

No. 746,248.

PATENTED DEC. 8, 1903.

R. BAGGALEY.  
AUTOMATIC WAREHOUSING APPARATUS.

APPLICATION FILED MAR. 28, 1903.

NO MODEL.

5 SHEETS—SHEET 1.

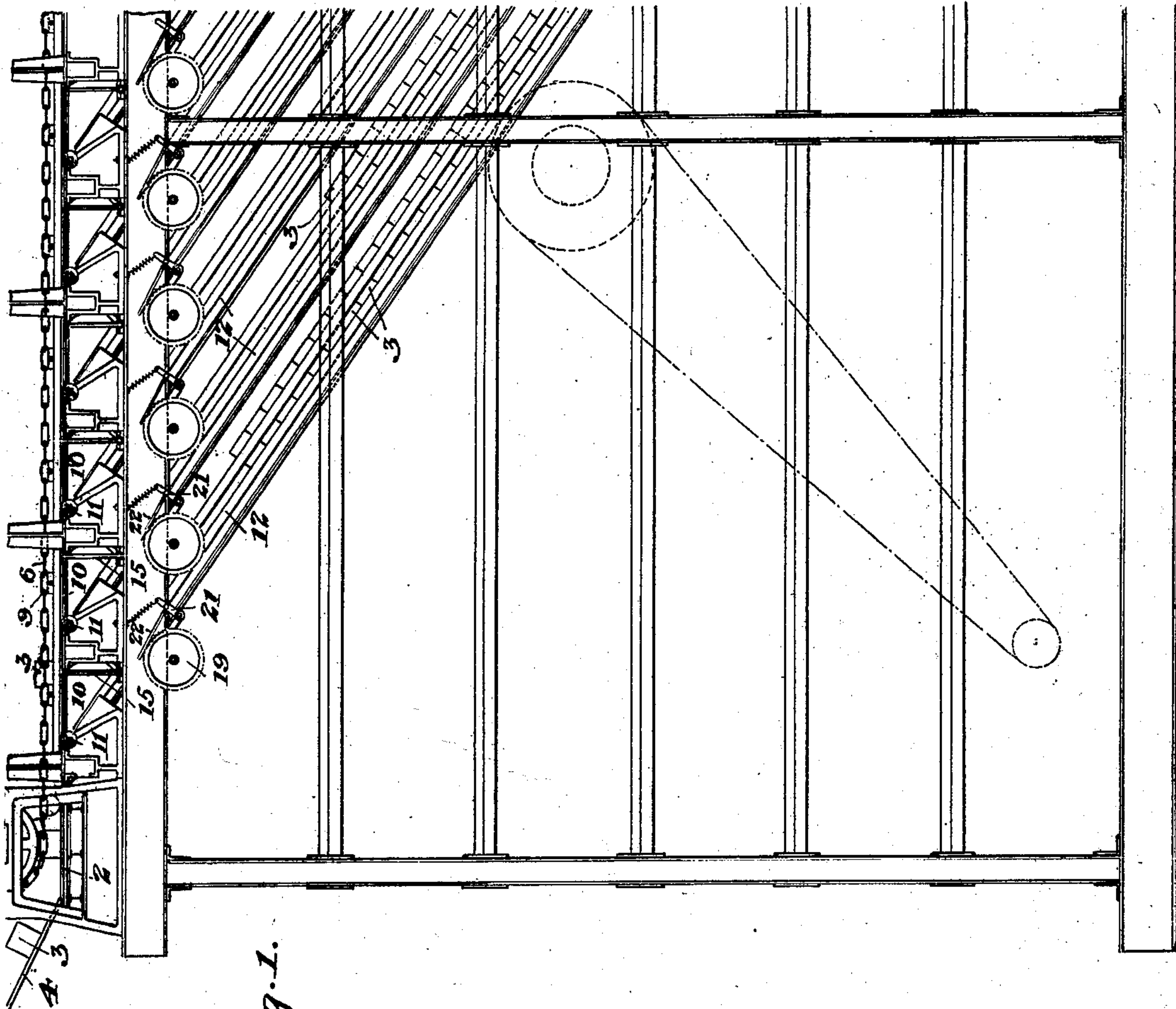


Fig. 1.

