

No. 820,065.

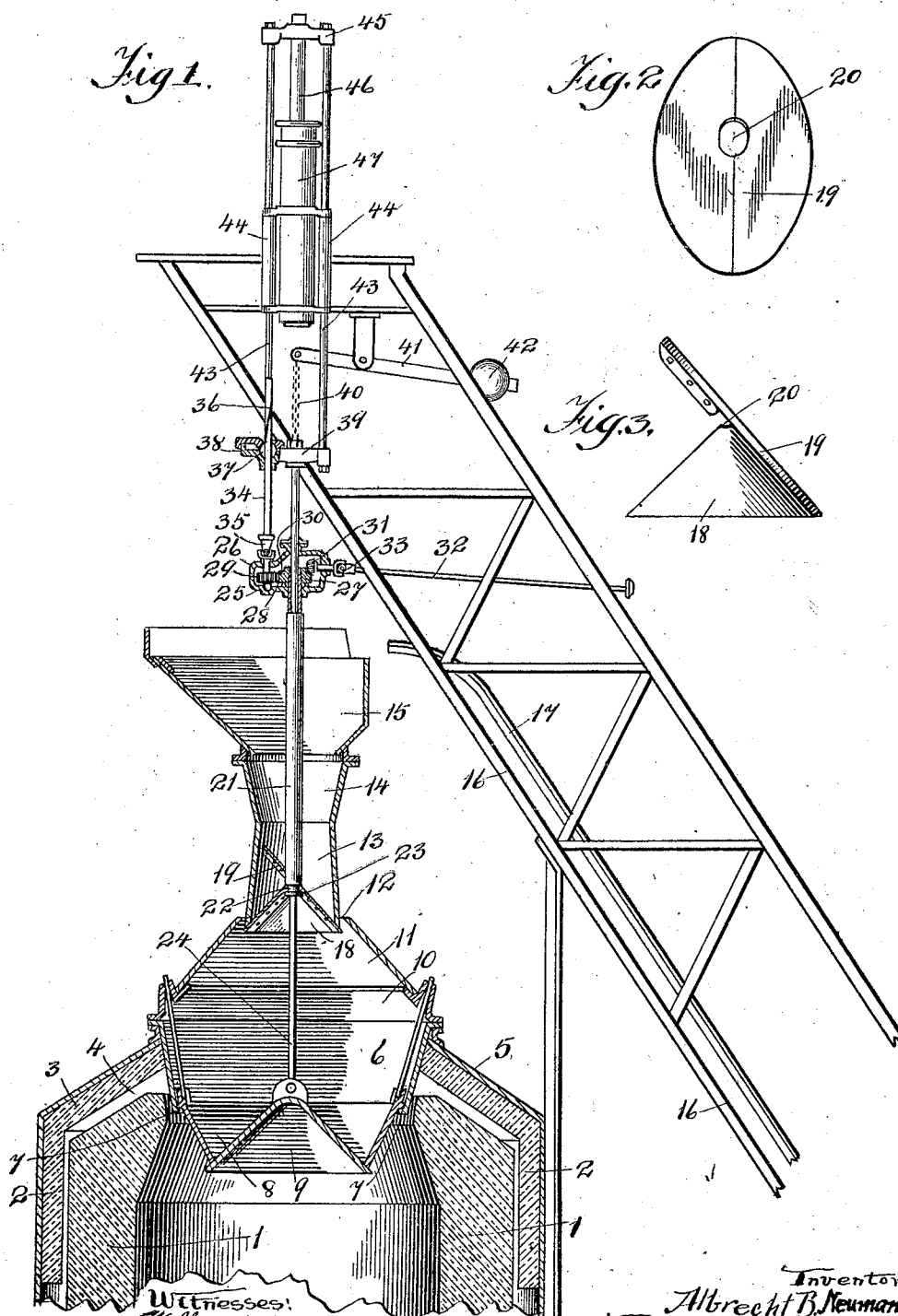
PATENTED MAY 8, 1906.

A. B. NEUMANN.

DISTRIBUTER FOR BLAST FURNACES.

APPLICATION FILED JAN. 19, 1905.

