Oct. 4, 1949. W. E. EHINGER 2,483,817

TRANSFER CAR

Filed Oct. 29, 1943

4 Sheets-Sheet 1

Fig. 1

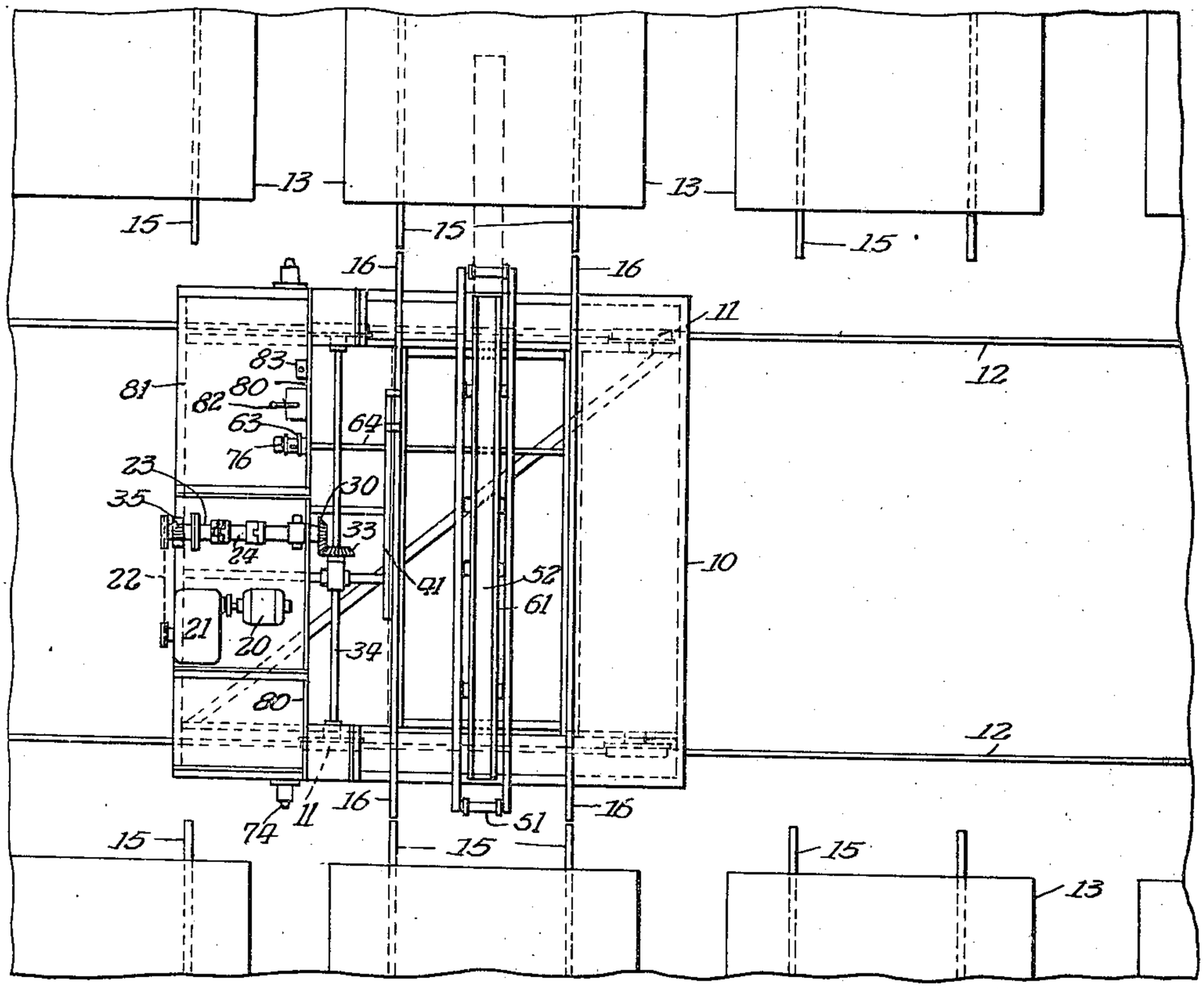


Fig. 2