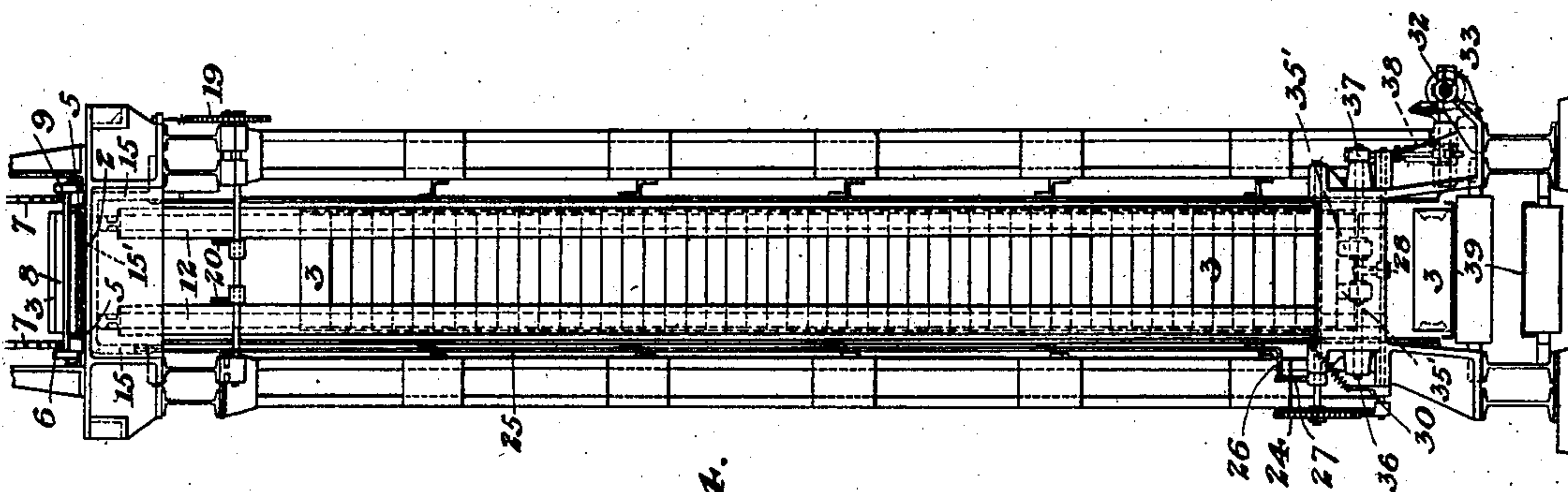


Fig. 4.

WITNESSES

*Carl Lindquist.*  
*Geo. J. Rockwell.*

INVENTOR

*Ralph Baggeley*



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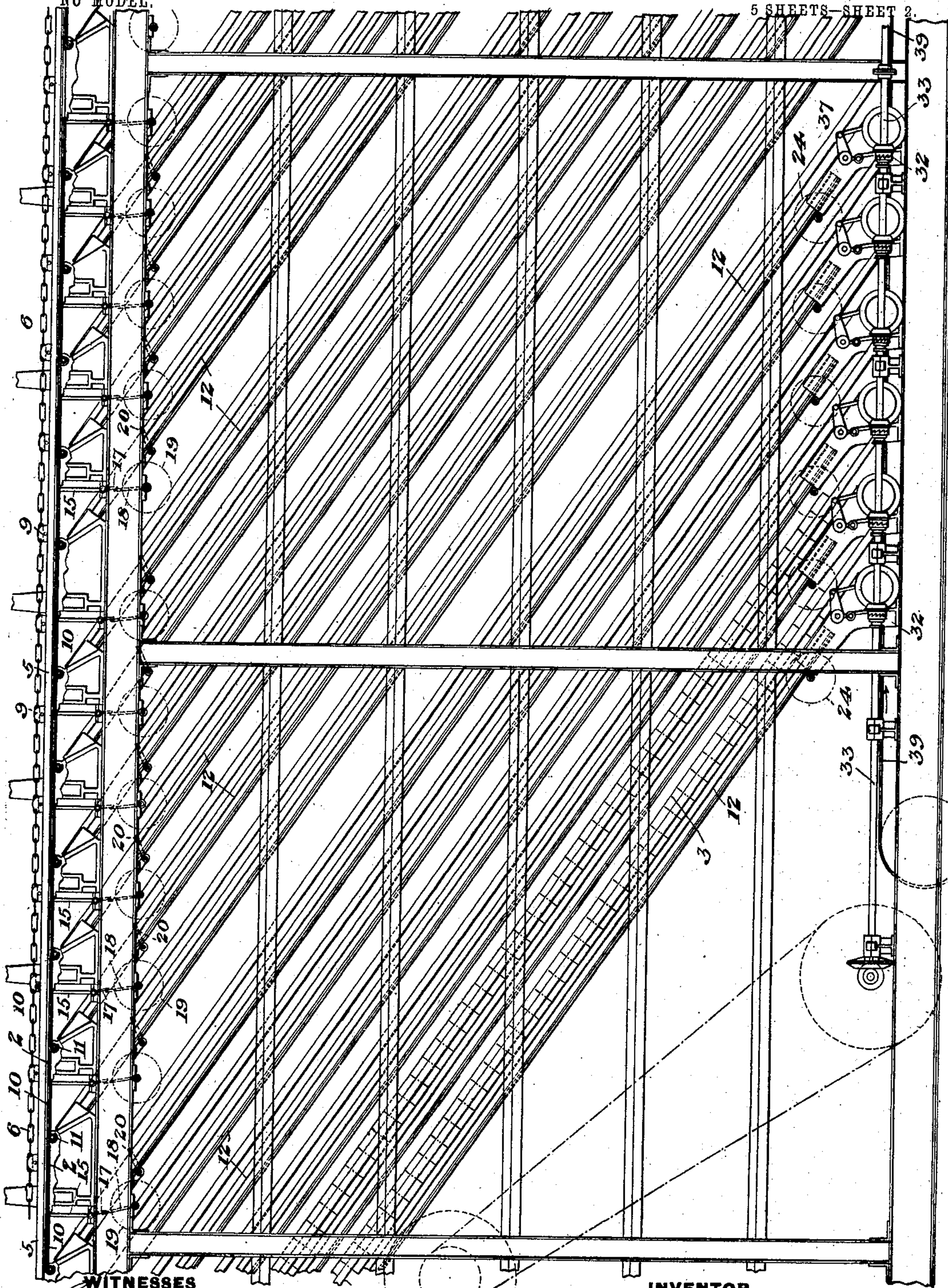
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5 SHEETS—SHEET 2.



