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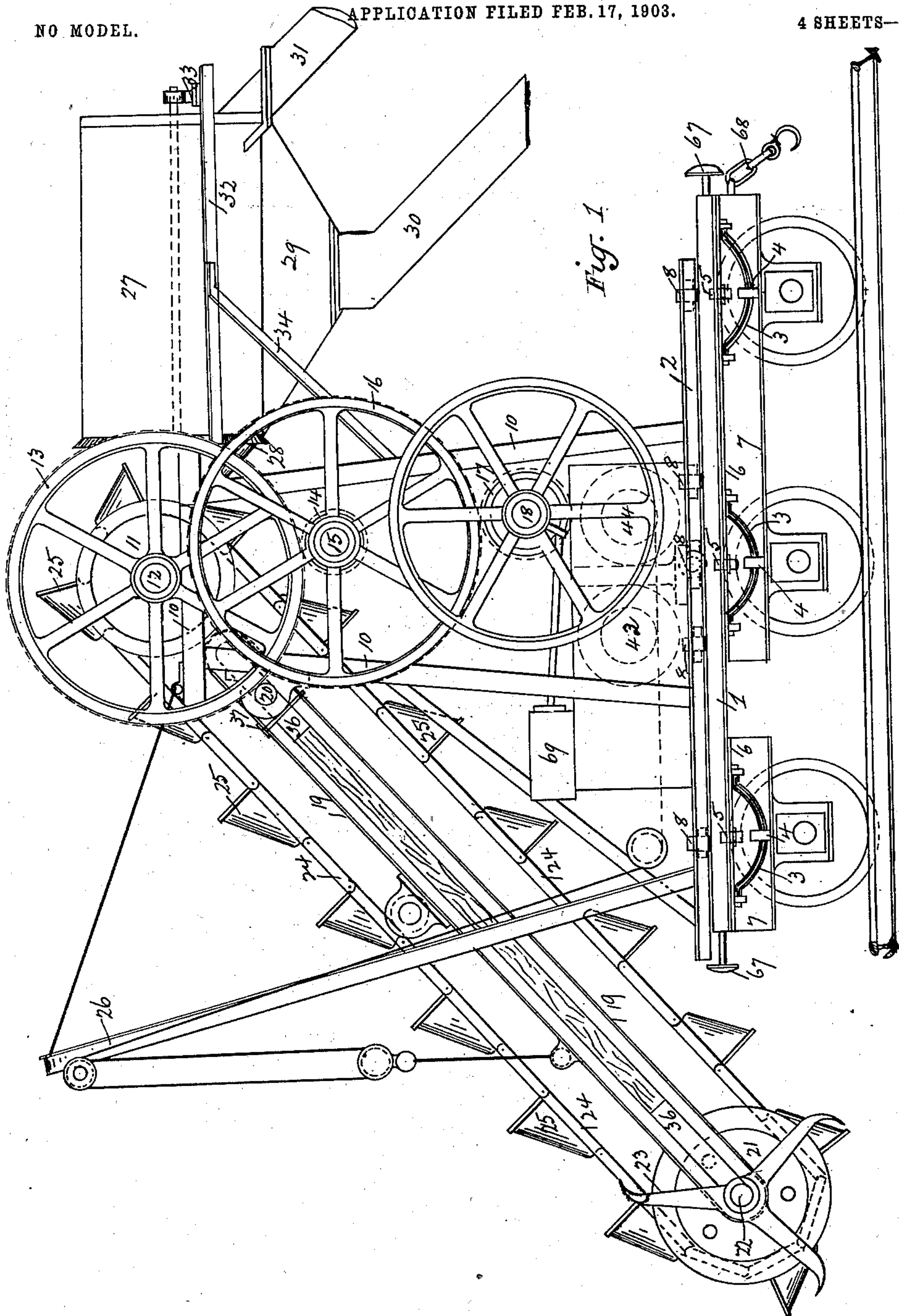
PATENTED FEB. 23, 1904.

H. QUERTIER.  
MACHINE FOR EXCAVATING, RAISING, SCREENING, AND FILLING  
GRAVEL BALLAST, &c.

APPLICATION FILED FEB. 17, 1903.

NO MODEL.