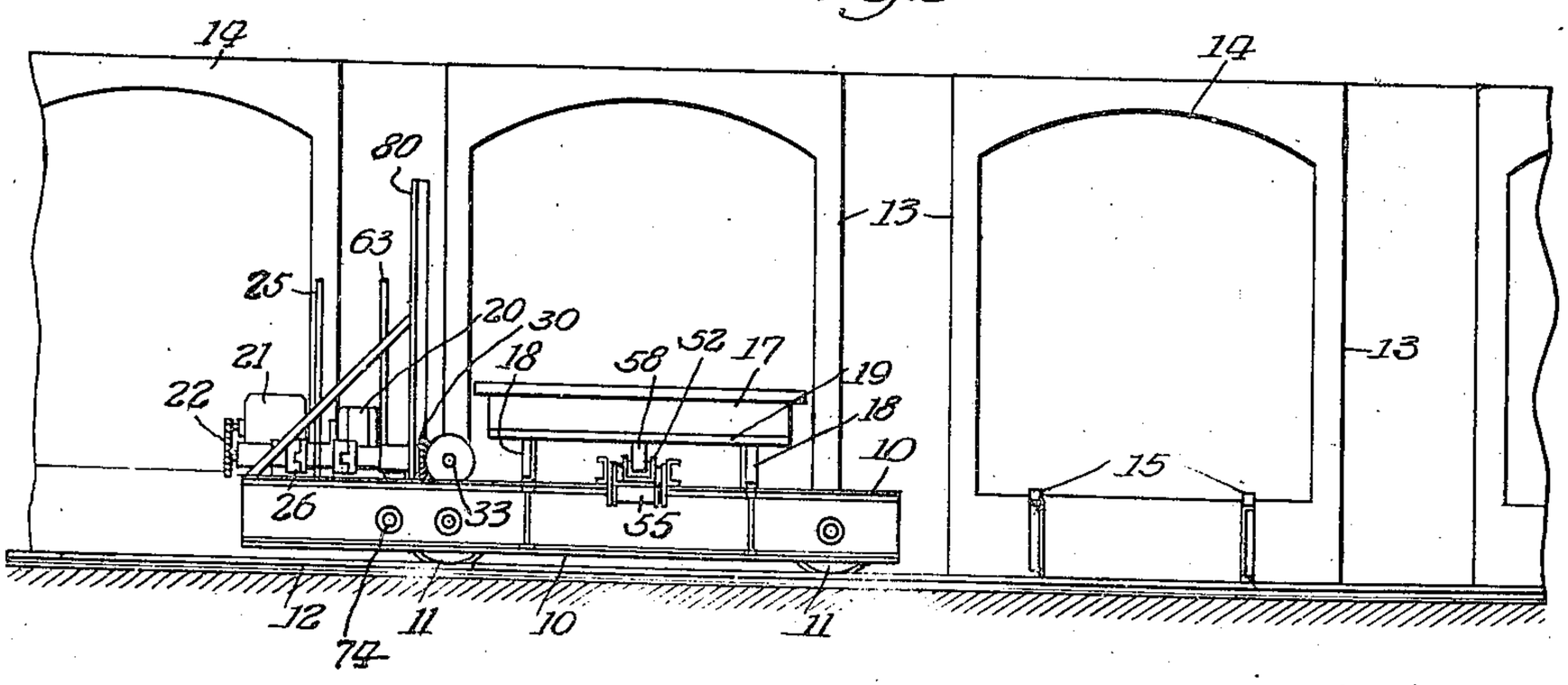


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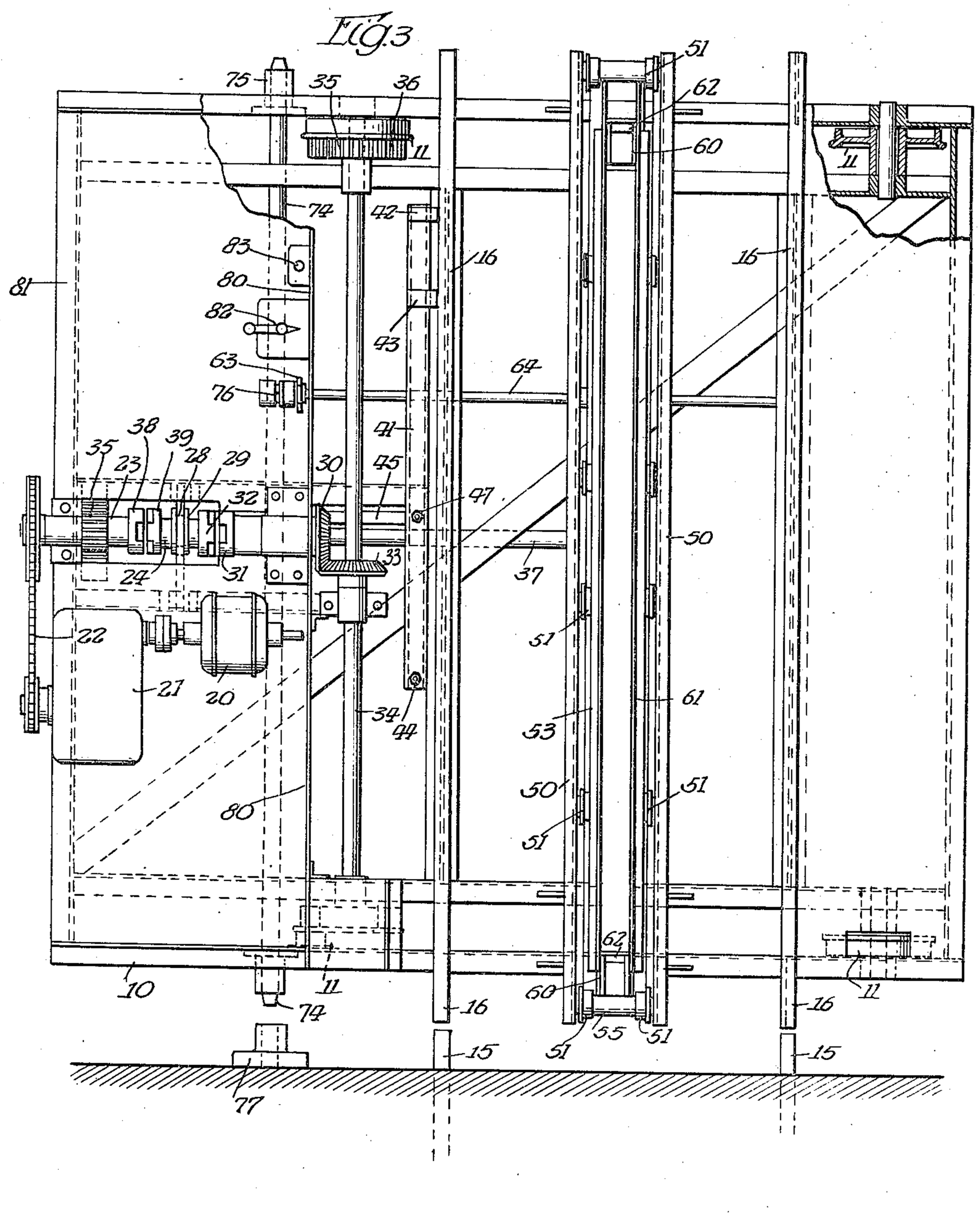
Fig. 3