WITNESSES

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*Geo. J. Rockwell.* *Fig. 2.*

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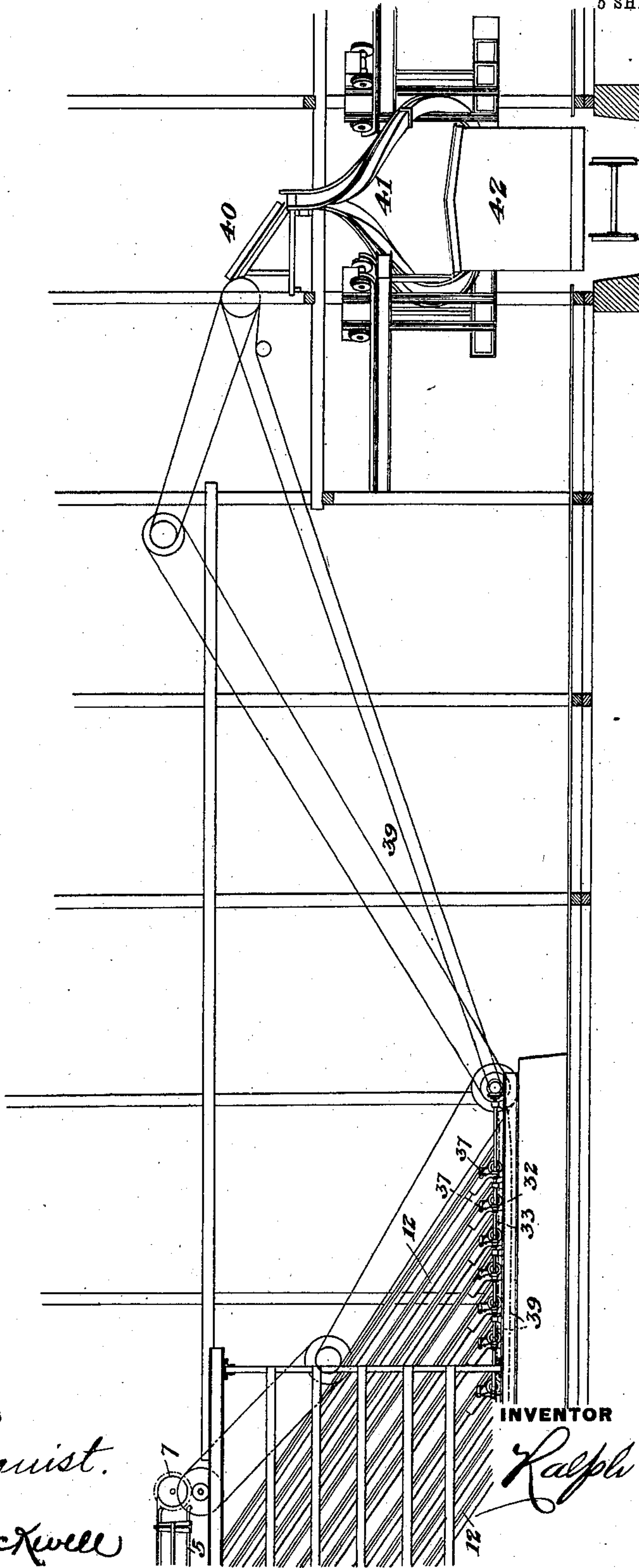
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5 SHEETS—SHEET 3.

Fig. 3.



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5 SHEETS—SHEET 4.