2 SHEETS—SHEET 1.



Witnesses:
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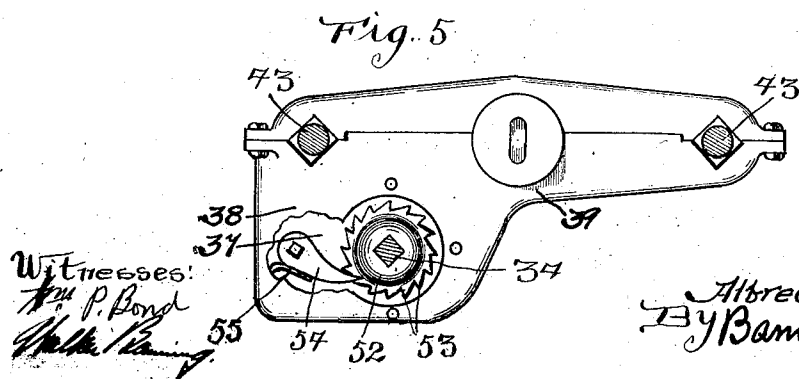
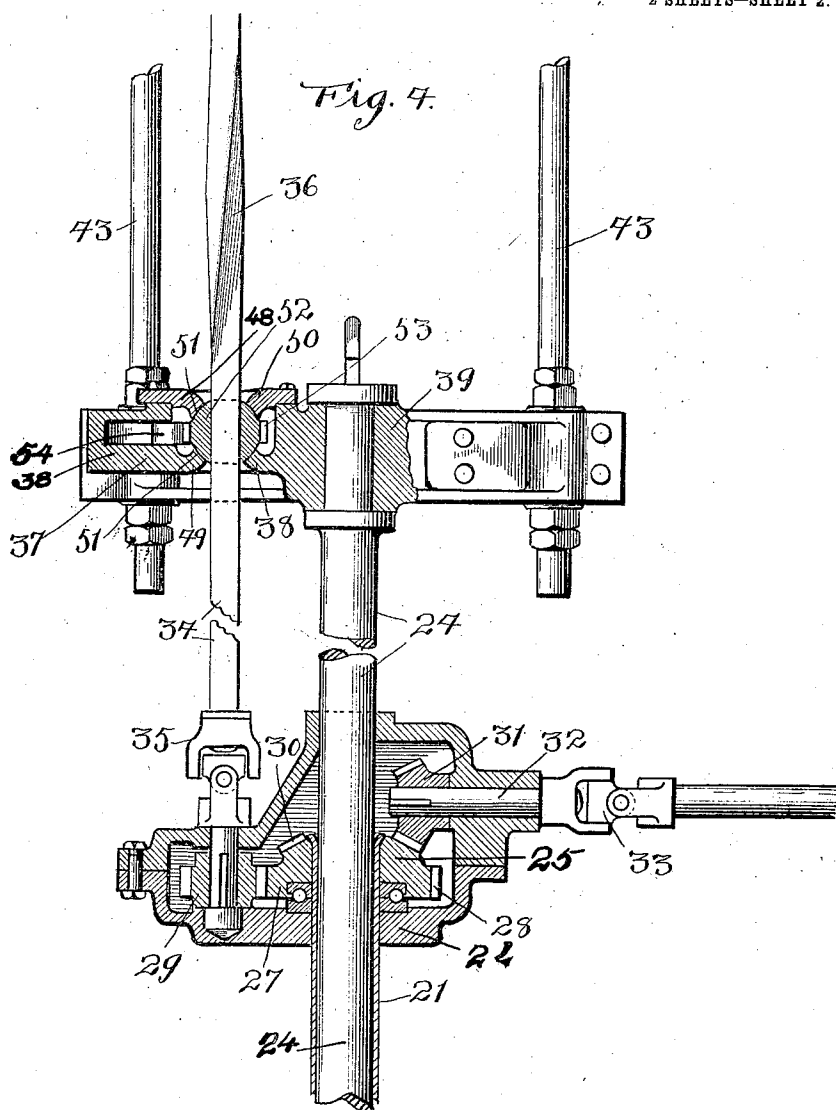
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UNITED STATES PATENT OFFICE.

