W. E. WILLIS.

ICE HANDLING APPARATUS.

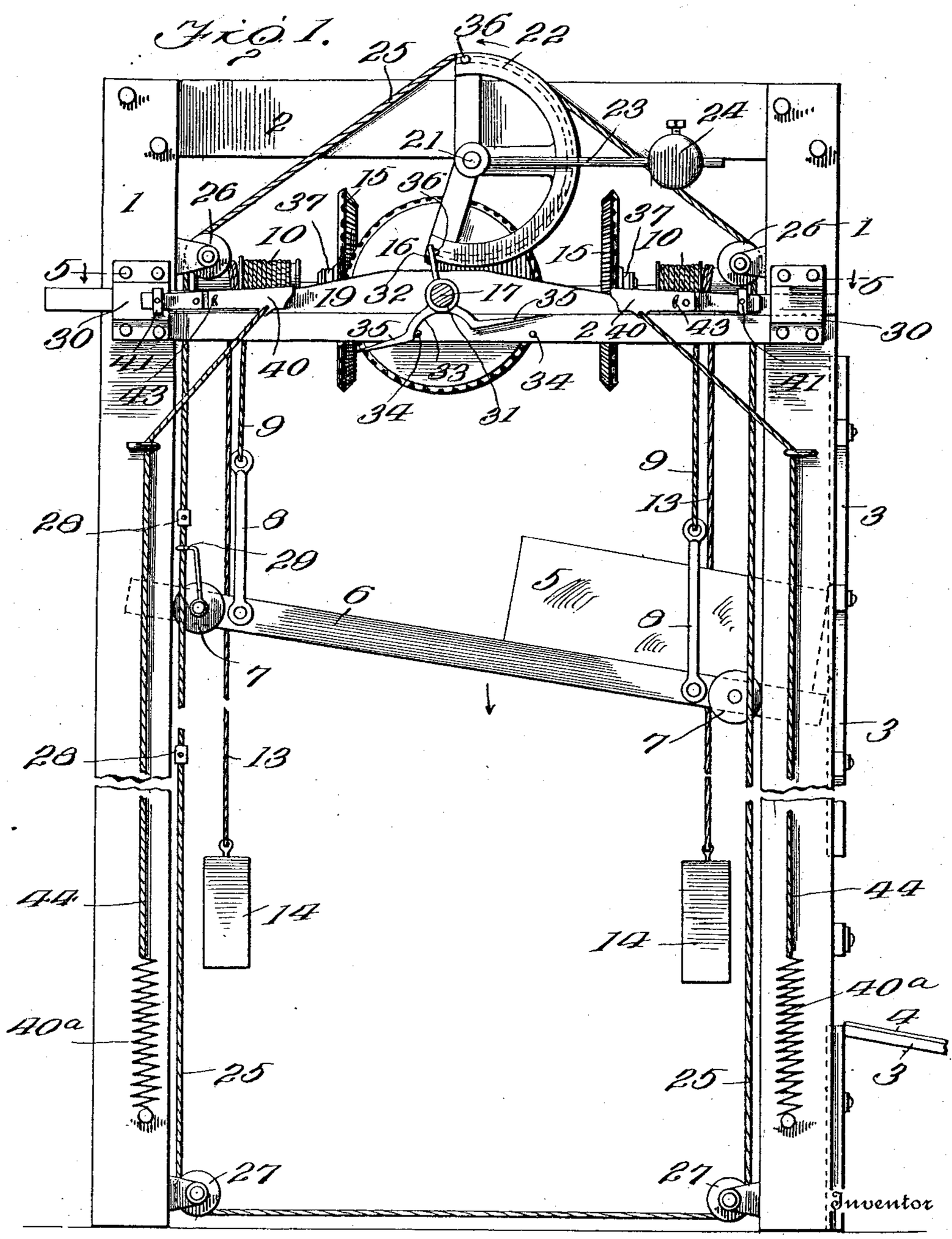
APPLICATION FILED AUG. 12, 1914.

1,167,140.

Patented Jan. 4, 1916.

3 SHEETS—SHEET 1.

Fig. 1.



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3 SHEETS—SHEET 2.

Fig. 2.