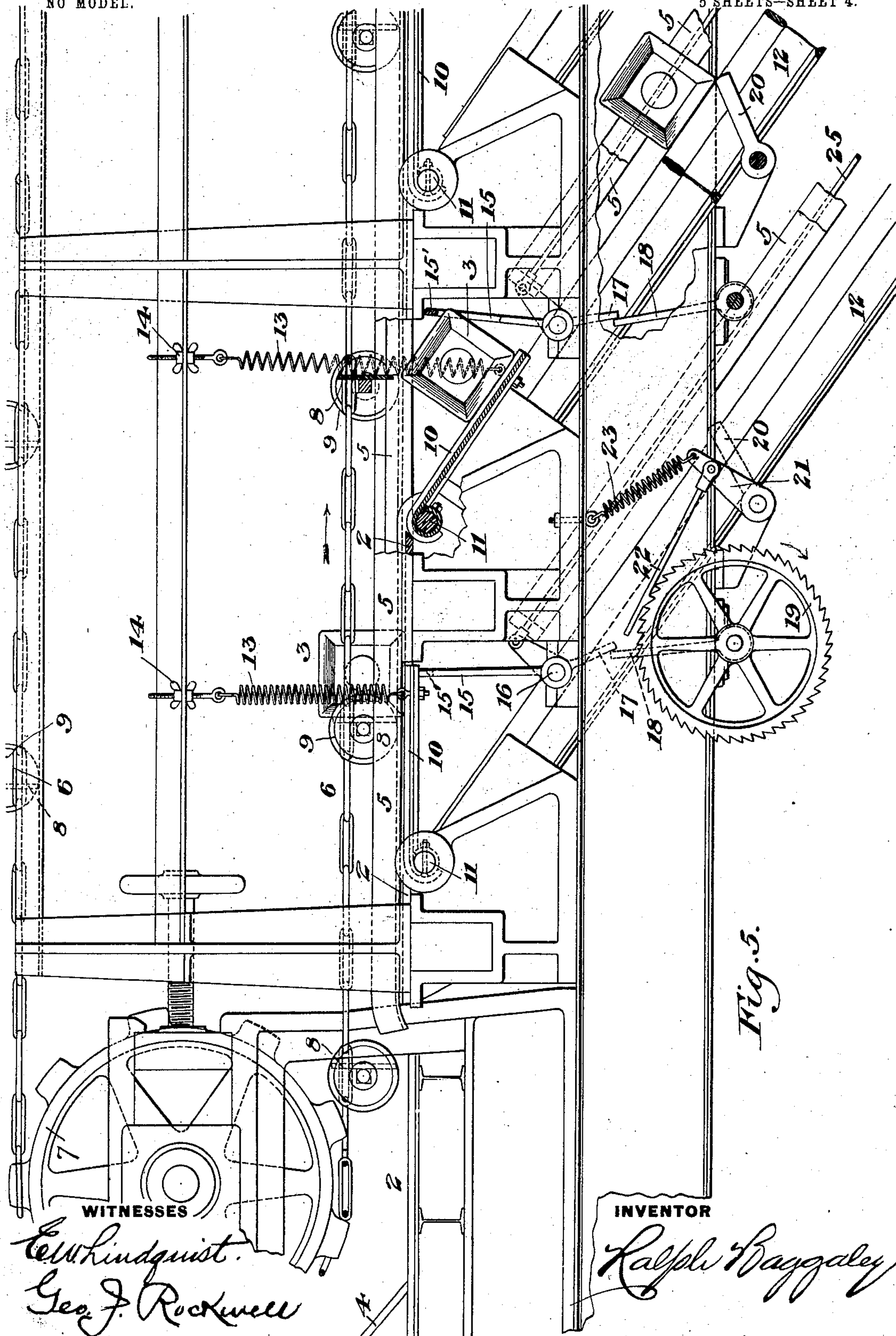


Fig. 5.

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5 SHEETS—SHEET 5.

Fig. 6.

