causes the arm to swing about its pivot and to remove its shoulder from the hanger, so that the hanger and bucket proceed upon their course, while the loading-car, being now freed, is returned to its initial position by means of a weight W and intervening connections, and is then ready to be picked up again by the hanger of the succeeding bucket.

I is a loading-platform above, from which extends downwardly a hopper J, having hinged at its lower end at the point  $j$  a gate  $j'$ , provided with sides  $j^2$ , Fig. 8, which are adapted, when the gate is dropped to an open position, to inclose and continue the sides of the hopper, Fig. 9, so that the mate-



rial fed thereto will pass on down through it directly into the underlying loading-car.

In Fig. 2 when the loading-car is in its initial position under hopper J and has just received its load therefrom the gate G of said car is of course closed in order to hold the load, and said gate is held closed by reason of the wheels  $g^3$  engaging that portion of the cam-track H which at this place, where the hopper is located, is, as shown in Fig. 2, the farthest removed from the line of travel of the bucket and cable, and consequently, through the rod  $g^2$ , the gate G is pulled and held in a closed position; but as the loading-car is carried forward by and with the bucket the wheels  $g^3$ , traveling on the portion  $h$  of track H which inclines toward the line of travel of the bucket, cause the rod  $g^2$  to swing the gate G open, which is its position in Fig. 1, the bucket and loading-car in said figure being supposed to be farther removed from the observer than the hopper J, which is nearer and has its gate  $j'$  closed, as shown, for the workmen to supply it with a fresh charge. When the loading-car is disengaged from the bucket and returns, the gate G closes again by the return on track H, and when once more under the hopper is ready to receive a fresh load.

When the bucket and the loading-car are traveling together during the period of the loading of the former, the workmen on the platform I supply a charge of material to the hopper J, the gate of which is closed and held in this closed position against the weight of the material by means of a weighted arm  $j^3$ , Fig. 1, connected with a ratchet-bar  $j^4$ , which is engaged and held by an angled pawl  $j^5$ , controlled by a strong spring  $j^6$ .

A pivoted track  $j^8$ , Figs. 4, 5, 6, and 7, has one of its ends lying under the end of the angled pawl  $j^5$ . At its other end it has a widened portion  $j^9$ , which has its under side cut on a double incline, as shown. Now when the loading car is returning to its initial position a pin  $j^7$ , fastened to it, will freely pass onto the widened portion  $j^9$  of the pivoted track and travel on top of it, as is shown in Figs. 5 and 7. In doing this it bears that end of the track down and raises its other end, causing said last-named end to bear up under and to release the angled pawl  $j^5$  from the ratchet-bar  $j^4$ , whereupon the weight of the material in the hopper will open its gate and the material will drop down into the loading-car, the gate of which has been closed and is now held closed by means of the rod  $g^2$  and cam-track H; but on the forward movement of the loading-car the pin  $j^7$  (having left the track  $j^8$ , Fig. 4, which, being relieved, had allowed the hopper-gate to be closed by the weighted arm  $j^3$ ) now passes without violent contact under the inclined lower surface of the widened end  $j^9$  of the track  $j^8$ , as is shown in Fig. 6, and though it lifts said end the other end is depressed and simply moves away from the angled pawl  $j^5$  without affect-

ing it. By this arrangement of having in addition to the loading-car a charge-hopper no time need be wasted, as the workmen need not await the return of the car, but may, while it is accompanying the bucket and delivering its load, fill in a charge to the hopper, ready to be delivered to the loading-car upon its return. As soon as the charge is delivered from the hopper the weighted arm  $j^3$  closes the gate  $j'$ , and the hopper is ready to receive its next charge.