ALBRECHT B. NEUMANN, OF JOLIET, ILLINOIS, ASSIGNOR OF ONE-HALF
TO DAVID BAKER, OF PHILADELPHIA, PENNSYLVANIA.

DISTRIBUTER FOR BLAST-FURNACES.

No. 820,065.

Specification of Letters Patent.

Patented May 8, 1906.

Application filed January 19, 1905. Serial No. 241,818.

To all whom it may concern:

Be it known that I, ALBRECHT B. NEUMANN, a citizen of the United States, residing at Joliet, in the county of Will and State of Illinois, have invented certain new and useful Improvements in Distributers for Blast-Furnaces, of which the following is a specification.

The object of this invention is to provide means which may be automatically operated for evenly and uniformly distributing the charge introduced into a blast or similar furnace, so that the material may be thrown into the furnace from a single point and will be evenly distributed when it finally falls into place.

It has hitherto been customary in charging a blast-furnace to carry forward the loads of material in wheelbarrows or similar conveyances and dump the same into the hopper of the furnace on different sides, so that the charge would not accumulate in one place, which would tend to impair the operation of the furnace and the quality of the resulting product. This method of charging the furnace is unsatisfactory for several reasons, in that it requires additional staging to be built around the top of the furnace and renders the charging of the furnace by automatic means difficult and uncertain. The distributor of the present invention enables the entire charge to be introduced from a single point and provides means for properly positioning the discharge during its descent into the furnace.

The invention consists in the features of construction and combinations of parts hereinafter described and claimed.

In the drawings illustrating the invention, Figure 1 is a sectional view of the top of a blast-furnace, showing the distributor of the present invention and means for operating the same; Fig. 2, a face view of the distributing-plate, and Fig. 3 a side elevation of the upper bell and plate secured thereto; Fig. 4, a side elevation, partly in section, of the rotating mechanism; and Fig. 5, a top or plan view of the clutch.

The furnace, as shown, is cylindrical in shape and consists of an inner wall 1, converging slightly at its top, and an outer wall 2, provided with a converging roof 3, leaving a space 4 between the inner and outer walls. The furnace is covered on the outside by a

shell or casing 5, and the roof of the outer wall has entered therein a downwardly-converging hopper 6, provided with a flange 7 around its open lower end, which flange forms a shoulder-abutment, upon which rests a funnel-shaped ring 8, which forms a seat for a lower bell 9, which when in raised position closes the opening of the funnel-shaped ring and serves to retain the material dumped into the hopper. The hopper is partially closed at the top by means of a sloping roof consisting of a lower section 10 and an upper section 11, the latter of which is provided with an inlet-opening 12, into which extends a chute 13, outwardly flared at its upper end 14, upon which chute is positioned a receiving-hopper 15 in suitable proximity to a staging 16, carrying a track 17 for carrying buckets or other receptacles up to the mouth of the receiving-hopper, whence they are discharged therein. The discharge-mouth of the chute 13 is normally closed by means of an upper or distributing bell 18 of conical shape, which is provided on one of its sloping side walls with a distributing-plate 19, which is elliptical in shape and extends diagonally across the body of the chute, forming a slide for throwing the material discharged into the chute to one side thereof. The distributing-plate is of suitable size and shape to substantially fill the entire passage of the chute, and its curvature is necessarily elliptical by reason of the fact that it is positioned in diagonal relation to the body of the chute. The distributing bell and plate are provided with a hole or opening 20, through which passes a tubular shaft or sleeve 21, provided near its end with an annular groove 22, which receives the bell, which latter is held in place by means of a ring or collar 23 on the end of the tubular shaft or sleeve. The lower bell is supported by means of a solid shaft 24, which passes through the tubular shaft and is moved independently thereof. The tubular shaft connects with suitable mechanism 25 for imparting a partial rotation thereto, and said mechanism, as shown, consists of a casing 26, into which the tubular shaft enters, and said shaft has secured to its end a gear-wheel 27, having teeth on its periphery 28, which mesh with a pinion 29, and teeth on its upper face 30, which mesh with a pinion 31 on the end of a shaft 32, which is provided with a universal joint 33 to adapt it to rotate under all circum-