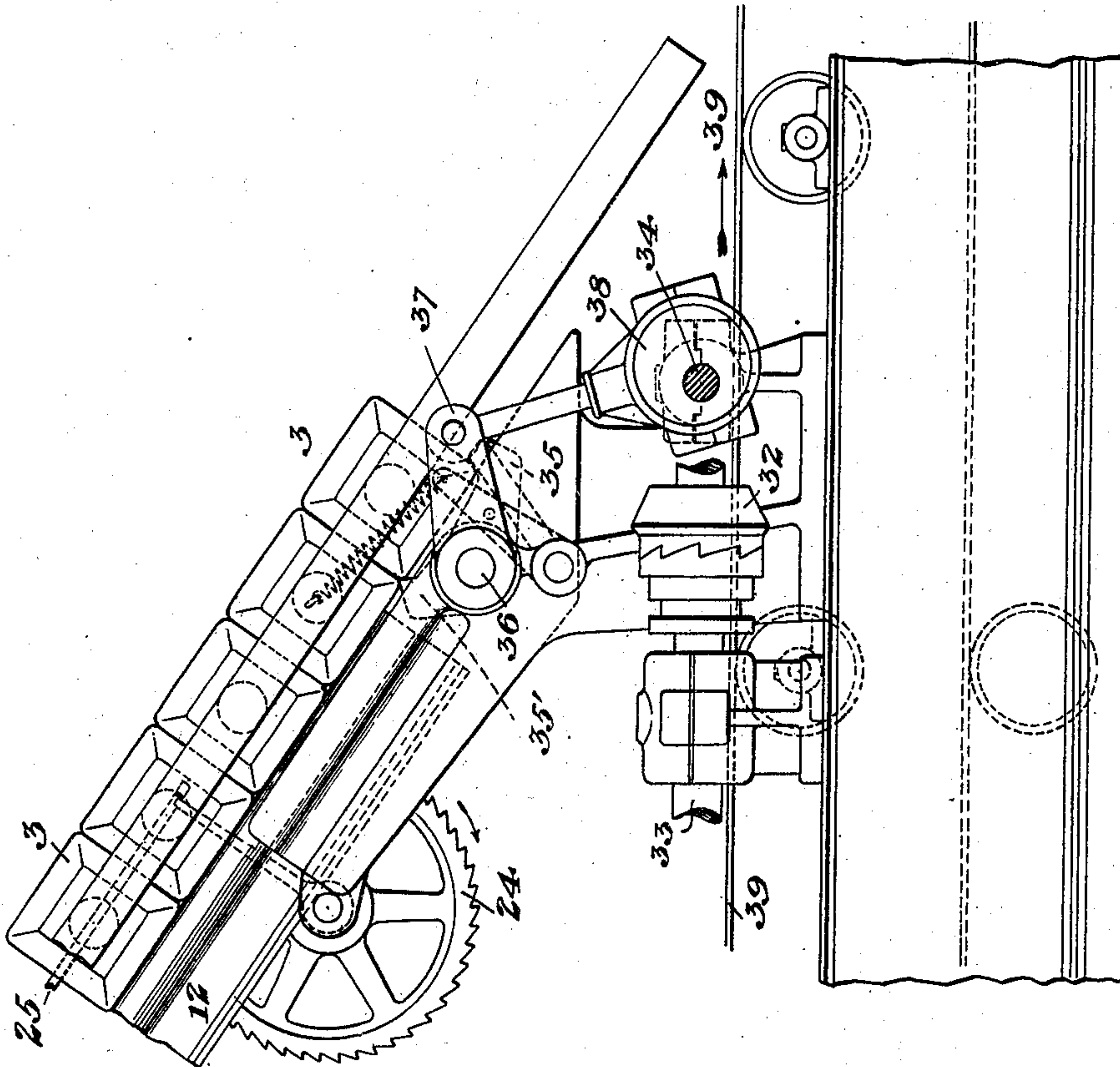
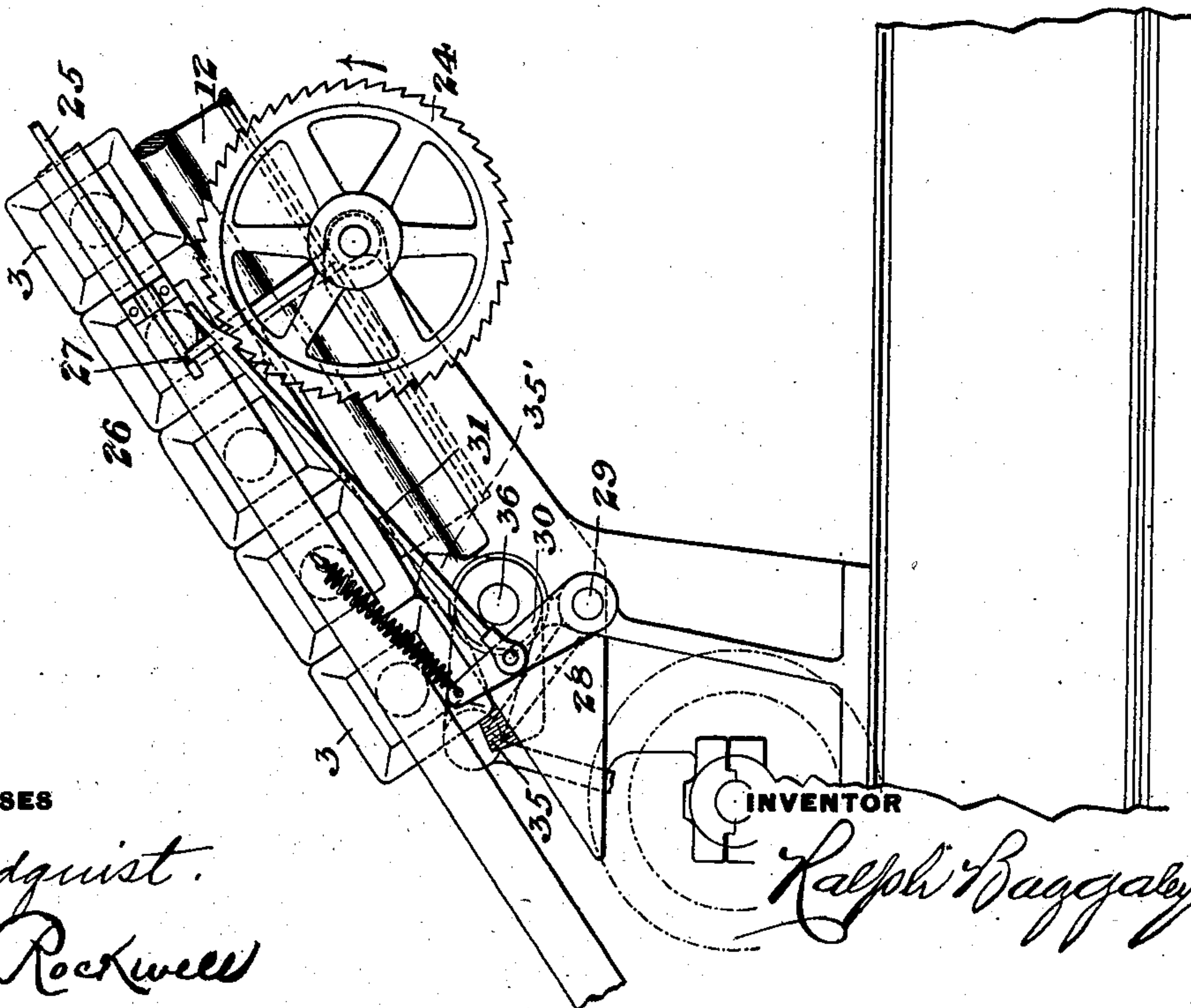


