

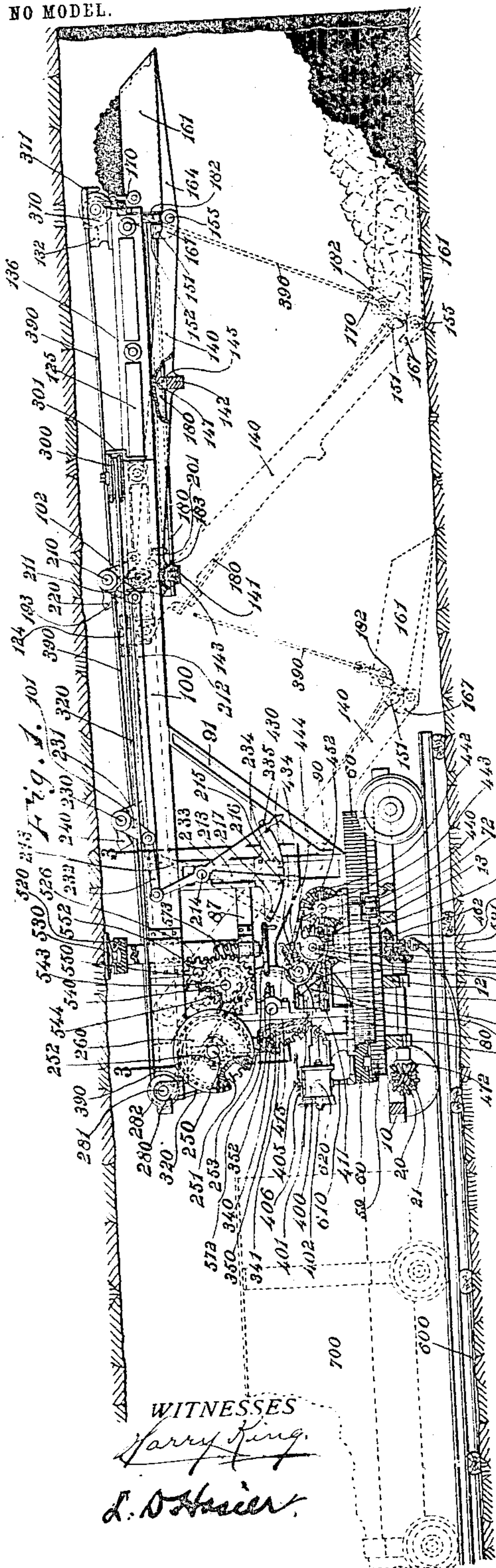
No. 775,210.

PATENTED NOV. 15, 1904.

A. J. DOSS.  
LOADING MACHINE.  
APPLICATION FILED DEC. 4, 1903.

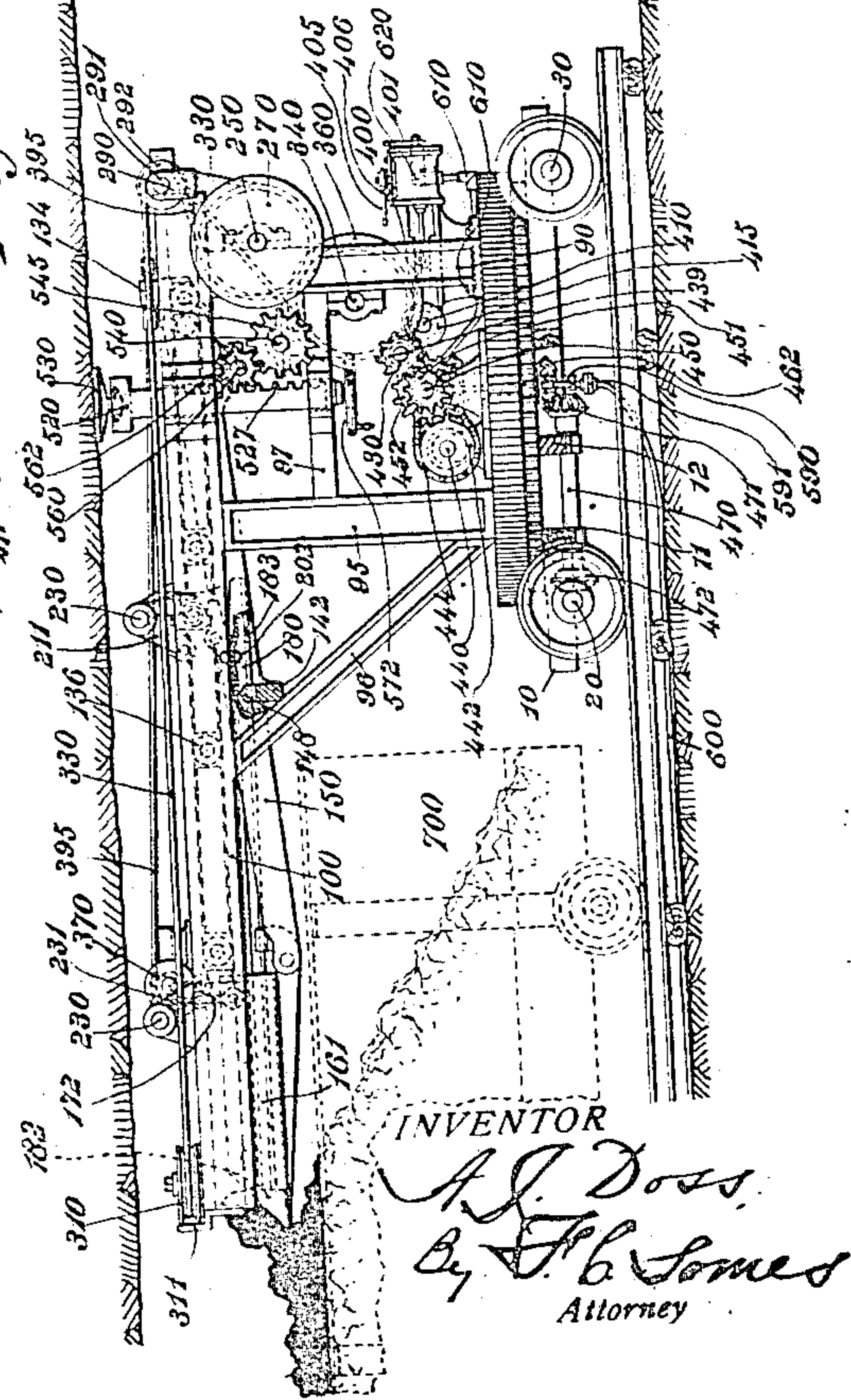
7 SHEETS—SHEET 1.

NO MODEL.



WITNESSES  
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Fig. 2.



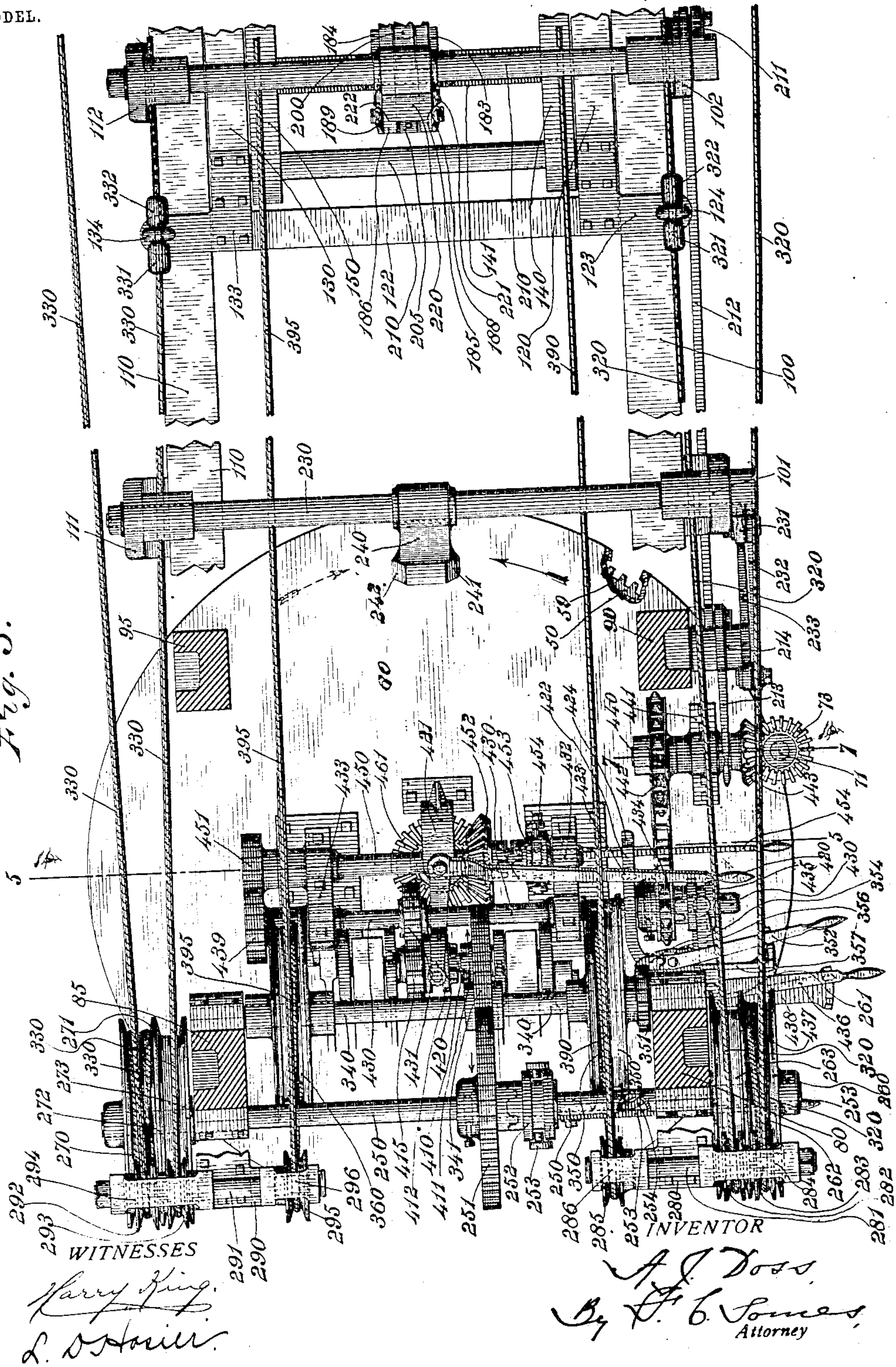
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PATENTED NOV. 15, 1904.

