

No. 761,319.

PATENTED MAY 31, 1904.

W. J. PATTERSON & A. M. ACKLIN.

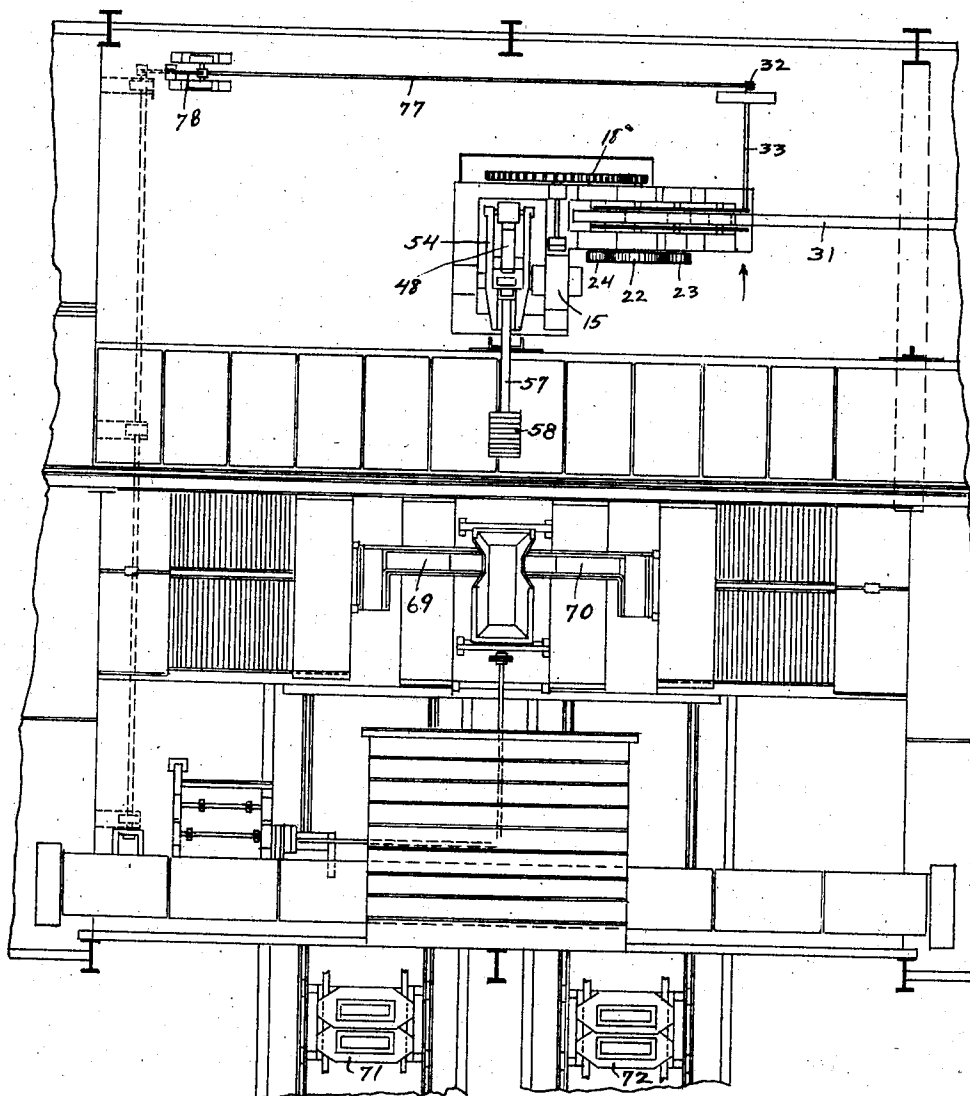
LADLE TILTING DEVICE.

APPLICATION FILED FEB. 5, 1903.

NO MODEL.

6 SHEETS—SHEET 1.

Fig. 1



Witnesses.