Fig. 7.



WITNESSES

*C. W. Lindquist.*  
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*Ralph Baggage*



# UNITED STATES PATENT OFFICE.

RALPH BAGGALEY, OF PITTSBURG, PENNSYLVANIA.

## AUTOMATIC WAREHOUSING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 746,248, dated December 8, 1903.

Application filed March 28, 1903. Serial No. 149,987. (No model.)

*To all whom it may concern:*

Be it known that I, RALPH BAGGALEY, of Pittsburgh, Allegheny county, Pennsylvania, have invented a new and useful Automatic Warehousing-Machine, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, in which—

Figures 1, 2, and 3 show my improved apparatus in side elevation. These figures are successive parts of the same apparatus and should be read together, placing them end to end, Fig. 3 being on a smaller scale than Figs. 1 and 2. Fig. 4 is a rear end elevation of the apparatus. Fig. 5 is a view on a larger scale, showing the upper receiving end of the apparatus. Figs. 6 and 7 show the lower delivery end of one of the racks or compartments, illustrating, respectively, opposite sides thereof.

My invention relates to an apparatus for receiving and storing pig-copper or other like articles and when required delivering them for shipment into ordinary box-cars or onto trucks, wagons, drays, or elsewhere without manual labor.

This apparatus is one unit which may be used in a complete system invented by me and having for its object the taking of copper or other ores, carrying them and their resulting mattes, slags, and refined pigs through the varied processes necessary in their treatment, together with the storage of the same in suitable warehouses as long as may be desired, and when ready for shipment the delivery of the metal pigs into ordinary box-cars in evenly-distributed and accurately-counted loads practically without the use of manual labor.

As the present application is confined to the one unit of the automatic warehousing-machine, the following description is limited to it alone.

The pigs of refined copper after having been cast pass on conveyers submerged in water in order to effect the removal of black oxid to flu-trimming machinery, thence to the weighing-machine, thence to the stamping-machine, in which the exact weight of each pig is stamped upon it, and thence on conveyers to the automatic warehousing-

machine which forms the subject-matter of this application. Such pigs are delivered by suitable machinery to the receiving end of this machine, at which point the sweeps or arms of the distributing-carrier catch them separately and move them on a table composed, preferably, of rails which extend over the doors of the storage compartments or racks. These doors are held lightly in position by counterbalancing weights or springs, which are set to counterbalance the weight of the door and hold it in closed position. After the first receiving-rack has been emptied of its pigs through shipment a lock on its door is automatically released, and when the pig is moved by the distributing-carrier onto this door the weight of the pig will cause the door to open and to permit the pig to slide down to the bottom of the first rack. Each rack is designed to hold, say, fifty pigs, each weighing approximately two hundred pounds. Hence each rack can hold ten thousand pounds, or five tons of pig-copper. Any other weight of pig may be used, if desired, and any other storage capacity for each rack may be utilized. As each pig enters the rack its passage actuates a mechanism preferably consisting of a ratchet-wheel designed so that when, say, fifty pigs have been delivered into the first rack its door will be automatically locked, so that the succeeding pigs will move over it to the door of the next rack and will pass there-through.

Each rack consists, preferably, of two rails or bars, which may be railroad-rails, set for convenience at an angle of approximately thirty degrees; but any other angle above the angle of repose of the plugs may be used, if desired, and other forms of rack or components may be used. Each rack receives through the action of the automatic machinery its exact complement of pigs in succession until all the racks have been filled.

