E. F. HURD.

DIFFERENTIAL GATE MECHANISM.

APPLICATION FILED MAY 19, 1910.

1,086,531.

Patented Feb. 10, 1914.

2 SHEETS—SHEET 1.

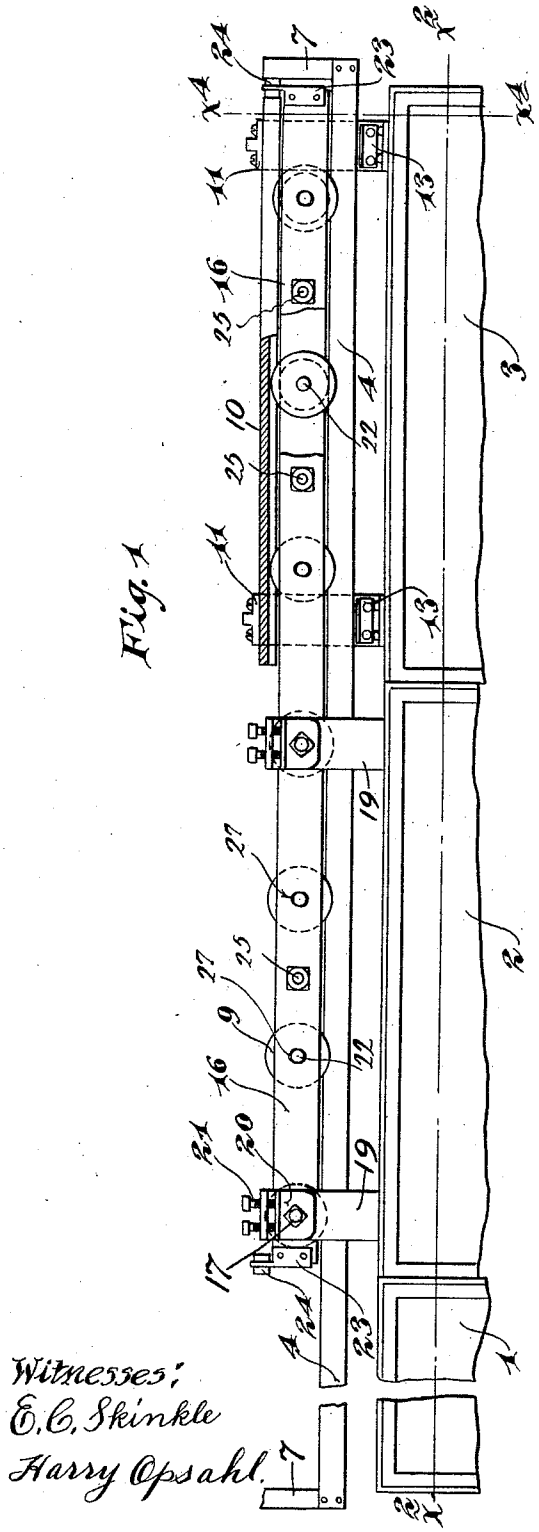


Fig. 1

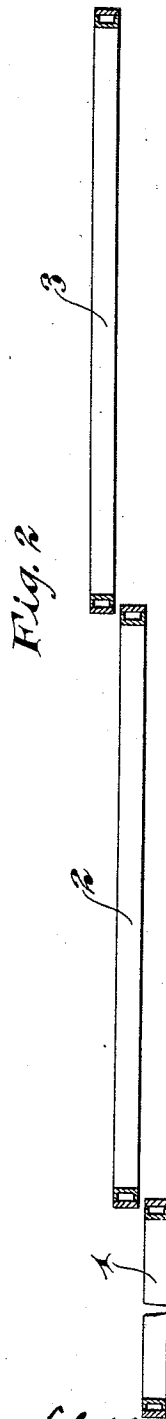


Fig. 2

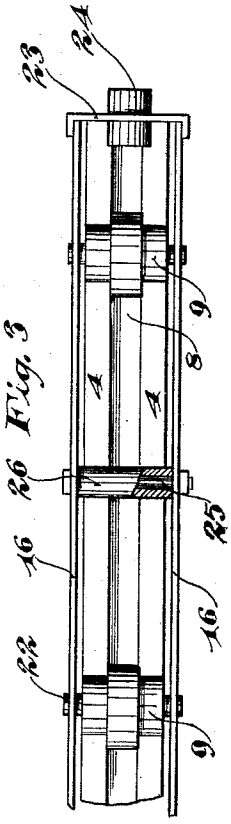


Fig. 3

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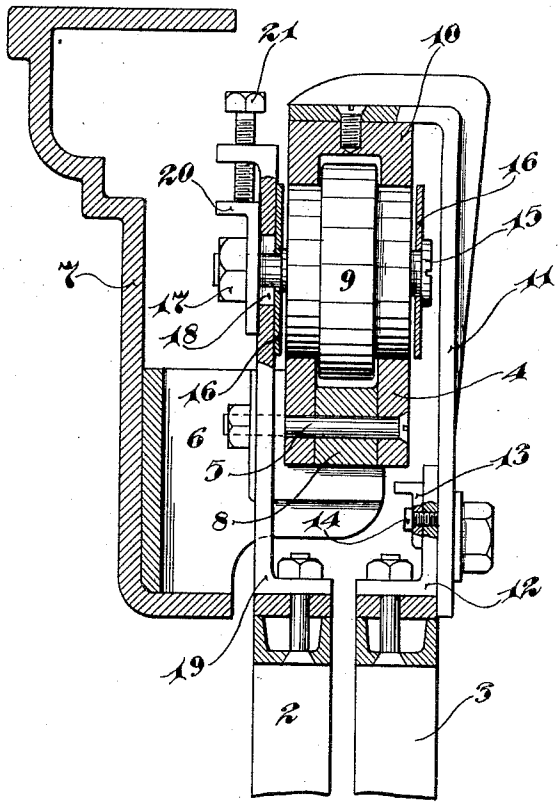
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2 SHEETS—SHEET 2.

Fig. 4



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DIFFERENTIAL GATE MECHANISM.

1,086,531. Specification of Letters Patent. Patented Feb. 10, 1914.

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To all whom it may concern:

Be it known that I, EDWARD F. HURD, a citizen of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Differential Gate Mechanism; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to horizontally movable gates wherein the gate is composed of two panels which move in the same direction, one twice as fast as the other.

The main object of my invention is to construct a hanger for gates of that type which not only affords support for the panels, but contains mechanism whereby the differential movement of the panels is brought about.

A further object is to produce a simple, strong and durable hanger; one which will operate easily and noiselessly.

Another and very important object is to construct the hanger in such manner that certain imperfections of construction which are likely to be present will not impair or hinder its operation.

In the accompanying drawings Figure 1 is an elevation with the transom bar removed; Fig. 2 is a sectional plan taken on lines x^2 x^2, Fig. 1; Fig. 3 is a fragmentary plan view, and Fig. 4 a vertical section taken on line x^4 x^4, Fig. 1.

Similar numerals indicate similar parts throughout the several views.

The numeral 1 indicates the fixed panel of an elevator inclosure, and 2 and 3 the slow and fast panels respectively, of the gate. The track 4, which is made of two strips separated by an intermediate strip 8, is secured by bolts 5 to brackets 6. Brackets 6 are in turn supported by the transom bar 7. Strip 8 being lower than strips 4 affords a groove between the latter, in which the central ribs on the wheels 9 run. The portions of the wheels outside of the ribs roll upon the track 4 and the wheels are kept in their proper positions by a rectangular frame composed of strips 16, end pieces 23, and tie bolts 25. These bolts pass through and clamp the strips 16 firmly against the ends of sleeves 26 and are placed at suitable intervals along the frame. Two of the wheels, the first and fourth in Fig. 1, rotate upon bolts 15 that pass through close fitting holes in the strips 16. One end of each bolt is smaller than