4 SHEETS—SHEET 1.



WITNESSES

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J. M. Dowling

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BY *Richard J. ...*

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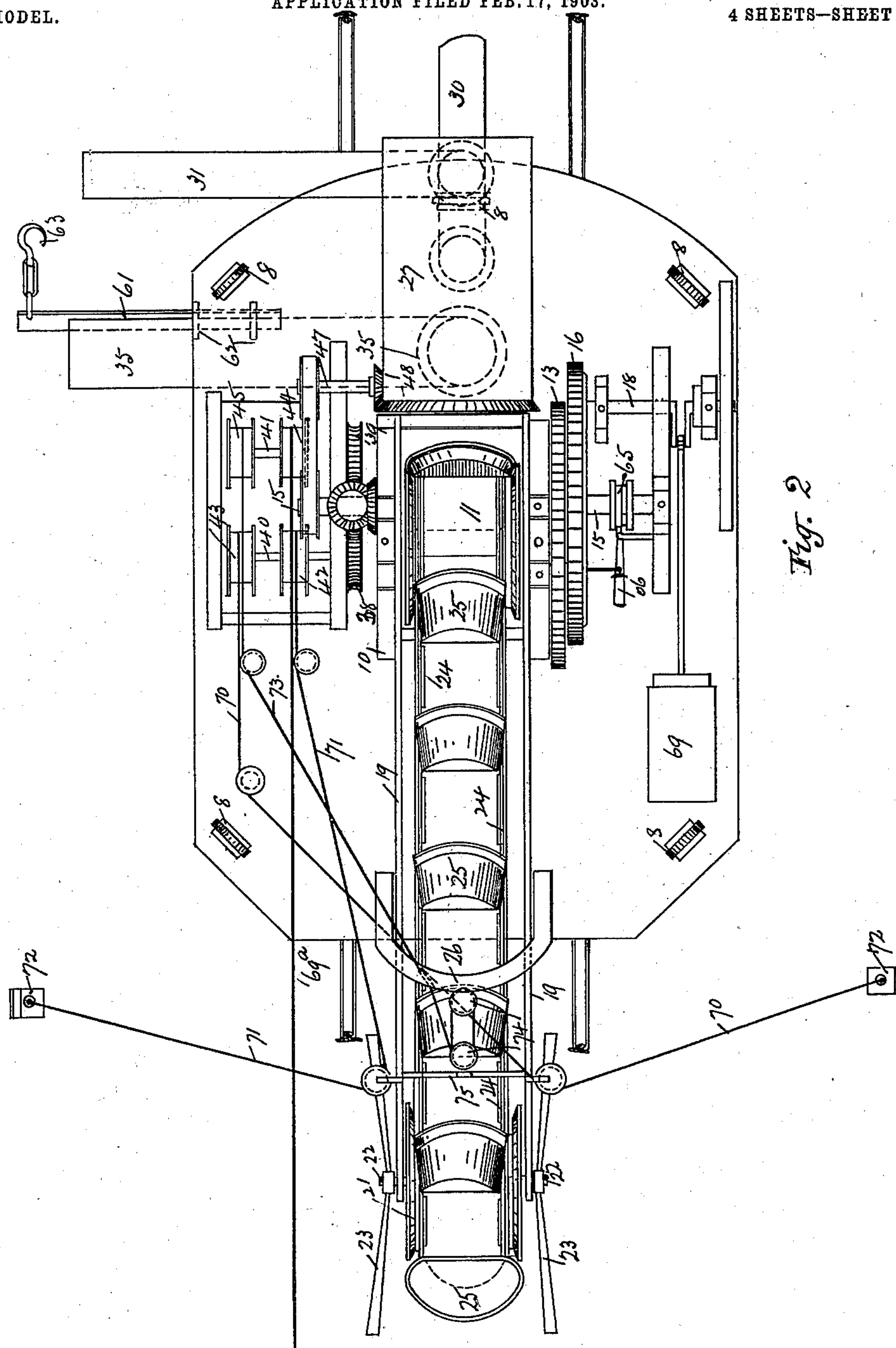
