No. 765,832. PATENTED JULY 26, 1904.

W. E. HAMILTON.

LOADING MACHINE.

APPLICATION FILED OCT. 20, 1903.

NO MODEL. 8 SHEETS—SHEET 1.

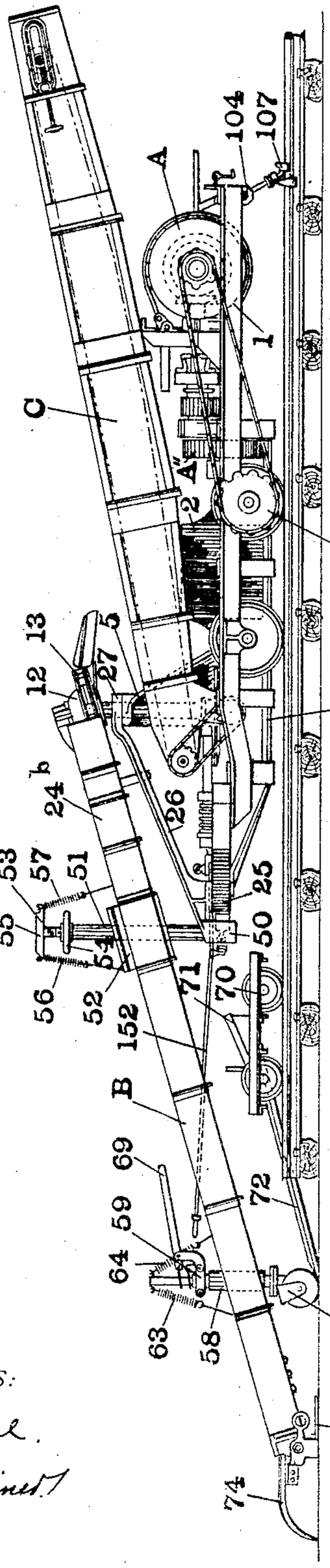

Fig. 1

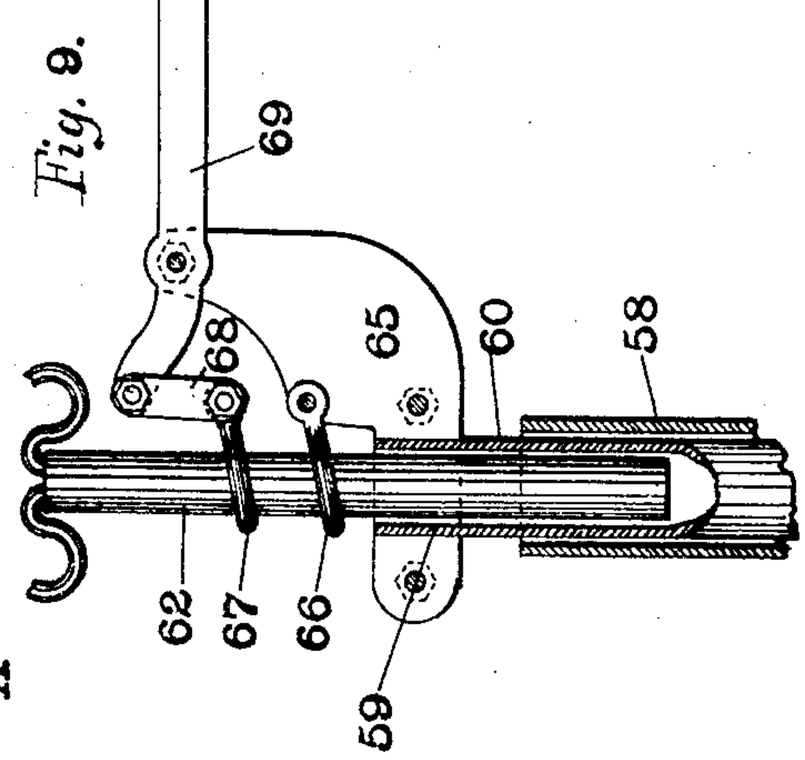

Fig. 9.

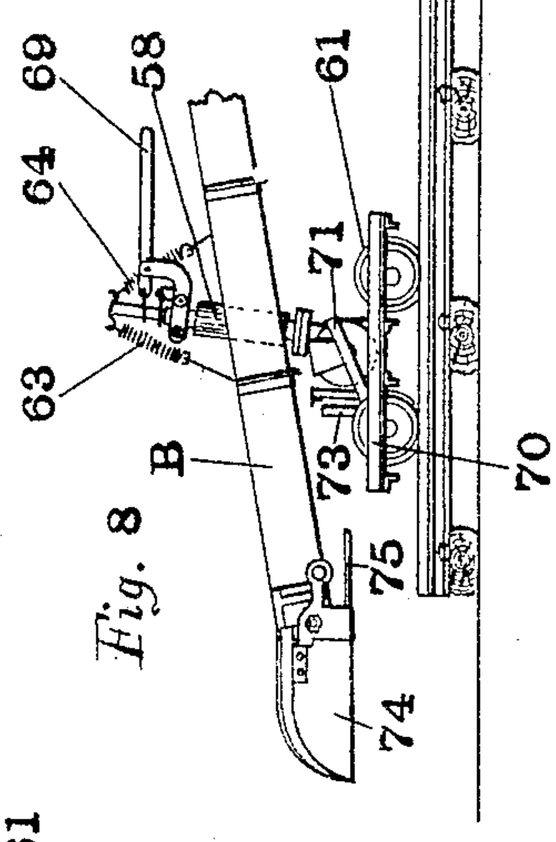

Fig. 8

WITNESSES:

G. Braune.

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No. 765,832. PATENTED JULY 26, 1904.

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NO MODEL. 3 SHEETS—SHEET 2.

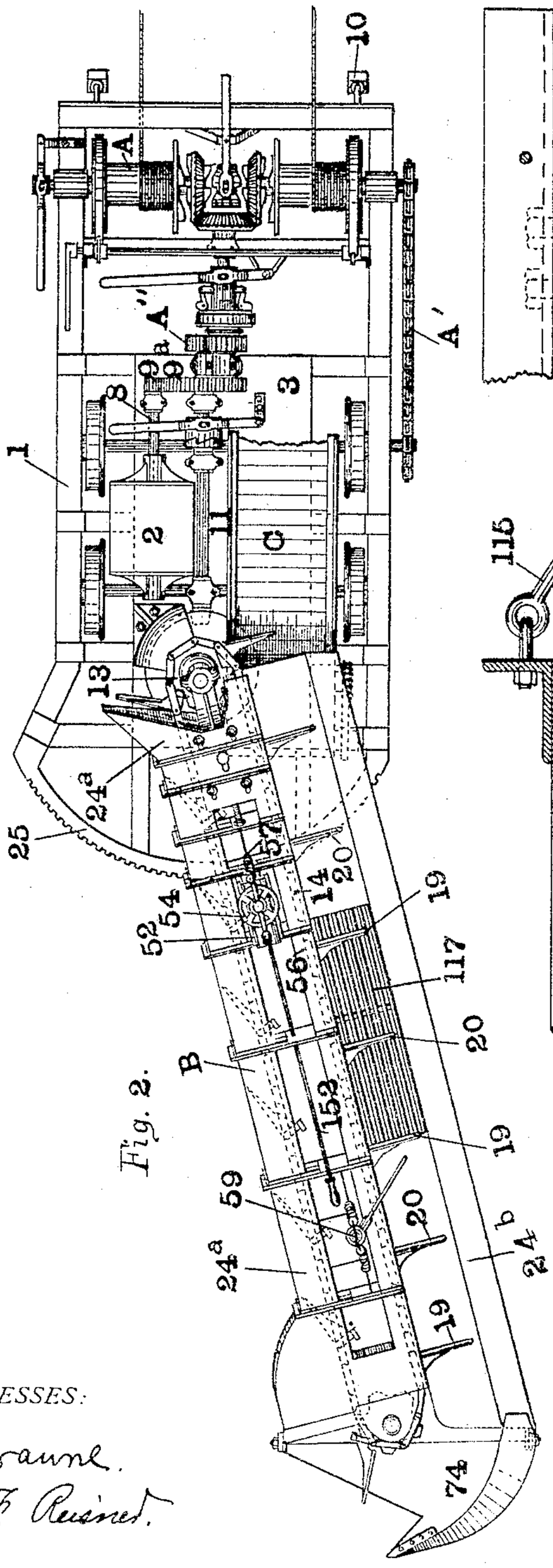

Fig. 2.

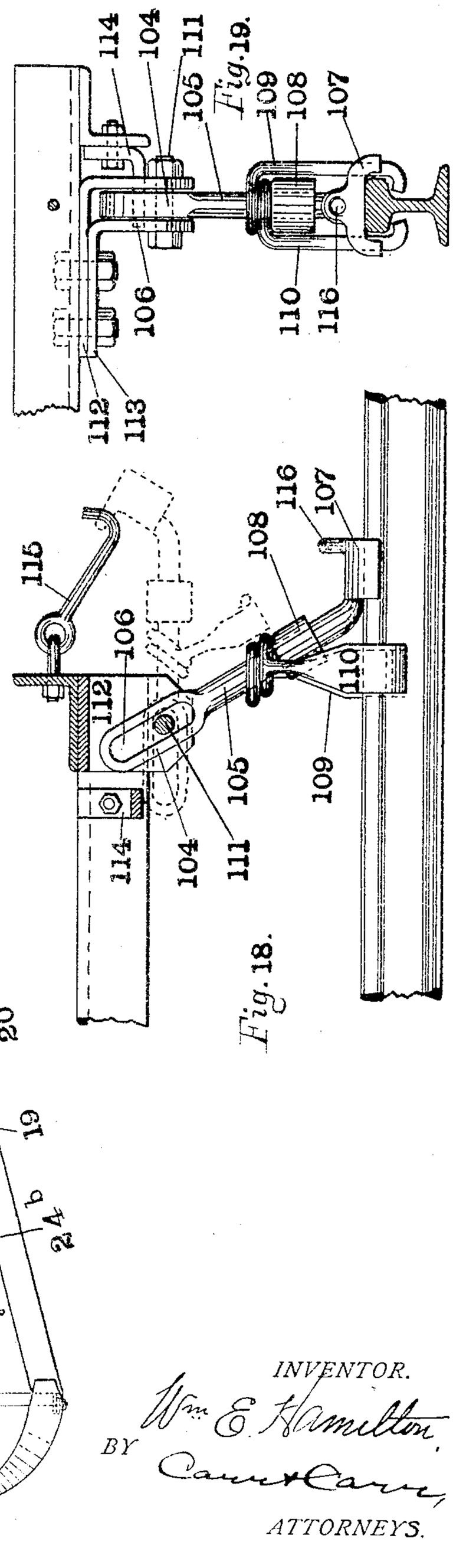

Fig. 18.

Fig. 19.

WITNESSES:

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NO MODEL. 8 SHEETS—SHEET 3.

