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PATENTED JULY 31, 1906.

W. KENNEDY.
BLAST FURNACE CHARGING APPARATUS.
APPLICATION FILED OCT. 26, 1905.

FIG. 1.

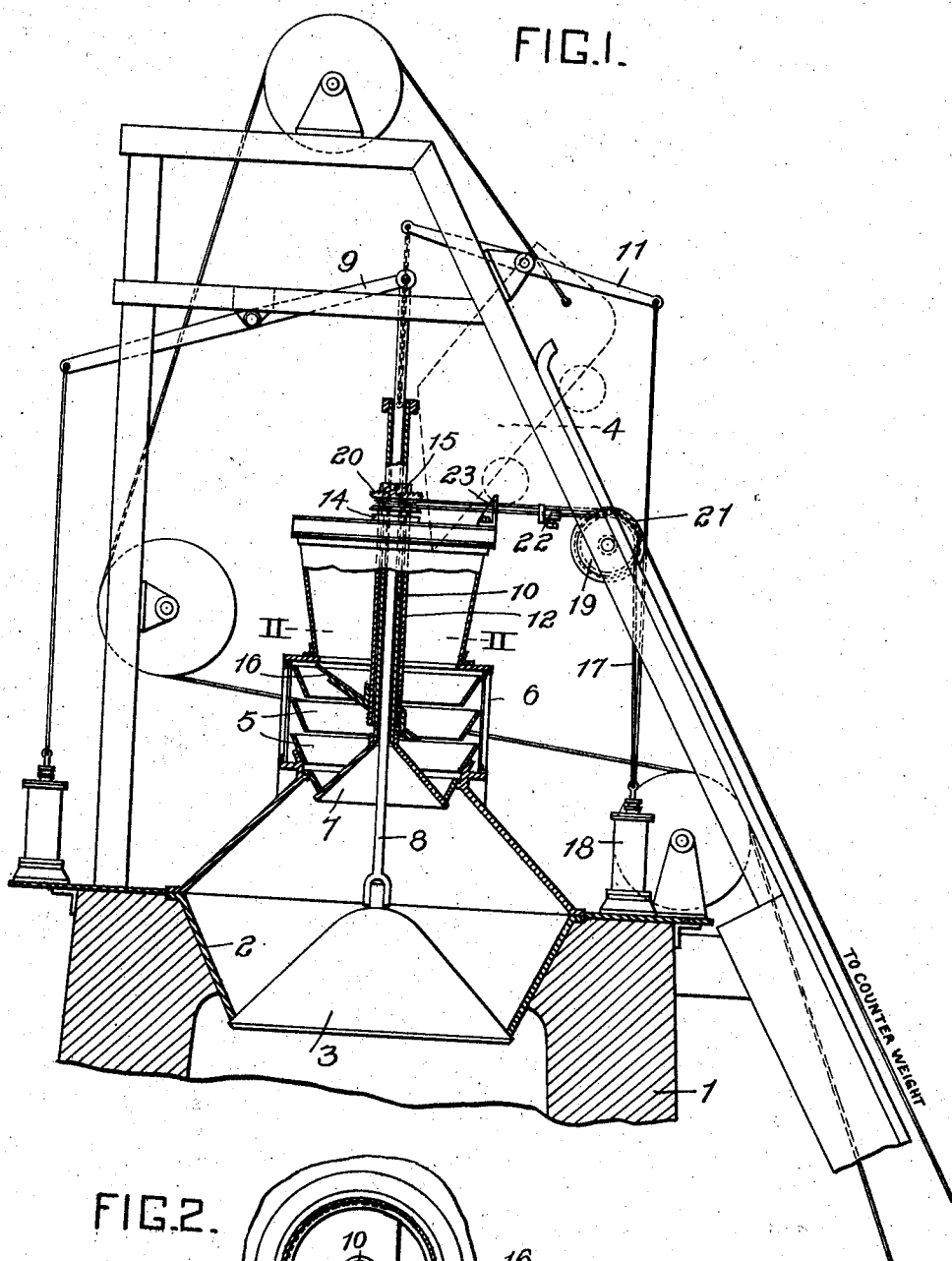
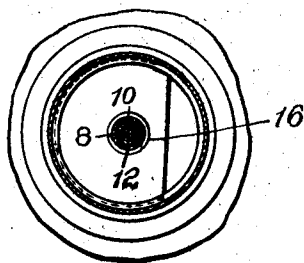


FIG. 2.