7 SHEETS—SHEET 2.

Fig. 3.





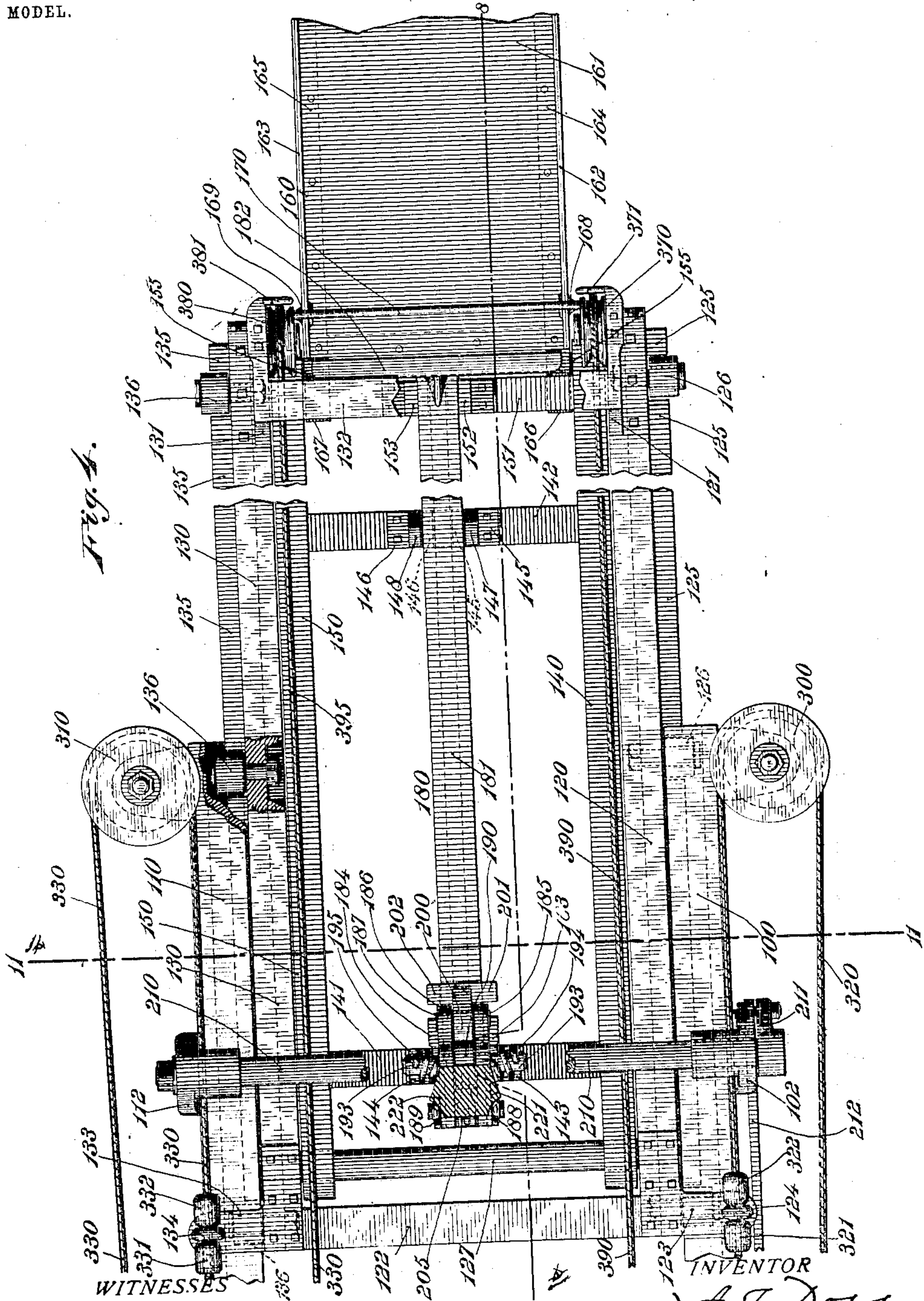
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7 SHEETS—SHEET 3.

NO MODEL.



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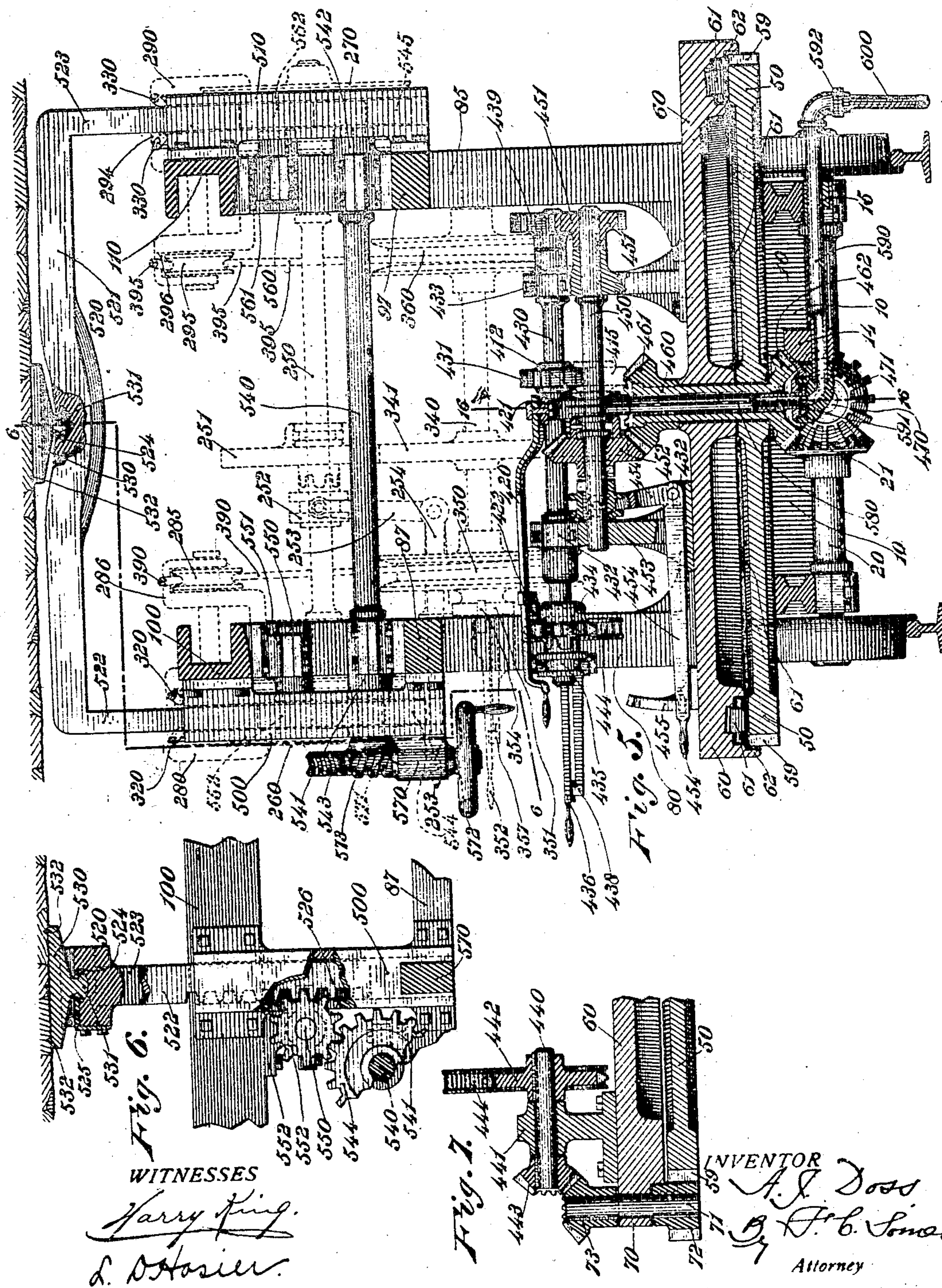
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7 SHEETS—SHEET 4.

NO MODEL.





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NO MODEL.

7 SHEETS—SHEET 5.

Fig. 8.

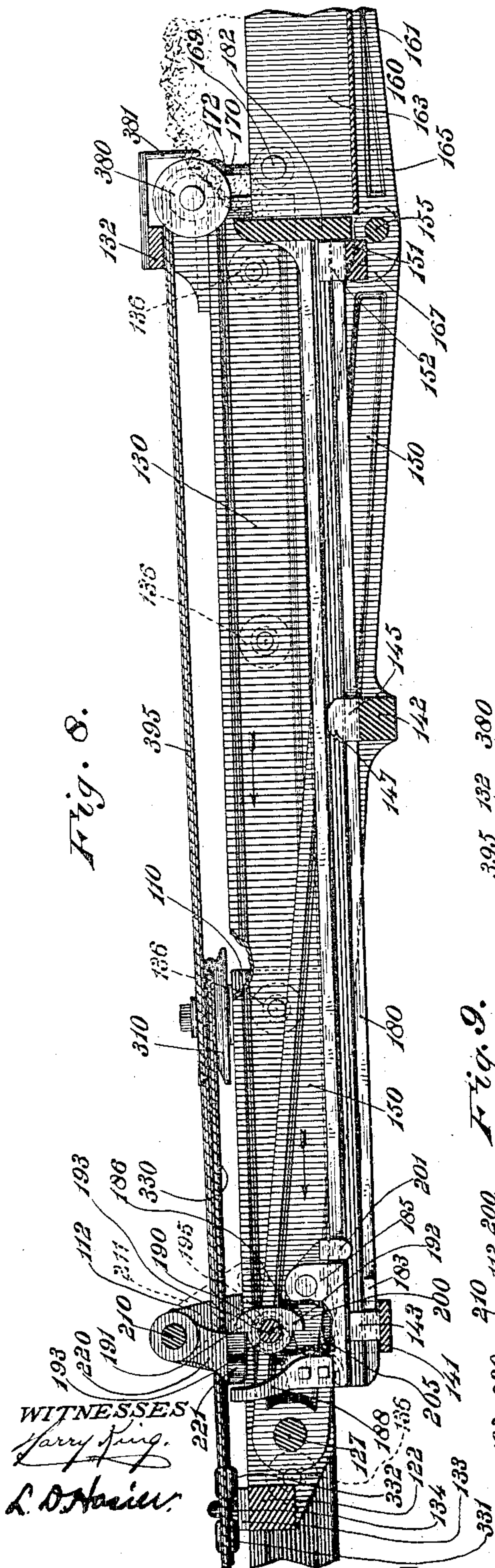


Fig. 9.