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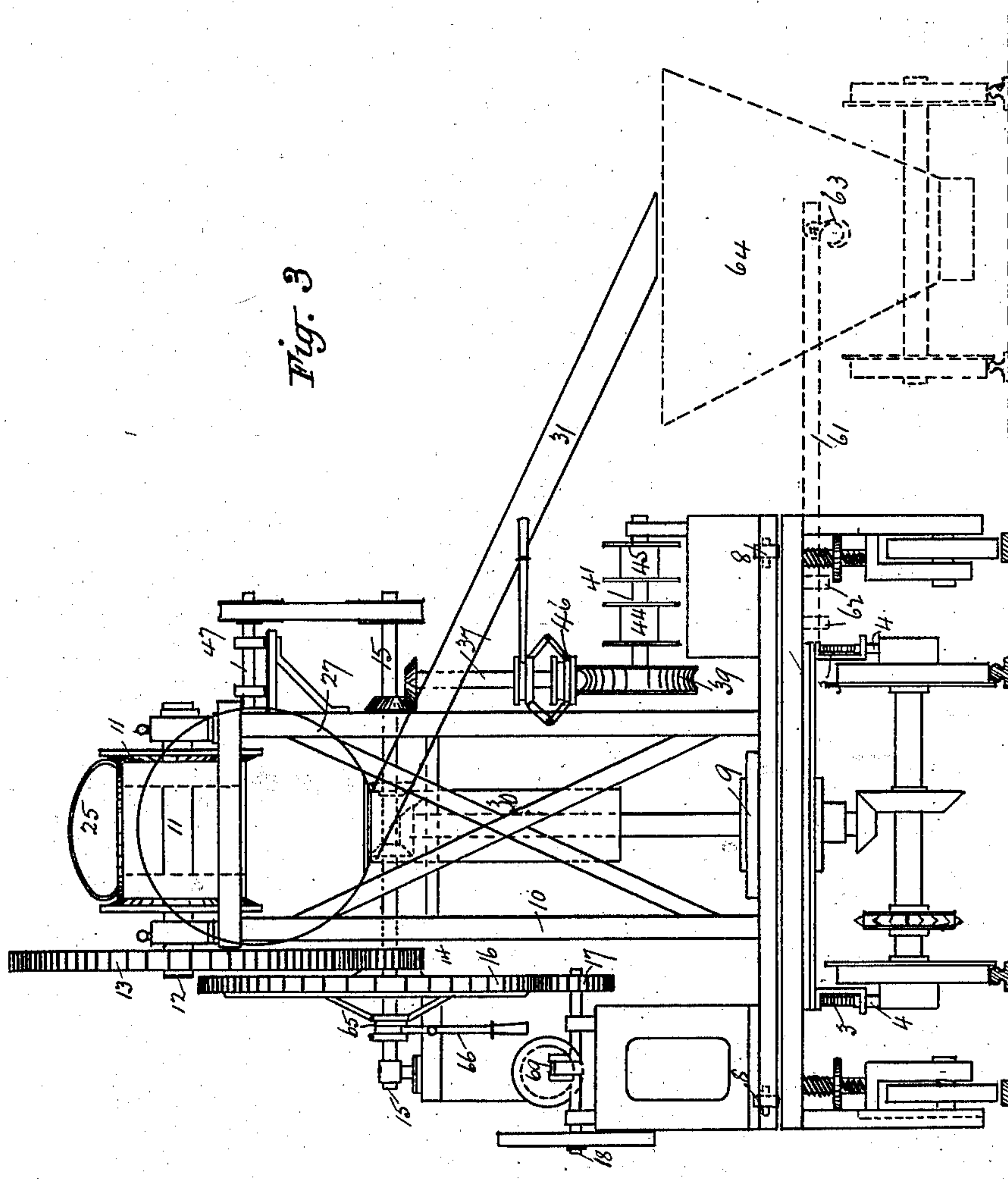
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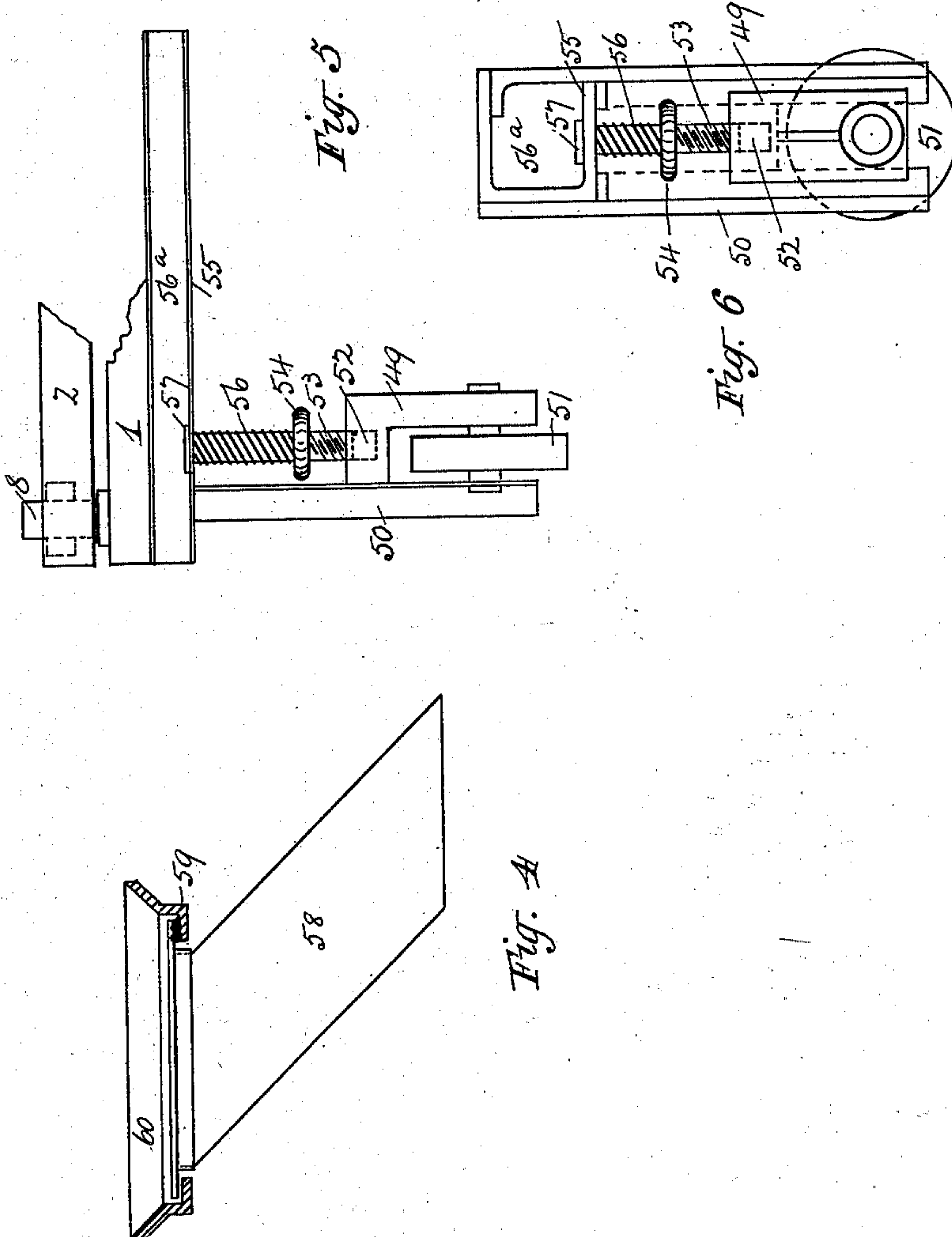
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# UNITED STATES PATENT OFFICE.