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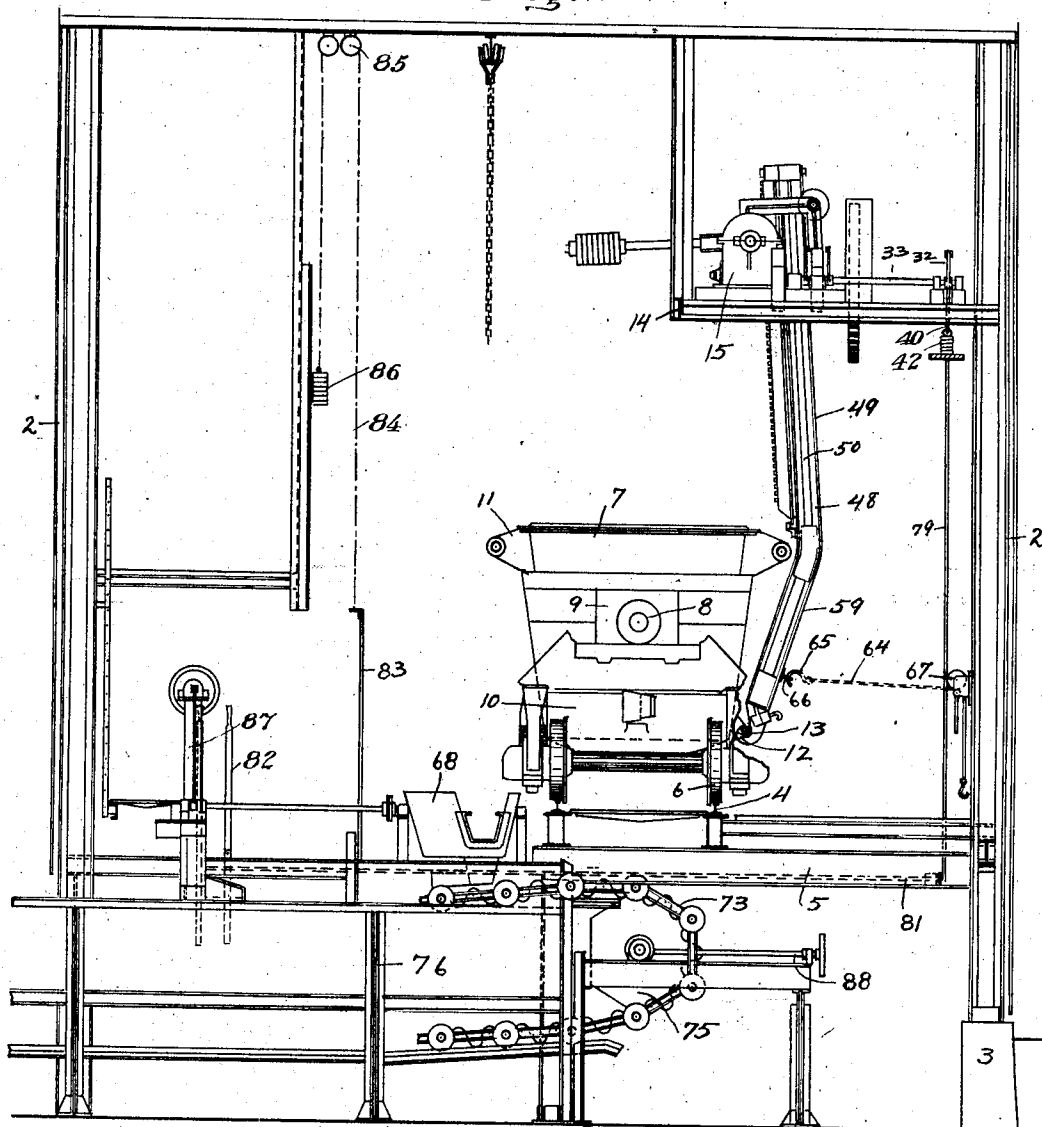
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6 SHEETS—SHEET 2.

Fig. 2



Witnesses.

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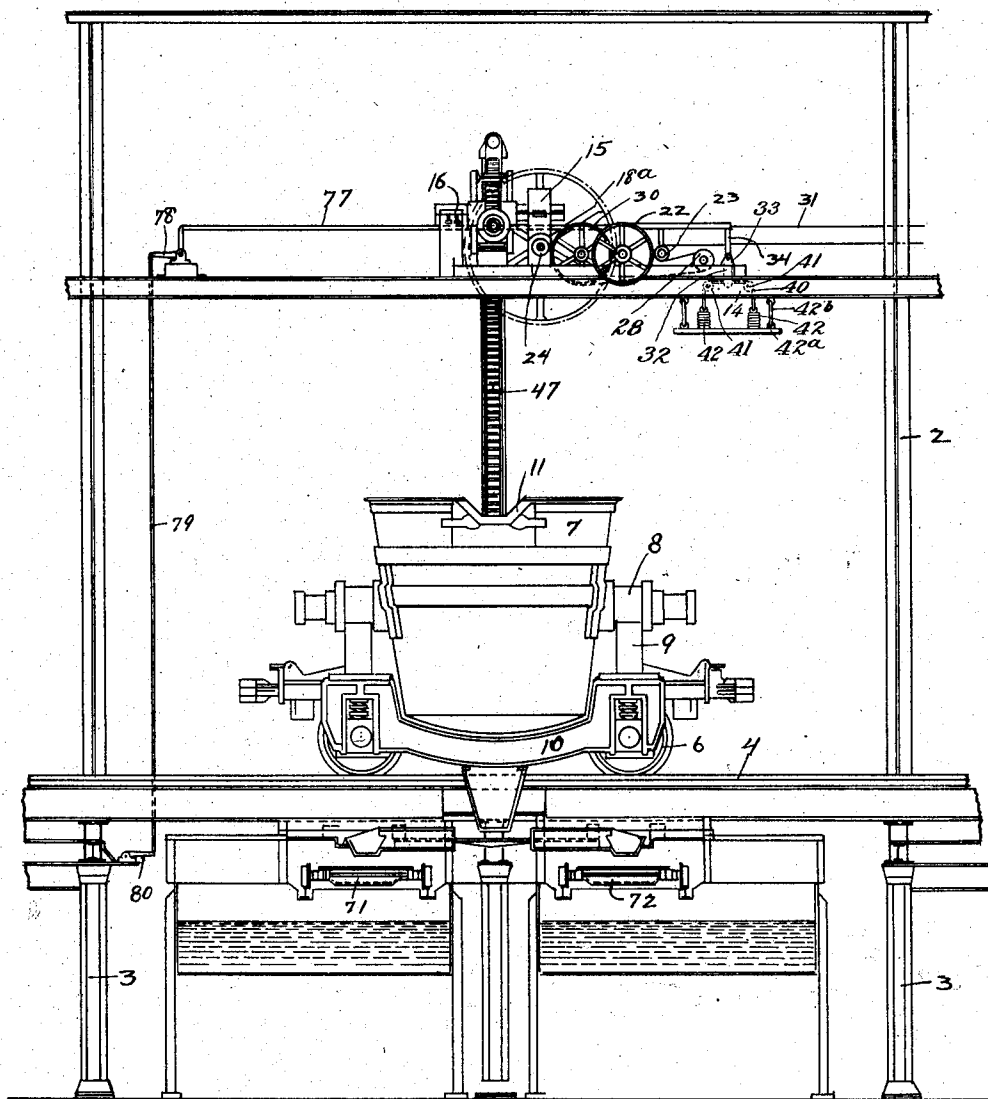
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6 SHEETS—SHEET 3.