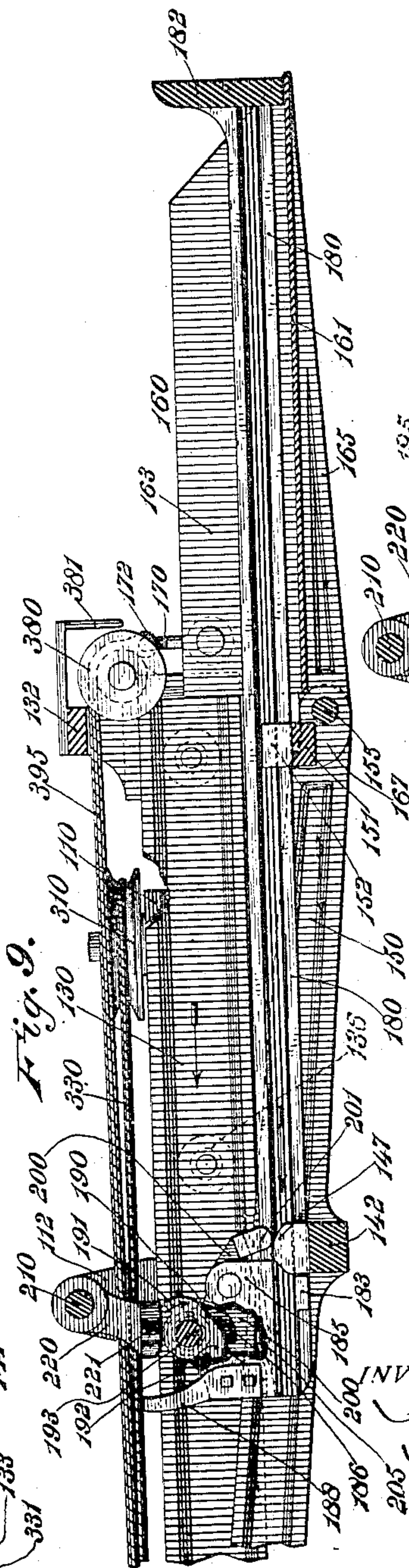
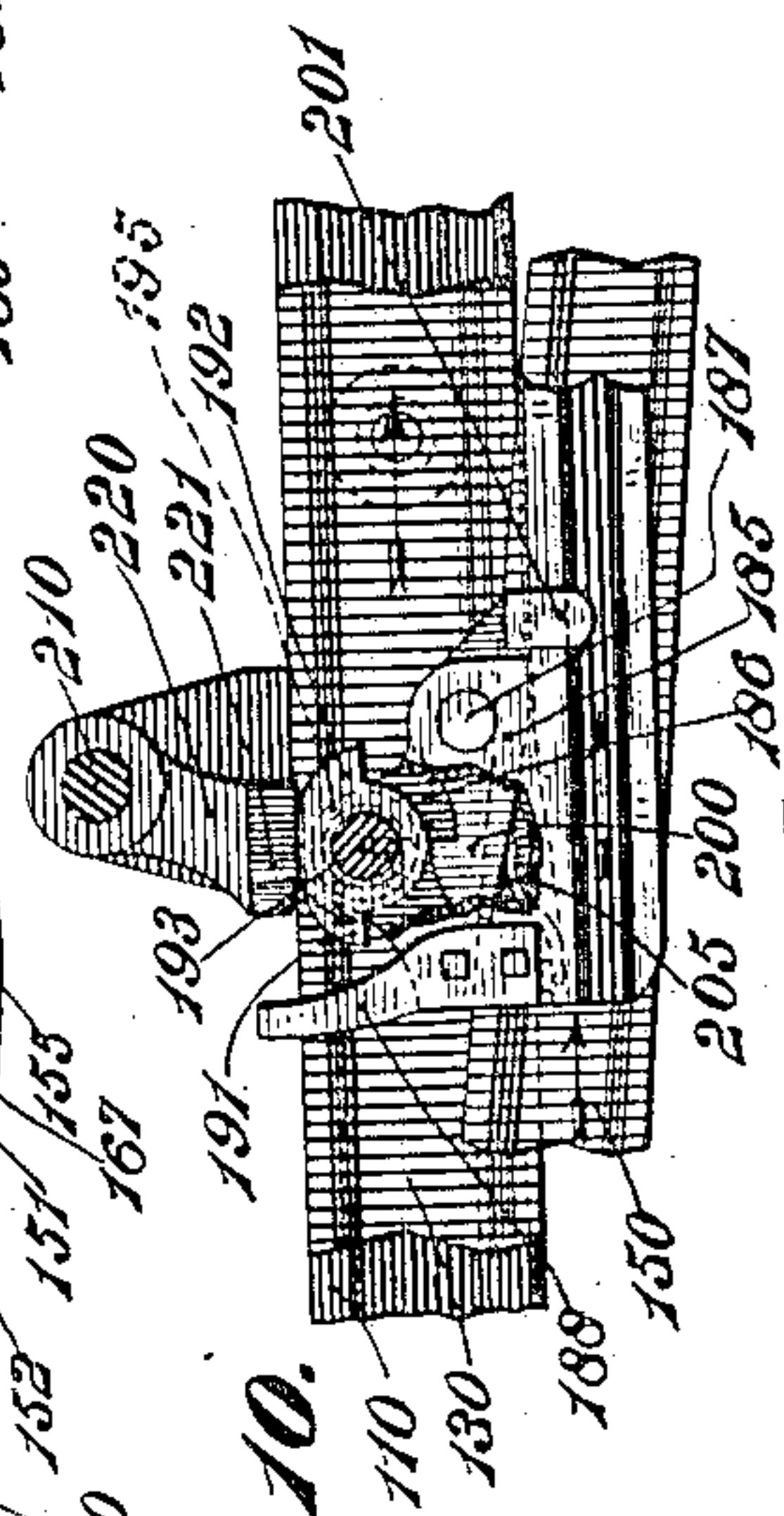


Fig. 10.







No. 775,210.