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TRANSFER CAR

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4 Sheets-Sheet 3

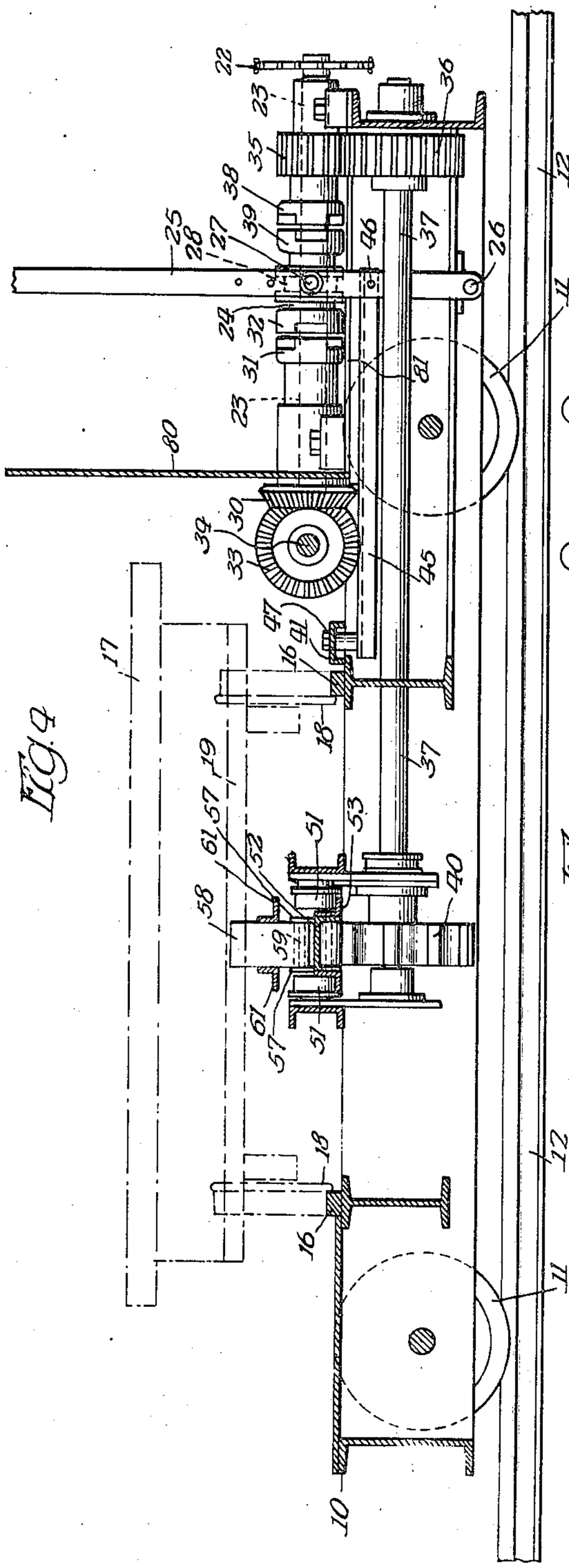

FIG. 4

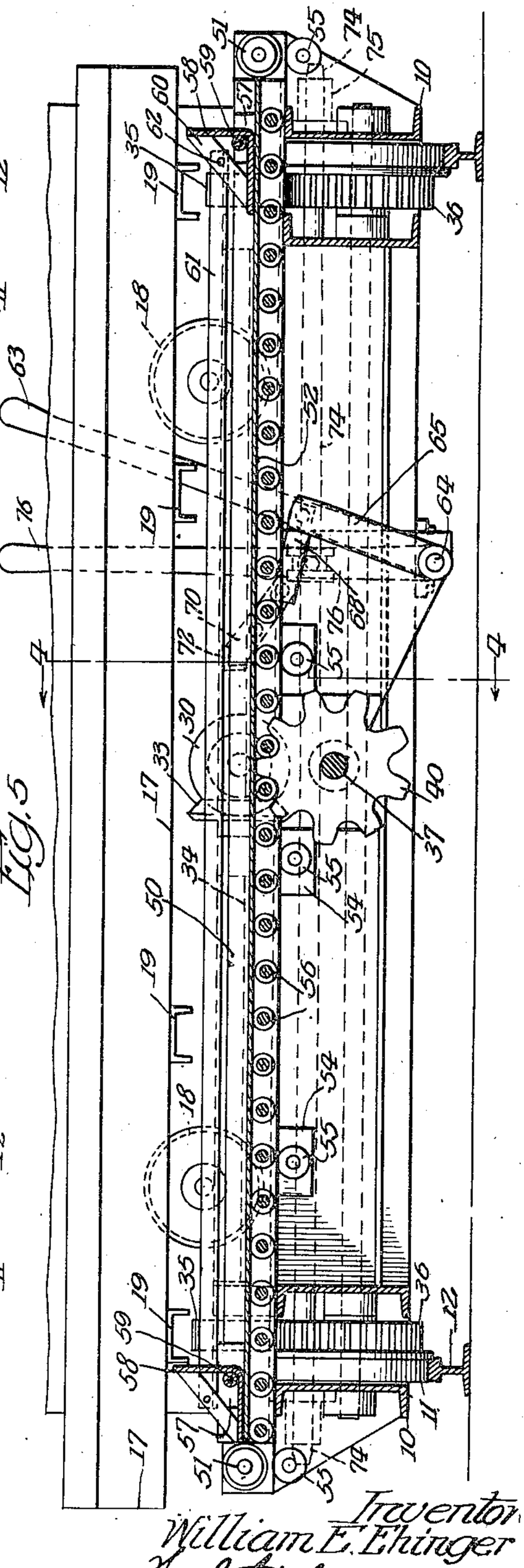