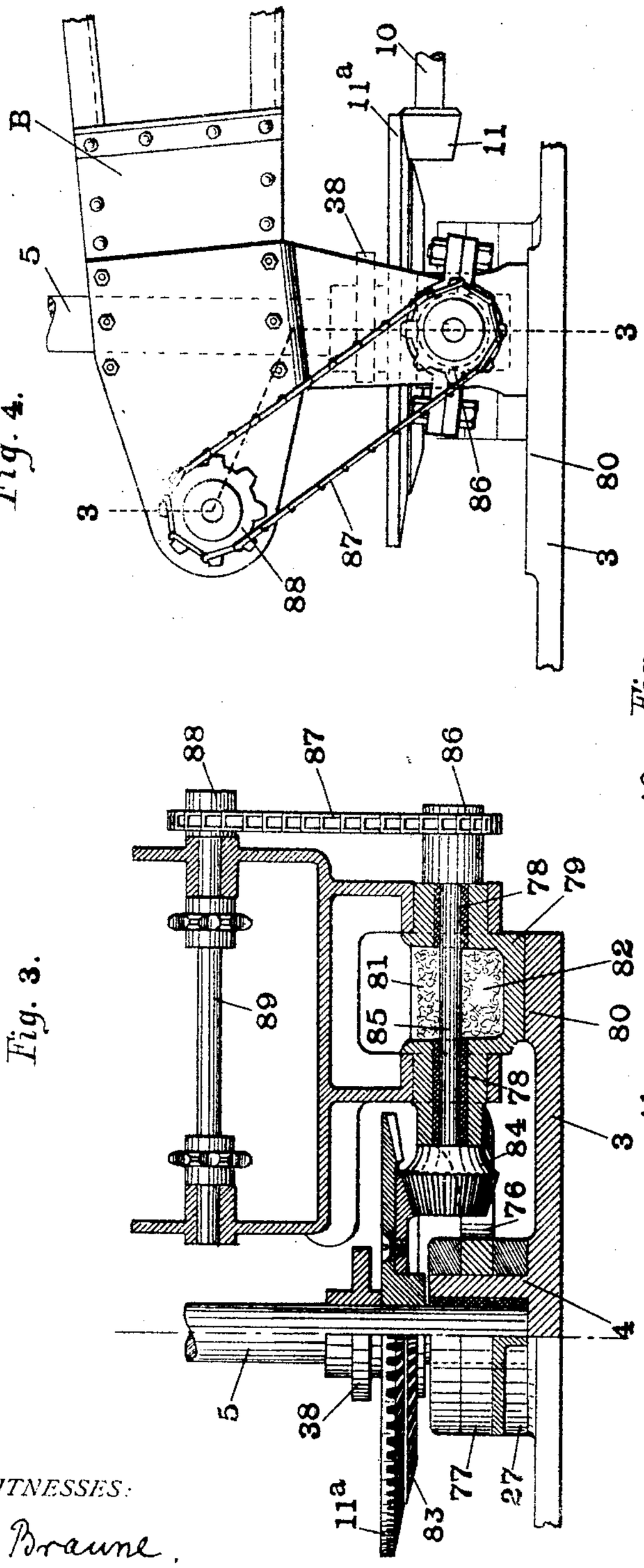

Fig. 4.

Fig. 3.

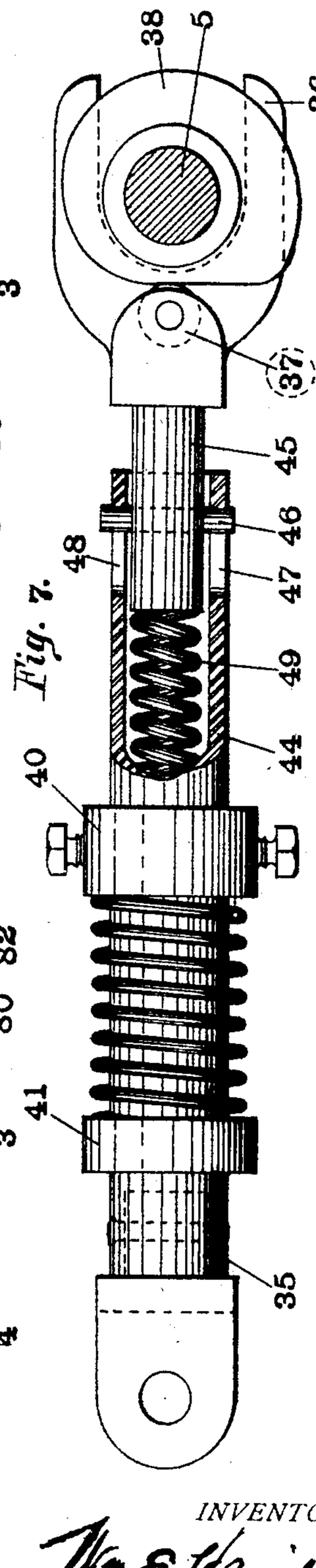

Fig. 7.

WITNESSES:

G. Braune.

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No. 765,832. PATENTED JULY 26, 1904.

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NO MODEL. 8 SHEETS—SHEET 4.

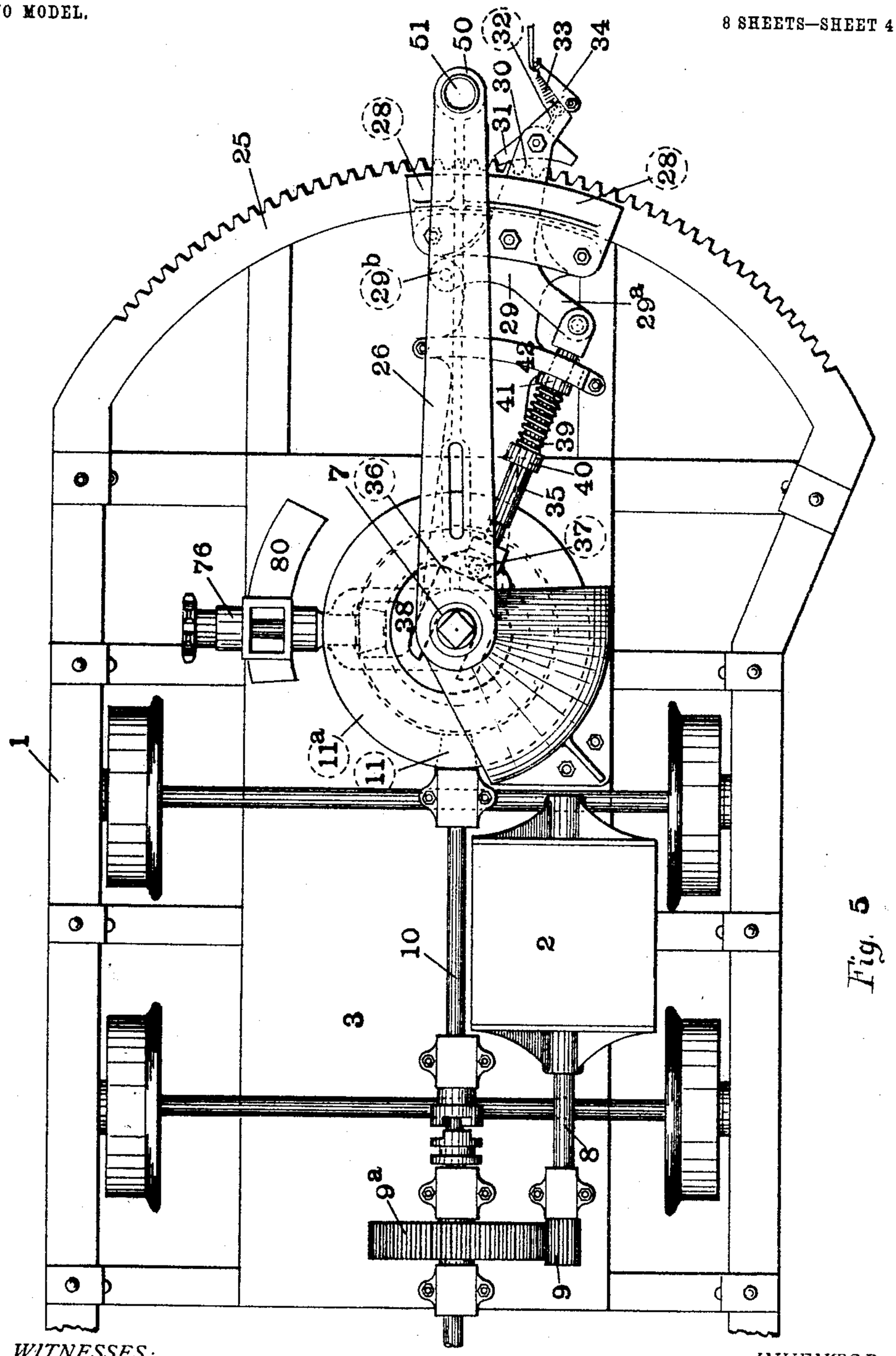

Fig. 5

WITNESSES:

G. Braune.

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NO MODEL. 8 SHEETS—SHEET 5.

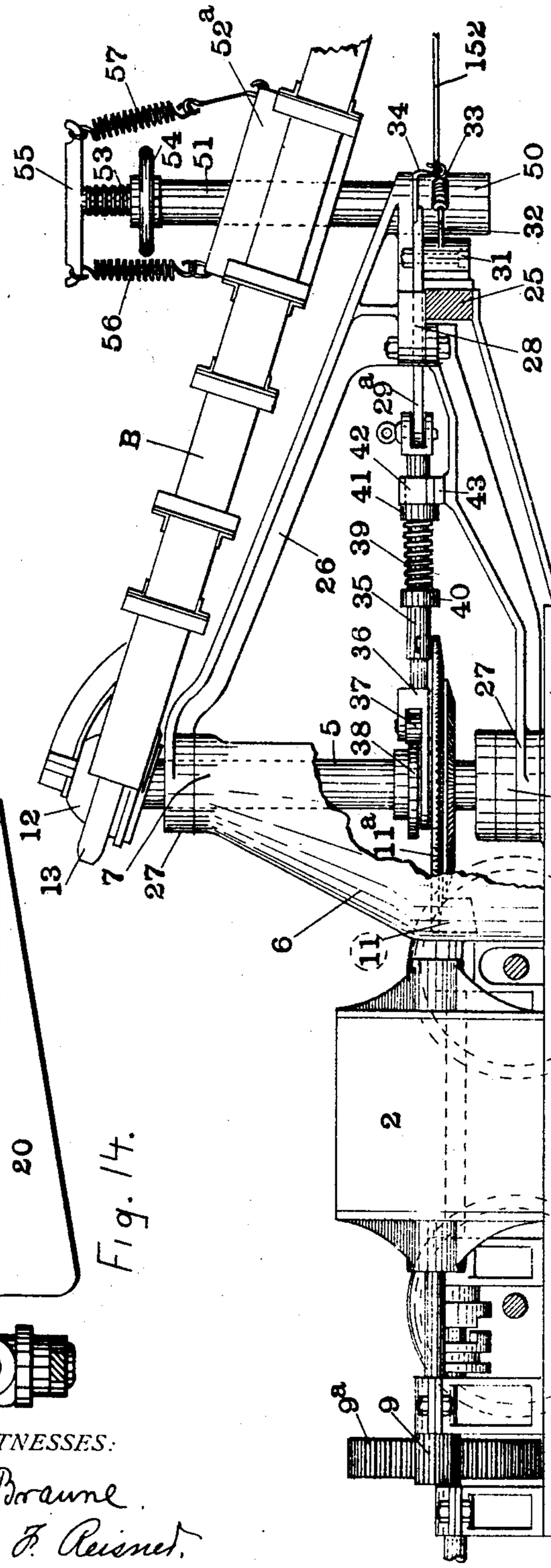

Fig. 6.