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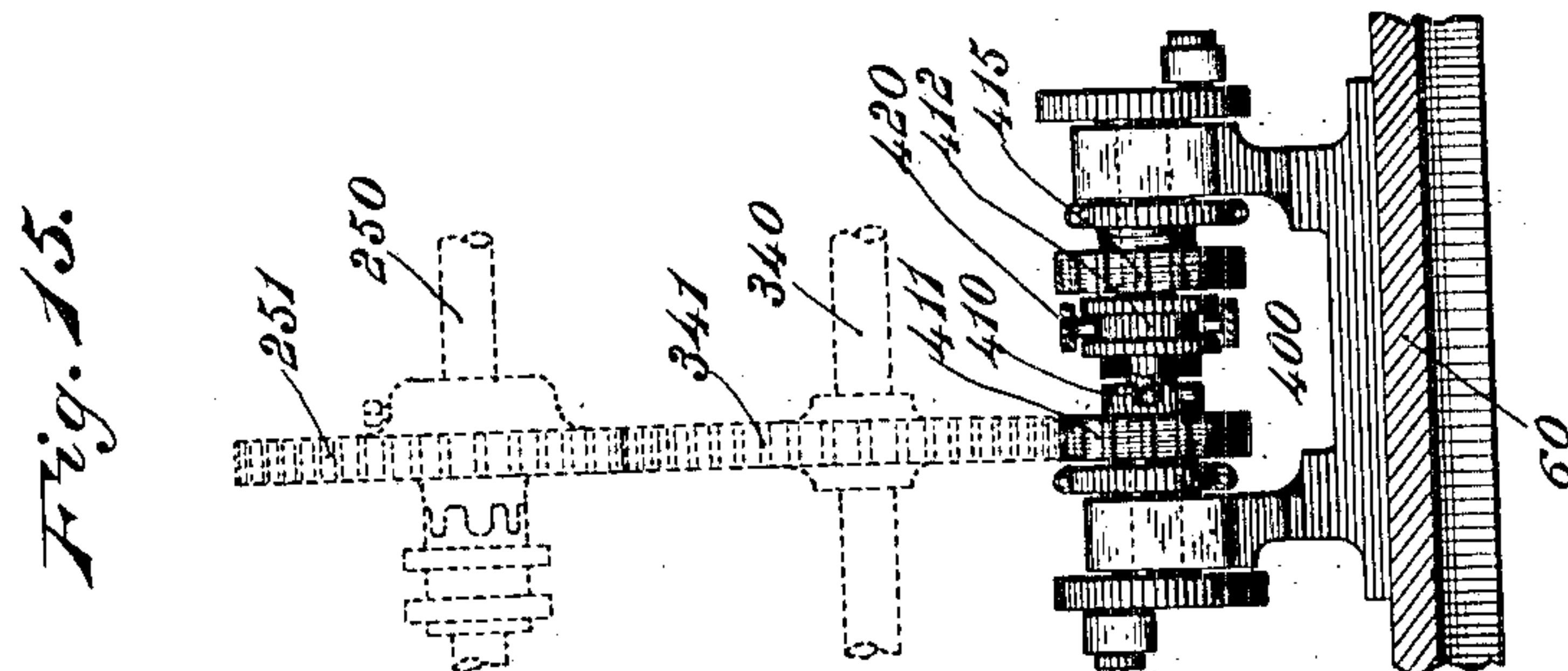
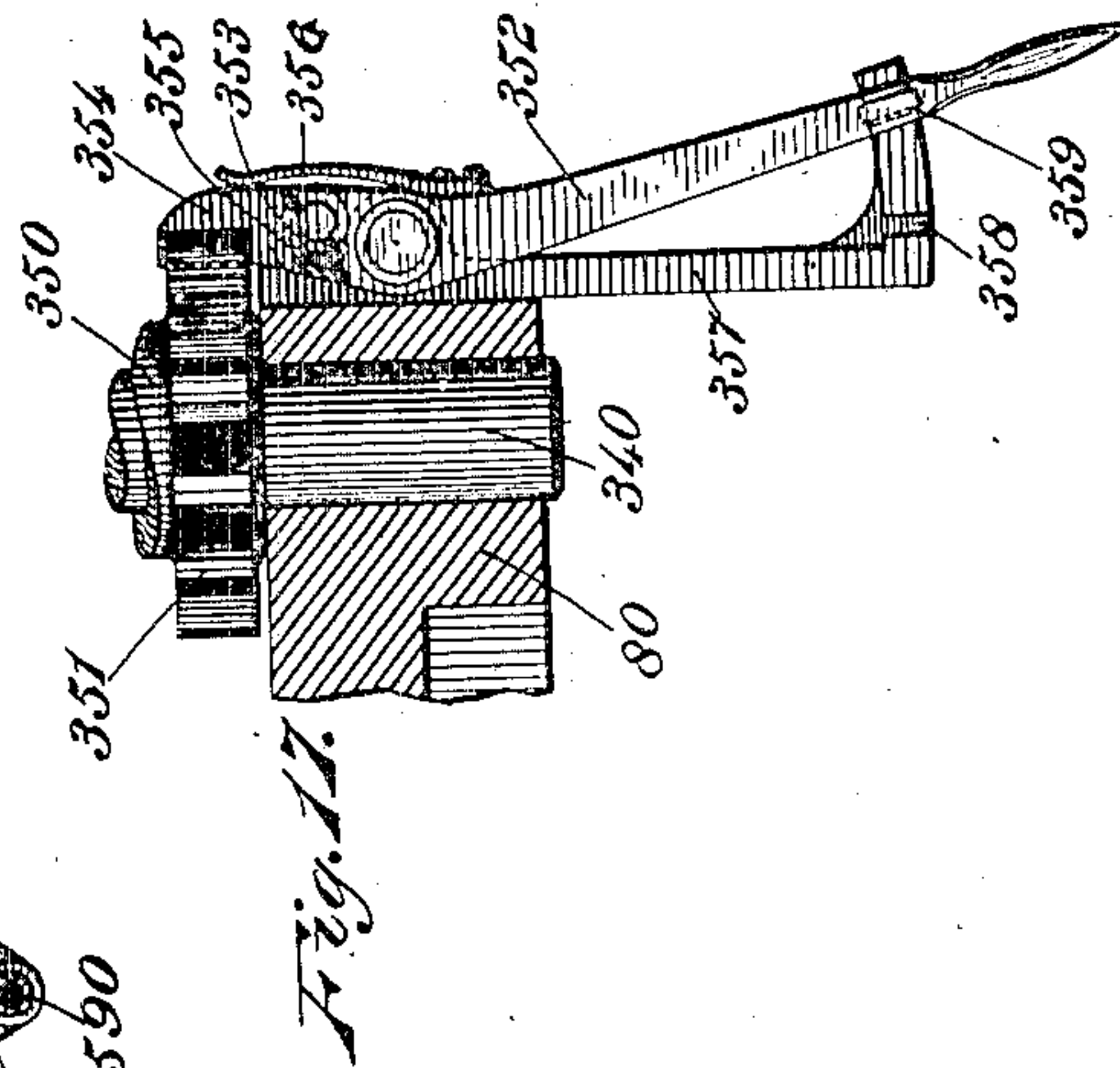
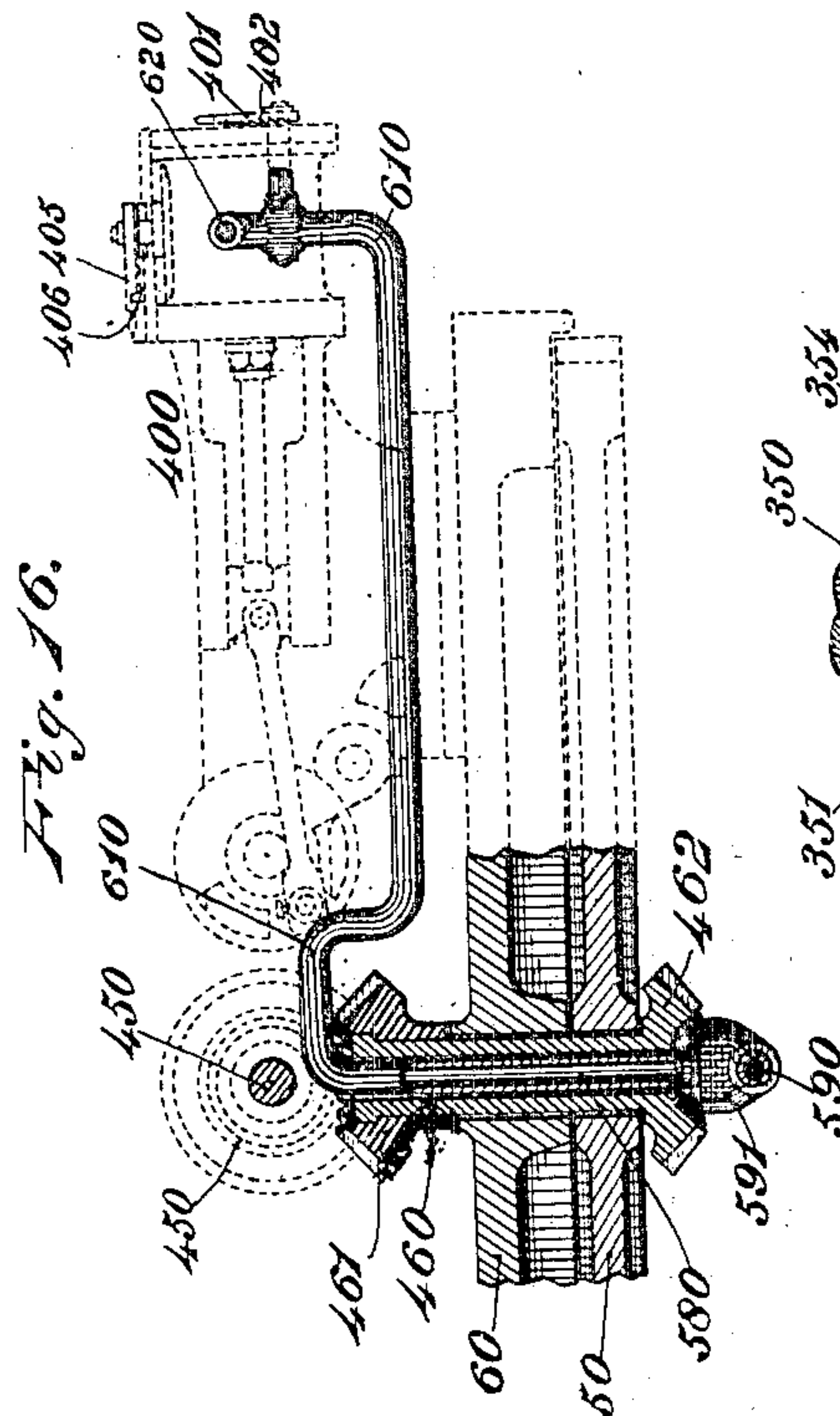
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LOADING MACHINE.

APPLICATION FILED DEC. 4, 1903.

NO MODEL.

7 SHEETS—SHEET 7.



WITNESSES

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# UNITED STATES PATENT OFFICE.

ANDREW JACKSON DOSS, OF SWITCHBACK, WEST VIRGINIA, ASSIGNOR  
TO JAMES ELLWOOD JONES, OF SWITCHBACK, WEST VIRGINIA.

## LOADING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 775,210, dated November 15, 1904.

Application filed December 4, 1903. Serial No. 183,795. (No model.)

*To all whom it may concern:*

Be it known that I, ANDREW JACKSON DOSS, a citizen of the United States of America, residing at Switchback, in the county of McDowell, in the State of West Virginia, have invented certain new and useful Improvements in Loading-Machines, of which the following is a specification.

This invention relates to a machine for transferring material—such as coal, ore, ashes, or other substances—from one point to another; and it is especially designed for loading coal from the floor of a mine onto the mine-car for carrying it out of the mine.

The loading of coal in mines has heretofore been generally done by manual labor, as the conditions of the mines were thought to be such as to prevent the practical use of machines for this purpose, owing to low ceilings, narrow passages, and small rooms in which the work is to be done.

The principal object of this invention is to provide a loading-machine adapted to operate in the contracted space of a coal-mine for loading onto cars for conveying it out of the mine the coal shot down by the usual blasting operation, and in carrying out this object I have devised a simple mechanism, preferably located on a car traveling on a mine-track adapted to pick up the coal from the mine-floor, elevate it to a point over the mine-car, and deliver it into said car.

The loading-machine when constructed in the form of embodiment herein used to illustrate this invention comprises a runway mounted on a swinging base and supported on a machine-car movable on the mine-track, a traveling carriage on said runway, a vertically-swinging frame pivoted to said carriage, a shovel pivoted to the free end of said frame, means for swinging said frame to lower the shovel to a plane for scooping up the material and for raising said shovel to a plane for delivering the scooped-up material into the mine-car, means for causing the carriage carrying the shovel to reciprocate on the runway, stop mechanism for holding the shovel in elevated position, means for rotating the base to swing the runway from the

position of take-up to the position of delivery and the reverse, means for adjusting the shovel, means for locking the machine into contact with the mine-roof, and other features hereinafter claimed.

Figure 1 of the accompanying drawings represents, on a small scale, a section of a mine-room and a side elevation of a loading-machine embodying one form of this invention, shown in operation within said room, for loading coal onto a mine-car, a few parts being broken out to facilitate the illustration, the shovel being shown in dotted lines in lowered position preparatory to moving forward to take up coal and in the act of taking up coal from the floor of the mine and in full lines in elevated position preparatory to the drawing in and swinging around to the point of discharge. Fig. 2 is a similar view showing the runway reversed and the shovel in position at the rear of the machine-car in the act of delivering the coal into the mine-car. Fig. 3 represents, on an enlarged scale, the rear portion of the machine, partly in plan and partly in horizontal section, the section having been taken approximately on line 3 3 of Fig. 1, parts being broken out in order to bring together the principal elements. Fig. 4 represents, on the same enlarged scale, a plan view of the front portion of the machine, parts being broken out for convenience of illustration. Fig. 5 represents, on the same enlarged scale, a vertical transverse section on line 5 5 of Fig. 3 looking toward the rear. Fig. 6 represents, on the same scale, a vertical section and side elevation on line 6 6 of Fig. 5. Fig. 7 represents, on the same scale, a vertical transverse section on line 7 7 of Fig. 3, showing the mechanism for turning the base. Fig. 8 represents, on the same scale, a longitudinal vertical section of the front portion of the machine on line 8 8 of Fig. 4, showing the shovel in its outward thrust and the shovel-discharging mechanism in position for delivering the coal in the shovel on the further retraction of the latter. Fig. 9 also represents a longitudinal section of the parts shown in Fig. 8, the shovel being shown in retracted position after the delivery of coal into the



mine-car. Fig. 10 represents a longitudinal section of the actuating mechanism for the shovel-pusher constituting the unloading device. Fig. 11 represents a vertical transverse section of the parts shown in Fig. 4 on line 11 11 of said figure. Fig. 12 represents a longitudinal section of a fragment of the machine, showing the pivotal connection of the shovel with its supporting-arm and the locking device therefor, the parts being in lowered position. Fig. 13 represents a similar view of the same parts in raised position. Fig. 14 represents a perspective view of the rear portion of the shovel and the bail connected thereto. Fig. 15 represents a side elevation of the driving-shaft of the engine, showing the gear connecting said shaft with the mechanism for lowering and elevating the shovel. Fig. 16 represents a vertical section through a portion of the machine on line 16 16 of Fig. 5, showing the means for the supplying of motive fluid from the supply-mains of the mine to the motor on the machine through the axis of the swiveling base. Fig. 17 represents an enlarged plan view of the stop device applied to the shovel lowering and lifting mechanism for holding the loaded shovel in elevated position.