FIG. 5

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FIG. 6

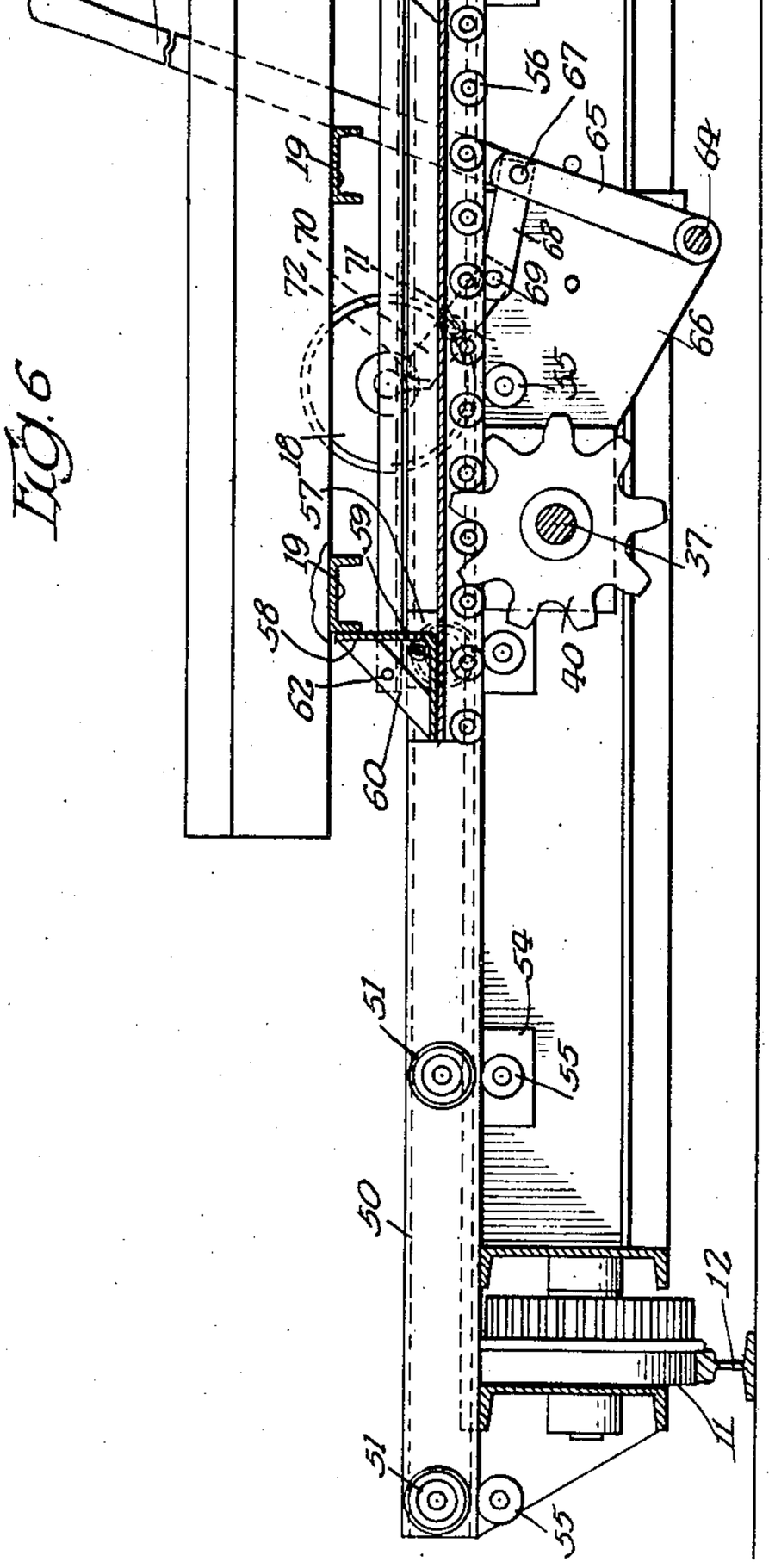



FIG. 8

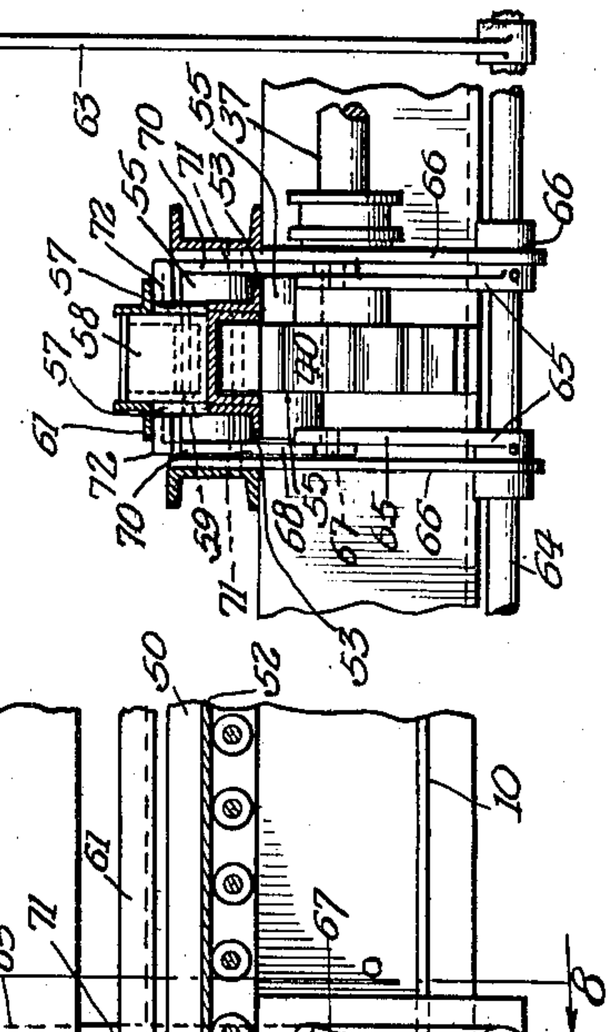
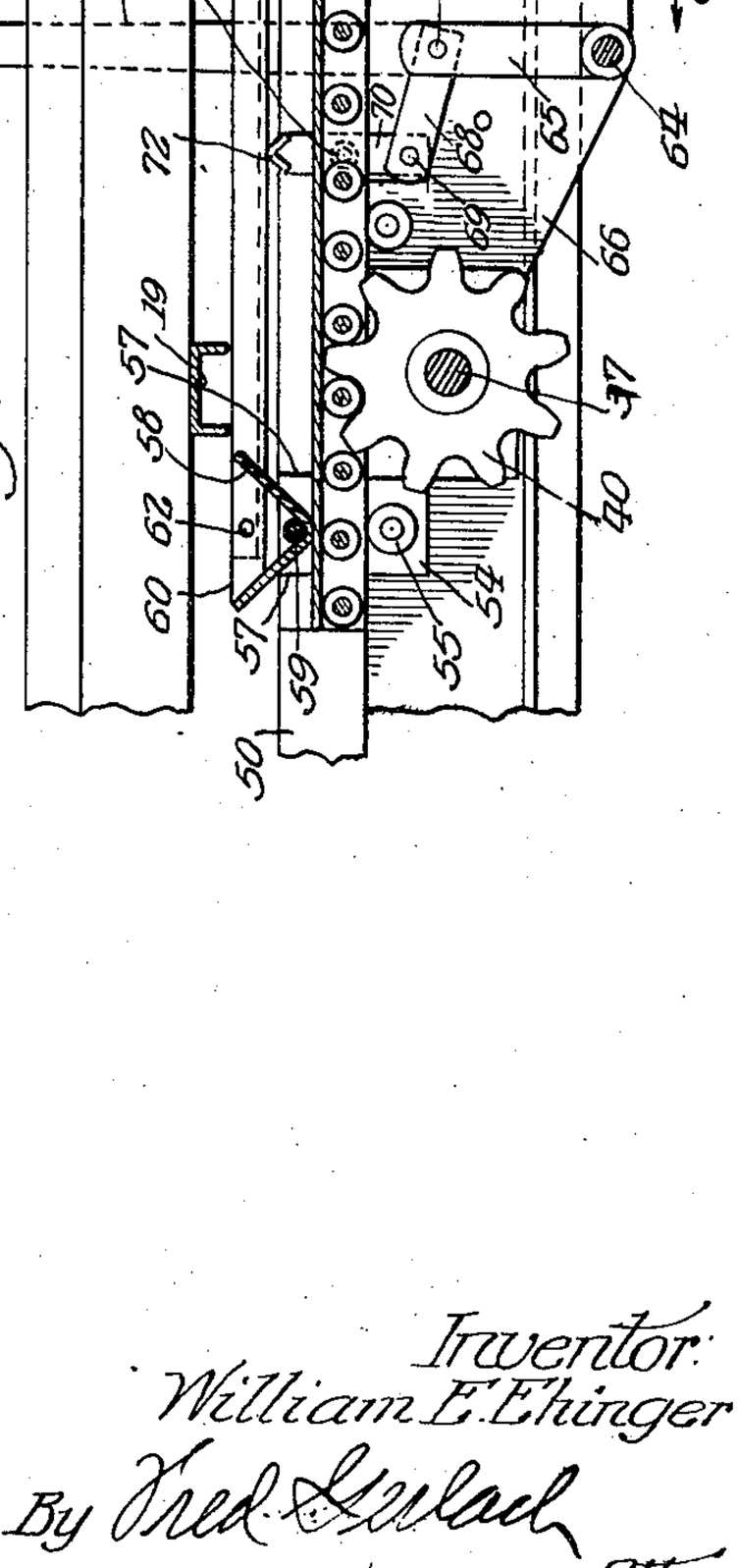