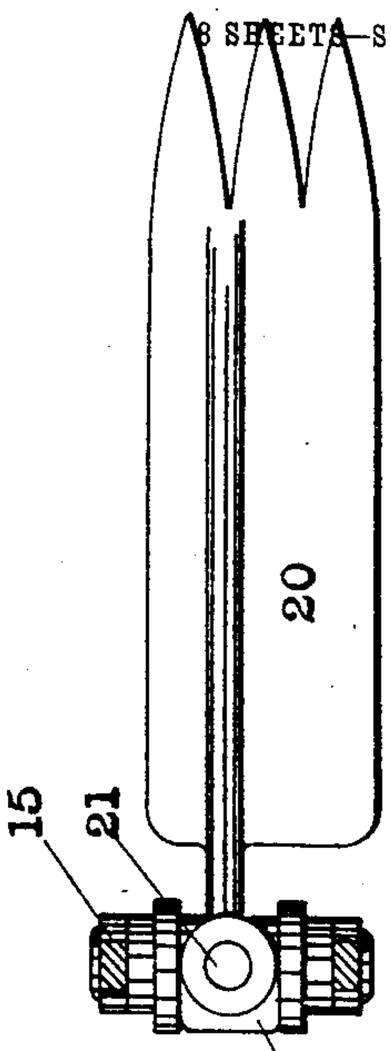

Fig. 15.

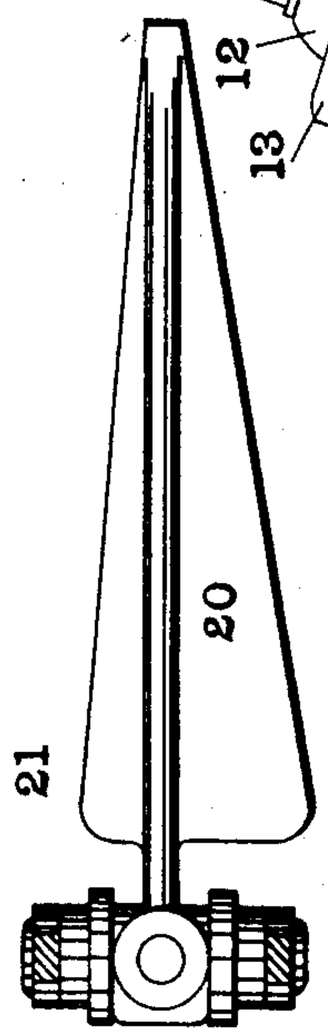

Fig. 14.

WITNESSES:

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APPLICATION FILED OCT. 20, 1903.

NO MODEL. 8 SHEETS—SHEET 6.

Fig. 12.

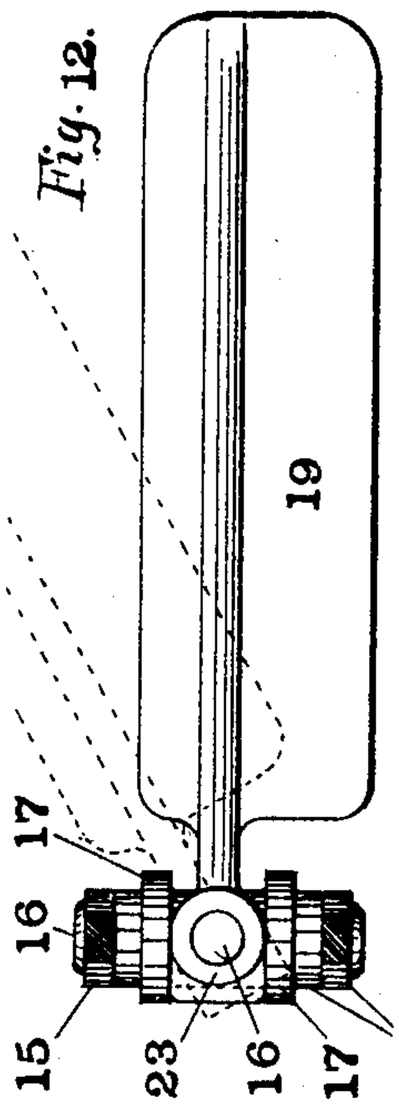


Fig. 13.

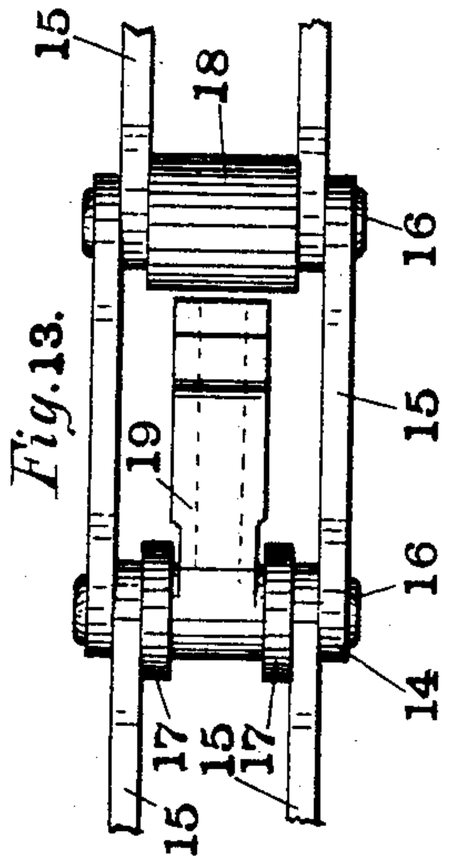


Fig. 17.

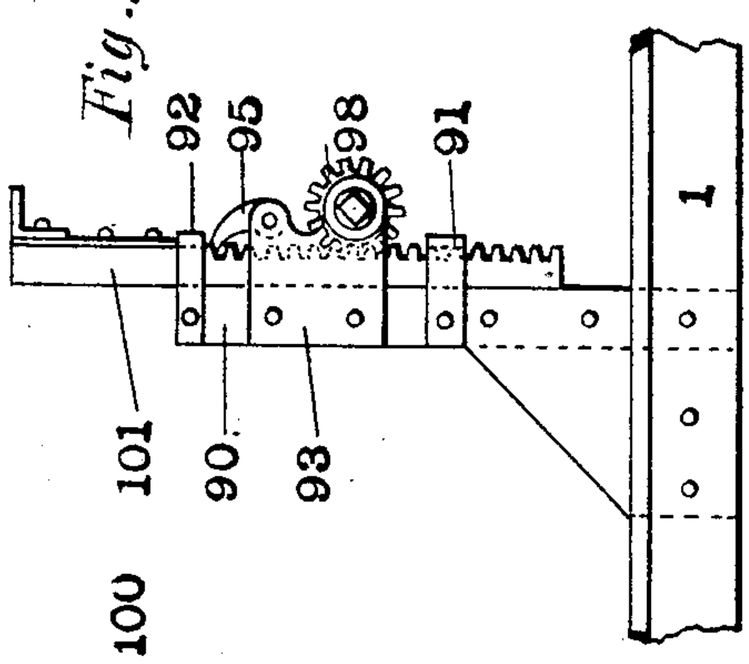


Fig. 11.

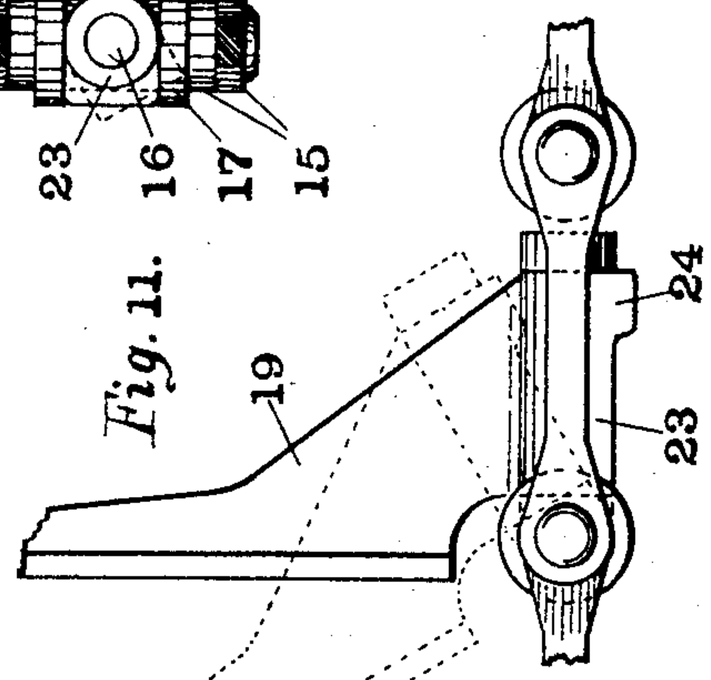


Fig. 10.