stances. The pinion 29 is connected with a shaft 34, having therein a universal joint 35, and said shaft is provided with a spirally-extending groove or channel 36, which passes through a clutch 37, which is rigidly secured to a cross-head 39, which carries the inner shaft 24. The clutch consists of a casing 38, having a closing disk or plate 48, and the lower wall of the casing and the closing disk are perforated for the passage of the shaft 34, the edges of the two perforations being provided with inwardly - extending annular flanges 49 and 50, respectively, which have their edges 51 concaved to provide a seat for the clutch-ball 52, which latter is provided with a ring of sprocket-teeth 53, which co-operate with a dog 54, which is held in engagement with the teeth by means of a spring 55, allowing the clutch-ball to run freely in one direction and holding it against rotation in the other. The casing 26 is adapted to be raised and lowered by means of a chain 40, connected to the end of a pivoted counter-balance-arm 41, having thereon a weight 42, which allows the casing and mechanism therein contained to be moved up and down the inner shaft as a guideway and the outer or tubular shaft and bell attached thereto to be raised and lowered independently of the operation of the inner shaft which supports the lower bell. To the cross-head 39 are secured rods 43, which pass through guideways 44 and connect with an upper cross-head 45, which is secured to a piston 46, operating within a hydraulic cylinder 47, which furnishes power to raise and lower the lower bell which controls the direct discharge into the furnace.

In operation the material to be introduced into the furnace is dumped in the receiving-hopper from the track 17 at the right-hand side of the hopper and falls down against the distributing-plate, which when turned to the position shown in the drawings will throw down all of the material to the right-hand side of the distributing-bell by reason of the slope of the distributing-plate. After this portion of the chute has been sufficiently filled the bell is lowered by raising the counterbalance-arm, and the first charge dropped from the distributing-bell will fill the space to the right of the lower bell, after which the distributing-bell will be raised into position; but the outer sleeve and bell will be turned a quarter-revolution to bring the distributing-plate to a position at right angles to that previously occupied, so that the second charge will be deposited in a different position, after which the operation is repeated and the charge is distributed around the lower bell and discharging-hopper preparatory to their introduction into the furnace.

The mechanism herein shown for turning the upper bell operates as follows: As the tubular shaft supporting the distributing-bell

and the mechanism secured thereto descend the spirally-grooved shaft 34 will be drawn down through the clutch-ball 52, which in this position is released and allows the shaft to slide free without revolving the pinion 29. When the bell is again raised, the dog will engage the sprocket-teeth and hold the clutch-ball, which, being held rigid, will act in the spiral groove and turn the shaft and pinion 29, which imparts a partial rotation to the gear-wheel 27 and serves to revolve the tubular shaft or sleeve a partial revolution, which may be a quarter or any other suitable fraction of an entire revolution, so that the distributing-plate when fully raised will stand at a different position preparatory to receiving a second charge. It will be understood that while the charge is being distributed the cross-head 39 and casing 38 for the clutch mechanism will remain stationary or rigid for the purpose of revolving the spirally-grooved shaft. After the charge has been fully distributed around the lower or discharging hopper the hydraulic cylinder and piston can be operated to lower the shaft 24 and lower bell, allowing the complete charge equally distributed to slide into the furnace. As the gear-wheel 27 is revolved it will likewise revolve the bevel-pinion 31 and shaft 32, which revolution is transmitted to a pointer, (not shown,) the position of which serves to indicate to the operator the position of the distributing-plate, so that it will be possible to tell at a glance how many times the distributing-bell has been lowered and how many loads have been dumped into the lower hopper.

It will be seen in the foregoing description that the device is extremely simple in construction and operation and that it entirely dispenses with the necessity for providing a staging all the way around the top of a receiving-hopper or the laying of track and the discharge of material from different points in order to distribute the material. At the same time the operation of the parts is done automatically, as it were, and the charges will be more accurately distributed than would be possible if dumped from wheelbarrows or similar receptacles.