The same reference characters indicate corresponding parts in all the figures.

A car traveling on the mine-track supports the loading mechanism and conveys it from place to place, as required. This car has preferably a rectangular skeleton frame 10, resting on journal-boxes supported on car-axes 20 and 30. The frame 10 has supplemental cross-bars 11, 12, and 13 and a supplemental longitudinal bar 14. The frame is also provided on one side with a bracket 15. A platform 50 is mounted on the frame 10 and fixed thereto. This platform is preferably circular and provided on its periphery with a circular rack 59. A swiveling-base 60, preferably provided on its under side with antifriction-rolls 61, is mounted on the platform 50 and preferably provided with an annular downward flange 62, which encircles the upper edge of the circular rack 59 and protects it from dust or clogging material. A bracket 70 is secured to the edge of said base and projected beyond its periphery and carries a shaft 71, provided with a pinion 72, which meshes with the circular rack 59 of the platform. This shaft also carries at its upper end a fixed beveled pinion 73, as shown in Figs. 3 and 7.

The loading mechanism and the driving-engine are mounted on the swiveling base. The support for the loading mechanism comprises four standards 80 and 85 and 90 and 95. The standards 80 and 90 are connected by a longitudinal bar 87, and the standards 85 and 95 are connected by a similar bar 97. These standards are preferably constructed of metal in substantial form, bolted or otherwise securely attached to the base 60 and adapted to

constitute a rigid support for the loading mechanism.

An elevated runway disposed in approximately horizontal position is supported on said standards by braces 91 and 96. The frame of this runway comprises two longitudinal rails 100 and 110 on opposite sides of the machine. The runway is provided with a continuous track extending from end to end thereof. The side rails are preferably composed of double angled-iron bars having their horizontal flanges projecting inwardly to form the track. The frame of the runway is provided on opposite sides with standards 101 and 111, disposed opposite each other, and forward of said standards with other standards 102 and 112, these standards being bowed out from the frame, the former to a greater degree than the latter.

A traveling carriage is adapted to reciprocate on the runway and comprises side bars 120 and 130, connected by a rear end cross-bar 122 and a front end cross-bar 132, the latter being somewhat elevated for the purpose hereinafter described. The rear end of the frame of the carriage is provided with two lateral brackets 123 and 133, said brackets having eyes 124 and 134 for the attachment of the actuating mechanism hereinafter described. The side bars 120 and 130 are provided on their outer faces with longitudinal flanges 125 and 135, which project into the grooved rails 100 and 110 of the frame. The side bars are also provided with antifriction-rolls, as 126 and 136, which travel in said grooves. A rod 127 extends transversely across the carriage at the rear end thereof.

A swinging frame is pivoted to the carriage at the rear end thereof, preferably on the rod 127. This swinging frame comprises side bars 140 and 150, said side bars being connected by a rear cross-bar 141, a front cross-bar 151, and an intermediate cross-bar 142. The rear cross-bar 141 is provided about midway of its length with two angled guides 143 and 144. The bar 151 is provided with two similar guides 152 and 153, and the bar 142 is provided with guides 145 and 146, having upwardly-projecting cams 147 and 148.

A shovel 160 is pivoted to the swinging frame 140 150 at the outer end of said swinging frame by means of a pivot-rod 155. This shovel is designed to scoop up a load along the mine-floor, elevate it to a plane above the mine-car, and deliver it into the mine-car. This shovel is designed to be of large capacity capable of carrying a considerable proportion of a ton, more or less, of coal, and it may be of any suitable construction to adapt it to this purpose. It comprises when constructed as shown a bottom 161 and vertical sides 162 and 163, the latter being preferably beveled at their front ends. The bottom of the shovel is preferably reinforced on its under side by tapered ribs 164 and 165. These ribs are pro-



vided with rearward extensions 166 and 167, which project beyond the rear end of the shovel and engage the under side of the cross-bar 151 at the front end of the shovel-support and serve as stops to hold the shovel in horizontal position when elevated. When the shovel is lowered and moving forward under the coal, this cross-bar engages the rear ends of the shovel sides and acts as a push-stop to hold the shovel in proper position to keep the front end down. This shovel is provided on its opposite sides at its rear portion with lateral studs 168 and 169. A bail 170 is pivoted to these studs 168 and 169 and serves as a brace for the sides of the shovel and as a means for connecting the lifting mechanism thereto, being provided with eyes 171 and 172.

A shovel-discharging device is mounted on the swinging frame which supports the shovel and adapted to be held stationary while the shovel moves back for discharging the contents thereof. This discharging device when constructed in the form shown consists of a pusher 180, comprising an elongated grooved shank-bar 181, and a pusher-head 182, disposed transversely at the outer end thereof, said pusher-head being of a length equal to the width of the interior of the shovel. The shank of this pusher rests on the cross-bars 141, 142, and 151, and the angled guides 143 144 and 145 and 146 and 152 and 153 engage the grooves on opposite sides of the shank-bar.

The machine is provided with means for holding the pusher stationary while the shovel moves backward relatively thereto for the discharge of the shovel, also with means for holding the pusher stationary while the shovel moves forward relatively thereto and to project the shovel in front of the pusher preparatory to reloading and with means to cause the pusher to move in unison with the shovel at the proper times during the backward-and-forward motion of the carriage carrying the shovel.

The means shown for causing the pusher to reciprocate with the carriage comprise lateral studs 183 and 184 on opposite sides of the rear end of the shank-bar of the pusher and between the guides on the cross-bar 141 and the guides on the cross-bar 142. As the carriage moves forward the guides 143 and 144 on the cross-bar 141 engage the studs 183 and 184 and cause the pusher to move in unison with the carriage in the further forward movement thereof, and the guides 145 and 146 on the cross-bar 142 engage said lateral studs on the backward movement of the carriage. During the movement of the carriage backward and forward the pusher is held stationary for a period while the studs 183 and 184 traverse the space between the cross-bars 141 and 142, being a distance equal to the length of the shovel or thereabout. Means for holding the pusher stationary preferably comprise a locking mechanism. The shank-bar 181 is pro-

vided at its rear end on opposite sides with upwardly-projecting lugs 185 and 186, and a pivot-pin 187 spans the space between these lugs. Upwardly-projecting laterally-operating springs 188 and 189 are attached to the rear portions of these lugs. A tumbler 190, provided with diametrically opposite shoulders 191 and 192, is fixed on a short shaft 193, which has its bearings in said lugs 185 and 186 and forms trunnions for said tumbler. Torsional springs 194 and 195 are attached at their outer ends, respectively, to said shaft and at their inner ends to said lugs and operate to hold said tumbler normally with its shoulders in a vertical plane, as shown in Fig. 8. A latch 200 is adapted to swing on the pivot 187, and the tail thereof is provided with dependent ears 201 and 202, which straddle the upper edge of the shank-bar of the pusher, the lower ends of said ears being rounded to permit them to ride over the cams 147 and 148. A spring 205 tends to hold the notched end of the latch upward to engage the shoulder 192 of the tumbler 190 whenever the latter is in position to permit this action to take place. Stopping devices for arresting the movement of the pusher are disposed at intervals on the runway, so as to secure a discharge of the shovel at any desired point over the mine-car. Two such stopping devices are shown in the drawings, one which operates to cause the shovel to discharge over the rear portion of the mine-car and another which operates to cause the shovel to discharge over the front portion of said car. These stopping devices are adjustable into and out of position and are under the control of the operator to enable him to effect the discharge of the shovel at the point desired. One of these stopping devices when constructed as herein shown comprises a crank-shaft 210, which is supported in the standards 102 and 112, attached to the runway. This shaft is provided at its front end with a crank 211 and intermediately between its bars with a stop 220, fixed to said shaft. This stop is provided with lateral cam-shoulders 221 and 222, which are engaged by the springs 188 and 189. When the shaft 210 is turned so as to swing the stop 220 downward into operative position, as shown in Figs. 3, 4, 8, 9, and 10, it is in position to be engaged by the tumbler 190 as the carriage carrying the shovel moves backward on the runway, and when the shaft 210 is adjusted to lift the stop 220 into elevated position, as shown in full lines in Fig. 1, the stop is in inoperative position and the carriage carrying the shovel moves backward without stopping the pusher. When the stop 220 is at operative position and the shoulder 191 of the tumbler 190 engages said stop, the pusher will be held stationary until the cams 147 and 148 engage the ears 201 and 203, respectively, of the latch 200 and swing said latch out of contact with the shoulder 192 of said tumbler, where-



by the latter is permitted to oscillate and pass under the stop 220, permitting the pusher to travel backward with the shovel. This occurs after the shovel has moved backward sufficiently to bring the front end thereof under the pusher-head 192, as shown in Fig. 9. On the outward movement of the carriage on the runway, the stop 220 being down in operative position, the rounded side of the shoulder 191 of the tumbler 190 engages the rear side of the stop 220 and said tumbler is swung into horizontal position, as shown in Fig. 10, permitting the pusher to travel forward until the springs 188 and 189 engage the cams 221 and 222 of the stop 220, whereby the movement of the pusher is arrested and the shovel permitted to continue on its forward movement. When the carriage is moved forward a sufficient distance, while the pusher remains stationary, to thrust the shovel in front thereof, the guides 143 and 144 engage the lateral studs 183 and 184 on the pusher and force the pusher forward with the carriage, the springs 188 and 189 yielding laterally to permit them to pass over the cams 221 and 222 of the stop 220. As soon as the tumbler 190 passes clear of the stop 220 in the forward movement of the carriage said tumbler resumes its vertical position under the action of its torsional springs, and the latch 200 engages said tumbler, all the parts being restored to their normal positions preparatory to the unloading of the shovel on a succeeding stroke. The stop 220 is shifted from operative to inoperative position or the reverse by any suitable means. The means shown comprise a connecting-rod 212 and a lever 213, pivoted on a stud 214 on the standards 90 of the frame, said connecting-rod being pivoted at its front end to said lever. A lever-lock 215 is also attached to said standard and provided with notches 216 and 217, with which said lever engages.