Fig. 3



Witnesses.

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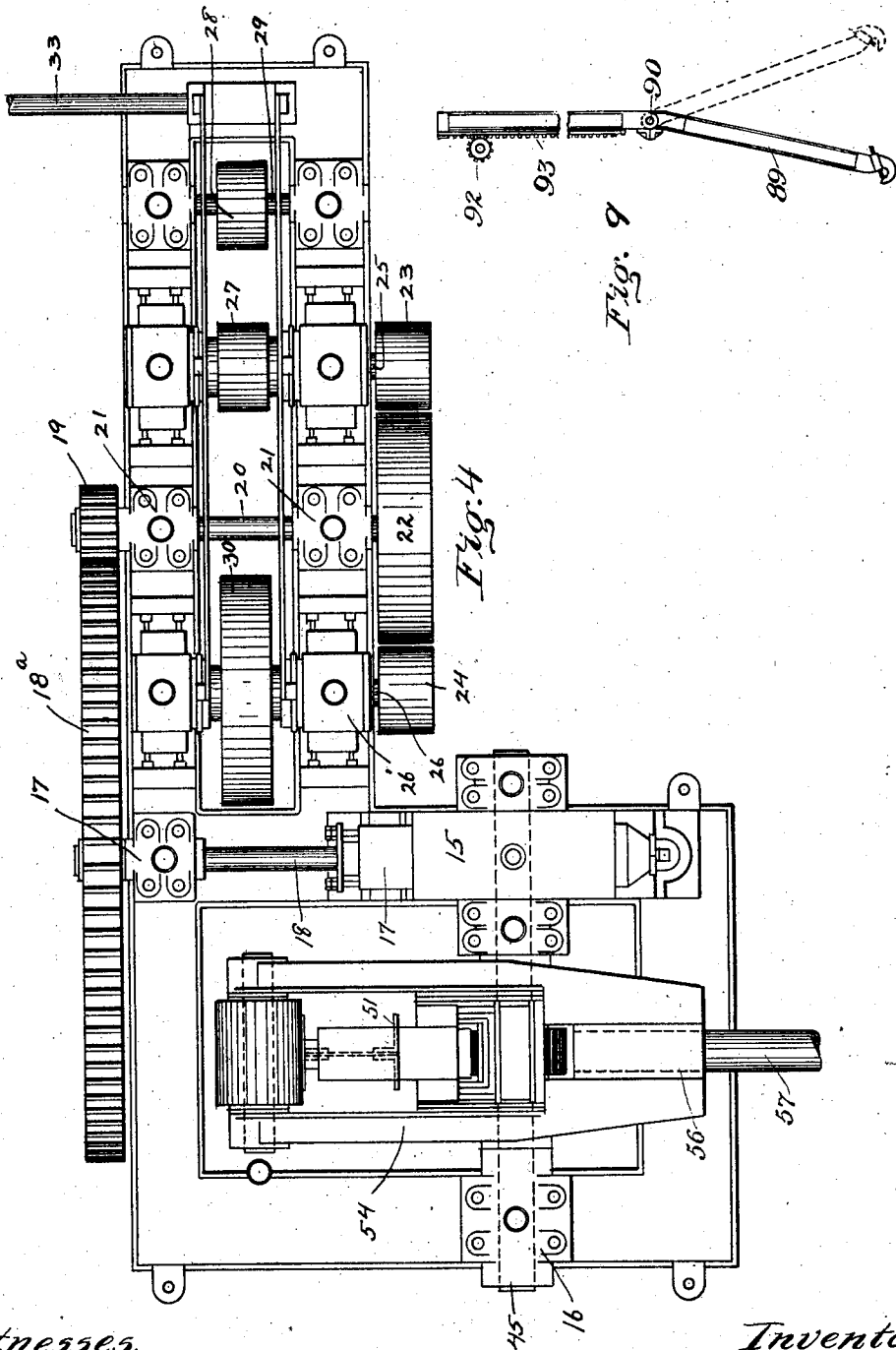
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NO MODEL.

6 SHEETS—SHEET 4.



Witnesses.