The particular construction of furnace and hopper herein shown serves the purposes of illustration; but it will be understood that the distributing-bell is applicable to different styles of furnaces and different constructions of hoppers from that herein shown and described.

What I regard as new, and desire to secure by Letters Patent, is—

1. A distributor for blast or similar furnaces consisting of a discharging-hopper, a bell adapted when raised to close the mouth of the discharging-hopper, a chute leading into the discharging-hopper, a bell adapted when raised to close the mouth of the chute, a flat oval distributing-plate abutting against

and extending diagonally upward from the bell across the chute and serving to provide a continuously-sloping deflecting-surface, a tubular shaft to which the last-mentioned bell and distributing-plate are secured, means for imparting a reciprocating movement to the upper bell and automatically imparting an intermittent rotation to the deflecting-plate, and a second shaft passing through the tubular shaft and connected with the discharging-bell and adapted to be raised and lowered, substantially as described.

2. A distributor for blast or similar furnaces consisting of a discharging-hopper, a bell adapted when raised to close the mouth of the discharging-hopper, a chute leading into the discharging-hopper, a bell adapted when raised to close the mouth of the chute, a flat oval distributing-plate abutting against and extending diagonally upward from the bell across the chute, a tubular shaft to which the last-mentioned bell and distributing-plate are secured, a gear-wheel on the end of the tubular shaft, a casing within which the gear-wheel is rotatably mounted, a second gear-wheel meshing with the first-mentioned gear-wheel, a shaft having therein a spiral formation to which the last-mentioned gear-wheel is connected, means for raising and lowering the casing, a second shaft passing through the tubular shaft and connected with the discharging-bell, a cross-head on said shaft, means for raising and lowering the cross-head, and a clutch member secured to the cross-head through which the spiral shaft extends, said clutch member being rotatable as the spiral shaft is moved in one direction and being held against rotation as the spiral shaft is moved in the opposite direction for compelling rotation of the spiral shaft and imparting such rotation through the gears to the tubular shaft, substantially as described.

3. A distributor for blast or similar furnaces consisting of a discharging-hopper, a lower bell adapted when raised to close the mouth of the discharging-hopper, a chute opening into the discharging-hopper, a bell adapted when raised to close the mouth of the chute, a distributing-plate secured to the bell and extending diagonally upward therefrom across the chute and having the same deflecting-angle as the surface of the bell and

forming a continuously-sloping deflecting-surface, a tubular shaft to which the deflecting-plate and bell are secured, an inner shaft extending through the tubular shaft for raising and lowering the lower bell, means for reciprocating the inner shaft and means for reciprocating and automatically rotating the tubular shaft, substantially as described.

4. A distributor for blast or similar furnaces consisting of a discharging-hopper, a lower bell adapted when raised to close the mouth of the discharging-hopper, a chute opening into the discharging-hopper, a bell adapted when raised to close the mouth of the chute, an oval-shaped flat distributing-plate extending diagonally upward from the bell and across the chute and forming a continuously-sloping deflecting-surface, a tubular shaft to which the deflecting-plate and bell are secured, an inner shaft extending through the tubular shaft for raising and lowering the lower bell, means for reciprocating the inner shaft and means for reciprocating and automatically rotating the tubular shaft, substantially as described.

5. A distributor for blast or similar furnaces consisting of a discharging-hopper having downwardly-converging walls and opening into the mouth of the furnace, a discharging-bell of conical shape adapted to close the mouth of the discharging-hopper and adapted to deflect material to the sides of the hopper, a chute opening into the discharging-hopper, a distributing-bell adapted when raised to close the mouth of the chute, a deflecting-plate of oval shape secured to the sloping surface of the distributing-bell and extending diagonally upward from the bell across the hopper and serving to provide a continuously-sloping flat deflecting-surface, a tubular shaft to which the distributing bell and plate are secured, a gear mechanism for imparting a partial revolution to the tubular shaft, means for raising and lowering the tubular shaft, an inner shaft secured to the discharging-bell and passing through the tubular shaft, and a piston for raising and lowering said shaft, substantially as described.

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Witnesses:

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