The other pusher-stopping device shown in the drawings comprises a crank-shaft 230, which is journaled in the standards 101 and 111 on the runway. This shaft is also provided with a crank 231 and with a stop 240, which may be similar in construction to the stop 220, having corresponding cam-shoulders 241 and 242. The means shown for operating the stop 230 comprise a connecting-rod 232 and a lever 233, also pivoted on the stud 214 and adapted to engage the notches 234 and 235 in said lever-lock.

Suitable means are provided for lowering the shovel to the floor of the mine or other plane of take up for coal and elevating the shovel when loaded to the plane of discharge, and means are also provided for reciprocating the carriage carrying the shovel from end to end of the runway to effect the take up and delivery, said carriage-reciprocating mechanism operating in conjunction with said lowering and lifting mechanism. The mechanisms for this purpose may be of any suitable con-

struction. In the form of embodiment herein illustrated a drum-shaft 250 is supported in journals attached to the rear standards 80 and 85 and provided with a gear-wheel 251, loose thereon, and with a clutch 252, splined to said shaft and adapted to engage the hub of said gear-wheel. This clutch is operated by a lever 253, pivoted on a bracket 254. The shaft is provided at its opposite ends with drums 260 and 270. The drum 260 is preferably provided with a rib 261, forming two grooves 262 and 263 on opposite sides thereof, and the drum 270 is also preferably provided with a rib 271, forming grooves 272 and 273 on its opposite sides. Brackets 280 and 290 are attached to the rear end of the runway on opposite sides thereof. The bracket 280 carries a short transverse rod or shaft 281, and the bracket 290 carries a similar short transverse rod or shaft 291. Two idler grooved vertical pulleys 282 and 283 are disposed on the outer end of the rod 280, and two similar grooved idler-pulleys 292 and 293 are disposed on the outer end of the shaft 290. These idler-pulleys are provided over their tops, respectively, with guards or keepers 284 and 294. The runway is provided at its front end with two horizontal grooved idler-pulleys 300 and 310, supported in brackets attached to opposite sides of said runway. These pulleys are guarded, respectively, by keepers 301 and 311, as shown in Figs. 1 and 2. A rope 320, composed, preferably, of steel, is attached at one end to the outer groove 262 of the drum 260 and at its opposite end to the inner groove 263 of said drum. This rope passes from the outer groove of said pulley over the vertical idler-pulley 282, thence longitudinally along the runway to the idler-pulley 300, at the front end thereof, thence backward through the eye 124 of the carriage which carries the shovel, thence back over the vertical idler-pulley 283, thence downward over the inner groove 263 of the pulley 260. This rope is provided with means for locking it to the eye 124, which means may comprise adjustable collars 321 and 322, clamped to said rope on opposite sides of said eye. The rope 320 has sufficient turns or windings on the drum 260 to equal the distance which the carriage has to travel on the runway, and it is so adjusted in diameter for this distance as to avoid any superposing of one coil upon another. In Fig. 3 the rope is shown as wound sufficiently in the outer groove 262 of the drum 260 to pull the carriage to its extreme outward position, as shown in Fig. 8. A corresponding rope 330 is connected at its opposite ends to the drum 270 and passes over the idler-pulleys 292, 310, and 293. This rope 330 passes through the eye 134 at the opposite side of the carriage and is provided with locking devices 331 and 332 on opposite sides of said eye.

The means shown for swinging the shovel supporting frame to lower and lift the shove



comprise when constructed as shown in the drawings another drum-shaft, 340, supported in journal-boxes attached to opposite sides of the rear standards 80 and 85. This shaft is provided with a gear-wheel 341, which meshes with the gear-wheel 251 on the shaft 250 and with drums 350 and 360, disposed inside the standards. Vertical idler grooved pulleys 285 and 295 are disposed on the inner ends of the shafts 280 and 290, respectively, and guarded by keepers 286 and 296, and vertical idler-pulleys 370 and 380 are supported at the outer ends of the carriage, on opposite sides thereof, and guarded, respectively, by keepers 371 and 381. A rope 390, preferably composed of steel wire, is attached at one end to the drum 350 and passes over the vertical idler-pulleys 285 and 370 and is attached at its other end to the eye 171 of the bail 170, which is pivoted to the shovel. Another rope, 395, is connected at one end to the drum 360, passes over the vertical pulleys 295 and 380, and is connected to the eye 172 of said bail 170.

Means are provided for locking the carriage in stationary position on the runway and for locking the shovel in elevated position when the carriage-actuating and shovel-actuating mechanisms are disconnected from the engine. These means are preferably combined in a single locking mechanism, which operates to lock the shaft 340, and thereby hold both the shovel and the carriage stationary when the locking device is brought into use. The periphery of the outer hub of the drum 350 is provided with teeth 351. A lever 352 is pivoted to the front journal-box of the shaft 340 and provided at its inner end with a pivoted dog 354. The inner end of the lever, to which the dog is pivoted, is provided with a tongue or shoulder 353, and the dog is provided with a recess 355. A spring 356, attached to the lever, presses against the dog 354 and tends to hold said dog toward the toothed hub and in contact with the shoulder 353. A lever-lock 357, provided with locking-notches 358 and 359, is also attached to said journal-box adjacent to said lever. When the lever is adjusted in the outer notch 359, the dog 354 engages the toothed hub of the drum 350 and locks said drum in stationary position, thereby holding the shaft 340 from turning. The spring 356 permits the lever 352 to be adjusted in the outer notch at any point of rotation of the toothed hub 351. If a projecting tooth be passing, the spring permits the adjustment of the lever and said spring will operate to throw the dog into the following notch as soon as the tooth passes from under the dog. When the lever is adjusted in the inner notch 358, the dog is withdrawn from the toothed hub and the drum and its shaft are free to rotate.

The several mechanisms of the machine which are driven by power are operated by a motor 400. The motor shown is a duplex engine or motor which is provided with a le-

ver 401, which controls the supply of the motive fluid to the engine, and a reversing-lever 405, which controls the direction of motion of the engine. A lever-lock 402 is disposed adjacent to the feed-lever 401 and permits the adjustment of the lever in different positions to cut off the motive fluid, to permit a full flow thereof, and to vary the supply thereof. A lever-lock 406 is also disposed adjacent to the reversing-lever 405 and is preferably arranged to hold said lever in three different positions—to wit, a position to permit the engine to move forward, a position which permits the engine to move backward, and an intermediate neutral position in which the engine will have no motion. The driving-shaft 410 of this engine carries a loose pinion 411, which meshes with the pinion 341 on the shaft 340. A clutch 412 is splined on the shaft 410 and adapted to engage the toothed hub of the loose pinion 411, as shown in Fig. 15. This clutch is operated by a bell-crank lever 420, pivoted on a support 421, attached to the base 60, as shown in Fig. 3. A lever-lock 422 is attached to the standard 80 and is provided with notches 423 and 424, which serve to hold the lever 420 in positions to hold the clutch open or closed. The driving-shaft 410 is also provided with a fixed pinion 415, through which motion is communicated to other mechanisms of the machine, hereinafter described.

The machine includes a mechanism, preferably driven by power, for rotating the base on the car to swing the front of the runway laterally to take up coal at various points on the floor of the mine-room and to reverse the runway, so as to bring the shovel over the mine-car for the delivery of its contents. The means shown in this particular embodiment of the invention for this purpose comprise a transverse shaft 430, having its bearings in standards 432 and 433, bolted or otherwise attached to the base 60. This shaft is provided with a fixed gear 431, which meshes with and receives motion from the fixed gear 415 on the engine driving-shaft 410. This shaft is also provided with a loose sprocket-pinion 434 and with a splined clutch 435, the latter being actuated to lock said sprocket-wheel to turn with the shaft by means of a lever 436, pivoted to a bracket 437, attached to the rear standard 80. A bracket 438 is attached to the standard 80 and provided with notches whereby it is adapted to serve as a lever-lock for the lever 436. The shaft 430 is provided at its opposite end with a fixed pinion 439, the purpose of which will hereinafter appear. A stub-shaft 440 is journaled in a standard 441 and projects on opposite sides thereof, being provided at its inner end with a sprocket-wheel 442 and at its outer end with a beveled pinion 443. A sprocket-chain 444 passes over the sprocket-pinion 434 and sprocket-wheel 442 and transmits motion from the former to the latter. The beveled



pinion 443 meshes with the beveled pinion 73, whereby motion is imparted to the vertical shaft 71, carrying the pinion 72, which meshes with the peripheral rack 59 of the platform 50, as hereinbefore described. By this mechanism the shaft 71 is made to travel in either direction around the platform 50, thereby causing the rotation of the base 60 as desired. The motion of the base is changed by reversing the engine or by any other suitable means. Traction mechanism for causing the car to move in and out of the mine preferably consists of a part of the machine and is preferably connected with and driven by the same motor which drives the other mechanism. In the embodiment shown a transverse shaft 450 is also journaled in standards 432 and 433 and provided at one end with a fixed pinion 451, which meshes with the pinion 439 on the shaft 430, whereby motion is transmitted from the shaft 430 to the shaft 450. This shaft 450 is also provided with a loose beveled pinion 452 and with a splined clutch 453, which is actuated to lock said beveled pinion to move in unison with the shaft by means of an angular lever 454. This lever is pivoted to the standard 432, and a lever-lock 455, provided with two locking-notches, serves to hold said lever in position to hold the clutch in engagement with the pinion or free therefrom. A shaft 460 passes through the platform 50 and base 60 and serves as the axis on which the latter turns. This shaft is provided at its upper end above the base 60 with a fixed beveled pinion 461 and at its lower end below the platform 50 with a beveled pinion 462.