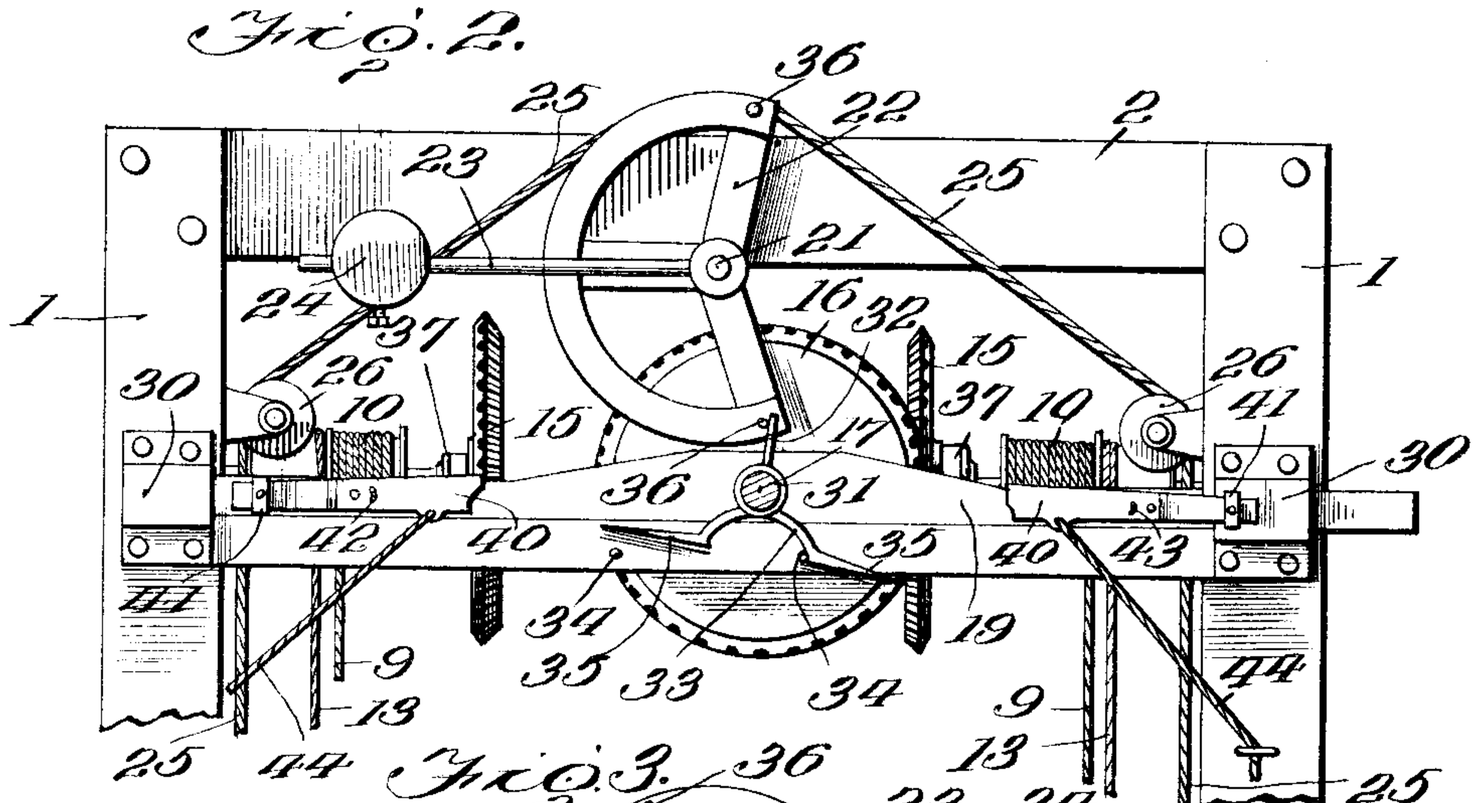


Fig. 3.