At any desired point in the course of the tramway there is located a dumping-rail K, Fig. 3, having an inclined course and adapted to receive the contact of an arm  $e'$ , projecting from the bottom of the bucket E, and by the travel of said arm up the rail the bucket will be automatically dumped, turning about its bail  $e$  until its contents are discharged. While traveling at this portion of its course the bail of the bucket is guided against a fixed track M of the framework. When the bucket is being operated upon, either in loading or in unloading, the operations are such as to cause the hanger of the bucket to be retarded more or less, as, for example, in the loading part of its course it has to pick up and carry with it for a short distance the loading-car, and in the dumping portion of its course it has to bear the resistance of the contact of the arm  $e'$  of the bucket with the dumping-rail K. For these reasons it is necessary, in order to hold the hanger perpendicular and steady under this work, to assist it at these points in its course. The means which I employ to accomplish this work are as follows:

Referring to the loading portion of the tramway, Figs. 1 and 2, it will be seen that there is a chain N, mounted and adapted to travel upon suitable pulleys  $n$ . The travel of this chain is effected by means of suitable gearing (indicated by  $n'$ ) driven from the main cable machinery, and its rate of speed is the same as that of the cable A. Its position is such that it is in proximity to the hangers of the buckets, and pins  $n^2$ , projecting from said chain, are caused thereby to come in contact with and engage said hangers, and thus to assist the onward movement of the hangers and to hold them straight and steady. At the unloading-point of the ropeway there is the same traveling chain similarly lettered and adapted to perform precisely the same function at that point. This chain is here shown driven by connection from a supplementary cable  $a$ , deriving its power from the main cable.

I am aware of the use in cable-tramways of devices for assisting and holding the hangers of the buckets while the loading and dumping operations are being performed. Heretofore these means have consisted of what is termed a "rag-wheel," namely, a sprocket-wheel which has been located upon the terminal shaft of the tramway, so that the dumping and loading devices will necessarily be confined to the termini. This has been found



very inconvenient, as it is often necessary to perform these operations at other points more or less distant from the terminal points. By the use of my traveling chain I can effect these operations at any point in the course of the tramway, as the chain may be mounted and located at any intermediate portion.

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

1. In a wire ropeway and in combination with the traveling bucket, a loading-car adapted to accompany the bucket for a given distance, and to return again to its initial point, said car having a gate at its lower end, provided with side flanges, which, when the gate is open continue the side walls of the car and a rod from said gate engaging a cam-track by which it is operated to control the opening and closing of the gate.

2. In a wire ropeway, and in combination with the traveling bucket, a loading-car adapted to accompany the bucket for a given distance and to return to its initial point, a swinging gate hinged to the lower end of the car, and adapted to open under the weight of the load, a rod from said gate engaging a cam-track by which it is operated to control the opening and closing of the gate, an overlying charge-hopper adapted to supply a charge of material to the loading-car when the latter is at its initial point.

3. In a wire ropeway and in combination with the traveling bucket, a loading-car adapted to accompany the bucket for a certain distance and then to return to its initial point, and an overlying charge-hopper adapted to supply a charge of material to the loading-car when the latter is at its initial point.

4. In a wire ropeway and in combination with the traveling bucket, a loading-car adapted to accompany the bucket for a certain distance and then to return to its initial point, and an overlying charge-hopper adapted to supply a charge of material to the loading-car when the latter is at its initial point, said

hopper having the gate at its lower end provided with ends adapted to continue the walls of the chute when supplying the charge.

5. In a wire ropeway and in combination with the traveling bucket, a loading-car adapted to accompany the bucket for a certain distance and then to return to its initial point, an overlying charge-hopper adapted to supply a charge of material to the loading-car when the latter is at its initial point, said hopper having a swinging gate at its lower end, and the means for controlling said gate consisting of the weighted arm, the ratchet-bar, the spring-controlled pawl and swinging track for releasing the pawl and the pin on the loading-car for operating the track.

6. In a wire ropeway having buckets suspended by hangers from a traveling cable, the means for holding said hangers straight during operations tending to retard them, consisting of a chain moving at the rate of speed of the hangers and having means for engaging them.

7. In a wire ropeway having buckets suspended by hangers from a traveling cable, the means for holding said hangers straight during operations tending to retard them, consisting of a traveling chain moving at the rate of speed of the hangers and having pins adapted to engage said hangers.

8. In a wire ropeway having buckets suspended by hangers from a traveling cable, and having means for loading and unloading, depending for their operation upon the traveling buckets and hangers, means for holding and steadying the hangers against the retarding tendency of said operations, consisting of endless traveling chains moving at the rate of speed of the cable and engaging the hangers.

In witness whereof I have hereunto set my hand.

JAMES T. LUDLOW.

Witnesses:

S. H. NOURSE,  
JESSIE C. BRODIE.