the other end, the change in diameter forming a shoulder which abuts the inside of the strip 16 nearest the thread. The threaded end of each bolt passes through a vertical slot 18 in a pendent 19, and a flanged plate 20, and receives a nut 17. The panel 2 of the gate is bolted to and carried by the pendents 19. With a set screw 21 in a laterally extending lug on each pendent which rests upon the flange of the plate 20, the panel 2 may be raised or lowered at will until the nuts 17 are screwed up, after which the adjustment remains permanent.

From the foregoing description it is clear that panel 2 of the gate, and the rectangular frame as well, are carried by the first and fourth wheel 9. The remaining wheels are provided with axles 22, which may be and preferably are integral with the wheels. (See Fig. 3.) These axles rotate in vertical slots 27 formed in the strip 16, but touch neither the top nor bottom of the slots, the object being to permit each wheel to rest without restraint upon the track. To further facilitate this these wheels are made rather short, so as to avoid the possibility of binding between the strips 16. (See Fig. 3.) A grooved bar 10 rests upon two or more wheels, the groove in the bar being somewhat deeper than the height of the wheel ribs. Pendents 11 secured to this bar or rider 10 are bolted to knees 12, which in turn are bolted to and carry panel 3 of the gate. Flanged plates 13 are secured to the knees 12 by screws 14 and, extending under and close to the track, prevent the bar 10 jumping off of the wheels. When the panel 3 is moved friction causes the rider 10 to rotate the wheels upon which it rests. Since the axles of all but the first and fourth wheels lie in vertical slots it is obvious that not only are these wheels perfectly free to rest upon the track but their semi-detached relation to the frame permits the first and fourth wheels to rest upon the track with the full force of the weight sustained by the pendents 19. It is, therefore, clear that the wheels upon which the rider rests rest and bear upon the track with as much force as the rider bears upon the wheels. On this account there is as much friction between the wheels and track as between the wheels and rider, and when the wheels are rotated

by the rider they roll along the track, carrying the rectangular frame and the panel 2 with them. As the rider advances with reference to the wheels just as the wheels advance with reference to the track, and as the advance is in the same direction, it follows that the rider gets the benefit of both advances, causing panel 3 to travel twice as fast as panel 2, with the result that by the time panel 2 arrives behind panel 1, panel 3 will have overtaken panel 2 and will also be behind panel 1.