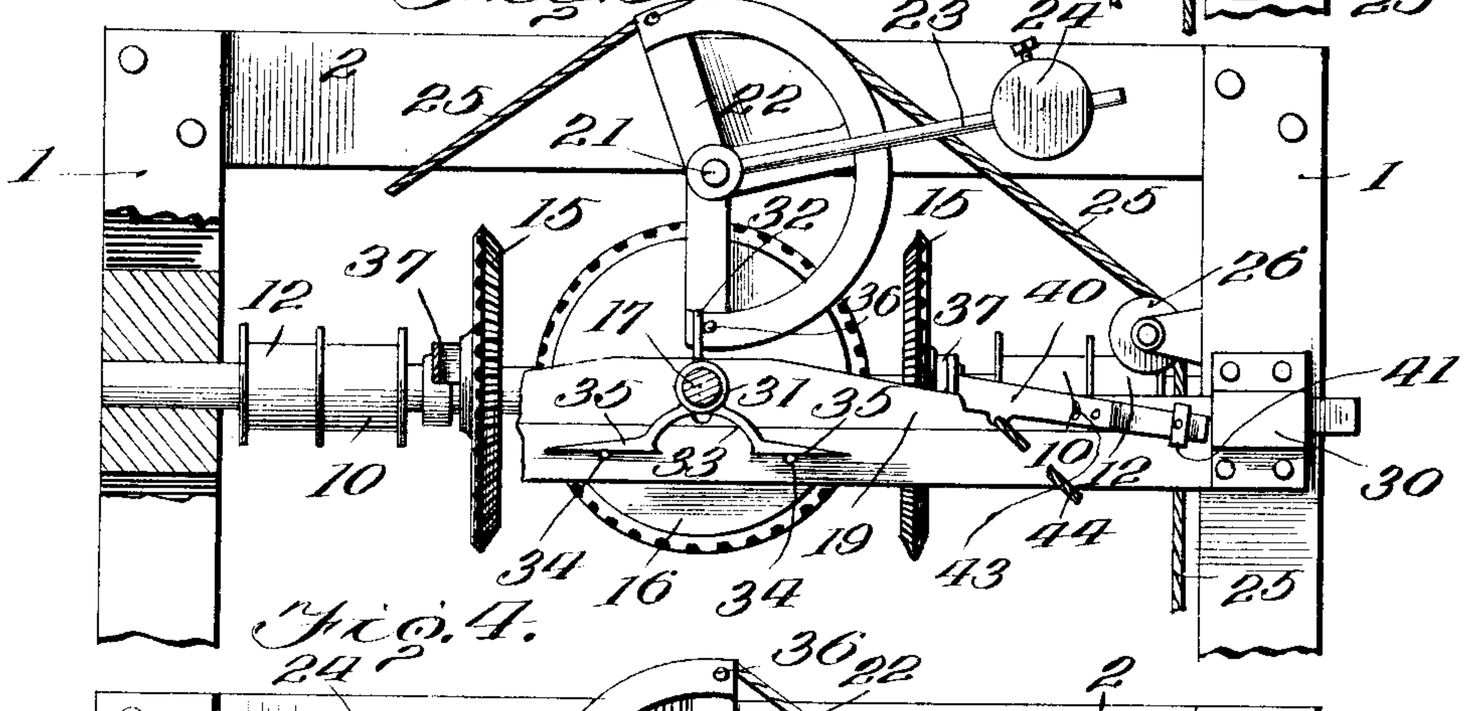
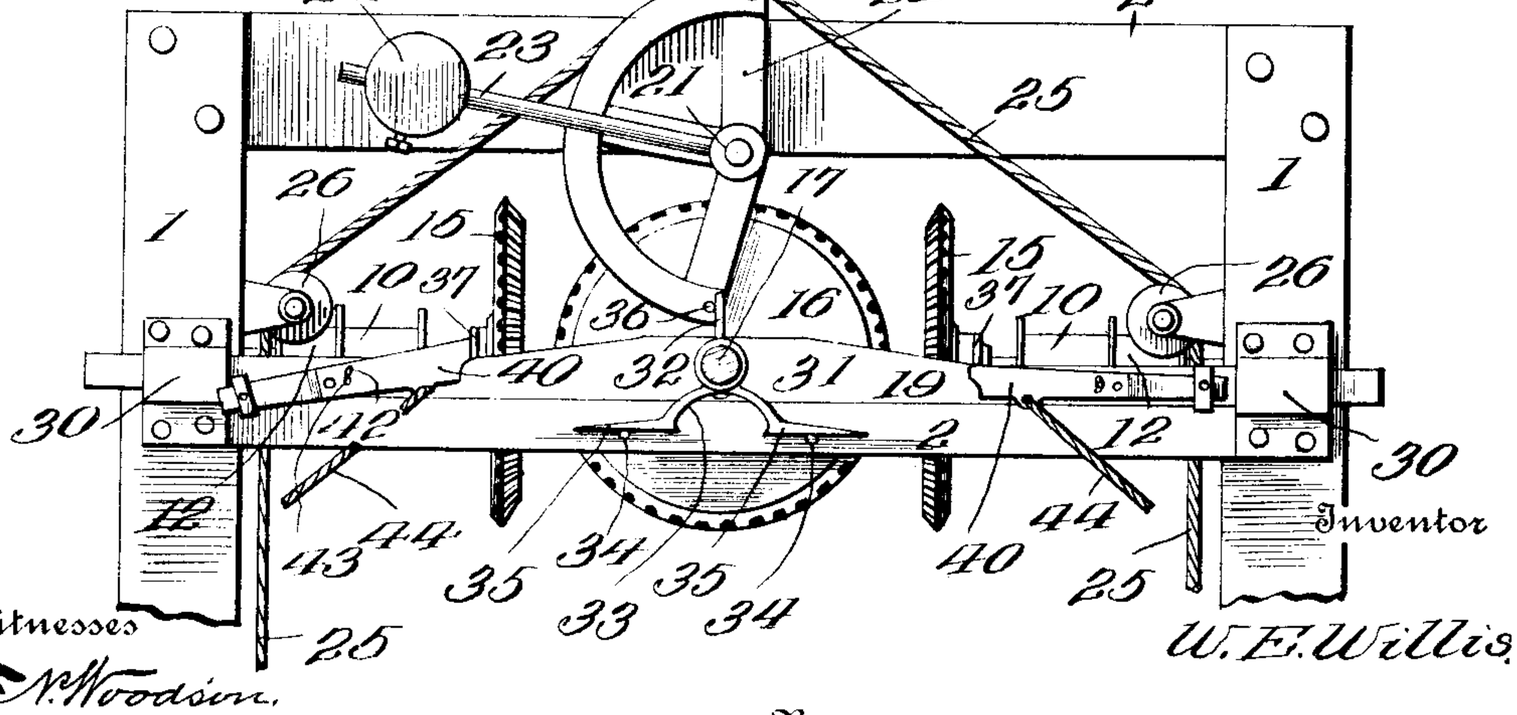


Fig. 4.