FIG. 7

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2,483,817

# UNITED STATES PATENT OFFICE

2,483,817

## TRANSFER CAR

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Application October 29, 1943, Serial No. 508,271

10 Claims, (Cl. 104—50)

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This invention relates in general to a transfer car and is more particularly described as a medium for moving a furnace car into and out of ovens or furnaces on one or both sides of the path of movement of the transfer car. The car comprises a wheeled truck movable along rails at right angles to the rails leading to the ovens or furnaces. It carries a pair of laterally spaced rails extending transversely of the transfer car adapted when aligned with the furnace rails to permit movement of a furnace car from one to the other.

The invention comprises mechanism mounted on the truck of the transfer car between the rails for the furnace car reciprocable either to pull a furnace car from the furnace rails upon the truck or to push a furnace car from the truck of the transfer car upon the furnace rails.

An important object of the invention is to provide a mechanism located upon and operated entirely from a transfer car for pushing a furnace car from the transfer car into an oven at right angles to the direction of movement of the transfer car and to pull a furnace car from such an oven upon the transfer car.

A further object of the invention is to provide shiftable rack and latch mechanism mounted upon and operated from a transfer car which may be shifted, withdrawn, and again projected to cause a complete movement of a furnace car from the transfer car and completely into an oven or furnace at the side of the transfer car, and also to engage and remove a furnace car from within a furnace and to position it upon the transfer car.

A still further object of the invention is to provide means for effecting a step by step shifting movement of a car to or from a transfer car controlled entirely from the transfer car.

A further object of the invention is to provide a transfer car with reversible motive means for propelling the car in either direction along its tracks and also to reciprocate the mechanism for moving a furnace car in either direction with respect to the transfer car and at right angles to its direction of movement.

A still further object of the invention is to provide improved latch means on the transfer car for controlling the rack shifting mechanism for a furnace car.

Another object of the invention is to provide a transfer car which is generally of new and improved construction and is characterized by simplicity of design as well as ease and facility of manufacture and operation.

Other objects of the invention and various advantages and characteristics of the present transfer car will be apparent from a consideration of the following detailed description.

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The invention consists in the several novel features of construction which are hereinafter described and more particularly defined by claims at the conclusion hereof.

In the drawings which accompany and form a part of this specification or disclosure, and in which like letters and numerals of reference denote corresponding parts throughout the several views:

Figure 1 is a plan view illustrating a transfer car in accordance with this invention movable upon rails at right angles to ovens at both sides thereof having rails which terminate at the sides of the transfer car and match with the ends of transverse rails on the transfer car;

Figure 2 is an elevational view of the lay out in Figure 1 illustrating the way a furnace car is moved into a furnace at one side thereof;

Figure 3 is an enlarged plan view of the transfer car with parts broken away for illustrating the operating parts;

Figure 4 is a sectional view illustrating the clutch and operating mechanism as taken upon line 4—4 of Figure 5;

Figure 5 is a sectional view illustrating the shiftable rack and latch mechanism for moving a furnace car;

Figure 6 shows the rack and latch mechanism in a partially shifted position;

Figure 7 illustrates the latch mechanism in an intermediate position; and

Figure 8 is a detailed sectional view of the rack and latch mechanism as taken on the line 8—8 of Figure 7.