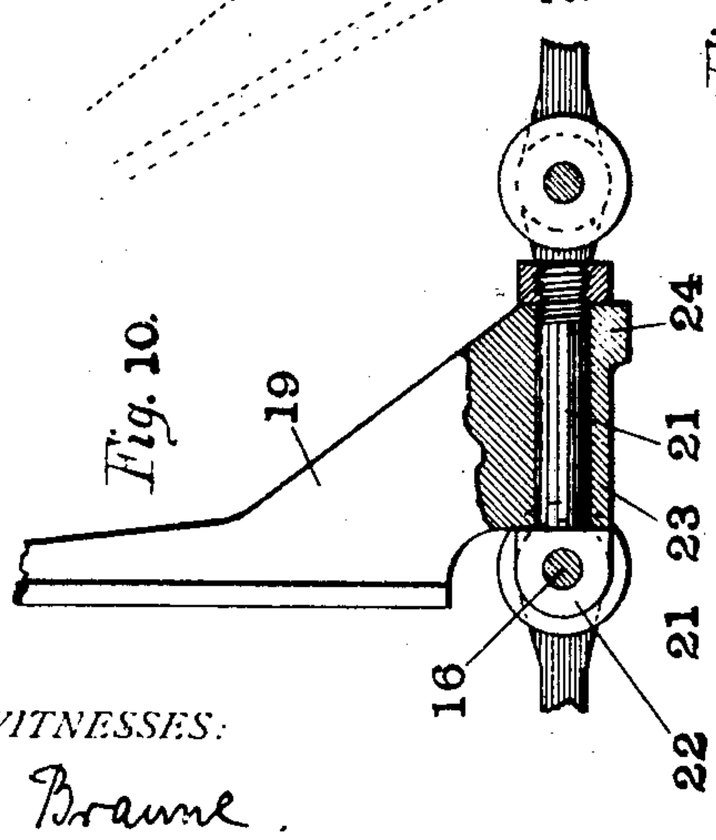
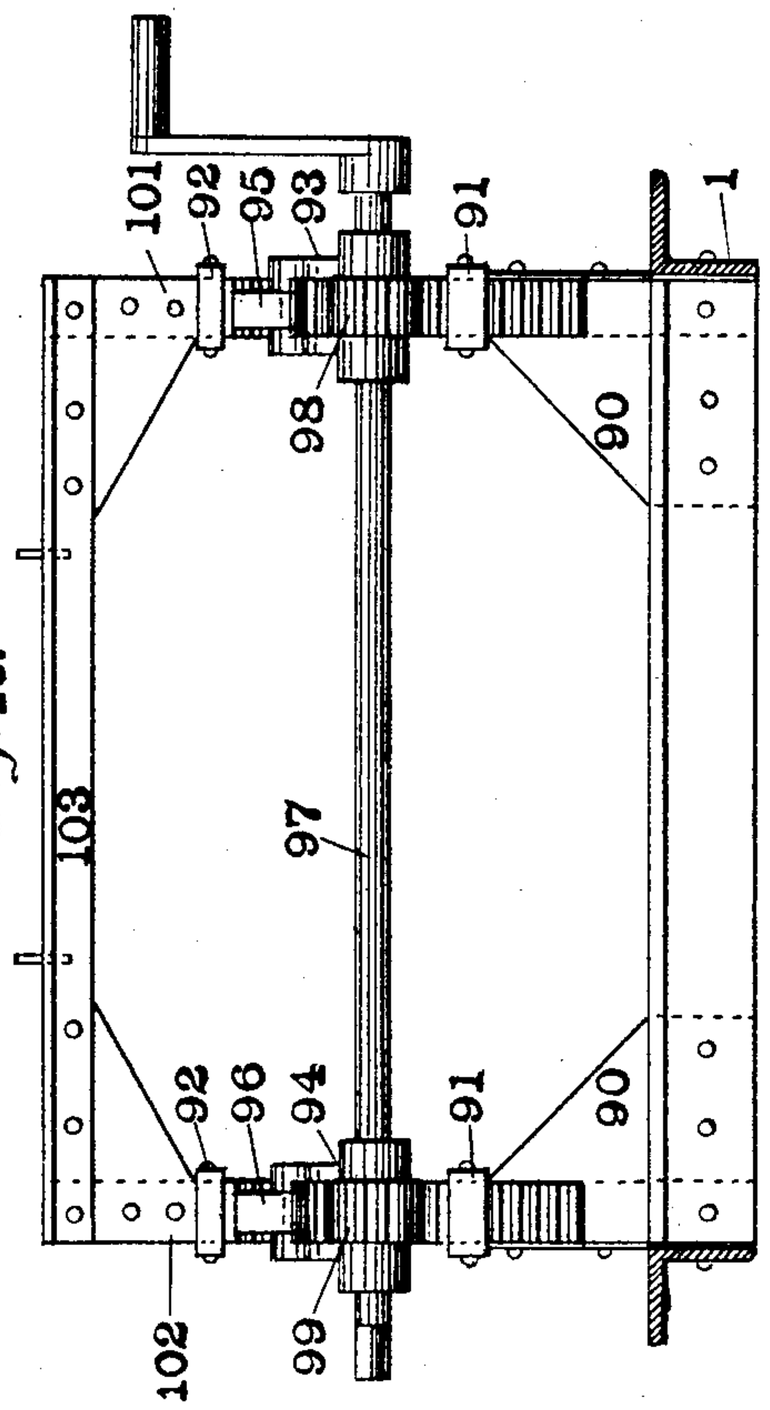


Fig. 16.



WITNESSES:

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LOADING MACHINE.

APPLICATION FILED OCT. 20, 1903.

NO MODEL. 8 SHEETS—SHEET 7.

Fig. 20

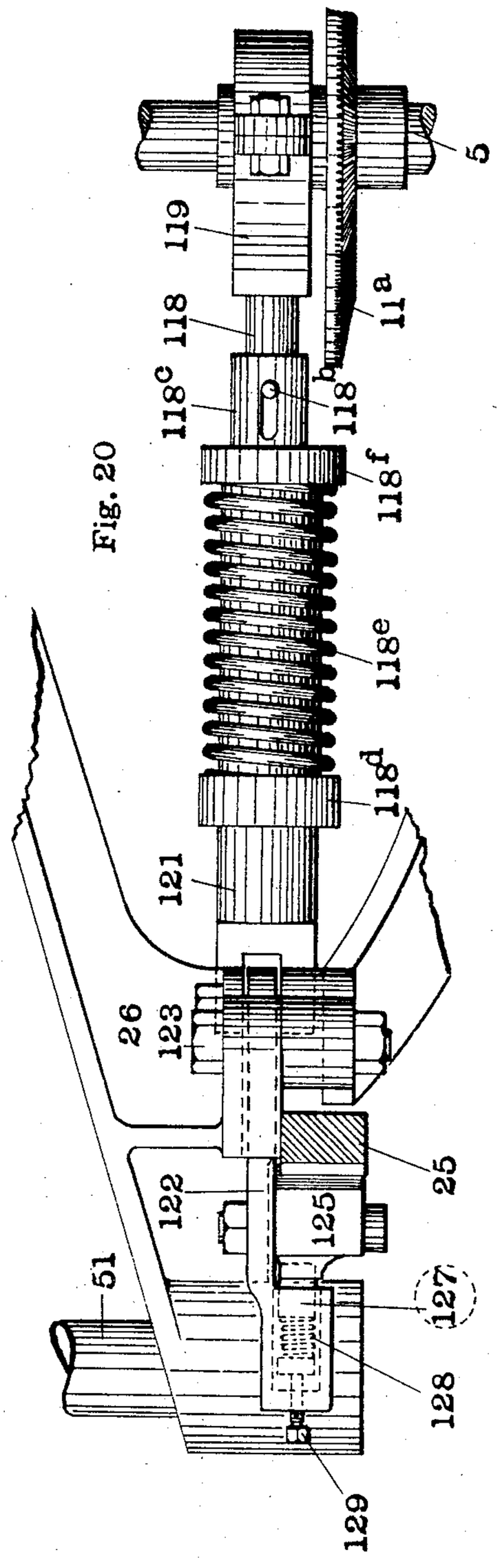
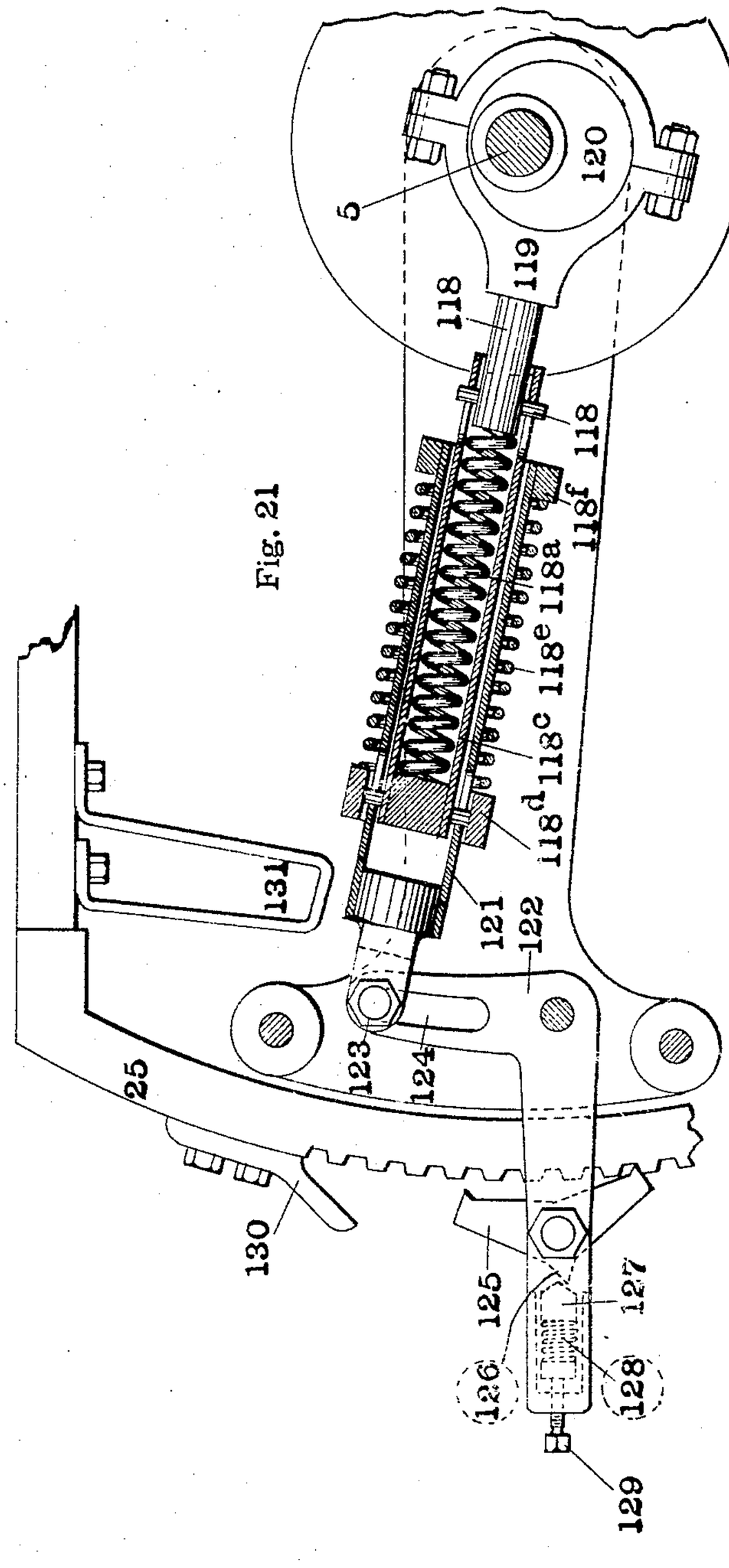


Fig. 21



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LOADING MACHINE.

APPLICATION FILED OCT. 20, 1903.

NO MODEL. 8 SHEETS—SHEET 8.