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3 SHEETS—SHEET 3.

Fig. 5.

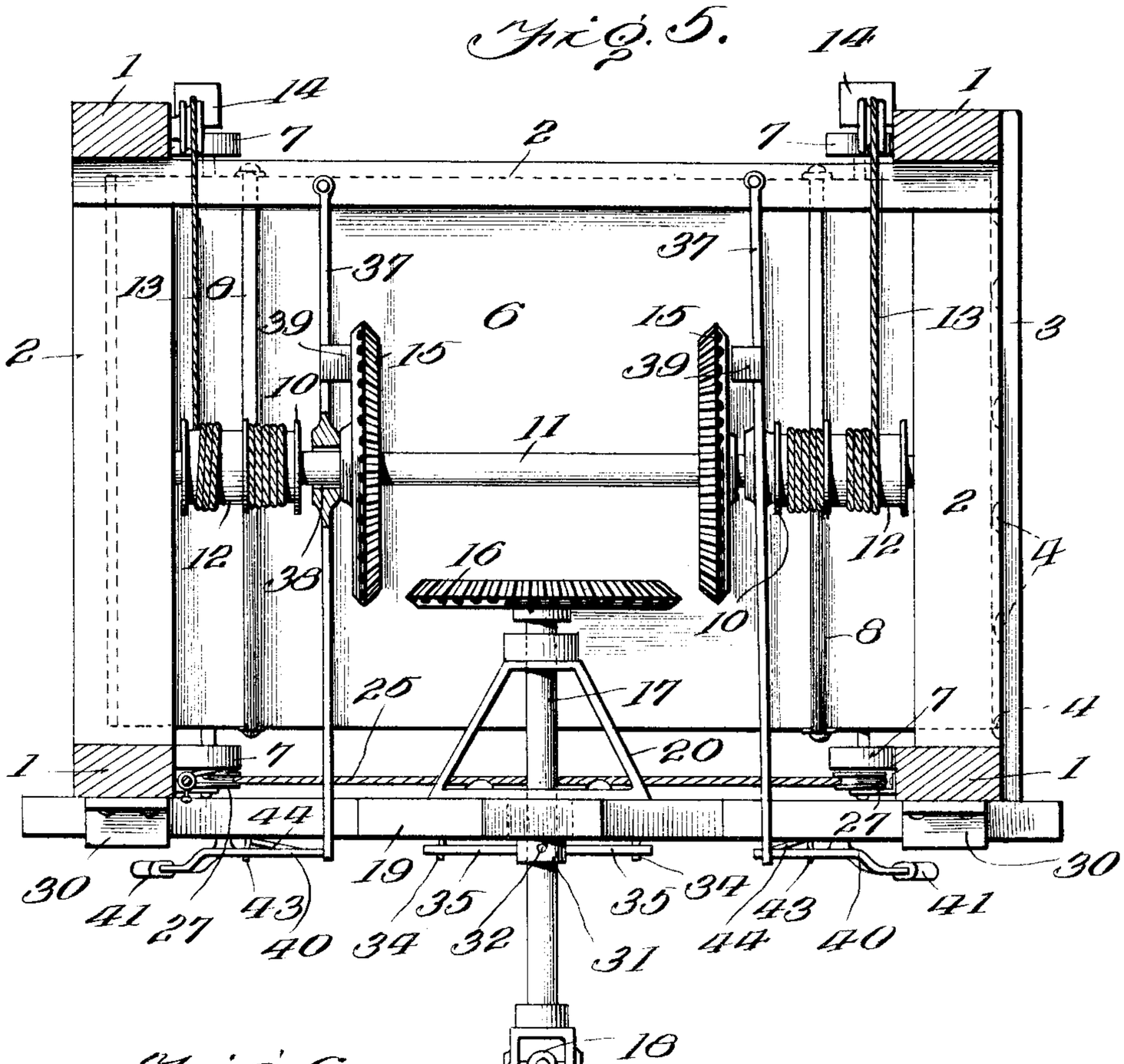


Fig. 6.