A short longitudinal shaft 470 (shown in Figs. 1 and 2) is supported in bearings attached to the cross-bars 11 and 12 of the frame 10. This shaft is provided at its free end with a beveled pinion 471, which meshes with the beveled pinion 462 on the vertical shaft 460, and at its outer end with a beveled pinion 472, which meshes with the beveled pinion 21 on the axle 20 of the machine-car. This mechanism enables the operator to transmit motion at will through the lever 454 and the clutch operated thereby from the motor to the car-axle. The direction of motion is controlled by the engine-reversing lever 415.

Means are provided for locking the loading-machine in fixed position in the mine while in operation. This mechanism preferably operates against the ceiling of the room or passage in which the machine operates. In the embodiment shown the machine is provided with two vertical sockets 500 and 510, disposed on opposite sides thereof and bolted at their lower ends to the longitudinal bars 87 and 97 of the stationary frame and at their upper ends to the rails 100 and 110 of the runway. These sockets are located in a transverse vertical plane passing through the axis of the rotary base 60. A sliding yoke 520 comprises a hori-

zontal cross-bar 521 and vertical lugs 522 and 523, disposed, respectively, in said sockets. The cross-bar 521 is provided centrally of its length with a socket 524, which is in a vertical line passing through the axis of the base 60. A contact-plate 530 is provided on its under side with a knuckle 531, which rests in the knuckle-socket 524 of the cross-bar 521. The upper face of the contact-plate is adapted to engage the top or ceiling of the mine-room and is preferably roughened or provided with prongs, as 532, to engage said ceiling. The knuckle-joint formed between the contact-plate and the cross-bar enables said plate to tilt at any necessary angle to adapt itself to the inequality of the roof. A detachable plate 525 is secured to the bar 521 and permits the socket 524 to be opened for the adjustment or removal of the contact-plate. The lugs 522 and 523 are provided with racks 526 and 527. Means are provided for thrusting the yoke 520 upward to cause the contact-plate 530 to press against the roof of the mine for holding the machine stationary. The means shown for this purpose comprise a transverse shaft 540, disposed in bearings 541 and 542, attached to the bars 87 and 97, respectively, of the frame. This shaft is provided at its front end with a worm-wheel 543 and just inside said worm-wheel with a gear 544 and at its opposite end with a similar gear 545. Stub-shafts 550 and 560 are disposed in bracket-bearings 551 and 561, attached to the under sides of the rails 100 and 110 of the runway. These stub-shafts leave the space between said rails free for the movement of the shovel-carriage. The stub-shaft 550 is provided with a pinion 552, which meshes with the gear-wheel 544 on the shaft 540, and the stub-shaft 560 is provided with a pinion 562, which meshes with the gear 545 on the shaft 540. A vertical journal 570 is attached to the lower end of the socket 500, and a vertical shaft 571 is supported in said journal-box and provided at its lower end with a hand-wheel 572 and at its upper end with a worm 573, which engages the worm-wheel 543 on the shaft 540. This mechanism enables the operator by turning the hand-wheel 572 to adjust the locking-yoke 520 into rigid contact with the roof of the mine, the intermediate gear affording sufficient movement of said yoke for this purpose without such an elongation of the lugs of the yoke as would tend to interfere with the underlying mechanism. When the locking-yoke is adjusted into contact with the roof of the mine, the machine has virtually a continuous axis with supports at both ends.

Compressed air serves as a convenient means for driving the motor when the mine is equipped with mains for compressed air. The embodiment shown provides for the use of such a motive fluid, and to avoid difficulty in connecting the supply-pipes on the swiveling machine with the stationary mains laid within



the mine the supply is made to pass through the axis of the swiveling base. To this end the shaft 460 is made hollow, and a pipe 580 is disposed therein, said pipe projecting at its outer end above the beveled pinion 461 and at its lower end below the beveled pinion 462, as shown in Figs. 5 and 16. A lateral pipe 590 is connected to the lower end of the pipe 580 by means of a swiveled joint 591. This pipe 590 is supported by the bar 14 and bracket 15 and projects from the farther side of the machine between the wheels on axles 20 and 30, being provided with a coupling-joint 592. A flexible supply-pipe 600 connects this pipe with the compressed-air main within the mine. A pipe 610 leads from the top of the pipe 580 and connects it with the supply-pipe 620 of the engine 400. This arrangement enables the connection to be made when the machine is ready for operation between the supply-main and the stationary part of the machine. Thus any lateral throw of the connecting-pipe is avoided during the horizontal swinging of the runway.

The operation: In the use of this machine the traction mechanism is first brought into operation to cause the machine-car to travel through the mine-corridors and into the mine-room where the coal to be taken up has been shot down, or the machine may be pushed into place by any motor-car used about the mines. In the traveling position of the machine-car the carriage 120 130, carrying the shovel, is disposed at the inner end of the runway 100 110, being telescoped, so to speak, in said runway. In case the machine-car serves as its own locomotive the lever 454 is operated to shift the clutch 453 into engagement with the beveled gear 452, all the other clutch-levers being disengaged from their respective locking connections. Then motion is transmitted from the driving-shaft 410 of the engine through the gearing 415, 431, 439, and 451 to the shaft 450, thence through the gearing 452 461 to the hollow shaft 460 and gearing 462 471 to the shaft 470 and gearing 472 and 21 to the car-axle 20. The machine having been brought to its desired position for taking up coal, the lever 454 is actuated to detach the clutch 453, and thereby disconnect the traction mechanism. The machine is then locked in place against any longitudinal or tilting motion by means of the ceiling-locking device, which is brought into play by a manipulation of the hand-wheel 572, the rotary base 60, carrying the loading mechanism, being then free to rotate around its axis. Assuming that the carriage 120 130, carrying the shovel, is in its normal position at the inner end of the runway 100 110, the lever 420 is shifted to bring the clutch 412 into connection with the pinion 411, whereby the shovel lifting and loading mechanism is brought into operative connection with the engine. This causes the rotation of the shovel-drums 350

360 in a direction which unwinds the shovel-cables 390 395, permitting the shovel-carrying arms 140 and 150 to swing downward to lower the shovel to a plane on a level or thereabout with the mine-floor, as indicated in the first dotted-line position of the shovel in Fig. 1. Then the operator shifts the lever 253 to operate the clutch 252 to bring the carriage-actuating mechanism into connection with the engine, the lever 420 remaining in operative position. Then the carriage-drums 260 and 270 will be rotated in unison with the shovel-drums 350 360 in a direction to pay out the cables 320 and 330 from the inner parts of said drums and wind them up on the outer parts thereof. This movement of these cables draws the carriage outward on the runway and causes the shovel in its then lowered position to scoop up coal from the floor of the mine, as indicated in the second dotted-line position in Fig. 1. Then the reversing-lever 405 is shifted to reverse the engine 400, and the lever 253 is actuated to disconnect the actuating mechanism from the driving-shaft. Then the shovel-drums turn in a direction to wind up the cables 390 395, and thereby swing the shovel-carrying arms 140 150 in upward direction and lift the loaded shovel into position in line with the runway, as shown in full lines in Fig. 1. Then the lever 253 is shifted to connect the carriage-actuating mechanism with the engine, and the latter being still reversed the drums 260 270 wind up the carriage-ropes 320 330 on the inner parts thereof and unwind them from the outer parts thereof, thereby drawing in the carriage on the runway, and simultaneously with this inward movement of the carriage the ropes 390 and 395 continue to be wound upon the drums 350 360, so as to avoid any slack of these ropes and to hold the shovel in elevated position during the inward movement of the carriage. Then the lever 420 is shifted to release the clutch 412, whereby both sets of drums are disconnected from the driving mechanism. Then the lever 352 is shifted to throw the locking mechanism into connection with the shaft 340, whereby the carriage is held in its inward position in the runway and the shovel is maintained in its elevated position. Then the operator actuates the lever 436 to shift the base-turning mechanism into connection with the engine. Then the base is rotated in the direction of the full-line arrow in Fig. 3 for a half-turn, more or less, sufficient to bring the shovel in line with the mine-car. Then the lever 436 is shifted to throw said base-turning mechanism out of operation. Then the engine is reversed and run forward, and the lever 420 again throws the carriage-actuating mechanism into gear, and the carriage is propelled toward the outer end of the runway a sufficient distance to project the shovel beyond the desired point of delivery over the rear or front portion of the mine-car to be



loaded, as the case may be. When it is desired to load the rear part of the mine-car, the lever 213 is adjusted to throw the stop 220 into operative position to engage the pusher-stop mechanism. Then the engine is again reversed and run backward, and the carriage moves inward on the runway, and the tumbler 190 comes in contact with the stop 220, and the pusher is stopped, while the shovel continues to move backward, whereby the coal is pushed out of the shovel and discharged into the mine-car in the manner indicated in Fig. 2, said figure, however, showing this operation of delivery when the stop 230 has arrested the pusher for the discharge into the front portion. Then the carriage continues to move backward until it is wholly withdrawn into the runway, and during this continued backward movement the ears on the latch 200 are engaged by the cam projections 147 148, whereby said latch is made to release said tumbler and the pusher is permitted to move backward with the carriage, as shown in Fig. 9. Then the lever 420 is shifted to throw the actuating mechanism out of gear. Then the engine is reversed to forward motion and the lever 436 shifted to lock the base-turning mechanism into gear, and the base is rotated a half-revolution, more or less, in the direction of the dotted arrow in Fig. 3, and then said lever 436 disconnects the turning mechanism and the machine is restored to its original position and is then ready for another operation. When the coal has been removed from that portion of the room directly in front of the machine, the base-turning mechanism is utilized to swing the loading mechanism at an angle to take up the coal lying more or less to one side of the line of the track on which the machine-car travels, and then the loading operation is performed as before described.

I claim as my invention—

1. The combination of a traveling runway, a traveling carriage on said runway, a vertically-swinging frame pivoted to said carriage, a shovel pivoted to said swinging frame and adapted to swing substantially in alinement therewith in raised position, means for swinging said pivoted frame to lower and raise the shovel, and means for reciprocating the carriage on the runway.
2. The combination of a traveling runway, a traveling carriage on said runway, a vertically-swinging frame pivoted to said carriage, a shovel pivoted to said swinging frame and adapted to swing substantially in alinement therewith in raised position, means for swinging said pivoted frame to lower and raise the shovel, means for reciprocating the carriage on the runway, and means for discharging the shovel.
3. The combination of a traveling runway, a traveling carriage on said runway, a vertically-swinging frame pivoted to said carriage,

a shovel pivoted to the free end of said pivoted frame, means for swinging said pivoted frame to lower and raise the shovel, means for reciprocating the carriage on the runway, and a scraper for discharging the shovel.