Fig. 24

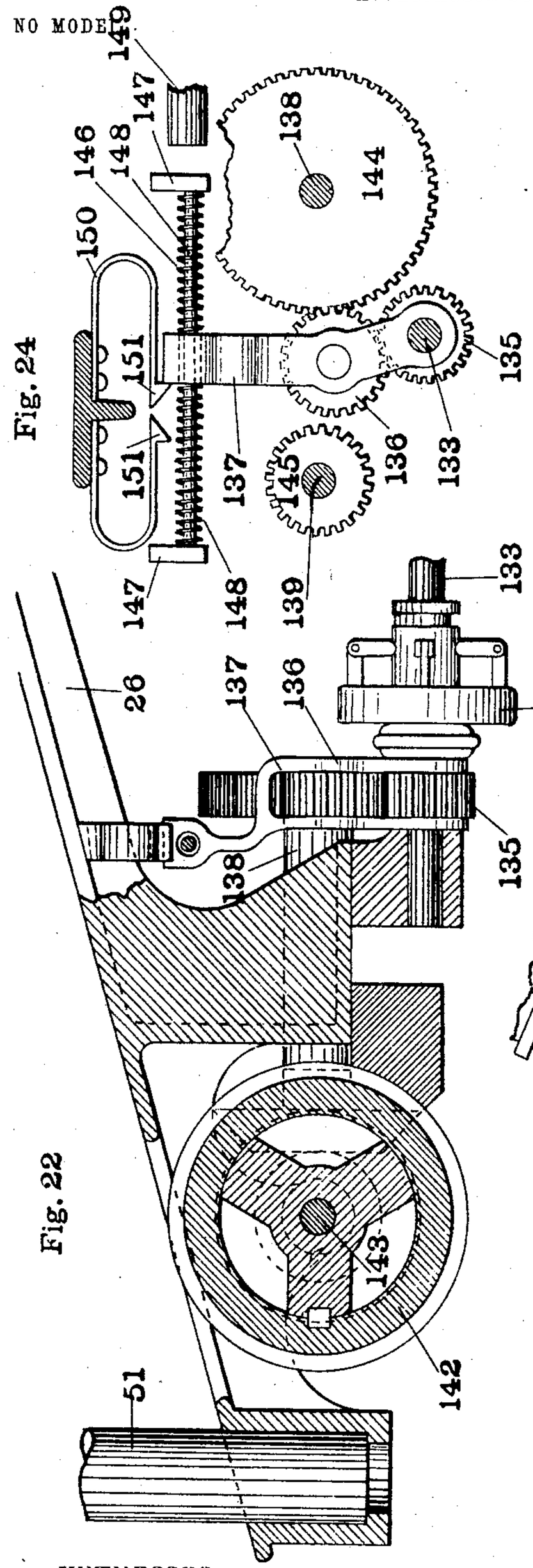

Fig. 23

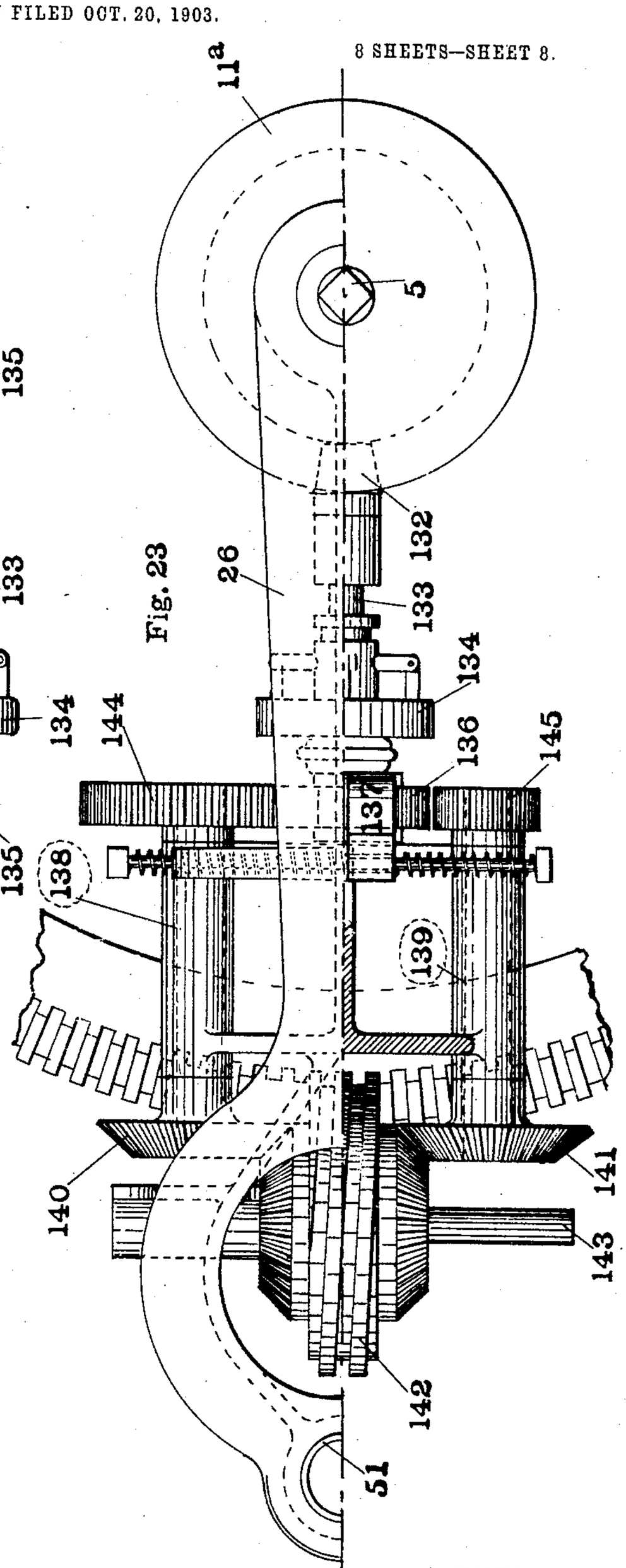

Fig. 22

WITNESSES:

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ATTORNEYS.

No. 765,832. Patented July 26, 1904.

UNITED STATES PATENT OFFICE.

WILLIAM E. HAMILTON, OF ZANESVILLE, OHIO.

LOADING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 765,832, dated July 26, 1904.

Application filed October 20, 1903. Serial No. 177,750. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM E. HAMILTON, a citizen of the United States, and a resident of the city of Zanesville, county of Muskingum, and State of Ohio, have invented certain new and useful Improvements in Loading-Machines, of which the following is a specification.

My invention relates to loading machinery, and especially loading machinery for mines; and its principal objects are to load material from the bulk, to properly distribute the material discharged, to feed the gathering mechanism more rapidly upon its return movement than upon its forward movement, to automatically retard or prevent the movement of the gathering mechanism until the material within reach has been loaded, to provide means within the control of the attendant for stopping and reversing the feed of the gathering mechanism, to yieldingly support the gathering mechanism and conveniently adjust it vertically, to provide for the easy removal of the loading-machine from one place to another, to anchor the machine in position, and other objects hereinafter more fully appearing.

My invention consists in the parts and arrangements and combinations of parts hereinafter described and claimed.

In the accompanying drawings, forming a part of this specification, and wherein like symbols refer to like parts wherever they occur, Figure 1 is a side view of my improved loading-machine. Fig. 2 is a plan view with a portion of the picking-table broken away. Fig. 3 is a section on the line 3 3 of Fig. 4. Fig. 4 is a side view of the forward end of the picking-table and its gearing. Fig. 5 is a plan view, and Fig. 6 is a side view, of a portion of the truck and the feeding mechanism for the gathering mechanism. Fig. 7 is a detail view of the thrust-rod of the feeding mechanism. Fig. 8 is a detail view of the forward end of the gathering mechanism mounted on the pony-truck. Fig. 9 is a detail of the support for the forward end of the gathering mechanism. Figs. 10 to 15 are detail views of the flight and chain. Figs. 16 and 17 are front and side views, respectively, of the support for the rear end of the picking-table. Figs. 18 and 19 are side and front views, respectively, of the anchor-clamp for the loading-machine truck. Figs. 20 and 21 are respectively vertical and horizontal views of a self-reversing feeding device, and Figs. 22 and 23 are respectively vertical sectional and horizontal detail views of a modified form of self-reversing feeding device, and Fig. 24 is an elevation of a portion of the construction illustrated in Figs. 22 and 23.

The loading-machine is mounted on a wheeled truck 1 for moving the machine from place to place. Upon the truck a motor 2, of any desired form, is mounted to furnish the power to operate the loader, to drive the truck, and to haul the cars to be loaded. A car-puller A, driving mechanism A′ for the truck, and gearing A″, intermediate the motor and the car-puller and driving mechanism, are also mounted on the truck. This mechanism forms the subject-matter of my copending application, Serial No. 185,612, filed December 18, 1903, in which said mechanism is fully described.

The loading-machine comprises a scoop-nosed conveyer or gathering mechanism B, which gathers the material to be loaded by a sweep movement about a vertical axis and is hereinafter designated as the "gathering mechanism," and a secondary conveyer C, hereinafter designated as the "picking-table," which receives the material from the gathering mechanism and discharges it into the car or receptacle to be loaded or elsewhere, as desired.

Mounted upon the frame of the truck is a base-plate 3, which is provided near its forward end with a vertical tubular projection 4. (Shown best in Fig. 3.) This tubular projection is internally lined and serves as a step-bearing for a vertical shaft 5. Externally said tubular projection is adapted to serve as a stud upon which parts may be pivoted. A segmental head-frame 6 is bolted to the base-plate 3 near one side. The upper part of the head-frame is substantially a segment of a cone converging to the top, where it terminates in a cylindrical portion 7, the interior of which serves as a bearing for the vertical shaft 5 and the exterior of which is finished to permit its use as a stud. The vertical shaft

5, which is mounted in said tubular projection and the bearing on said head projects above the latter. All of the loading mechanism is driven from the shaft 5, which is hereinafter called the "head-shaft."

On the motor-shaft 8 is a gear-wheel 9, which meshes with a gear-wheel 9^a, fixed on a second shaft 10, and this second shaft has a bevel gear-wheel 11, which meshes with a bevel gear-wheel 11^a, fixed on the head-shaft 5, whereby said head-shaft is driven by the motor.

The gathering mechanism B comprises an elongated frame to have universal movement about the upper end of the head-shaft 5. The details of this universal mounting 12 and of the concentric driving-sprocket 13 for the flight-chain 14 are described and claimed in Patent No. 740,559, issued to me October 6, 1903, to which reference is made for a further description.

The flight-chain 14, coöperating with the trough of the conveyer, is composed of links 15, fastened together by rivets 16. The rivets between opposite links constitute journals for rollers 17 18 and pivoted flights 19 20. The axis 21 of the flights has a bearing 22, which is mounted upon the rivet 16, between two narrow rollers 17. The flights are integral and have bearings 23 to receive the axis 21. The flights are thus mounted to have movement in two planes. The rivets intermediate the flight-carrying rivets carry broad rollers 18, which in addition to their function as antifriction-rollers serve to space the links 15. The flights 19 and 20 are preferably mounted alternately upon the chain, the flights 19 being substantially rectangular in shape and serving to carry the material, such as shown in Fig. 12, and the flights 20 being pointed or pronged and serving to dislodge the material to be loaded, such as shown in Figs. 14 and 15. Both kinds of flights have a projecting heel 24 upon the rearward portion of the bearing 23, which bears against the side of the conveyer-trough when carrying material up. As the flights pass down or outwardly along the guideway 24^a, provided therefor, Figs. 1 and 2, on the elongated frame, their outer ends engage the side thereof and are folded back toward the flight-chain. The heel portion thereof extends through the chain and the open side of the guideway. By this arrangement the guideway may be made narrow, and thus space is saved on that side of the gathering mechanism.