HILARY QUERTIER, OF DUNEDIN, NEW ZEALAND.

MACHINE FOR EXCAVATING, RAISING, SCREENING, AND FILLING GRAVEL BALLAST, &c.

SPECIFICATION forming part of Letters Patent No. 752,709, dated February 23, 1904.

Application filed February 17, 1903. Serial No. 143,859. (No model.)

*To all whom it may concern:*

Be it known that I, HILARY QUERTIER, engineer, a subject of the King of Great Britain and Ireland, residing at Dunedin, in the Colony of New Zealand, have invented a new and useful Improved Machine for Excavating, Raising, Screening, and Filling Gravel Ballast and the Like; and I do hereby declare the following to be a full, clear, and exact description of the same.

This invention has for its object, broadly, excavating sand, gravel ballast, soil, or other material, raising and screening it and filling the same into trucks by mechanical power.

One portion of the invention consists of the combination of parts hereinafter to be described, whereby a bucket-ladder carrying an endless chain of buckets may be made to excavate gravel or the like and to raise, screen, and fill the same continuously either from immediately in front of the machine, which is mounted upon a traveling rail-truck, or from a given point at the side of the track. This part of my invention provides means whereby the bucket-ladder and its operating mechanism is swung at any angle with the rail-track upon which the supporting-truck runs, while the whole will at the same time be wound up to and held fast at its work. The action of the machine will thus be continuous and the buckets will be capable of being swung to work at either the front, sides, or rear of the carriage.