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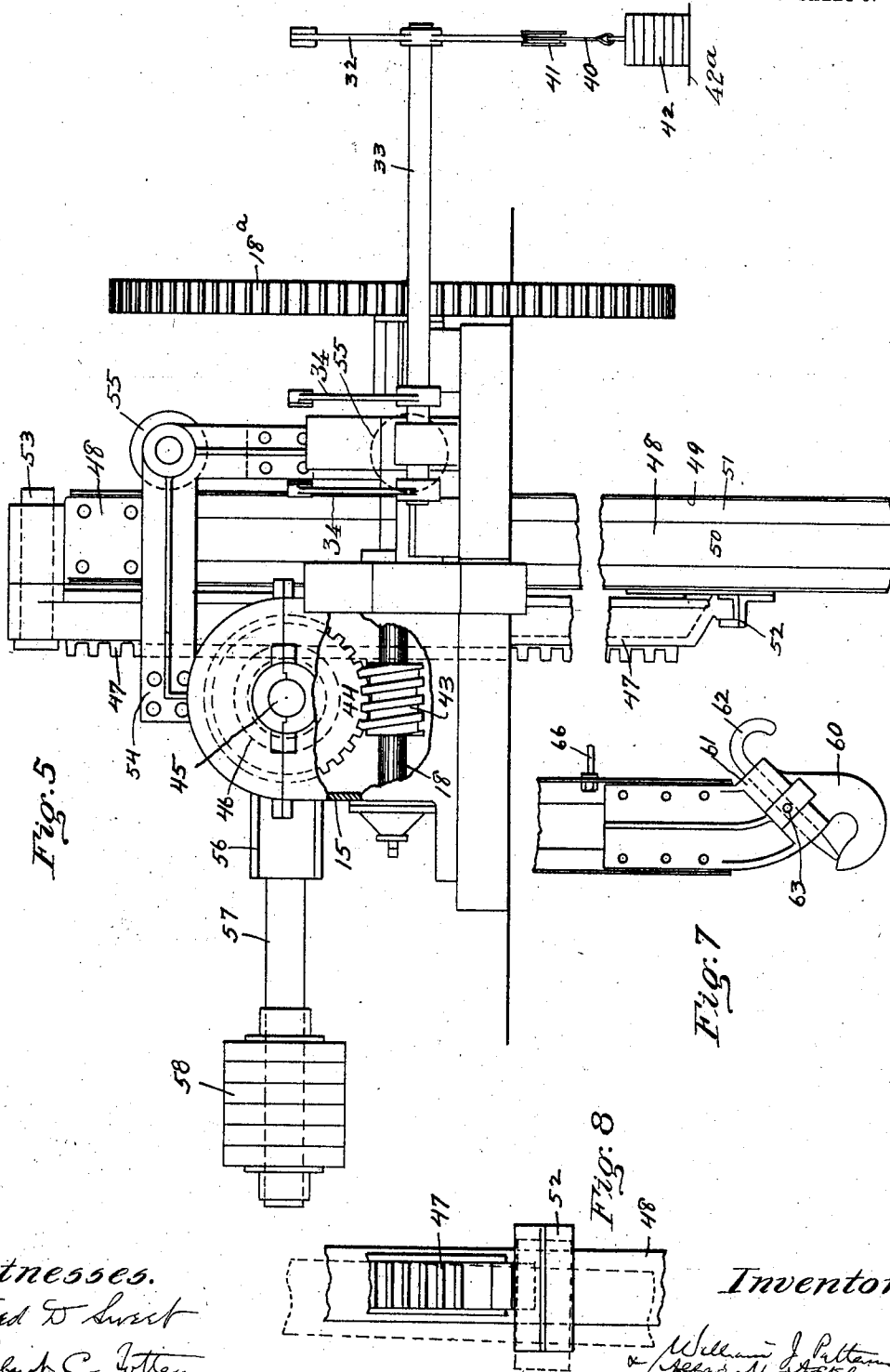
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NO MODEL.

6 SHEETS—SHEET 6.



Witnesses.

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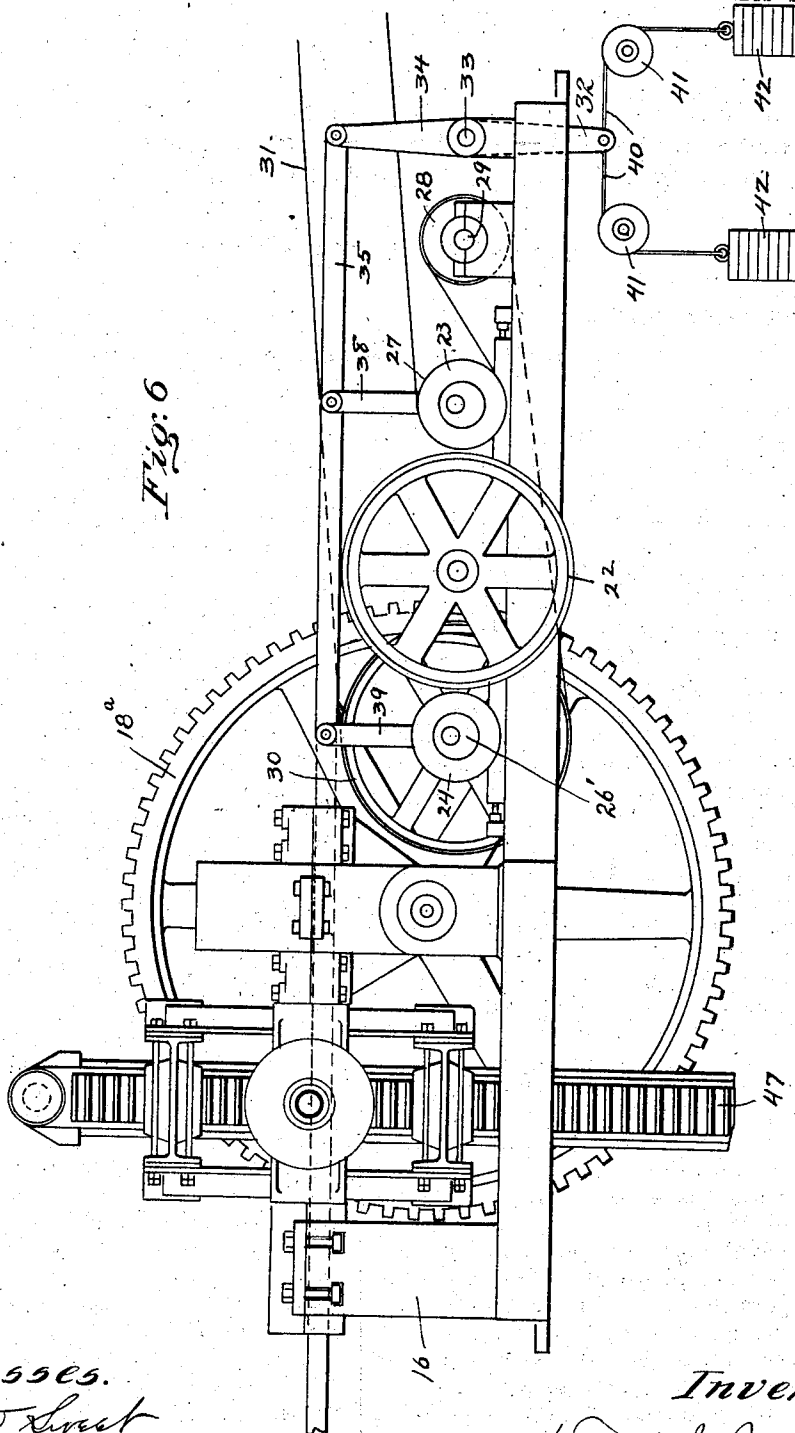
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NO MODEL.