The gathering mechanism is driven in its sweep by a step-by-step movement. An arcuate feed-rack 25, concentric with the shaft 5, is rigidly mounted upon the forward end of the truck 1. A radial frame 26, hereinafter called the "crane," extends forward over the feed-rack 25 and has widely-separated bearings 27 loosely mounted upon the tubular projection 4 and the bearing on the head-frame. Near its forward end it has separated bearing-pieces 28, which slide upon the top of the feed-rack. A three-arm lever 29 is pivoted upon the crane with one arm 30 extending between the bearing-pieces 28. The arm 30 carries a pawl 31, each end of which is adapted to engage the feed-rack. An arm 32 is rigidly mounted on the pawl and is connected to a spring 33, which serves to hold the pawl in engagement with the rack. The other end of the spring is connected to a support 34, pivoted upon the arm 30. When the support 34 is thrown around one hundred and eighty degrees, it throws the spring 33 into position to hold the opposite end of the pawl in engagement with the feed-rack. The arms 29^a and 29^b are of unequal length and may be alternately detachably connected with one end of a thrust-rod 35. At its other end the thrust-rod has a yoke 36, embracing the head-shaft 5, and an antifriction-roller 37, bearing against a cam 38, fixed on the head-shaft. The roller is held in engagement with the cam 38 by means of a spring 39, which is arranged between a fixed collar 40 and a loose collar 41 on the thrust-rod. A bearing for the loose collar is provided on the crane by means of spaced arcuate plates 42 43, between which the thrust-rod extends. These plates have an extent sufficient to afford a bearing for the loose collar 41 when the thrust-rod is connected to either of the arms 29^a or 29^b of the lever 29.

At its forward extremity the crane has a seat 50, in which is a hollow standard 51. This standard 51 extends upwardly through an elongated opening 52, provided therefor (shown in Fig. 2) in the gathering mechanism. The elongated opening is just wide enough to permit the standard to pass through and is faced on the sides with guide-plates 52^a, which project both above and below the frame of the gathering mechanism. An extended bearing on the standard is thus provided, and thereby the tendency of the gathering mechanism to tilt sidewise is resisted. This standard also transmits the sweep of the crane to the gathering mechanism.

As shown in Fig. 5, the feed mechanism is set for effecting the forward movement of the gathering mechanism forward, (or to the right,) feeding two teeth for every revolution of the head-shaft. For the return or backward movement of the gathering mechanism more rapid movement is desirable, as the gathering mechanism is idle. The thrust-rod 35 is then connected to the arm 29^b, and the spring-support 34 is thrown around to put the opposite end of the feed-pawl 31 into engagement with the feed-rack. The angular movement of the pawl-carrying arm 30 is now greater, and the mechanism is moved back more than two teeth for each revolution of the head-shaft, being three teeth for each revolution for the proportions shown in the drawings.

In loading from a pile containing lumps at

times a "key-lump" will be removed, and a slide will occur, bringing material down faster than it can be carried away. This will cause a great resistance to the forward movement of the gathering mechanism. If the latter were forced forward as usual at such times, material would be left in its path, and a second sweep would be necessary to collect it. Accordingly it is desirable to stop or retard the forward movement of the gathering mechanism until substantially all the material within reach has been carried up. This is automatically accomplished by a novel construction of the thrust-rod 35. (Shown in Fig. 7.) The thrust-rod consists of a tubular section 44 and a telescoping section 45. The section 45 is held against rotation and confined to a limited longitudinal movement by a pin 46, projecting on both sides into slots 47 48 in the tubular section 44. Between the sections is a spring 49, which communicates the longitudinal movement of the section 45 to the section 44. The spring 49 is put in position under compression, and hence for all forces smaller than this initial force of compression it will act as a rigid strut. The same end could be accomplished, however, by using a spring so heavy that it would require the same initial force to appreciably compress it. The compression under which the spring is put initially is such that for normal conditions the spring will not be compressed, and the thrust-rod will act as a rigid rod. However, when an excess of material is encountered and the sweep of the gathering mechanism is strongly resisted the spring will be compressed more or less. If the resistance is not greatly above normal, the spring may be compressed for only a portion of the stroke of the telescoping section of the thrust-rod, and for the remainder of the stroke the tubular section will move within it. The result is a shortening of the stroke of the latter, and the rack-engaging pawl 31 will move forward only one tooth instead of two. If, however, the resistance is greatly above normal, the spring will be compressed during the entire stroke of the telescoping section of the thrust-rod, and the gathering mechanism will not be fed forward at all. The thrust-rod is thus incapable of transmitting greater than a predetermined force, though it is ineffective for this purpose only during the time it is subjected to the excessive resistance. Of course this predetermined force is much smaller than the force necessary to break elements of the transmission-train designed with respect to the strength of the materials rather than with respect to the force of resistance that may be encountered under the conditions pointed out above.

A screw 53 is mounted inside of the hollow standard 51 and is vertically adjusted by means of an interiorly-threaded hand-wheel 54, resting upon the top of the standard and engaging the screw. At its top the screw has an integral cross-arm 55, carrying at its ends springs 56 57, connected to the gathering mechanism. This construction constitutes one of the intermediate supports of the gathering mechanism and one of the means for its vertical adjustment.

Another of the intermediate supports of the gathering mechanism is arranged near the forward end thereof. (Shown in Figs. 8 and 9.) A tubular guide 58 is pivotally mounted in the gathering mechanism. A roller-mounted supporting-jack 59 passes through this guide. It consists of a tubular body-piece 60, pivotally mounted at its lower end upon a caster 61 of any desired form, which travels upon the ground or floor. A lifting-section 62 telescopes inside of the body-piece 60 and is connected to the gathering mechanism by means of springs 63 64. A bracket 65 is mounted upon the upper end of the body-piece. Two rings 66 67 surround the lifting-section 62. One ring, 66, is pivotally mounted on the bracket 65. The other ring, 67, is pivotally connected to a link 68, carried on a lever 69, pivoted upon the bracket 65. When it is desired to raise the lifting-section, the handle of the lever 69 is pressed downwardly, thus carrying the pivoted end of the ring 67 upwardly and causing the ring to grip the lifting-section. The lifting-section is thus moved upwardly and the upward movement releases it from the action of the ring 66 until its weight is again thrown upon said ring.

To move the loading-machine from one place to another, the forward end of the gathering mechanism is supported on a pony-truck 70, as shown in Fig. 8. The pony-truck 70 is provided with a seat 71 for the caster of the supporting-jack 59. A skid 72 is provided, up which the supporting-jack is run when the machine is moved backward. When the caster is seated, the skid 72 is placed across the pony-truck against standards 73 and serves to block and retain the caster in its seat. When the caster is seated on the pony-truck, its pivotal connection to the supporting-jack enables the latter to serve as a king-bolt and permits the pony-truck and gathering mechanism to turn with respect to each other. The gathering mechanism is comparatively long; but by this arrangement the short curves prevailing in mines may be turned.

The extreme forward end of the gathering mechanism is supported upon the gathering-scoop 74, which is pivotally connected thereto. The axis of the pivots of the scoop makes an acute angle with the longitudinal axis of the gathering mechanism. A heel 75 extends from the rear of the scoop, its function being to prevent the tilting of the scoop by the weight of the gathering mechanism.

The picking-table C is mounted on the truck 1 to have pivotal movement about both horizontal and vertical axes. This adjustability is desirable, as by the vertical adjustment cars

of different heights may be loaded, and the horizontal adjustment permits the wider range of delivery, as the loading of cars on a side track and the distribution of the material over the full width of a car. The horizontal swing is also desirable in moving the loading-machine through a mine, for it permits the turning of sharp curves prevailing therein.

A horizontal trunnion-frame 76 has a bearing 77, which engages and turns upon the exterior of the tubular projection or hub 4, provided therefor on the base-plate 3, as hereinbefore described. At its opposite end the trunnion-frame 76 has bearings 78 for a transmission-shaft, and a bearing-surface 79, by which it is supported on the bearing-lug 80 on the base-plate. Intermediate the bearings is a chamber 81 for the reception of oil-impregnated waste 82 to lubricate the bearings.

The forward end of the picking-table has downwardly-extending bearing-lugs, which are mounted to turn on the exterior of the bearings 78. The picking-table is thus pivoted to move about the horizontal axis of the bearings 78 and about the vertical axis of the head-shaft 5.

The conveying-belt of the picking-table is driven from the head-shaft. A bevel-gear 83 is rigidly secured to the bevel-gear 11^a, fixed on the head-shaft. The bevel-gear 83 meshes with a bevel-gear 84, rigid on the shaft 85, journaled in the bearings 78 and carrying the sprocket-wheel 86. A chain 87 connects the sprocket-wheel 86 with a sprocket-wheel 88 on the drive-shaft 89 of the conveying-belt of the picking-table. As the axis of the sprocket-wheel 86 is coincident with the horizontal axis of the movement of the picking-table and the bevel-gear 83 is concentric with the vertical axis of the movement of the picking-table, the operation of the gearing is not affected by the picking-table's movement.

Near the rear end of the truck 1 a vertically-adjustable support for the rear end of the picking-table is provided. Braced uprights 90 are rigidly fastened on the truck and have forwardly-extending guide-loops 91 92. Brackets 93 94 are also mounted on the uprights and furnish bearings for pawls 95 96 and a shaft 97, carrying actuating-pinions 98 99. Upon the end of the shaft 97 a crank-handle 100 is mounted. Sliding in the loops 91 92 are rack-bars 101 102, rigidly connected at the top by a bar 103 and having teeth in position to be engaged by the pawls 95 96 and pinions 98 99, respectively. This support is given a width such that it will furnish a bearing for the picking-table at any point from one extreme lateral position to the other. The bar 103 is provided with a series of vertical holes. A pin on the picking-table is adapted to engage any one of these holes, and thus temporarily fix it in position.

The operation of the machine tends to move the truck rearwardly and to slow it. For this reason it is desirable to anchor it, and for this purpose anchor-clamps 104, projecting rearwardly from the truck, are provided. The clamp comprises a strut-bar 105, having an elongated slot 106 at one end. A rail-engaging foot 107, having downwardly-extending lateral flanges, extends from the other end at an angle to the body of the bar. There is a set-collar 108 intermediate the ends of the bar. Supported on the strut-bar above the collar are hooks 109 110, having eyes surrounding the bar and adapted to engage beneath the flange of the rail, as shown in Figs. 18 and 19. At its upper end the strut-bar is connected to the truck by means of a pin 111, passing through the slot 106 and supported in the downwardly-extending portions of L-shaped plates 112 113, bolted to the truck. This anchor-clamp when in position on the rail is automatic in its action. When the truck moves forward, the strut-bar is permitted to assume a sharper angle with the track, and the hooks are released from engagement with the flange; but upon rearward movement of the truck, due to friction of the foot upon the track, the hooks engage the flange, the rail is clamped, and further rearward movement stopped. The anchor-clamp may be disengaged from the rail by swinging the hooks outwardly from the rail, the eyes being large enough to permit this motion. Obviously the construction of the anchor admits of considerable variation, and it is not necessary to clamp the rail.