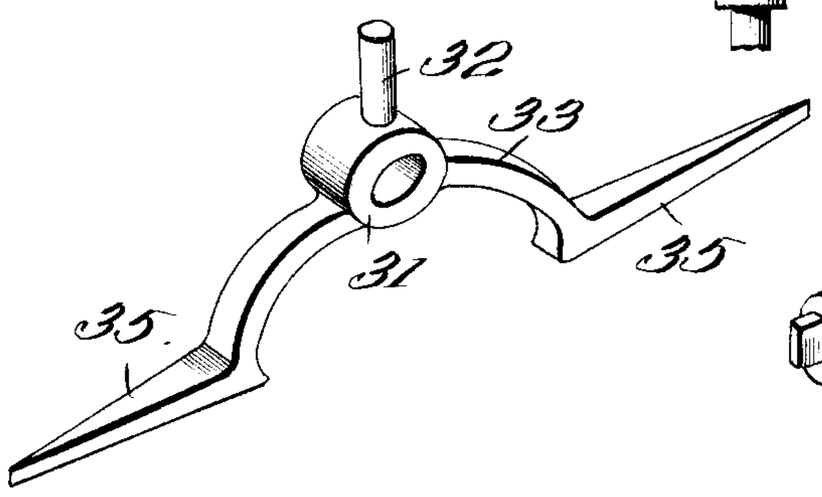
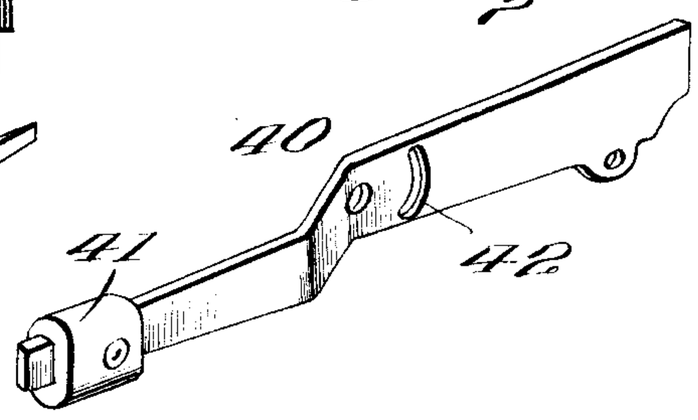


Fig. 7.



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UNITED STATES PATENT OFFICE.

WILLIAM EDWARD WILLIS, OF FAIRVIEW, OKLAHOMA.

ICE-HANDLING APPARATUS.

1,167,140. Specification of Letters Patent. **Patented Jan. 4, 1916.**

Continuation in part of application Serial No. 781,226, filed July 26, 1913. This application filed August 12, 1914. Serial No. 856,400.

To all whom it may concern:

Be it known that I, WILLIAM EDWARD WILLIS, citizen of the United States, residing at Fairview, in the county of Major and State of Oklahoma, have invented certain new and useful Improvements in Ice-Handling Apparatus, of which the following is a specification.

This invention relates to means for moving objects between different levels and is designed especially for use in transferring ice from a storage plant to a refrigerator car or other vehicle, or for transferring ice from a vehicle to a storage plant.

One object of the invention is to provide a simple, strong and durable apparatus in which the ice-carrying member will be alternately raised and lowered and the direction of travel will be automatically reversed at the limit of movement in each direction.

A further object of the invention is to provide means whereby the travel of the carrier may be arrested at either limit of its movement.

Other incidental objects of the invention will appear as the description of the same proceeds, and the invention consists in certain novel features which will be particularly pointed out in the claims following the description.

In the drawings, Figure 1 is an elevation of an apparatus embodying my invention, parts being broken away and the carrier being shown as traveling downward; Fig. 2 is an elevation of the operating mechanism showing the position of the same when the carrier has reached the lower limit of its movement and is about to start upward; Fig. 3 is a similar view showing the position of the operating parts when the carrier has been arrested near the extreme upper limit of its movement; Fig. 4 is a similar view showing the position of the operating mechanism when the travel of the carrier has been arrested at a lower point of the apparatus; Fig. 5 is a horizontal section taken on the line 5—5 of Fig. 1; Fig. 6 is a detail perspective view of the escapement dog; Fig. 7 is a detail perspective view of the brake-actuating trip or lever.

In carrying out my invention I employ a supporting structure comprising posts or standards 1 which may be of any desired construction and are illustrated as being rectangular wooden posts. These posts or standards are spaced apart so as to form a substantially rectangular shaft or well and near their upper ends they are connected by transverse and longitudinal beams 2, as shown. The supporting structure thus described is arranged at one side of the warehouse or storeroom and within the same and to two of the posts or standards 1, I removably secure a series of doors 3 which may be arranged so as to form a part of the wall of the building. When these several doors are attached to the posts they will form an effective closure for the structure, and upon their inner sides I provide cleats or rails 4 which constitute a track for the ice, indicated at 5, which is supported upon the platform 6. It will be understood that these doors may be separately released and turned downwardly to form a skid, as shown in Fig. 1, over which the ice may travel to the refrigerator-car or delivery wagon. It will also be understood that, as the level of the ice rises in the vehicle, the door which has been used may be raised into its closed position and a higher door lowered and, of course, the reverse manipulation of the doors may be had when the apparatus is being used to transfer ice from a delivery wagon or other vehicle into the storehouse.