In accordance with this invention, a rack mechanism is provided with a pair of pivoted latches which may be swung to engage with projections on the bottom of a furnace car to push or pull the furnace car from the transfer car, and also to shift the rack into a position where it projects away from and beyond the transfer car and underlies the furnace car. The rack may then be shifted back in order to cause another engagement of the latch mechanism with a furnace car in order that it may be projected and controlled at a further distance beyond the side of the transfer car both in removing the furnace car from the transfer car into an oven or furnace at the side thereof and to engage the near end of a furnace car at a further distance from the transfer car in pulling it from an oven or furnace and moving it onto the transfer car.

Referring now more particularly to the drawings, a transfer car 10 is mounted upon flanged wheels 11 to run upon rails 12 of a track at right angles to a number of kilns, ovens or furnaces 13 at either or both sides thereof having end doors 14 which may be raised and lowered, and rails 15 at the bottom of each oven which extend outwardly therefrom and align with rails 16 extending transversely of and upon the transfer car.

A number of furnace cars are provided for movement by the transfer car into and from the ovens or furnaces. A loaded furnace car is moved by the transfer car until the rails 15 and 16 of any oven or furnace register with each other whereupon the furnace door is raised and the loaded car is shifted from the transfer car into the furnace. After the furnace operation, a furnace car is removed therefrom by the transfer car which is then bodily moved upon its rails 12 to move the furnace car to some other location.

A furnace car 17 is mounted upon flanged wheels 18 which engage the transfer car rails 16 and at the bottom of this car are a number of channelled crosspieces 19 for strengthening the car, but which also provide means for engagement of the car for moving it to and from the transfer car.

In order to operate the transfer car in either direction, an electric motor 20 is connected through a reduction drive 21 and a belt connection 22 with a driving shaft 23. A coupling member 24 is splined to the shaft intermediate its ends, and is movable in opposite directions from a central position by a lever 25 having a pivot 26 at the under side of the car and a yoke with opposite pins 27 engaging a groove 28 in a collar 29. Mounted at the inner end of the shaft 23 is a bevel gear 30 having a clutch member 31 at the opposite end to engage with a cooperating clutch member 32 at one end of the coupling 24, the gear meshing with a bevel gear 33 secured to a cross shaft 34 connected to opposite wheels 11 of the transfer car.

Near the other end of the shaft 23 is a pinion 35 meshing with a gear 36 mounted on a counter shaft 37 extending toward the center of the transfer car. Connected to the pinion 35 is a clutch member 38 adapted to cooperate with the clutch member 39 at the adjacent end of the coupling 24. At the inner end of counter shaft 37 is a rack pinion 40, for operating the furnace car.

When the lever 25 moves the coupling member 24 toward the bevel gear 30 connecting the clutch elements 31 and 32, the transfer car is driven in either direction depending upon the direction of rotation of the motor 20; when the clutch lever 25 moves the coupling member 24 in the opposite direction, interengaging the clutch elements 38 and 39, the pinion 25 is then connected to rotate with the shaft 23 for driving the countershaft 37 and the rack pinion 40 in either direction for moving the furnace car.

When the lever 25 is moved in the direction to operate the furnace car in either direction, it is desirable to provide a locking means for preventing a furnace car from movement laterally of the transfer car while it is in motion. A car locking strip 41 is therefore located near the outer side of the adjacent car rail 16, and has two projections 42 and 43 near one end and adapted to overlie the rail 16 when moved in that direction and to be positioned on opposite sides of the wheel of a furnace car supported by the rails 16



so that the furnace car cannot move in either direction beyond its engagement with these projections. At the other end of the strip is a pivot 44 extending through the plate or deck of the transfer car, and intermediate the ends of the strip is a bar 45 connected at one end by a pivot 46 to the clutch operating lever 25 and at the other end connected to the strip by a fastening bolt 47. The operation of the lever 25 to move the transfer car in either direction will cause the projections 42 and 43 to be projected across the track 16 on either side of a furnace car wheel therebetween. Between and extending longitudinally of tracks 16 is a rack and latch mechanism comprising spaced channels 50 with the webs turned outwardly at the top of the transfer car and having flanged rollers 51 extending inwardly at intervals. An inverted channel bar 52 is mounted between the rollers 51 and has angle bars 53 secured to its outer side ends and engaging below the rollers 51.

Depending from the channels 50 at the same intervals as the rollers 51 are plates 54 which support rollers 55 extending between the opposite plates 54 and engaging the lower edges of the angle bars 53 opposite the engagement of the rollers 51. Thus the inverted channel 52 is mounted between the spaced rollers 51 and 55 for rolling movement in either direction. In order to move the channel 52 in this manner, it is provided at the inside with rollers 56 at spaced intervals to engage between the teeth of the pinion 40, to form therewith a rack and pinion which may be moved in either direction by the rotation of the countershaft 37.

Mounted on top of the rack channel 52 near each end is an upwardly extending bracket 57 and at each side thereof in which a latch 58 is rotatable on a pivot 59, each latch comprises a plate bent at right angles and the pivot at the inside thereof with a cross bar 60 at each side joining the angular extremities. The two latches at opposite ends of the channel 52 are connected at the sides by angle bars 61 connected to the crosspieces 60 by pivots 62. These latches are positioned for connection in the same direction as shown more clearly in Figure 6 and may be rotated together to the other position at 90° therefrom as shown by the broken outline in Figure 6 and also to an intermediate position as shown in Figure 7. In the intermediate position, the latches will be free from engagement with crosspieces 19 at the underside of the furnace car, but in either upright position they will engage the crosspieces. To push the furnace car to the right in Figure 6, the latches are in the position shown by full lines, but to pull the furnace car in the reverse direction, the latches would first be moved free from engagement with any crosspiece 19 and then the latches would be rotated to the broken line position, and if the left latch did not engage one of the crosspieces 19, the right end latch would engage one of the crosspieces.