Assume, for the purpose of this description, that the machine is filled with its full storage capacity of copper, say sixty racks of five tons each, amounting to three hundred tons, or ten ordinary car-loads, and that the shipping clerk desires to withdraw from the machine and to load onto a box-car thirty tons, which



will represent the contents of six racks. For this purpose I provide at the base of the racks feeding mechanism operated, preferably, by suitable clutches. The shipping clerk throws the clutch into position on the shaft that actuates the delivery mechanism of the first or any other rack by which the pigs are released and delivered in succession. As each pig is released it slides by gravity upon a conveyer located underneath the machine, by which it is carried to a chute, whence it slides into the box-car for distribution either into one end or the other over the entire bed of the car. As the shipping clerk throws the first clutch into action and the regular delivery of the pigs into the car for shipment is commenced he stations himself at a convenient place with a shipping-book and pencil in hand, the pages in the book having already been prepared to show the name of the owner of such copper, as the same has previously been cast on each pig, and being ruled in columns and with the requisite number of lines on the one page to record the exact weight of each pig forming a part of the three hundred pigs necessary to load one car. In this way the shipping clerk's duties are confined to observing the exact weight of each passing pig and to recording it in the shipping-book. As the first rack completes its delivery of all its pigs to the delivery-conveyer the last pig in its exit unlocks the upper door of the emptied rack, so that it is again ready for the reception of a fresh stock of pig-copper.

Referring now to the drawings, which show the preferred form of my apparatus, 2 represents a table or bed upon which the pigs 3 of copper or other articles to be stored are delivered by means of a chute 4, as shown in Fig. 1, or by any other suitable device. This table 2 extends horizontally along the top of the machine, as shown in Fig. 5, and is preferably provided with side rails 5 to guide the pigs as they are carried along the same. The carrying mechanism consists, preferably, of endless chains 6, passing around sprocket-wheels 7 and provided at intervals with arms 8, and preferably has supporting-wheels 9, adapted to travel along the surface of the table. At intervals along the table there are drop-doors 10, which are pivoted at 11 at the upper ends of parallel inclined racks 12, each of which is preferably constituted by two rails which may be set, as above stated, at an angle of thirty degrees to the horizontal. Each door is supported by a counterbalancing spring or weight 13 of sufficient tension to counterbalance the weight of the door and to uphold it in horizontal position. The tension can be adjusted by nuts 14. Each door is provided with a lock for holding it closed. A convenient form of such lock consists of upright arms 15, pivoted at 16 and having a cross-bar 15', adapted to uphold the door when the arms are upright, as shown at the right of Fig. 5. For automatically setting these locks in lock-

ing position I employ suitable setting mechanism consisting, preferably, of an arm 17, connected to the pivotal axis 16 and adapted to be engaged by an arm 18 on a ratchet-wheel 19, so as to move the lock into locking position. This ratchet-wheel is operated automatically by the pigs as they pass down the rack, and for this purpose I prefer to employ an arm 20, set in the path of the pigs and connected by a lever 21 to the pawl 22 of the ratchet, so that each pig as it passes will move the arm 20 and through the pawl will advance the ratchet-wheel one space. When the ratchet-wheel makes a complete revolution, the arm 18 will engage the lever-arm 17 and will move the lock 15 into upright position.

23 is a spring for retracting the pawl.

The number of teeth on the ratchet is chosen so that the ratchet will have made one complete revolution when a sufficient number of pigs to fill the rack have passed the arm 20.

The delivery mechanism at the lower end of the rack is provided with a ratchet-wheel 24, which will release the lock 15 when the entire contents of the rack have been discharged. For this purpose I prefer to employ the mechanism shown in Figs. 5, 6, and 7, in which the lock is connected with a rod 25, having a shoulder 26 at the lower end of the rack and adapted to be engaged and moved by an arm 27 on the ratchet-wheel 24 when this ratchet-wheel has made a complete revolution. The ratchet 24 is operated by an arm 28, extending into the path of the pigs at the delivery end of the rack and pivoted at 29. It is connected by a lever 30 to the pawl 31 of the ratchet, so that as each pig is discharged it will move the ratchet one step, and when the ratchet has made a complete revolution—that is to say, when the entire contents of the rack have been discharged—the arm 27 will engage the stop 26 at the end of the rod 25 and will move the lock 15 out of the path of the door 10.

The operation of charging the racks with pigs is as follows: Each of the locks 15 being released from the doors 10 and these doors being upheld only by the counterbalancing-springs 13, the carrier 6 is set in motion and the pigs to be stored are delivered by the chute 4 or other suitable means upon the table, where they are engaged successively by the arms 8. As the pigs come in succession over the first door 10 their weight will overcome the tension of the springs 13 and they will drop through the floor and will travel down the inclined rails of the rack to the bottom thereof, each pig in passing moving the arm 20 and turning the ratchet-wheel 19 one space. When the first rack has received its full complement of pigs, the ratchet will have been turned through one complete revolution, and the arm 18 then coming into contact with the lever-arm 17 will move the lock 15 under the door 10 and will hold it in closed position. The next pig carried along the table will pass



over the first door 10, which is then locked, but on reaching the second door 10 will drop through the same, as shown at Fig. 5, and will descend the rails of the second rack, moving the ratchet-wheel of that rack in its passage, as above explained. When this second rack has been filled, its door 10 will be locked in like manner and the pigs will then be carried to and caused to drop into the third rack, and thus each of the racks or any desired number of them may be charged with pigs.