The platform 6 is equipped with rollers 7 which ride upon the posts 1, as indicated most clearly in Fig. 5, and thereby guide the platform or ice-carrier in its movement, and the carrier is suspended by bails 8 and cables 9 from drums 10 which are fixed upon a shaft 11 supported by the transverse beams 2, as will be readily understood. Upon the said shaft 11, I also secure counterbalance drums 12 upon which cables 13 are wound in a direction opposite to the winding of the cables 9, and the said cables 13 carry counterbalance weights 14, as shown in Fig. 1. These counterbalance weights serve to off-set the weight of the load upon the platform and assure a smooth easy movement of the platform or carrier, while they also prevent racing of the engine when the load has been removed from the carrier. It will also be noted upon, reference to Fig. 1 that the carrier is preferably inclined so that the passage of the ice from the carrrier through the opening provided by removing one of the doors 3 will be facilitated. Gear wheels 15 are secured upon the shaft 11 at opposite sides of the apparatus, and these gear-wheels receive motion alternately from a driving gear-wheel 16 which is carried by the inner

end of a power-shaft 17, said shaft being continuously rotated by and from the engine and being equipped with a universal joint 18 to accommodate the oscillations thereof in the operation of the mechanism. The shaft 17 is mounted loosely in a bearing provided in the sliding bar 19 which rests directly on the front longitudinal beam 2, as shown, and a bracket 20 is secured to the inner side of the said sliding member so as to provide an additional support for the driving shaft. It will be readily understood that, as the driving shaft is continuously rotated in one direction when it engages one of the gear-wheels 15, the carrier will be raised, owing to the winding of the suspending cables 9 upon the drums 10, and when the driving gear-wheel engages the opposite gear-wheel 15 the drum will be rotated in the opposite direction and the carrier will be lowered.

Mounted in any convenient manner upon the top of the supporting structure is a rock-shaft 21 to which is rigidly secured a segment 22. A weight-carrying arm 23 is also rigid with this rock-shaft and extends beyond the segment between the ends thereof, the weight 24 being adjustable, as shown. To the opposite ends of the segment, and extending in opposite directions over the arcuate edge thereof, are secured the overlapping ends of a cable 25 which extends from the segment to guide rollers 26 mounted upon the frame and thence to lower similar guide rollers 27 provided at the bottom of the frame. Upon one run of this cable 25 I provide stops or lugs 28 which are adjustable thereon and are adapted to be engaged by a guide or eye 29 carried by the carrier and fitting around the cable between the said stops or lugs. When the carrier approaches the lower limit of its movement the eye or guide 29 will engage the lower lug 28 so as to push the same downward and exert a force upon the cable 25 which will pull the segment 22 from the position shown in Fig. 1 so that the weighted arm 23 will move up over and down to the position shown in Fig. 2 unless the brake be applied as hereinafter explained, in which event the movement will be checked at the position shown in Fig. 4. When the carrier is moving upwardly and approaches the upper limit of its movement, the eye 29 will engage the upper lug 28 and the segment 22 and the arm 23 will be swung in the opposite direction, as will be readily understood. It will thus be seen that the controlling cable 25 is automatically shifted at each limit of the movement of the carrier, and by adjusting the lugs or brackets 28 upon the cable the extent of movement of the carrier may be regulated so that the carrier will not move above the level of the ice which is being removed nor travel below the top of the ice which is being stored. The slide 19 has its ends extended beyond the beam 22 upon which it is mounted, and the said ends play in and are guided by brackets 30 secured upon the frame or supporting structure. At the center of the slide 19 I pivotally mount an escapement dog 31 having a central upstanding pin or arm 32 and having an arcuate body 33 adapted to engage stop pins 34 upon the beam 2 and spaced equal distances from the center thereof, wings 35 extending in opposite directions from the lower ends of the said arcuate body, as clearly shown. At the ends of the segment 22 are pins 36 which project laterally therefrom and are adapted to impinge against the upstanding arm or pin 32 so as to rock the escapement dog and shift the slide, as will presently appear.