In order to withdraw the rack and latch mechanism without moving the car, or to advance it under the car, the latch mechanism is turned to the intermediate position as shown in Figure 7 whereupon the latches and the bars 61 will move freely under the crosspiece 19. To operate the latches, a lever 63 is mounted upon a cross shaft 64 at the bottom of the transfer car. The lever is located at one side of the car near the clutch control lever 25 and the shaft is suitably mounted to provide a support for arms 65 extending upwardly at the insides of plates 66 which are

secured to the inner sides of channels 50 and each having a pivot 67 at its upper end to which one end of a link 68 is connected. The other end of the link is connected by a pivot 69 with the lower end of a latch lever 70 having an intermediate pivot 71 also secured to the supporting plate and having an angular projection 72 at its upper end adapted to engage below the lower web of the angle bar 61 which connects the latches 58 at that side. In the intermediate position of the lever, as shown in Figure 7, the bars 61 are raised, turning the latches 58 to the intermediate position, and when the lever 63 is moved to its limiting position at either side of the central position, it turns the latches in a corresponding direction and the side face of the angular end 72 engages the underside of the bar holding it in that position. This latch mechanism has the advantage that it may be moved by manual engagement of the latches themselves or kicked over by foot, and also may be operated by the lever 63 which is located on the transfer car at the operator's station.

A car locking shaft 74 is mounted to extend transversely through the opposite sides of the car with the extremities mounted in bearings 75 projecting from the sides of the car, and the shaft is longitudinally movable by means of a lever 76 pivoted at its lower end in the transfer car and engaging the shaft above the lower end so that the movement of the lever in either direction projects the shaft from the corresponding side of the car. For each position in which the oven or furnace tracks 15 are aligned with the transfer car tracks 16, there is a receiving socket 77 secured in fixed position at the side of the tracks 12 to receive the projected end of the shaft and to hold the transfer car in position where the tracks 15 and 16 will be aligned for that particular oven or furnace.

At the operator's station on the transfer car, and extending along the side parallel with the tracks 16 is a heat shielding partition 80 which may be of sheet metal or any heat resisting material and protects the operator of a transfer car when the furnace car contains hot castings or other materials which are to be inserted into or removed from the ovens or furnaces.

An operator's platform 81 is usually provided at one corner of the transfer car where all of the operating levers and switches are located. A reversing switch 82 is provided for operating the motor 20 in reverse directions, and a line starter switch 83 may be provided for making electrical connections from a suitable source of supply to the reversing switch for the motor. Thus all of the controlling levers are mounted within easy reach of an operator at the station, the transfer car may be connected for movement in either direction on its tracks 12; the transfer car is locked in place for any oven rails 15 by the locking shaft 74 and a furnace car on the transfer car is moved from the car into the oven or from the oven into the car by the latch and rack mechanism.

A transfer car containing a loaded furnace car may be moved in either direction along the tracks 12 by connecting the driving motor 20 through the clutch connection to the drive wheels 11 and operating the motor in the proper direction by means of electric switches 82 and 83. When the transfer car reaches the desired position so that its tracks 16 are in alignment with the corresponding tracks 15 of an oven or furnace at either side of the track, the locking shaft 74 is projected to engage a receiving socket 77. In this position the locking strip 41 and its projections 42 and 43 are withdrawn by the operation of lever 25 which controls the movement of coupling member 24 so that when the driving motor 20 is connected thereby to operate countershaft 37, in either direction, the pinion 40 will drive the rack bar 52 in either direction according to the direction of rotation of the driving motor 20.



To move a furnace car in one direction, the latches 58 are turned upwardly in one direction either by manually operating them or the connecting angle bar 61 or by operating the lever 63 at the operator's station. In projecting a furnace car from a transfer car, it is moved about half of the length of the rack bar and then the latches 58 are turned downwardly to either intermediate position where they will not engage the cross pieces of the furnace car. The rack bar is then moved in the reverse direction approximately the full length of the rack bar if desired. The latches are then turned upwardly in the same direction as before and the rack bar is again projected in the first direction until one of the latches engages one of the cross pieces 19 for further moving the furnace car into one of the ovens or furnaces at the side of the transfer car.

In removing a furnace car from an oven or furnace and loading it upon the transfer car, the above operation is reversed; that is, the rack bar is first projected from one side of the transfer car with the latches 58 in intermediate position until the outermost latch is extended under the outer edge of the furnace car. The latch is then turned up in the proper direction to engage the outer cross piece 19 of the furnace car so that when the rack bar is withdrawn, the furnace car will be engaged by the latch and moved in the direction of the furnace car. Thus it is necessary to move the rack bar and latch mechanism beckward and forward at least twice in pushing or pulling a furnace car off of and on to a transfer car. The same motor which is used for propelling the transfer car, also operates the rack mechanism for pushing and pulling a furnace car, and all operations as set forth, may be controlled from the operator's station and platform on the furnace car.

The invention is not to be understood as restricted to the details set forth, since these may be modified within the scope of the appended claims without departing from the spirit and scope of the invention.

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

1. The combination with a transfer car having tracks to registei with oven tracks at the sides thereof, of a furnace car movable on said tracks, rack and latch mechanism carried by the transfer car and movable directly together to engage the furnace car to propel it to and from the transfer car, a driving motor on the transfer car, furnace car locking mechanism comprising projections movable across the furnace car tracks on opposite sides of one of the wheels, and a clutch mechanism on the transfer car for connecting the driving motor with the rack mechanism and including operating means also connected with said locking mecha-

nism for removing the projections in connecting the driving motor to operate the rack mechanism.

2. The combination with a transfer car having tracks to register with oven tracks at the sides thereof, of a furnace car carried by the transfer car and movable on said tracks, a rack, and latch mechanism carried by the rack for direct movement therewith and comprising an angular latch having arms of equal length and pivoted to the rack at the apex of the angle to swing in a vertical plane and movable from an intermediate position free from engagement with the under side of the furnace car into either one of two positions with one of the arms to engage the under side of the furnace car and propel said furnace car in one direction or the other from the transfer car depending upon the position of the latch.