A further object of my invention is to provide apparatus whereby the material that is raised by the buckets may be screened and filled into suitable receptacles, and the filling-chutes are such that they can be adjusted to deliver the material either immediately behind the machine or into a truck upon a parallel set of rails while the machine is working directly in front of its truck or at various angles with the rail-track.

A further object of my invention is to provide a novel device for preventing the extreme side sway or side tip of the machine while at work. The said device is such that while it is in operation the whole machine will be capable of being moved along the rail-track without affecting the efficiency of either the machine or the said device.

My invention is intended for use primarily on railroads and will be found especially useful for clearing away land slips or other debris. The machine can be employed in making cuttings and channels and for almost any service connected with the formation and ballasting of the permanent way of a railroad. It can also be utilized in ballast-pits for the purpose of raising the gravel and for separating out the sand, the presence of which in the ballast of rail-tracks is responsible for much wear and tear upon the parts of rolling-stock.

My invention will be found illustrated in the accompanying sheets of drawings, in which—

Figure 1 is a side elevation of the machine. Fig. 2 is a plan of same; Fig 3, an end elevation. Fig. 4 shows a swiveling chute. Fig. 5 is an end view of the tip-preventer, and Fig. 6 is a side view of same.

Upon the floor 1 of a suitable truck is mounted the bed-plate 2 of the machine. The truck may be of the ordinary class, that shown being mounted upon a single and double bogie-truck. The wheel-boxes are provided with springs 3, the strap 4 of which makes contact with a set-screw 5, threading with the web of channel-iron 7. The set-screw is intended to relieve the springs 3 from undue strain when great pressure is brought to bear upon either side of the truck, as when the ladder is working at an angle of forty-five degrees or more with the track. The set-screw 5 may be adjusted with reference to strap 4 according as it is desired to relieve springs 3 from undue strain. The bed-plate 2 mounts rollers 8, which move upon truck 1 and support the tumbler-framing carrying the bucket-ladder of the machine, so that the same may be revolved about a king-bolt 9 as desired.

10 is a frame which supports tumbler 11. Tumbler-shaft 12 is rotated by a spur-wheel 13, gearing with a pinion 14 on a shaft 15, mounting a spur-wheel 16, actuated from pinion 17 on the engine-shaft 18. The bucket-ladder 19 is pivotally connected to the tumbler-frame at 20, and its lower end supports the lower tumbler 21 upon its shaft 22. Mounted upon the same shaft is a revoluble pick 23, and an endless chain 24 extends between the upper and lower tumblers. Con-



nected to the chain 24 are buckets 25. The lower end of the bucket-ladder is suspended from a gauntree 26, and suitable hoisting-gear is provided whereby the ladder can be elevated as desired. A screen 27 receives the material as it falls from the uppermost bucket through a hopper-chute 28. The said screen has an apron 29 terminating in a chute 30. This chute, as, indeed, are all the chutes on my machine, is adapted to turn in its socket, so that material may be delivered therefrom at any angle to the track as desired. Chute 30 is intended to deliver the sand and finer material passing into the screen, while a tail-chute 31 at the rear end thereof carries away the stones and the coarser material. The screen is mounted upon the extension angle-iron framework 32, carrying bearing 33 and supported by suitable stay 34. When the machine is to be used for extensive excavations, the whole screen, with its framework, may be detached from the tumbler-framing 10, to which it is bolted. When the screen is removed, the material coming from the buckets is delivered straight into a chute 35. (Shown dotted in Fig. 2.)

The employment of chutes that swivel in their sockets is an important element in the working of my apparatus, as the discharge of the chute can be regulated in accordance with the position of the excavator when working at an angle with the rail-track. Thus as the superstructure swings or turns about it will be apparent that the mouth of the chute can within certain limits be still used to discharge into the same wagon (whether immediately in rear of the excavator or parallel thereto) that it was filling prior to the machine swinging out of the direct track-line.

Referring to the bucket-ladder 19, which is pivotally connected to a journal at 20, said ladder is provided with a medial slot 36, so as to allow of the ladder being lengthened or shortened at will. A pin 37 passes through the ladder 19 and forms a bearing against pivot 20. This pin is removed preparatory to the length of ladder being altered and in case it is desired to lengthen the same to its fullest extent the ladder is allowed to run out until pivot 20 will be at the upper end of the slot, when the pin is again inserted in convenient holes for its reception. One or more links will be added to or taken from the chain 24, according as it is desired to alter the length of the ladder.