Pivotally mounted upon the rear beam 2 and projecting therefrom across the apparatus, so that their free ends will be over the slide 19, are brake levers 37 which are provided with openings 38 at proper points to permit the levers to fit around the drum shaft 11, the said levers passing close to the outer faces of the gear-wheels 15 and being equipped with brake shoes 39 adapted to bear upon the respectively adjacent gear-wheel, as will be readily understood. Pivotally mounted upon the front side of the slide 19 and near the ends thereof are the trips or brake actuating levers or dogs 40, and upon the outer ends of these brake-controlling dogs are weights 41 which tend to hold the inner ends of the said dogs up in position to engage the respectively adjacent brake levers. The dogs are provided with arcuate slots 42 receiving pins or studs 43 on the slide 19 so as to limit the movement of the dogs and prevent them dropping so that they will fail to perform their functions, and a rope or chain 44 is secured to each dog near the end thereof and extends downwardly therefrom to a point near the bottom of the supporting structure. If these ropes or chains 44 are held the dogs 40 will be held down so that they will ride under the brake levers as the slide 19 is reciprocated and, consequently, will fail to actuate said levers. If the fastening rope or chain attached to either dog, however, be released, the weight on said dog will swing the inner end of the dog up into the horizontal plane of the adjacent brake lever and the slide 19 will then carry the said dog against the said brake lever so that it will be caused to bind against the adjacent gear wheel and stop the rotation of the drum shaft, and consequently, arrest the travel of the carrier. It will, of course, be understood that one of these dogs will stop the carriage near the upper limit of its movement, while the other dog will operate to stop the same at the lower limit of its movement and thereby,

by releasing either dog as may be desired, the carrier may be automatically arrested at the top or the bottom of the shaft. If both dogs be released the carrier will be caused to stop near the limit of its movement in both directions. To permit the dogs to travel with the slide without operating the brakes, springs 40ª may be utilized to connect the lower ends of the ropes or chains, these springs being strong enough to resist the action of the weights 41 but not strong enough to arrest the slide 19.

Assuming that both dogs 40 have been secured against movement under the influence of their respective weights, the carrier will ascend and descend alternately as long as the engine is running. Assuming the carrier to be traveling downwardly, as shown in Fig. 1, the escapement dog is in engagement with the left-hand pin 34 and the segment has a pin 36 bearing against the right-hand side of the pin 32 on said dog, the weighted arm 23 holding the parts in this position so that the slide cannot move toward the right in Fig. 1. When the eye 29 on the carrier engages the lower lug 28 the continued downward movement of the carrier will move the said lug downwardly and exert a pull upon the cable 25 which will swing the segment 22 and the weighted arm 23 up over and to the left, as previously described. The pin 36 which appears at the bottom of the segment 22 in Fig. 1 will be thus moved away from the pin 32 and the pin 36 which appears at the top in Fig. 1 will be moved downwardly and impinge against the left-hand side of the pin 32 so as to rock the escapement dog and lift the same out of engagement with the left-hand pin 34. The rocking of the escapement dog will cause that wing 35 which was raised to drop upon the previously free pin 34, and the continued travel of the carrier with its pull upon the cable 25, aided by the weight of the arm 23, will push upon the escapement dog so that the slide 19 will be moved to the right, as shown in Fig. 2, the dog riding over the said pin 34 and dropping into engagement with it, as clearly shown in Fig. 2. The movement of the slide to the right will carry the gear-wheel 16 away from the left-hand gear-wheel 15 and into engagement with the right-hand wheel 15, and the rotation of the drum shaft 11 will, consequently, be reversed so that the cables 9 will then wind upon the drums 10 and the carrier ascend. A similar operation will take place when the carrier approaches the upper limit of its movement, the parts being returned to the positions shown in Fig. 1 and the carrier again descending. The momentary presence of the carrier at each limit of its movement will suffice ordinarily to permit the block of ice which was on the carrier to be removed therefrom and to permit a block of ice to be shoved onto the empty carrier.

Assuming that it is desired to stop the travel of the carrier at the top of the structure, the right-hand dog 40 is released. Then, when the upward movement of the carrier brings the eye 29 into engagement with the upper lug 28 and shifts the controlling cable 25 so as to rock the segment 22 and the arm 23, the pin 36 on the segment will engage the right-hand side of the pin 32 but the slide 19 will not complete its movement. When the slide 19 thus moves toward the left, the released dog 40 will impinge against the free end of the adjacent brake lever 37 and will force the same against the adjacent gear-wheel 15, as shown in Fig. 3. The brake shoe will thus be caused to bind against the said gear wheel and arrest its movement so that the drum shaft will be held stationary and the travel of the carrier, of course, arrested. This operation will hold the slide 19 about midway of its travel upon the beam 2 so that both wings 35 of the escapement dog will be resting upon the stop pins 34 and the driving gear-wheel 16 will be out of mesh with both wheels 15. The weighted arm 23 will also be partly raised, as clearly shown in Fig. 3. If the fastening rope or chain 44 attached to the dog 40 be now drawn upon, the dog will be disengaged from the brake lever and the weight upon the arm 23 will then drop so that the segment will be further rocked and will push the escapement dog with the slide 19 into the position shown in Fig. 1, whereupon the downward travel of the carrier will automatically start. The operation in stopping the carrier at the bottom of the structure is similar to that just described, but in such event the left-hand dog 40 is released, while the right-hand dog 40 is held down and the left-hand dog will then engage the adjacent brake lever so that the movement of the parts will be checked in the position shown in Fig. 4. It will be understood, of course, that the dog which is held down will pass under the respective adjacent brake lever without engaging the same.