4. The combination of a traveling runway, a traveling carriage on said runway, a vertically-swinging frame pivoted to said carriage, a shovel pivoted to said swinging frame and adapted to swing substantially in alinement therewith in raised position, means for swinging said pivoted frame to lower and raise the shovel, means for reciprocating the carriage on the runway, and means for swinging the runway to reversed position for discharge.

5. The combination of a traveling runway, a traveling carriage on said runway, a vertically-swinging frame pivoted to said carriage, a shovel pivoted to said swinging frame and adapted to swing substantially in alinement therewith in raised position, means for swinging said pivoted frame to lower and raise the shovel, means for reciprocating the carriage on the runway, and stop mechanism for holding the shovel in elevated position.

6. The combination of a car, a swiveling base mounted thereon, an elevated horizontal runway mounted on said swiveling base, a reciprocating carriage on said runway, a vertically-swinging frame pivoted to said carriage, and a shovel pivoted to said swinging frame and adapted to swing substantially in alinement therewith in raised position.

7. The combination of a runway, a traveling carriage on said runway, a vertically-swinging frame pivoted on said carriage, a shovel pivoted to the free end of said pivoted frame, means for swinging said pivoted frame to lower and raise the shovel, a sliding pusher mounted on said frame, and means for actuating said moving parts.

8. The combination of a runway, a traveling carriage on said runway, a vertically-swinging frame pivoted to said carriage, a shovel pivoted to the free end of said pivoted frame, means for swinging said pivoted frame to lower and raise the shovel, a sliding pusher mounted on said frame, means for actuating said moving parts, and a stop device on said runway for arresting the pusher to discharge the shovel at a desired point.

9. The combination of a runway, a traveling carriage on said runway, a vertically-swinging frame pivoted to said carriage, a shovel pivoted to the free end of said pivoted frame, means for swinging said pivoted frame to lower and raise the shovel, a sliding pusher mounted on said frame, means for actuating said moving parts, and a plurality of adjustable stop devices on said runway for arresting the pusher for discharging the shovel at the desired point.

10. The combination of an elevated traveling runway, a reciprocating carriage thereon, a vertically-swinging arm pivoted to said car-



riage, a shovel carried by the free end of said arm, means for reciprocating said carriage, means for lowering and raising said arm to cause the shovel to scoop up material, and means for engaging the material in said shovel for discharging it.

11. The combination of a runway, a reciprocating carriage thereon, a vertically-swinging arm pivoted to said carriage, a shovel carried by the free end of said arm, means for reciprocating said carriage, means for lowering and raising said arm to cause the shovel to scoop up material, and a pusher mounted on said arm and movable bodily therewith and to a limited extent independently thereof for engaging material in said shovel for discharging it.

12. The combination of a runway, a traveling carriage thereon, a vertically-swinging frame pivoted to said carriage, a shovel pivoted to said swinging frame, a pusher for discharging said shovel, means for causing said pusher to reciprocate with said carriage, and means for holding said pusher stationary relatively to the shovel during parts of the backward and forward movements of the carriage.

13. The combination of a runway, a traveling carriage thereon, a vertically-swinging frame pivoted to said carriage, a shovel pivoted to said frame, and means for holding said shovel in horizontal position in its thrust and discharge.

14. The combination of a runway, a traveling carriage thereon, a vertically-swinging frame pivoted to said carriage, a shovel pivoted to said swinging frame, a pusher for discharging said shovel, and means for holding said shovel in horizontal position in the lowered position of said frame.

15. The combination of a runway, a traveling carriage thereon, a vertically-swinging frame pivoted to said carriage, a shovel pivoted to said frame, and means for holding said shovel in horizontal position substantially in alignment with said frame in the raised position of the latter.

16. The combination of a runway, a traveling carriage thereon, a vertically-swinging frame pivoted to said carriage, and a shovel pivoted to said frame and adapted to swing substantially in alignment therewith, said frame being provided with a push-stop adapted when the frame is in lowered position to engage the shovel and hold it in operative position.

17. The combination of a runway, a traveling carriage thereon, a vertically-swinging frame pivoted to said carriage, and a shovel pivoted to said swinging frame, said frame being provided with a cross-bar adapted to engage the rear end of the shovel and act as a push-stop to hold it in operative position when the swinging frame is lowered.

18. The combination of a runway, a traveling carriage thereon, a vertically-swinging

frame pivoted to said carriage, a shovel pivoted to said swinging frame and provided with a rearward extension adapted to engage said frame and hold the shovel in horizontal position when said frame is elevated.

19. The combination of a runway, a traveling carriage thereon, a vertically-swinging frame pivoted to said carriage, a shovel pivoted to said swinging frame and adapted to swing substantially in alignment therewith in raised position, means for reciprocating said carriage on said runway, and means connected with the shovel for lowering and lifting said shovel and the pivoted frame with which it is connected.

20. The combination of a runway, a traveling carriage thereon, a vertically-swinging frame pivoted to said carriage, a shovel pivoted to said swinging frame, a sliding pusher mounted on said swinging frame, a yielding tumbler pivoted on said pusher and having means tending to hold it in normal position, a dog adapted for locking said tumbler against movement in one direction, a stop on said runway engaged by said tumbler for arresting said pusher, and means for releasing said dog to permit the pusher to move with the carriage at the proper time.

21. The combination of a runway, a traveling carriage thereon, a vertically-swinging frame pivoted to said carriage, a shovel pivoted to said swinging frame, a sliding pusher mounted on said swinging frame, a yielding tumbler pivoted on said pusher and having means tending to hold it in normal position, a dog adapted for locking said tumbler against movement in one direction, a cam-faced stop on said runway, means for releasing said dog to permit the pusher to move with the carriage at the proper times, and a spring on said pusher adapted to engage and ride over said cam-faced stop.

22. The combination of a runway, a traveling carriage thereon, a vertically-swinging frame pivoted to said carriage, a shovel pivoted to said frame and adapted to swing substantially in alignment therewith, pulleys on said runway, a drum, a rope passing over said pulleys and drum and connected with said carriage, means for rotating said drum in either direction to cause the carriage to traverse the runway, and a rope-and-drum mechanism connected with said shovel and operating in unison with said traversing mechanism to lower, raise and hold said shovel.

23. The combination of a runway, a traveling carriage thereon, a vertically-swinging frame pivoted to said carriage, a shovel pivoted to said frame and adapted to swing substantially in alignment therewith, pulleys at opposite ends of said runway, a drum, a rope passing over said pulleys and drum and connected with said carriage, means for rotating said drum in either direction to cause the carriage to traverse the runway, a rope-and-drum



mechanism connected with said shovel and operating in unison with said traversing mechanism to lower, raise and hold said shovel, and means for locking the carriage in stationary position on the runway.

24. The combination of a runway, a traveling carriage thereon, a vertically-swinging frame pivoted to said carriage, a shovel pivoted to said frame and adapted to swing substantially in alinement therewith, pulleys at opposite ends of said runway, a drum, a rope passing over said pulleys and drum and connected with said carriage, means for rotating said drum in either direction to cause the carriage to traverse the runway, a rope-and-drum mechanism connected with said shovel and operating in unison with said traversing mechanism to lower, raise and hold said shovel, means for locking the carriage in stationary position on the runway, and means for locking the shovel in elevated position when its actuating mechanism is disconnected therefrom.

25. The combination of a runway, a traveling carriage thereon, a vertically-swinging frame pivoted to said carriage, a shovel pivoted to said frame, pulleys at opposite ends of said runway, a drum, a rope passing over said pulleys and drum and connected with said carriage, means for rotating said drum in either direction to cause the carriage to traverse the runway, a rope-and-drum mechanism connected with said shovel and operating in unison with said traversing mechanism to lower, raise, and hold said shovel, and a single locking mechanism which holds the carriage in stationary position on the runway and the shovel in elevated position when their actuating mechanisms are disconnected.

26. The combination of a car, a swiveling base mounted thereon, a loading mechanism mounted on said base, and means for locking the axis of said swiveling base against the ceiling of the mine or other place of use, comprising a plate adapted for contact with the ceiling and an adjustable yoke having a universal-joint connection with said plate.

27. The combination of a car, a swiveling base mounted thereon, a loading mechanism mounted on said base, and means for locking the axis of said swiveling base against the ceiling of the mine or other place of use, com-

prising a plate adapted for contact with the ceiling, an adjustable yoke having a universal-joint connection with said plate and a worm mechanism for adjusting said yoke.

28. The combination of a car, a swiveling base mounted thereon, a loading mechanism mounted on said base, a motor on said base for operating said mechanism, and means for conveying the motive fluid to said motor, including a pipe disposed in a hollow shaft which serves as the axis of the swiveling base and as a part of the traction mechanism.

29. The combination of a car, a swiveling base mounted thereon, a loading mechanism mounted on said base, a motor on said base for operating said mechanism, means for conveying the motive fluid to said motor, including a pipe disposed in a hollow shaft which serves as the axis of the swiveling base and as a part of the traction mechanism, and a lateral pipe having a swiveled connection with the lower end of said axle-pipe.

30. The combination of a traveling runway, a traveling carriage on said runway, a vertically-swinging frame pivoted to said carriage, a shovel pivoted to said swinging frame and adapted to swing substantially in alinement therewith in raised position, means for swinging said pivoted frame to lower and raise the shovel, means on said shovel and frame for holding the shovel in horizontal position in alinement with the frame, and means for reciprocating the carriage on the runway.

31. The combination of a traveling runway, a traveling carriage on said runway, a vertically-swinging frame pivoted to said carriage, a shovel having a knuckle-joint connection with said frame, and means for reciprocating the carriage on the runway.

32. The combination of a traveling runway, a traveling carriage on said runway, a vertically-swinging frame pivoted to said carriage, a shovel having a knuckle-joint connection with said frame, means for holding said shovel in alinement with the frame when the latter is in raised position, and means for reciprocating the carriage on the runway.

ANDREW JACKSON DOSS.

Witnesses:

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S. B. CRAWFORD.