6 SHEETS—SHEET 6.



Witnesses.

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UNITED STATES PATENT OFFICE.

WILLIAM J. PATTERSON AND ALFRED M. ACKLIN, OF PITTSBURG,
PENNSYLVANIA, ASSIGNORS TO HEYL AND PATTERSON, OF PITTS-
BURG, PENNSYLVANIA, A COPARTNERSHIP.

LADLE-TILTING DEVICE.

SPECIFICATION forming part of Letters Patent No. 761,319, dated May 31, 1904.

Application filed February 5, 1903. Serial No. 142,082. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM J. PATTERSON and ALFRED M. ACKLIN, residents of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Ladle-Tilting Devices; and we do hereby declare the following to be a full, clear, and exact description thereof.

Our invention relates to a ladle-tilting device, and more especially for use in connection with pig-casting apparatus in which the metal is discharged into a series of molds mounted on an endless chain, such as shown in Letters Patent of the United States No. 583,424, granted to one of us on the 25th day of May, 1897.

The object of our invention is to provide a simple form of mechanism to be used in connection with the ordinary tilting ladle mounted on trucks, whereby the arduous labor of tilting the ladle by hand-power is obviated and the tilting of the ladle is controlled in such a manner as to properly regulate the flow of the metal therefrom and prevent overtilting, so that an even and regular stream is obtained without liability of overflowing in the receiving-trough, while at the same time the apparatus is so arranged that it may be withdrawn when not in use, so as not to interfere with the operations of the workmen about the casting apparatus.

To these ends our invention comprises, generally stated, an overhead swinging frame with an operating-beam carried thereby and mechanism for raising and lowering said operating-beam, the lower end of said operating-beam being adapted to engage with the tilting ladle and by its vertical movement acting to tilt the ladle by a regular and gradual movement and return it to its normal position after the metal has been poured therefrom.

Our invention comprises other novel features, all of which will be fully hereinafter set forth and claimed.

To enable others skilled in the art to make and use our invention, we will describe the

same more fully, referring to the accompanying drawings, in which—

Figure 1 is a plan view of our improved ladle-tilting device and a diagrammatic view of a portion of the pig-metal-casting machine, such as above referred to. Fig. 2 is a side view in elevation of our improved tilting device, showing it in engagement with the tilting ladle and in position to begin the tilting operation. Fig. 3 is a front elevation. Fig. 4 is an enlarged plan view of the raising and lowering mechanism and the tilting frame. Fig. 5 is a side view of the operating-beam and the swinging frame and the mechanism for raising and lowering the beam. Fig. 6 is a side view of the raising and lowering mechanism. Fig. 7 is a side view of the lower end of the operating-beam. Fig. 8 is a front view of a portion of operating-beam, showing connection with lower end of rack-bar; and Fig. 9 shows a modified form of operating-beam.

As above stated, our invention is particularly applicable for use in connection with a pig-casting apparatus in which the molten metal is discharged into a receiving-trough which conducts it to molds mounted upon an endless carrier and adapted to pass in such position with reference to the trough as to be filled with molten metal as they pass said trough, as set forth in said Letters Patent above referred to, and we have accordingly illustrated our invention in connection with such a form of metal-casting apparatus, although we do not confine its use to any particular form of casting apparatus.

In the drawings, the numeral 2 indicates the framework of a suitable casting-house within which our improved ladle-tilting device is located, said framework being supported upon suitable pillars 3. The tracks 4 are laid within the framework 2 upon suitable floor-beams 5. The wheels 6 of the truck carrying the ladle 7 run upon the tracks 4. This tilting ladle 7 may be of the ordinary construction, having the trunnions 8 working in suitable supports 9 on the truck 10 and having the pour-

ing-spout 11. At one side of the ladle 7 are the lugs 12, which support the pin 13.