When it is desired to withdraw the pigs from the racks for delivery into cars—say to withdraw the contents of six racks, representing thirty tons of pigs, which is the capacity of the box-cars now in common use—the shipping clerk throws into connection a clutch 32, which connects a driven shaft 33 with a cam-shaft 34 at the foot of the first rack and is arranged to operate the delivery mechanism of that rack. This delivery mechanism consists, preferably, of rock-arms 35 35', pivoted at 36 and connected by a lever 37 with a cam 38 on the shaft 34, so that the back-and-forth motion of the cam will rock the arms 35 35' in opposite directions, the arm 35 descending to release the bottom pig and the arm 35' rising to stop the descent of the next pig and to uphold all the pigs above, and so on, each alternate oscillation of the arms causing the discharge of one pig. The pigs discharged from the rack descend by gravity upon a conveyer 39 and are carried thereby to the receiving-chute 40 of a car-charging apparatus 41, by which they are delivered into a railroad-car 42. (Shown at the right of Fig. 3.) As the last pig comes from the rack and is delivered upon the conveyer 39 it automatically unlocks the receiving-door 10 at the top of that rack. The shipping clerk then operates the clutch of another rack, which may be anywhere in the system, and thus starts the automatic discharge of the fifty pigs contained therein. The delivery of the pigs from the rack does not interfere in any way with the operation of storing of the pigs, which may proceed without interruption.

It will thus be seen that when constructed as above described the apparatus may be entirely automatic in its action. This is a matter of great importance, because the manual labor heretofore required in the work of storing and delivering copper pigs has been very considerable, and the high price of such labor in the localities in which copper-smelters are generally situated renders this item a large factor in the cost of production.

It will be understood by the skilled mechanic that the apparatus may be varied in many ways without departing from my invention. Other forms of conveying mechanism, racks, and feeding mechanism may be employed.

In the event that the owners of the smelting plant do not wish to store the copper

the apparatus may be used solely for delivering the pigs to the cars, in which case only one rack need be used. The pigs thus can be made to travel in a continuous stream directly from the refinery to the railroad-car.

I claim—

1. A storing apparatus comprising a number of inclined racks, means for closing and opening the upper ends thereof, and a carrier extending transversely across the upper ends of the inclined racks, and adapted to discharge articles into the open racks and to carry the articles past the closed racks; substantially as described.

2. A storing apparatus comprising a number of racks or compartments, means for closing the same, a carrier adapted to carry articles thereto and to deliver them to the racks or compartments not closed, and means operated by the passage of the articles and adapted automatically to close the racks or compartments; substantially as described.

3. A storing apparatus comprising a number of racks or compartments, means for closing the same, a carrier adapted to carry articles and to deliver them to the racks or compartments, means for discharging the articles from the racks or compartments, and automatic means operated by passage of the articles, and adapted to unlock the racks or compartments when the same are emptied; substantially as described.

4. A storing apparatus comprising a number of inclined racks, means for closing and opening the upper ends thereof, a carrier extending transversely across the upper ends of the inclined racks and adapted to discharge articles into the open racks and to carry the articles past the closed racks, discharging mechanism at the bases of the racks, and a conveyer to receive the discharged articles; substantially as described.

5. A storing apparatus comprising a series of inclined racks, a carrier adapted to carry the articles to the racks, and to deliver them therein, doors for the racks, and means for locking and unlocking the doors; substantially as described.

6. A storing apparatus comprising a series of inclined racks, a carrier adapted to carry the articles to the racks and to deliver them therein, doors for the racks, and means for locking and unlocking the doors, said means being operated by the passage of the articles; substantially as described.

7. A storing apparatus comprising a series of inclined racks, a carrier adapted to carry the articles to the racks and to deliver them therein, doors for the racks, means for locking and unlocking the doors, said means being operated by the passage of the articles, and consisting of a ratchet moved by the articles as they descend the racks; substantially as described.

8. A storing apparatus comprising a series of inclined racks, a carrier adapted to carry



the articles to the racks, and to deliver them therein, doors for the racks, and means for locking and unlocking the doors, said doors being counterbalanced; substantially as described. 5

9. A storing apparatus comprising a series of inclined racks or compartments, delivery mechanism at the base thereof consisting of arms, and means for alternately projecting 10 said arms into and retracting them from the path of the articles; substantially as described.

10. A storing apparatus comprising a series of inclined racks, a carrier adapted to carry 15 the articles to the racks, and to deliver them

therein, doors for the racks, means for locking and unlocking the doors, said doors being counterbalanced, and a conveyer leading from the racks; substantially as described.

11. A storing apparatus comprising an inclined rack, a carrier adapted to carry the 20 articles to the rack and to deliver them therein, discharging mechanism for the rack, and a conveyer; substantially as described.

In testimony whereof I have hereunto set 25 my hand.

RALPH BAGGALEY.

Witnesses:

JOHN MILLER,

H. M. CORWIN.