The shaft 15 actuates a vertical shaft 37, carrying a worm gearing with worm-wheels 38 and 39, which in turn operate drum-shafts 40 and 41, respectively. Shaft 40 will carry drums 42 and 43, while shaft 41 rotates drums 44 and 45. The winch-gear is cut in and out by an ordinary friction-clutch 46, and the drums can be separately cut in or out of gear by means of a double clutch. (Not shown in drawings.) A counter-shaft 47, driven by

shaft 15, revolves the screen 27 through bevel-gearing 48.

When the machine is working in heavy ground at an angle to the track, should there be a tendency to overbalance means are provided to counteract this, as illustrated in Fig. 3 and in detail in Figs. 5 and 6. In Figs. 5 and 6 a wheel-bracket 49 is attached to the angle-iron preventer-frame 50, mounting a wheel 51. The casting 49 is adapted to form a nut 52, which receives a screw-spindle 53 having a right-hand thread that is revolved by a hand-wheel 54.

The upper end of the screw-spindle passes through the webbing 55 of the channel-iron 56<sup>a</sup> and terminates in a collar 57, and a spiral spring 56 encircles the spindle below the channel-plate and impinges thereagainst, as shown. The wheel-bracket is channeled to receive the webs of the angle-iron framework, so that the wheel-bracket may be capable of an up-and-down movement between the angle-iron guides. The object of the device is to prevent an extreme side sway of the superstructure on the truck when the machine is in operation, to effect which the hand-wheel is operated so as to wind out the screw-spindle 53. This will have the effect of moving the wheel-bracket and wheel downward until it rests upon a plank placed across the edges of the sleepers forming the track, as shown in Fig. 3. With the tip-preventer in this position the balance of weight due to the sway of the machine will be borne by the spring 56, which is made strong enough for the purpose, while at the same time the whole machine will be capable of movement along the track.

The spring 56 allows the device to yield to any inequalities of the track upon which it runs as the excavator is being moved forward during operations. The wheel 51 upon the device enables the tip-preventer to remain in action during the time the excavator is working. My apparatus is continuous—that is to say, the truck carrying the bucket-ladder is being constantly wound forward and held firmly to the face. Consequently a continuous tip-preventer action is necessary on the machine to receive the extreme side sway should the buckets be working in tight ground.

Fig. 4 shows the swiveling chute, in which 58 is the conveyer of the chute, having a flange 59 resting within a ring 60 of irregular Z-shaped section. The upper arm of the Z is bent upward from the horizontal, so as to form a socket for the end of the screen-apron, to which the ring 60 is to be attached. The tail-chute 31 and direct chute 35 will be secured to the main parts of the machine by the ring 60, the parts being adapted for its reception.

By employing a swiveling chute it is immaterial whether the receiving cart or truck be on the same track of rails as the machine-truck or upon a duplicate set at the side.



A draw-bar 61, Fig. 3, that is loosely supported in hangers 62 underneath the truck-frame, can be run out from the same, and it is provided at its outer end with a draft-hook 63 for the purpose of coupling up ballast-truck 64 when the machine is delivering road-ballast thereto. When the truck is filled, it is uncoupled from the draw-bar and moved along to its place in the ballast-train.

Mounted upon the first-motion shaft 15 is a friction-grip 65, operated by a hand-lever 66, which, with the pinions 14 and 16, forms a friction-clutch, the object of which is to regulate the movement of the bucket-ladder or to cut it out of gear while the remainder of the machine is in motion. The advantage of this arrangement is that any tension may be put upon the bucket-ladder when working in hard rough ground, so as to avoid any strain upon the machinery that may be caused by the buckets coming in contact with any unyielding substance.

The traveling truck or carriage 1 is supplied with buffers 67 and draft-chain 68, so that the whole machine can, if necessary, be coupled in a train. It is, however, provided with self-propelling gear, as shown in Fig. 3.

Various sheave-wheels are provided upon the machine, the different parts of which operate as follows:

The engine 69 revolves pinion 17 that gears with spur-wheel 16, upon the shaft of which is pinion 14, gearing with crown-wheel 13, that revolves tumbler 11, supported on tumbler-frame 10, carrying bucket-chain 24, lower tumbler 21, and revolving picks 23, the arms of which are for the purpose of loosening the material to be raised by the buckets.

The contents of the latter are raised and discharged into the hopper-chute 28, leading to the screen 27, that separates the material, the sand or gravel passing through the perforations of the screen to the apron and from thence to the chute 30, while the stone and larger stuff is passed out through chute 31.