Arranged in the upper portion of the framework 2 is the platform 14, and carried by said platform are the housings 15 16. Journaled in the housing 15 and the journal-box 17 is the shaft 18, said shaft carrying at its outer end the large gear-wheel 18^a. This gear-wheel 18^a meshes with a pinion 19 on the shaft 20, mounted in the bearing-boxes 21. On the opposite end of the shaft 20 is the large friction-wheel 22, which is arranged between the friction-wheels 23 and 24, mounted on the shafts 25 and 26, respectively, carried by the eccentric-boxes 26'. The shaft 25 has the band-wheel 27 mounted thereon and in line with the idler band-wheel 28, mounted on the shaft 29. A large band-wheel 30 is mounted on the shaft 26 in line with the band-wheels 27 and 28. A belt 31 passes from a suitably-driven power-shaft around the band-wheel 27, over the band-wheel 28, and then back and around the large band-wheel 30, whereby the friction-wheels 23 and 24 are driven in opposite directions.

To provide for throwing the friction-wheels 23 and 24 alternately into engagement with the large friction-wheel 22, we employ the following mechanism: An arm or lever 32 is secured to a rock-shaft 33. Secured to this rock-shaft 33 are the arms 34, the upper end of said arms being connected to the rods 35. The rods 35 are connected to the eccentric-boxes 26' by means of the links 38 and 39, respectively. By throwing the lever 32 in one direction the friction-wheel 23 will be thrown into engagement with the large friction-wheel 22, and by throwing the lever 32 in the opposite direction the friction-wheel 24 will be thrown into engagement with the large friction-wheel 22, whereby the shaft 20 may be reversed and driven at higher speed. With the lever 32 in the position shown in Fig. 6 the shaft 20 remains idle.

The lower end of the arm 32 is connected to the cables or chains 40, passing over the pulleys 41 and having weights 42 attached thereto, adapted to rest on platform 42^a, supported from the frame by the bars 42^b. This is an equalizing device adapted to return the lever 32 to its normal or upright position and acts as a safety device in case the operator for any cause should let go of the lever 32, whereupon the raising and lowering apparatus would be brought to a standstill.

The shaft 18 has a worm 43 formed thereon, extending within the housing 15, and said worm engages with a worm-wheel 44, mounted on the shaft 45, journaled within the housings 15 and 16. This shaft 45 has the pinion 46, adapted to engage the rack 47 on the operating-beam 48. The operating-beam 48 may be composed of an I-beam 49, made up of a web-plate 50 and the angles 51 riveted there-

to. The rack-bar 47 is secured to the front face of the operating-beam 48, the lower end of said rack-bar fitting within a seat or bracket 52 on said operating-beam, while the upper end of said rack-bar is secured to said operating-beam by means of the bolt or pin 53. The seat or bracket 52 is so arranged as to allow for a certain amount of lateral play on the part of the beam independent of any movement on the part of the rack-bar, the upper end of said beam turning on the pin 53 for the purpose more fully hereinafter set forth.

By the term "beam" we have reference to any suitable construction of a like nature suited for the purpose.

A swinging frame 54 is mounted on the shaft 45, said swinging frame being formed of cast-iron or of any other suitable construction and having the idle rollers 55, adapted to engage the rear face of the operating-beam 48. The swinging frame 54 has the extension or socket 56, adapted to receive an arm 57, bearing the weight 58. This counterweight 58 assists in the tilting of the frame when the operating-beam is drawn out of the way in the manner hereinafter described.

The operating-beam 48 passes up through the swinging frame 54 and is held therein by means of the pinion 46, engaging the rack-bar 47 on said beam, and the idle rollers 55, engaging the rear face of said beam and forming a guide therefor. The lower portion of the operating-beam 49 is slightly inwardly inclined, as at 59, so as to bring the lower end of said operating-beam into position to engage the tilting ladle near the bottom thereof and not interfere with the upper flaring portion of said ladle.

Secured to the lower end of the operating-beam is the hook 60, said hook being provided with the socket 61, through which the pin 62 passes, said pin being held in place by the locking-pin 63. This hook 60 is adapted to engage the pin 13 in the lugs 12 of the ladle 7, and when in engagement therewith the pin 62 is inserted and secured in place, so as to prevent the disengagement of the hook from the pin 13 during the operation of tilting or restoring the ladle to its normal position.

A chain or cable 64 is connected by means of the hook 65 to a staple 66 on the operating-beam 49, said cable passing around the drum 67, by means of which said cable may be wound around said drum and the operating-beam withdrawn when not in use, so as not to interfere with the operations of the workmen around the casting plant or the locomotive which runs the ladles into position for pouring.

As hereinbefore stated, our invention is particularly applicable for use in connection with a pig-metal-casting machine in which there is a receiving-trough 68, said trough having the runways 69 70 extending out from both sides

thereof, so as to carry the metal to the two lines of molds 71 and 72. The molds are mounted upon a suitable endless chain 73, driven by suitable sprocket-wheels at both ends thereof, one of which, 75, is shown, the sprockets and chains being arranged upon suitable framework 76.

In order to operate the lever 32 from a point below, a rod 77 is connected to said lever and to a bell-crank 78. A rod 79 extends from bell-crank 78 to crank-arm 80 and a rod 81 from said crank-arm 80 to an operating-lever 82.