To support the anchor-clamp when out of use, a projecting plate 114 and hook 115 are mounted on the truck. The slot 106 permits longitudinal movement of the strut-bar 105 to bring the end beneath the plate 114, as shown in dotted lines in Fig. 18. The foot of the strut-bar is provided with an eye 116, which is engaged by the hook 115.

In operation the gathering mechanism begins its sweep at the extreme left. It is fed forward—that is, sweeps to the right—by the feeding mechanism, the thrust-bar being connected to the long arm of the three-arm lever, and the scoop gathers up the material in its path. The flights assist in the gathering and also carry the material up the conveyer-trough to the upper end thereof, where it is discharged onto the picking-table. The picking-table is provided with a conveying-belt and is wide enough to permit inspection and "picking" of the material being loaded. To effect the return of the gathering mechanism to its first position, the thrust-bar is connected to the short arm of the three-arm lever and the pawl is reversed, whereby the gathering mechanism is moved more rapidly than on the forward movement.

The frame of the conveyer forming part of the gathering mechanism has a trough or slideway 24^b on one side and a guideway 24^a on the other. The trough is provided in its bottom with a screen 117, so that the mate-

rial operated on may be screened at the time that it is loaded. The guideway for the outwardly-moving section of the chain and flights consists of a cover or casing extending around three sides thereof. The inner side of said casing is left open, and the frame-pieces have their adjacent portions cut away to allow the flights to swing back between them, as hereinbefore explained. By this arrangement the casing or guideway protects the descending flights and keeps them back close to the chain.

In the construction shown in Fig. 1, the machine is provided with a rod 152, connected at one end to an arm of the pawl-operating lever 34. The other end of said rod projects forwardly and is provided with a handle in a position convenient for manipulation by the attendant at the scoop end of the machine. By this arrangement such attendant can stop the feed whenever he desires without moving from his usual position. The loading-machine shown is low built and is particularly well adapted for use in mines; but obviously it is equally well adapted for use on the surface, in gravel-pits, in loading mineral ores, or wherever it is desired to load bulk material expeditiously and economically.

The term "crane" as used in this specification and the following claims signifies a "radial frame" and is intended to include within its scope such a frame whether it bears any part of the weight of the gathering mechanism or not.

Obviously the machine admits of considerable modification without departing from my invention, and I do not wish to be restricted to the specific construction described and shown. For instance, it is obvious that the machine may be made self-propelling and that by suitably designing the scoop portion of the gathering mechanism the machine may be made to gather material during its return sweep as well as during its forward sweep, and also during the forward movement of the machine. So, too, the gathering mechanism may be mounted to be capable of swinging vertically instead of horizontally or of swinging both horizontally and vertically.

In the construction illustrated in Figs. 20 and 21 the device for feeding the gathering mechanism is arranged to reverse automatically and at the same time change the rate of feed. In this construction the rod which transmits power from the head-shaft to the feed-pawl is made in three sections instead of in two sections, as in the construction illustrated in Fig. 7, where the rod transmits thrust only. In the construction illustrated in Figs. 20 and 21 the inner member or section 118 of the power-transmitting rod is connected to a strap 119, which swivels on an eccentric 120, fixed to the head-shaft 5 in lieu of the cam of Fig. 7, which transmits thrust only. The outer section or member 121 of the power-transmitting rod of Figs. 20 and 21 is connected to the pawl-actuating lever 122 by a pin 123, which extends through an elongated slot 124 in one arm of said lever, so as to be capable of movement lengthwise of said slot. Upon the outer end of said lever is mounted a pawl 125, which is pivoted near its middle and has a ratchet-tooth at each end arranged to engage alternately with the teeth of the feed-rack 25. In order to insure the proper engagement of the proper one of these ratchet-teeth with the rack, the middle portion of said pawl has an angular projection 126 on its outer side. Mounted in a socket provided therefor in the extended end of the lever-arm, so as to be movable transversely to the axis of said pawl, is a bolt or pressure-pin 127, whose sides are beveled to form an edge on the projecting end thereof. Inside of said socket is a spring 128, pressing outwardly against said bolt, and the pressure of this spring is regulated by means of a set-screw 129, mounted in the end of said lever-arm in position to bear against a plate provided therefor in the bottom of the socket. By this arrangement the pawl is made snap-acting—that is, as soon as the point of the pawl is moved past the edge of the pin the pressure on the pin carries said pawl to the end of its stroke. The initial movement of the pawl is effected by means of a plate 130, provided therefor on the rack and whose surface is arranged in the path of the pawl and at an inclination thereto. This plate is located in such position as to trip the pawl during the last feeding stroke thereof. For this purpose the inoperative end of the pawl should just engage the plate at the completion of the next to the last stroke of the pawl, and the inclination of the plate should be sufficient to carry the point of the projecting portion of the pawl past the edge of the spring-bolt during said last stroke.

The construction just described effects the reversal of the feeding movement automatically. In order to change the rate of the feeding movement, a projection 131, mounted on any suitable fixed part, is arranged in the path of the power-transmitting rod in such position that during the final feeding stroke of the pawl the power-transmitting rod will bear against said stop and be thereby prevented from continuing its rotatory movement with the crane. In consequence of the stopping of the rotatory movement of the power-transmitting rod while movement of the crane continues the lever 122 is carried to such a position that the connecting-pin 123 is shifted to the opposite end of the elongated slot. This shifting of the point of connection changes the angular throw of the lever, and consequently the rate of feed, as hereinbefore described.

It will be understood that the reversing-plate for the pawl and the limiting-stop for the thrust-bar are located with reference to

each other to effect their functions simultaneously and that when one is adjusted to a new position the other also ought to be adjusted. It is also to be understood that a pawl-reversing plate and a limiting-stop for the transmitting-bar are arranged for each end of the feed-rack.

In the construction illustrated in Figs. 22, 23, and 24 instead of the feed movement being effected step by step such movement is continuous except for the occasional cessations due to excessive resistance. In this modification the feeding movement is also self-reversing and its rate changes automatically. In this construction the head-shaft 5 has a bevel-gear 11[a] fixed thereto, which meshes with a bevel-gear 132, mounted on a shaft 133, journaled in the crane 26. This last-named shaft is sectional and has its sections connected by any suitable friction-clutch 134, arranged to yield to excess resistance. On the outer end portion of this shaft 133 is fixed a gear-wheel 135, which meshes with another gear-wheel 136, which is journaled in a yoke 137, which is pivotally mounted on said outer section of shaft 133. Journaled in the outer portion of the crane are two parallel shafts 138 139, each of which has fixed on its outer end a bevel-gear 140 141, arranged to mesh with bevel-gears fixed on opposite sides of a worm-gear 142 on a shaft 143, which is also journaled on said crane. On the inner end of each of said parallel shafts 138 139 is a gear-wheel 144 145, arranged in the plane of the gear-wheel 136 and on opposite sides thereof. Preferably these gear-wheels are of different sizes. The upper end of the yoke 137, which is pivotally mounted on the outer section of the transmission-shaft 133, projects upwardly and has a hole formed transversely therethrough. Fitting loosely in said hole is a rod 146, which has plates 147 mounted on its ends. Surrounding each end of the rod is a spring 148, which abuts at its respective ends against the end plate and the yoke, respectively. Normally the springs are under very little pressure. Mounted upon some fixed part in the path of the end plate is a limiting-stop 149, against which said plate bears when the crane approaches the limit of its feeding movement. In order to prevent the premature movement of the pivoted yoke, flat springs 150 are mounted on the crane and double back above the top of said yoke. The two springs 150 terminate in beveled teeth or shoulders 151, arranged closely opposite each other. The bend of each spring is arranged to overlap the ends of the corresponding plate on the transverse rod. In consequence of this arrangement the yoke is held in engagement with the tooth of a spring after the end plate reaches its limiting-stop and until the bend of the spring comes in contact with the corresponding end plate and is raised thereby. As soon as the spring is thus raised and the yoke is disengaged from its tooth the spring which has been compressed and is prevented from moving in one direction by the limiting-stop forces said yoke past the tooth of the opposite spring, by which it is held until it is released in the same manner as that just described. The shifting of the yoke 137 carries with it the gear 136, which is journaled therein, and the shifting of the gear carries it out of engagement with one of the gears on the two parallel shafts and into engagement with the other of said gears. This shifting of the connections effects a reversal of the feeding movement, and at the same time the rate of feeding is varied in proportion to the relative sizes of the gears on the parallel shafts.

What I claim is—

1. A loading-machine comprising a platform, a gathering mechanism and a crane independently mounted on said platform, means to cause said crane to describe a sector of a circle, and means to impart the motion of said crane to said gathering mechanism.

2. A loading-machine comprising a platform, a gathering mechanism and a crane independently pivotally mounted on said platform, means to cause said crane to describe a sector of a circle, and means to impart the motion of said crane to said gathering mechanism.

3. A loading-machine comprising a platform, a gathering mechanism and a crane independently concentrically pivotally mounted on said platform, means to cause said crane to describe a sector of a circle, and means to impart the motion of said crane to said gathering mechanism.

4. A loading-machine comprising a platform, a crane and a gathering mechanism independently concentrically mounted on said platform, means on said crane to move it about its center, and means connecting said crane and gathering mechanism to transmit said rotatory movement to and having means to elevate said gathering mechanism.

5. A loading-machine comprising a platform, an arcuate feed-rack, an actuating-shaft concentric with said feed-rack and having a cam thereon, a crane pivotally mounted on said platform concentrically with said feed-rack and said actuating-shaft, a lever on said crane, a rack-engaging pawl carried thereby, a yielding thrust-rod connecting said cam and lever, a gathering mechanism mounted concentrically with said crane to have universal movement, and means on said crane to elevate and propel said gathering mechanism.

6. A loading-machine comprising a platform, an arcuate feed-rack, an actuating-shaft concentric with said feed-rack and having a cam thereon, a crane pivotally mounted on said platform concentric with said feed-rack and said actuating-shaft, a lever on said crane, a rack-engaging pawl carried thereby, a yield-

ing thrust-rod connecting said cam and lever, a gathering mechanism pivotally mounted concentrically with said crane to swing horizontally, and means on said crane for propelling said gathering mechanism.

7. A loading-machine comprising a platform, a gathering mechanism mounted thereon to have universal movement, and a vertically-adjustable movable support yieldingly connected to said gathering mechanism.

8. A loading-machine comprising a platform, a crane pivotally mounted thereon, a gathering mechanism independently mounted concentrically with said crane to have universal movement, and means on said crane to vertically adjust said gathering mechanism and comprising a yielding connection.

9. An elevating-support for a loading-machine comprising a roller-supported tubular base, a vertically-adjustable rod therein, an ear on said base, a lever pivoted on said ear, a ring surrounding said rod and pivoted on said ear, and a second ring surrounding said rod and pivotally connected with said lever.