During the action of excavating the machine is drawn up to the face by a head-line 69<sup>a</sup>, wound upon drum 44, and the bucket-ladder is swung or swiveled round to any angle with the rail-track on either side by bow-lines 70 and 71 from drums 43 and 42, respectively, which lines pass through sheave-blocks upon the bucket-ladder and have their outer ends held in anchors 72. The bucket-ladder is elevated by winding in the line 73 on drums 45, said line passing round sheave-blocks 74, suspended between the gauntree 26 and hanger-bar 75.

The tumbler-framing carrying the bucket-ladder turns with the bed-plate 2 upon the truck 1 about the king-bolt 9 by means of its rollers 8, the outer members of the set of rollers at the same time supporting the bed of the machine.

When the machine is required to quickly remove debris, the screen may be provided with

a light liner, so that the material coming from the buckets will pass quickly through the screen to the tail-chute for removal. It has been stated that my excavator may, if necessary, be turned completely round upon the truck. This property will be found useful when working a cut at the side of the line, as when lifting ballast from a river-bed or in the construction of canals or other works where a long-range cut can be obtained. The machine will after finishing one cut be capable of swinging the ladder to work from the rear of the truck and to then begin the second cut on its return journey. It can thus work the cut to and fro on either side of the rail-track. In machines where the bucket-ladder is only susceptible of a small arc swing the whole machine would have to return to its starting-point before being able to commence another cut. My machine being able to turn completely is quite independent of turn-tables, and is consequently more useful than a machine which cannot revolve its bucket-ladder through three hundred and sixty degrees.

I wish it to be understood that the position of the anchors 72 is not an arbitrary position and that they are only placed where they are for convenience in describing the invention. The anchors may be placed anywhere, so as to give the best results when a turning movement of the machine is required.

The head-line 69<sup>a</sup> is any convenient length and has its outer end fast to a stationary object or it may be around a snatch-block fast to an anchor in advance of the cut end, in which case the outer end of the line would be connected to the coupling-chain of the machine-truck. The range of operation of my machine is thus almost unlimited, and its action is continuous, because a constant strain may be kept on the head-line. The greatest efficiency for the buckets is thus maintained by this means, as the machine need never be idle so long as the head-line is kept taut.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a machine for excavating and raising gravel ballast and the like, in combination, a traveling truck, a base-plate thereon rotating about a king-bolt, a tumbler-frame upon the base-plate, a bucket-ladder carrying buckets moving upon the frame, means for driving the same and also winch-drums, a head-line that is wound upon one of the drums and bowlines upon other drums the outer ends of the lines being attached to anchors suitably situated so that when either of the bowlines is inwound the base-plate and superstructure may be swung round a complete circle if need be, substantially as specified.

2. In apparatus for excavating raising and filling gravel ballast and the like, in combination with means for excavating and raising the material, a traveling truck, a base-plate there-



on rotating about a king-bolt, a head-line wound upon a drum, bowlines also drum-wound so that said excavating apparatus may if needful be turned about upon the truck to work at the side of the track upon which the truck runs, means for operating the drums, and a chute for conducting away the material as it falls from the topmost bucket, said chute being inclined and capable of being swiveled in its socket, as and for the purposes specified.

3. In apparatus for excavating raising screening and filling gravel ballast and the like, in combination with means for excavating and raising the material, a traveling truck, a base-plate thereon rotating about a king-bolt, a head-line wound upon a drum, bowlines also drum-wound so that said excavating apparatus may be turned about on the truck to work at the side of the track upon which the truck runs, means for operating the drums, a screen into which the material is fed, an apron upon the screen, an inclined chute on the apron capable of delivering material along a circular

arc, and a tail-chute in the screen also swiveling as and for the purposes specified. 25

4. As a means for preventing the extreme side sway of apparatus for excavating raising screening and filling gravel ballast and the like a wheel-bracket adapted to move in guides attaching same to the side of the machine, a wheel in the bracket, a vertical spindle the lower end of which is provided with a thread that meshes with a female thread formed in the said wheel-bracket, a handle for revolving the spindle and an encircling spring upon the upper portion thereof above the hand-wheel and between it and the channel-iron web 55, as specified and operating as set forth. 35

In testimony whereof I have signed this specification in the presence of two subscribing witnesses. 40

HILARY QUERTIER.

Witnesses:

P. M. NEWTON,  
MILDRED E. EYES.