Ordinarily the gate will be opened and closed by applying the hand to the panel 3, but it may, if preferred, be operated by moving the panel 2. Whichever panel receives the initial power the ratio of speed will be the same, panel 3 always moving twice as fast as panel 2. When power is applied to one panel the other panel is moved by the same force that causes a locomotive to move on the track when its wheels are rotated, but in the gate there is a double application of the force. That is, the force which rotates the wheels is a duplicate of and equal to the force which causes the wheels to move along the track. That the two forces are always equal is due to the arrangement already described whereby the wheels bear upon the track with a force equal to the weight they carry. Theoretically the track might be perfectly level, all the wheels exactly the same diameter and arranged in a perfectly straight line on the rectangular frame, and the rider perfectly straight. Under these conditions the mechanism might act properly though the wheels were journaled in round holes instead of vertical slots. But in practice the required perfection is not attainable, and mounting all but two wheels of the train so they can adjust themselves vertically makes it unnecessary.

Various departures may be made from the construction described while remaining within the scope of the appended claims.

What I claim is as follows:

1. In a differential gate mechanism the combination of a track, a gate comprising a slow and a fast panel, the slow panel being carried by rolling members which roll upon the track; a wheel resting on the track, a rider adapted to rest upon the wheel and one or more of said rolling members, said rider being connected to and carrying the fast panel, and means connecting the wheel to the slow panel, whereby the wheel is made to roll along the track in unison with said slow panel, said means permitting the wheel to move toward and away from the track.

2. In a differential gate mechanism, the combination of a track, a plurality of wheels to roll thereon, a member connecting the wheels together so they must roll in unison, and means whereby said member is carried by two of the wheels; the remainder of the wheels being connected to said member by means which permits limited movement of the wheels toward and away from the track.

3. In a differential gate mechanism, the combination of a track, a plurality of wheels to roll thereon, and a rectangular frame in which the wheels are confined, two of the wheels being connected to the frame by bolts passing through their centers and through holes in the sides of the frame, the remainder of the wheels having projecting axles which rotate in vertical slots in the sides of the frame.

4. In a differential gate mechanism, the combination of a track, a plurality of wheels to roll thereon, and a rectangular frame whereby the wheels are connected in a train, two of the wheels rotating upon axes fixed with reference to the frame, the remainder of the wheels rotating upon axes capable of movement perpendicular to the track.

5. In a differential gate mechanism, the combination of a track, a plurality of wheels to roll thereon, a rectangular frame whereby the wheels are connected in a train, two of the wheels rotating upon axes fixed with reference to the frame, the remainder of the wheels rotating upon axes capable of movement perpendicular to the track; means for connecting the slow panel to said fixed axis, a rider resting upon the peripheries of the wheels, and means for connecting the fast panel to the rider.

6. In a differential gate mechanism, the combination of a track, a train of wheels adapted to rest thereon, means for maintaining substantially fixed distances between the axes of the wheels, and means whereby all but two of the wheels are capable of limited movement perpendicular to the track.

7. In a differential gate mechanism, the combination of a track, a plurality of wheels to roll thereon, a member connecting the wheels together so they must roll in unison, means whereby said member is carried by two of the wheels, the remainder of the wheels being connected to said member by means which permits limited movement of the wheels toward and away from the track, means whereby one panel of the gate is connected to and carried by said carrying wheels, a rider resting upon the wheels, and means for connecting the other panel of the gate to the rider.

8. In a differential gate mechanism, the combination of a track, a plurality of wheels to roll thereon, a member connecting the wheels together so they must roll in unison, means whereby said member is carried by two of the wheels, the remainder of the wheels being connected to the member by means which permits limited movement of the wheels toward and away from the track, means for attaching the slow panel of a

gate to said carrying wheels, a rider resting upon the wheels, and means for attaching the fast panel of the gate to the rider.

9. In a differential gate mechanism the combination of a slow and a fast panel, a track, a train of three or more wheels resting and adapted to roll on the track, means whereby the slow panel is carried by two of the wheels, means supporting the other wheel or wheels to permit a limited movement toward and away from the track, a rider adapted to rest and ride on two or more of the wheels, and means for attaching the fast panel to the rider.

In testimony whereof I affix my signature in presence of two witnesses.

EDWARD F. HURD.

Witnesses:
ALICE V. SWANSON,
HARRY D. KILGORE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents Washington, D. C."