The other parts of the casting plant, which form no part of our invention, are, briefly, the shield 83, connected to the cable 84 and passing up over the pulleys 85, with the weight 86 attached thereto, the mechanism operated by lever 87 for tilting the receiving-trough 68, the chain-tightening device 88, &c.

When our improved ladle-tilting device is in operation, the ladle 7, containing the molten metal, is run into the casting-house over the tracks 4 until the pouring-spout is in proper position with reference to the receiving-trough 68, whereupon the operating-beam 49, which has been withdrawn, is allowed to swing forward into position by turning the drum 67 so as to unwind the cable 64, and when said operating-beam has been brought into proper position with reference to the tilting ladle the hook 60 at the lower end of said beam is brought into engagement with the pin 13 on the ladle and the pin 62 inserted in the hook, so as to secure said hook to said pin. The device is then ready for the tilting operation, whereupon the lever 82 is operated and through its connections acts to throw the friction-wheel 24 into contact with the friction-wheel 21, whereupon power is applied to the shaft 20, and the pinion 19, meshing with the gear-wheel 18, drives the shaft 18. Power is transmitted to the shaft 45 through the worm 43 and worm-wheel 44, whereby the pinion 46 is rotated, and said pinion meshing with the rack 47 acts to raise the operating-beam 49 by a gradual and steady movement. As the operating-beam 49 is raised in this manner the tilting ladle 7 is gradually tilted by the same positive and regular movement, the metal passing from the pouring-spout of said ladle in an even and well-controlled stream into the receiving-trough 68. Owing to the fact that the trunnions 8 of the ladle are mounted on the ladle frame or truck and the rigid beam 48 moves up by a gradual and positive movement, no overtilting of the ladle is possible. This is a danger which is liable to accompany the tilting of a ladle where nothing is employed to control the discharge of the ladle. The slag and crust which is liable to form at the upper portion of the ladle during the pouring operation is liable to overbalance the ladle and cause it to flow out in an uncontrolled

stream, often causing severe injuries to those in proximity to the ladle. By our improved device, however, this overtilting of the ladle is prevented, as the rigidity of the beam prevents the ladle from "running ahead," and the tilting of the ladle is by an even gradual movement. The operating-beam 49 continues to be moved up until the ladle has been tilted sufficiently to draw off all the metal therefrom, whereupon the operator reverses the lever 82, and thereby brings the friction-wheel 23 into engagement with the friction-wheel 21. This acts to reverse the direction of rotation of the shaft 20, and as the band-wheel 27 is of smaller diameter than the band-wheel 30 the speed of the shaft 20 is increased, and as a consequence the speed of the shaft 18 and through it the speed of the pinion 46. As a consequence the operating-beam 49 is lowered at an increased rate of speed and the tilting ladle is brought back to its normal position in less time than was required to tilt it for the discharge of the metal. After the metal has been discharged it is desirable to bring the tilting ladle back to its normal position as quickly as possible to permit of the ladle being run out of the way and another one brought into position for pouring.

When the operating-beam is not in use, it is swung out of the way, so as not to interfere with the workmen about the plant, and this is done by turning the drum 67, which winds up the cable 64 and draws the operating-beam out of the way. The operating-beam being mounted upon the swinging frame, said frame swings upon the shaft 45, and the weight 58 acts to assist in the withdrawal of the operating-beam, so that very little power is required to withdraw said beam. The operating-beam, as stated, has also a certain amount of lateral play within the swinging frame, so that in case the tilting ladle is brought into such position as to bring the hook 60 into exact line with the pin 13 on the ladle said operating-beam may be swung slightly to effect the proper engagement of these parts without necessity of shifting the position of the ladle.

By the use of our invention the trucks carrying the ladles may be run into position for pouring and the operating-beam quickly swung into position to engage the ladle and the ladle tilted by an even positive movement, so that the flow of the metal therefrom is properly controlled. The arduous labor and necessity of the employment of several men to tilt the ladle, as in the old method, is avoided and the operation of the device is accomplished from the same platform as that for the operating of the receiving-trough and other parts of the casting apparatus and by a single man. The ladle may be returned quickly to its normal position after tilting and

another ladle brought into position, so that a greater quantity of metal may be handled in a given time.

In Fig. 9 we have shown a modified form of operating-beam in which only the lower portion 89 swings, which is pivoted to the main portion of the beam by the pin 90. In this case the swinging frame is dispensed with, but said beam is raised and lowered by the pin 92 meshing with the rack 93.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. In a ladle-tilting device, the combination with a ladle-frame and a ladle supported entirely by said frame and adapted to tilt thereon, of a beam adapted to engage the ladle, and means for raising said beam.

2. In a ladle-tilting device, the combination with a ladle-frame and a ladle supported entirely by said frame and adapted to tilt thereon, of a beam adapted to engage the ladle at a point below the axis of said ladle, and means for raising said beam.

3. In a ladle-tilting device, the combination with a ladle-frame and a ladle supported entirely by said frame and adapted to tilt thereon, of a beam detachably connected to said ladle, and mechanism for raising and lowering said beam.

4. In a ladle-tilting device, the combination with a tilting ladle, of a swinging beam adapted to engage said ladle, mechanism for raising and lowering said beam, and mechanism for withdrawing said beam when not in use.

5. In a ladle-tilting device, the combination with a tilting ladle, of a shaft, a swinging frame mounted on said shaft, a beam supported by said frame adapted to engage said ladle, and mechanism for raising and lowering said beam.