10. A loading-machine comprising a truck, a gathering mechanism mounted thereon, a support for the forward end of said gathering mechanism, and a pony-truck adapted to receive said support.

11. A loading-machine comprising a truck, a gathering mechanism mounted thereon, a wheeled support for the forward end of said gathering mechanism, and a pony-truck having a seat to receive said support.

12. A loading-machine comprising a truck, a gathering mechanism pivotally mounted thereon, a wheeled support for the forward end of said conveyer, and a pony-truck adapted to receive said support.

13. A loading-machine comprising a truck, a gathering mechanism pivotally mounted thereon, a support for the forward end of said conveyer having a caster pivotally mounted in its lower end, and a pony-truck having a seat to receive said caster.

14. A loading-machine comprising a platform, a gathering mechanism pivotally mounted thereon, an independently-mounted crane coöperating therewith, said crane being arranged to prevent side tilting of the gathering mechanism.

15. A loading-machine comprising a platform, a gathering mechanism pivotally mounted thereon and having an elongated slot therein and a crane having a standard extending through said slot, said standard being of approximately the same width as the slot, whereby it prevents side tilting of the gathering mechanism.

16. A loading-machine comprising a platform, a gathering mechanism pivotally mounted thereon and having an elongated slot therein, wide vertical plates forming the sides of said slot, and a crane having a standard extending through said slot, said standard being arranged for said sides to bear against and thereby prevent side tilting of the gathering mechanism.

17. A loading-machine comprising a platform, a gathering mechanism pivotally mounted at one end upon said platform, a secondary conveyer pivotally mounted at one end upon said platform in position to receive the material discharged from said gathering mechanism a vertically-adjustable support for the free end of said secondary conveyer.

18. A loading-machine comprising a platform, a gathering mechanism pivotally mounted at one end upon said platform, a secondary conveyer pivotally mounted at one end on said platform to turn about both horizontal and vertical axes, and a vertically-adjustable support for the free end of said secondary conveyer having a broad bearing to support said conveyer in any angular position.

19. A loading-machine comprising a platform, a conveyer pivotally mounted thereon, and an adjustable feed mechanism to move said conveyer about its pivot, said mechanism being arranged to feed more rapidly on the return movement than the forward movement.

20. A loading-machine comprising a wheeled truck, a gathering mechanism and a picking-table mounted on said truck, and an automatic anchor-clamp on said truck having a strut-bar longer than the vertical distance from the frame of said truck to the track-rail and adapted to clamp a track-rail upon rearward movement of the truck and to be released upon forward movement thereof.

21. A loading-machine comprising a wheeled truck, a gathering mechanism and a picking-table pivotally mounted on said truck, and an automatic anchor-clamp on said truck having a strut-bar longer than the vertical distance from said truck to the track-rail and flange-engaging means on said strut-bar.

22. A loading-machine comprising a wheeled truck, a gathering mechanism and a picking-table mounted thereon, and an automatic anchor-clamp on said truck comprising a strut-bar pivotally connected to said truck having a laterally-flanged foot-piece making an obtuse angle therewith and adapted to engage the top of a track-rail, a collar on said strut-bar intermediate its ends, and hook members freely mounted upon said strut-bar above said collar and adapted to engage the head-flanges of the track-rail.

23. An anchor for a mine-truck comprising a pivotally-mounted bar having a foot adapted to engage a rail of a track and a shoulder intermediate its ends, and clamp-hooks loosely mounted on said bar above said shoulder and upon opposite sides in position to engage beneath the head-flanges of said rail.

24. A loading-machine comprising a platform, a gathering mechanism pivotally mounted thereon, and provided with a scoop at its forward end, feeding means for imparting a

sweep movement to said gathering mechanism, and means extending within convenient reach of the attendant at the scoop end of the machine to render said feeding means inoperative.

25. A loading-machine comprising a platform, a gathering mechanism pivotally mounted thereon, an arcuate feed-rack, a pawl engaging said feed-rack and operatively connected to said gathering mechanism, an actuating device operatively connected to said pawl, and means for throwing said pawl out of operative engagement with said rack, said means extending toward the forward end of said gathering mechanism within convenient reach of the attendant.

26. A feed mechanism comprising an arcuate feed-rack, an actuating-shaft, a crane pivoted at one end concentrically with said shaft, a lever pivotally mounted on the opposite end of said crane, a rack-engaging pawl on said lever, a cam on said actuating-shaft and a thrust-rod engaging said cam at one end and pivotally connected to said lever at the opposite end.

27. A feed mechanism comprising an arcuate feed-rack, an actuating-shaft concentric with said feed-rack, a crane pivoted at one end concentrically with said shaft, a lever pivotally mounted on the opposite end of said crane, a rack-engaging pawl on said lever, a cam on said actuating-shaft and a thrust-rod engaging said cam at one end and pivotally connected to said lever at the opposite end.

28. A loading-machine comprising a pivotally-mounted gathering mechanism, a pivotally-mounted picking-table adapted to receive material discharged from the gathering mechanism, actuating mechanism and means for transmitting motion from said actuating mechanism to said gathering mechanism said transmitting means having a yielding element adapted to yield to excessive resistance.

29. A feed mechanism comprising an arcuate feed-rack, an actuating-shaft, means engaging said feed-rack and connecting means between said shaft and rack-engaging means adapted to be put out of action on encountering more than a predetermined measure of resistance.

30. A loading-machine comprising a gathering mechanism, and feed mechanism for said gathering mechanism incapable of transmitting greater than a certain predetermined force proportioned to the carrying capacity of said gathering mechanism, whereby the feed movement will be interrupted when the normal rate of feed is faster than the rate at which the material to be loaded can be carried away.

31. A feed mechanism comprising an arcuate feed-rack, an actuating-shaft concentric therewith, means engaging said feed-rack and yielding means connecting said actuating-shaft with said rack-engaging means, whereby the feeding movement ceases whenever the resistance thereto exceeds a predetermined amount.

32. A feed mechanism comprising an arcuate feed-rack, an actuating-shaft, a crane, means on said crane engaging said feed-rack, and transmitting means intermediate said actuating-shaft and rack-engaging means, said transmitting means comprising a thrust-rod having telescoping sections and a spring between them.

33. A feed mechanism comprising an arcuate feed-rack, an actuating-shaft concentric therewith, a cam on said shaft, a crane pivoted concentrically with said shaft, a lever pivotally mounted on said crane and carrying a rack-engaging pawl, and a yielding thrust-rod connecting said cam and said lever and comprising telescoping sections and a spring between them.

34. A feed mechanism comprising an arcuate feed-rack an actuating-shaft concentric therewith, an eccentric on said shaft, a crane pivoted concentrically with said shaft, a lever pivotally mounted on said crane and carrying a rack-engaging pawl, and an automatically-yielding rod connecting said eccentric and said lever and comprising telescoping sections and springs between them.

35. A feed mechanism comprising an arcuate feed-rack, an actuating-shaft, a crane, means on said crane engaging said feed-rack, and transmitting means intermediate said actuating-shaft and rack-engaging means, said transmitting means comprising a rod having telescoping sections and springs between them.

36. A feed mechanism comprising an arcuate feed-rack, an actuating-shaft, means operatively engaging said feed-rack and movable relatively thereto, and connecting means between said shaft and said rack-engaging means, said connecting means being inoperative for transmitting motion to the rack-engaging means whenever the resistance to the feeding movement exceeds a predetermined amount.

37. A feed mechanism comprising an arcuate feed-rack, an actuating-shaft concentric therewith, means operatively engaging said feed-rack and movable relatively thereto, and connecting means between said shaft and said rack-engaging means, said connecting means being inoperative for transmitting motion to the rack-engaging means whenever the resistance to the feeding movement exceeds a predetermined amount.

38. A feed mechanism comprising an arcuate feed-rack, an actuating-shaft, means operatively engaging said feed-rack and movable relatively thereto, and connecting means between said shaft and said rack-engaging means, said connecting means being inoperative for transmitting motion to the rack-engaging means whenever the resistance to the

feeding movement exceeds a predetermined amount, and means for reversing the feeding movement.

39. In a loading-machine, a pivotally-mounted gathering mechanism and a feeding device therefor, said feeding device comprising a fixed feed-rack, a double pawl arranged to engage a feed-rack and means for tripping said pawl to reverse the feed.

40. In a loading-machine, a pivotally-mounted gathering mechanism, a pivotally-mounted crane, a feed-rack concentric with said crane, a lever on said crane, a double pawl on said lever arranged to coöperate at each end with said rack, and a tripping-plate arranged to change the engagement of said pawl with said rack, and means for actuating said lever.

41. In a loading-machine, a pivotally-mounted gathering mechanism, a pivotally-mounted crane, a feed-rack concentric with said crane, a lever on said crane, a double snap-acting pawl on said lever arranged to coöperate at each end with said rack, and a tripping-plate arranged to change the engagement of said pawl with said rack, and means for actuating said lever.

42. In a loading-machine, a pivotally-mounted gathering mechanism and means for feeding and returning the same, said means comprising a device arranged to make the return movement of said gathering mechanism faster than the forward movement thereof.

43. In a loading-machine, a pivotally-mounted gathering mechanism, a pivotally-mounted crane, a feed-rack concentric with said crane, a bent lever on said crane having an elongated slot in one arm and rack-engaging means on the other, and a power-transmitting rod having a pin in said slot, and means for shifting the point of engagement of said pin in said slot whereby the rate of feed is changed automatically.

44. In a loading-machine, a pivotally-mounted gathering mechanism, a pivotally-mounted crane, a feed-rack concentric with said crane, a bent lever on said crane having an elongated slot in one arm and a double pawl on the other arranged to engage the rack, a tripping-plate arranged to change the engagement of said pawl with the rack to reverse the feed, a power-transmitting rod having a pin engaging the slot in said lever, and a stop arranged in the path of said rod to shift the point of connection of said pin and thereby change the rate of feed simultaneously with the reversal thereof.

45. In a loading-machine, a chain comprising links, and flights on said links, the going and return sections of said chain and links being in substantially the same horizontal plane, some of said flights being pointed to loosen the material for the other flights to convey away.

46. In a loading-machine, a gathering mechanism comprising a trough and a chain, the going and return sections of said chain being in substantially the same horizontal plane, said chain having scraper-flights arranged to cooperate with said trough and scraper flights arranged to loosen the material.

47. In a loading-machine, a gathering mechanism comprising a conveyer-chain and a frame therefor, said frame having a trough on one side and a casing narrower than said trough for confining the chain on the opposite side.

48. In a loading-machine, a gathering mechanism comprising a conveyer-chain and flights pivotally mounted thereon and a frame for supporting said chain, said frame having a scraper-trough on one side and a casing narrower than the length of said flights for confining said chain and flights on the other side.

49. In a loading-machine, a gathering mechanism comprising a conveyer-chain and flights pivotally mounted thereon and a frame for supporting said chain, said frame having a scraper-trough on one side and a casing narrower than the length of said flights for confining said chain and flights on the other side the going and return sections of said chain being in the same plane.

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