3. A transfer car having tracks to register with oven tracks at the sides thereof, a furnace car movable on said tracks and having projections at the under side thereof, a rack mounted for endwise movement on the transfer car and supported at all times solely by the transfer car so that either end may project freely therefrom, and latch mechanism carried by the rack and movable below the furnace car in the path of movement of said projections, said mechanism comprising a pair of angular latches located at the ends of the rack, connected together for joint movement, embodying angularly disposed arms of equal length and provided between the apices of the arms and the rack, and movable from an intermediate position in which all of the arms thereof are free from engagement with the projections to an angular position at either side thereof in which at least one of the latches will have one arm thereof projecting to engage at least one of the projections of the furnace car for moving the furnace car to or from the transfer car.

4. In a transfer car, the combination with tracks adapted to register with oven tracks at the sides thereof and a movable rack and latch mechanism carried directly together by the transfer car and comprising a rack bar supported solely and at all times by the transfer car so that either end is capable of projecting therefrom, a pinion engaging the rack bar and rotatable in opposite directions, and pivoted angular latches carried by the rack bar, having arms of equal length and pivots between the apices of the arms and the ends of the rack, and movable in the direction of movement of the rack from an upright limiting position of one angular side to an opposite upright limiting position of the other angular side at right angles thereto for engaging and propelling a furnace car depending upon the direction of the movement of the rack.

5. In a transfer car of the class described, a movable rack mechanism comprising a rack bar having spaced projections, a pinion rotatable in opposite directions and engaging the projections for moving the bar, rollers upon which the rack bar is movable in the transfer car, projections at the sides of the rack bar, and upper rollers mounted in the transfer car above said rack bar for confining the rack bar between the upper and lower rollers, the rack bar being mounted for endwise movement on and supported solely by the transfer car so that either end may project therefrom and movable latch mechanism carried for direct movement with the rack bar, the latches being angular and pivoted at the ends of the rack bar.



6. A transfer car of the class described, having a movable rack and latch mechanism, said rack comprising a channel bar and spaced supports between which it is movable, supporting rollers for the rack bar at the bottom of the spaced supports, lateral projections at the sides of the channel bars, rollers mounted upon the spaced supports and projecting inwardly therefrom above the lateral projections at the sides of the channel bar for holding the channel bar for movement between the upper and lower rollers, the rack being supported solely by the transfer car at all times so that either end may project therefrom, a pinion for engaging the rack bar and moving it in either direction, angular latches pivoted at the upper side of the channel bar, having arms of equal length and each pivoted at one end of the rack bar in the apex of the angle, and having a connecting bar for operating them in unison, and means for engaging the connecting bar for moving and holding the latches in an intermediate non-engaging position and in either one of two angular limiting positions with one extremity projecting in engaging position.

7. In a transfer car, a rack and latch mechanism movable transversely in the transfer car, said mechanism comprising a rack bar mounted between upper and lower confining rollers, the rack bar being mounted for endwise movement on and supported solely by the transfer car so that either end may project therefrom, a pinion for operating the rack bar in opposite directions, a pair of angular pivoted latches at opposite ends of the rack bar, each comprising arms of equal length and pivotally mounted in the apex of the angle to swing in the vertical plane of the bar, a connecting bar for operating the latches in unison, a latch lever having an angular extremity to engage under the connecting bar for holding it and the latches in an intermediate non-engaging position and having opposite angular sides for moving the connecting bar and holding the latches with the extremities projecting in either one of two upright angular limiting engaging positions.

8. In a transfer car, a movable rack and latch mechanism for propelling a furnace car to and from the transfer car and comprising a rack bar mounted for a horizontal rolling movement between upper and lower sides of rollers in the transfer car, the rack being mounted for endwise movement on and supported solely by the transfer car so that either end may project therefrom, a pinion for operating the rack bar in either direction, a pair of triangular latches pivoted at the upper side at the ends of the rack bar, each latch having arms of equal length pivoted to the rack bar at the apex of the triangle to swing in the vertical plane of the bar connecting bars at the sides of the latches for operating them in unison, and means for remotely operating the latches from the transfer car comprising a hand lever connected to a shaft and having arms connected by links to pivoted levers, the pivoted levers having triangular end projections adapted to engage under the lower edges of the said connecting bars, the operation of the hand lever moving the said projections from a central position in which the connecting bars are raised and the latches are moved to an intermediate non-engaging position, and the hand lever being movable in either direction from said central position to move the latches

accordingly into angular limiting positions with one side projecting and the other resting upon the rack bar, one limiting position being at right angles to the other, and in the limiting positions the latches being adapted to engage and propel a transfer car depending upon the direction of movement of the rack bar.

9. The combination with a transfer car having tracks to register with oven tracks at the side thereof, of a furnace car movable on said tracks, a movable rack mounted for endwise movement on and supported at all times solely by the transfer car and adapted to have one end project therefrom, and a right angled latch at the top of each end of the rack for engaging the furnace car and having arms of equal length and pivoted to the rack at the apex of the angle to swing in a vertical plane and clearing the bottom of the furnace car midway of its swinging position.

10. The combination with a transfer car having a motor for propelling it in opposite directions, of a furnace car carried by the transfer car and movable transversely of its path of movement, a movable rack, a latch mechanism at the top of each end of the rack for engaging the bottom of the furnace car for moving it relatively



to the transfer car, the latch mechanism comprising a right angled latch at each end of the rack with arms of equal length pivoted to the rack at the apex to swing in a vertical plane and clearing the bottom of the furnace car in its mid position, and a bar connecting the latches at the ends of the rack for joint movement.

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## REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

| Number | Name | Date |
|---|---|---|
| 743,611 | Acklin | Nov. 10, 1903 |
| 1,098,725 | Healy | June 2, 1914 |
| 1,366,292 | Smith | Jan. 18, 1921 |
| 1,869,046 | Buck | July 26, 1932 |
| 1,877,193 | Norton | Sept. 13, 1932 |
| 1,886,588 | Riblet | Nov. 8, 1932 |
| 1,896,063 | Bottini | Feb. 7, 1933 |
| 2,051,062 | Turner et al. | Aug. 18, 1936 |
| 2,065,107 | Turner et al. | Dec. 22, 1936 |
| 2,321,253 | Schellentrager | June 8, 1943 |