6. In a ladle-tilting device, the combination with a tilting ladle, of a shaft, swinging frame mounted on said shaft, a pinion on said shaft, a beam adapted to engage said ladle and having a rack thereon with which said pinion engages and mechanism for driving said pinion.

7. In a ladle-tilting device, the combination with a tilting ladle, of a shaft, a swinging frame mounted on said shaft, a pinion on said shaft, a beam adapted to engage said ladle and having a rack thereon with which said pinion engages and mechanism for driving said pinion in opposite directions.

8. In a ladle-tilting device, the combination with a tilting ladle, of a shaft, a swinging frame mounted thereon, a pinion on said shaft, a beam adapted to engage said ladle and having a rack thereon with which said pinion engages, an idle roller on said frame engaging said beam, and mechanism for driving said pinion in opposite directions.

9. In a ladle-tilting device, the combination with a tilting ladle, of a counterweighted swinging frame, a beam supported thereby

adapted to engage said ladle, mechanism for raising and lowering said beam, and mechanism for withdrawing said beam to one side.

10. In a ladle-tilting device, the combination with a tilting ladle, of a shaft, a swinging frame mounted thereon, a pinion on said shaft, a beam adapted to engage said ladle and having a rack adapted to engage said pinion, a worm-wheel on said shaft, a worm-shaft, and mechanism for driving said worm-shaft.

11. In a ladle-tilting device, the combination with a tilting ladle, of a shaft, a swinging frame mounted thereon, a pinion on said shaft, a beam adapted to engage said ladle and having a rack-bar thereon adapted to engage said pinion, a worm-wheel on said shaft, a worm-shaft, and mechanism for driving said worm-shaft in opposite directions.

12. In a ladle-tilting device, the combination with a tilting ladle, of a shaft, a swinging frame mounted thereon, a pinion on said shaft, a beam adapted to engage said ladle and having a rack adapted to engage said pinion, a worm-wheel on said shaft, a worm-shaft, a gear-wheel on said worm-shaft, a pinion meshing with said gear-wheel, a friction-wheel on the last-named pinion-shaft, oppositely-driven friction-wheels mounted on adjustable shafts on each side of said first-mentioned friction-wheel, and mechanism for throwing said oppositely-driven friction-wheels alternately into engagement with said friction-wheel.

13. In a ladle-tilting device, the combination with a tilting ladle, of a shaft, a swinging frame mounted thereon, a pinion on said shaft, a beam adapted to engage said ladle and having a rack adapted to engage said pinion, a worm-wheel on said shaft, a worm-shaft, a gear-wheel on said worm-shaft, a pinion meshing with said gear-wheel, a friction-wheel on the last-named pinion-shaft, oppositely-driven friction-wheels mounted on adjustable or movable shafts on each side of said first-mentioned friction-wheel, a reciprocating bar, links connecting said adjustable or movable shafts to said bar, and connections between said bar and an operating-lever.

14. In a ladle-tilting device, the combination with a tilting ladle, of a beam adapted to engage said ladle, mechanism for raising and lowering said beam, and means for automatically bringing said beam to a standstill.

15. In a ladle-tilting device, the combination with a tilting ladle, of a beam adapted to engage said ladle, an operating-lever, connections between said operating-lever and said beam for raising and lowering same, and mechanism for automatically bringing said lever to normal position.

16. In a ladle-tilting device, the combination with a tilting ladle, of a beam adapted to engage said ladle, an operating-lever, connections between said operating-lever and said beam for raising and lowering same, a cable

connected to said lever and passing over pulleys at opposite sides thereof, weights attached to the ends of said cable, and a support for said weights.

5 17. In a ladle-tilting device, the combination with a tilting ladle, of a beam, a hook at the lower end of said beam adapted to engage a pin on said ladle, and a pin in said hook adapted to close the same.

10 18. In a ladle-tilting device, the combination with a tilting ladle, of a beam adapted to engage said ladle, a rack-bar on said beam, said beam having a certain amount of lateral play independent of said rack-bar, a pinion engaging said rack-bar, and mechanism for driving said pinion in opposite directions to raise and lower said beam.

15 19. In a ladle-tilting device, the combination with a tilting ladle, of a beam adapted to engage said ladle, a rack-bar pivoted to the upper end of said beam, whereby said beam has a certain amount of lateral play independent of said rack-bar, a pinion engaging said rack-bar, and mechanism for driving said pinion in opposite directions to raise and lower said beam.

20. In a ladle-tilting device, the combination with a tilting ladle, of a beam adapted to engage said ladle, a rack-bar pivoted to the upper end of said beam, the lower end of said rack-bar engaging a seat on said beam, whereby said beam has a certain amount of lateral play independent of said rack-bar, a pinion engaging said rack-bar, and mechanism for driving said pinion in opposite directions to raise and lower said beam.

21. In a ladle-tilting device, the combination with a tilting ladle and power appliances, of a beam adapted to engage said ladle and mechanism connecting said beam with the power for raising said beam at a certain speed and for lowering the same at an increased speed.

In testimony whereof we, the said WILLIAM J. PATTERSON and ALFRED M. ACKLIN, have hereunto set our hands.

WILLIAM J. PATTERSON.
ALFRED M. ACKLIN.

Witnesses:

ROBERT C. TOTTEN,
FRED D. SWEET.