My device may be readily operated without requiring the services of a large number of employees. By giving the carrier sufficient inclination, the block of ice placed thereon will automatically slide therefrom when it reaches the opened door 3 so that the positive stoppage of the carrier at the point of discharge will not be necessary and the attendant need only manipulate the brake-controlling ropes or chains so as to hold the carrier at the point where ice is to be placed thereon. The apparatus is free of any complicated arrangement of its parts and, consequently, is not apt to get out of order or need frequent repairs.

It is to be understood that I do not limit myself to the exact details of construction shown in the accompanying drawings as many minor changes may be made therein without involving a departure from the spirit or scope of the invention as the same is defined in the following claims. By properly winding the cables, the eyes 29 may be placed on the weights 14 instead of on the platform.

Having thus described my invention, what I claim as new is:

1. The combination of a support, a carrier arranged to travel therein, a slide mounted on the support, a shaft mounted on the support, connections between said shaft and the carrier, a driving shaft mounted on the slide, a rock shaft, operative connections between the carrier and the rock shaft, means whereby the driving shaft will actuate the shaft on the support in either direction and impart travel to the carrier, an escapement dog on the slide, lateral projections on the support arranged to be engaged by said dog, and means on the rock shaft to engage the dog and shift the slide and the driving shaft thereon to thereby reverse the travel of the carrier.

2. The combination of a supporting structure, a carrier mounted to travel therein, a drum shaft upon said structure supporting the carrier, opposed gear-wheels upon the said drum shaft, a slide mounted upon the supporting structure, a driving shaft carried by said slide, means actuated by the carrier for reciprocating said slide, a gear-wheel mounted upon the driving shaft and brought into engagement with either one of the first mentioned gear-wheels by the movement of said slide, and means controlled by the slide for arresting movement of the carrier.

3. The combination of a supporting structure, a carrier mounted to travel therein, a drum shaft supported by said structure, drums on said shaft, cables secured to said drums and supporting the carrier, opposed gear-wheels on the shaft, a slide mounted on the supporting structure, a driving shaft carried by said slide, a gear-wheel on said shaft adapted to mesh with either of the first mentioned gear-wheels, means controlled by the carrier for shifting said slide, and means controlled by said slide for arresting the movement of the carrier.

4. The combination of a supporting structure, a carrier mounted to travel therein, a drum shaft mounted in the supporting structure, means for suspending the carrier from said shaft, opposed gear-wheels on the drum shaft, a slide upon the supporting structure, a driving shaft carried by said slide, a gear-wheel on the driving shaft adapted to mesh with either of the first mentioned gear-whels, brake levers pivoted upon the supporting structure and extending past the respective opposed gear-wheels in proximity to the same, means actuated from the carrier to shift the said slide, and dogs mounted upon the slide and adapted to engage the respectively adjacent brake levers and force the same against the respective opposed gear-wheels whereby to arrest the travel of the carrier.

5. The combination of a supporting structure, a drum shaft mounted thereon, a carrier suspended from the drum shaft and arranged to travel in the supporting structure, opposed gear-wheels on the drum shaft, a slide mounted on the supporting structure, a driving shaft carried by said slide, a gear-wheel on the driving shaft adapted to mesh with either of the opposed gear-wheels, brake levers pivoted upon the supporting structure and extending past the respective opposed gear-wheels in proximity thereto, dogs pivoted upon the carrier and having weighted outer ends whereby their inner ends will tend to move into engagement with the respective brake levers, and means controlled by the carrier for reciprocating the slide.

6. The combination of a supporting structure, a drum shaft thereon, a carrier suspended from the drum shaft and arranged to travel in the supporting structure, a slide mounted upon the supporting structure, a continuously rotating gear-wheel carried by said slide, opposed gear-wheels on the drum shaft arranged to be alternately engaged by the continuously rotating gear-wheel, an escapement dog on the slide, fulcrum members upon the supporting structure below the said escapement dog, and means actuated by the carrier for oscillating the said dog and thereby reciprocating the slide.

7. The combination of a supporting structure, a drum shaft therein, a carrier suspended from the drum shaft and arranged to travel in the supporting structure, opposed gear-wheels on the drum shaft, a slide mounted on the supporting structure, a continuously operating gear-wheel carried by said slide and adapted to engage either of the said gear-wheels, an escapement dog pivotally mounted on the slide, a rock-shaft mounted on the supporting structure above the slide, means on said shaft actuating the escapement dog, and means controlled by the carrier for actuating said shaft.

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

WILLIAM EDWARD WILLIS. [L. S.]

Witnesses:
W. D. BOWLING,
F. A. PERKINS.