WITNESSES:

Robert A. Bradley
Paul Liddle

INVENTOR

W. Kennedy
Christie & Christie, Attys.

UNITED STATES PATENT OFFICE.

WALTER KENNEDY, OF BELLEVUE, PENNSYLVANIA.

BLAST-FURNACE-CHARGING APPARATUS.

No. 827,155.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, WALTER KENNEDY, a citizen of the United States, residing at Bellevue, in the county of Allegheny and State of Pennsylvania, have invented or discovered certain new and useful Improvements in Blast-Furnace-Charging Apparatus, of which improvements the following is a specification.

It has been found that in charging a blast-furnace there will be a separation of the materials flowing from the skip into the hopper of the fine and large lumps, the larger lumps being deposited on one portion of the bell and the small onto another, so that when the charge is finally dropped into the furnace a similar distribution of the material as regards their size is made therein. As a consequence of this separation of the large from the small it is found that the furnace will work unevenly, the blast passing up more freely through the part where the larger lumps are collected.

The object of the present invention is to provide for an approximately even mixing and distribution of the large and small lumps on the bell of the main hopper, so that when the charge is dropped there will be a correspondingly even distribution of the large and small and a thorough admixture of the two in the furnace.

The invention is hereinafter more fully described and claimed.

In the accompanying drawings, forming a part of this specification, Figure 1 is a view, partly in section and partly in elevation, of the charging apparatus on top of a furnace; and Fig. 2 is a sectional plan view on a plane indicated by the line II II, Fig. 1.

In the practice of my invention the furnace 1, with a main hopper 2, bell 3, skipway 4, and mechanism for raising and lowering the skip, is constructed and arranged in the usual or any suitable manner. On top of the main hopper 2 I arrange a receiving-hopper, which may be of any suitable form or construction, but is preferably constructed, at least as regards the portion adjacent to the main hopper, in the manner shown. As shown in the drawings, the lower portion of the receiving-hopper consists of a series of conical rings or bands 5, so arranged relatively to each other that the small lower end of one band will discharge into the large end of the next band below it. The upper band need not necessarily project below the upper

end of the next lower band, but is preferably adjacent thereto, so that there will be no liability of the lateral discharge of the material. These bands are secured at their peripheries to a series of posts 6, secured to the main hopper or resting thereon. The upper portion of the receiving-hopper may be constructed in a suitable manner, but is preferably formed with integral walls, as shown. By reason of this construction access can be had by a stirring-rod or otherwise, so as to prevent any clogging of the material when the bell 7 is lowered to discharge the material onto the bell 3 in the main hopper. The main hopper is supported by a rod 8, passing up through the receiving-hopper and connected to an operating-lever 9 or other suitable means whereby the bell may be raised and lowered. The bell 7 for closing the distributing-hopper is connected to a sleeve 10, surrounding the rod 8, and connected at its upper end to an operating-lever 11, whereby the bell may be raised and lowered, as desired. A sleeve 12 is arranged outside of the sleeve 10 and extends up above the receiving-hopper and is supported by a cross-bar 14 by means of a collar 15, secured to the sleeve. To this sleeve at a suitable point within the receiving-hopper is secured an inclined plate 16, which is constructed to prevent the passage of material beyond it except at one point. A desirable construction to this end consists in making the plate of such size that it extends entirely across the hopper except at one point, where the plate is cut away, so as to permit material to pass down onto the bell of the receiving-hopper, as shown in Fig. 2. It is preferred to construct this distributing-plate in two parts or sections, one part or section being preferably formed of cast metal and consisting of a hub with laterally-extending flange, as shown in Fig. 1, and to this flange is secured a steel plate by rivets or otherwise. This construction permits of the renewal of the portion of the plate which is rapidly worn away by the impact of the material charged thereon.

When the material is discharged from the skip into the distributing-hopper, it will strike upon the inclined plate and pass down along the same and onto the bell 7 at the cut-away point of the plate or an opening made therethrough for such purpose. After one skip-load has been discharged onto the bell the latter is lowered, so as to discharge the material therefrom onto the main bell 2. The

bell of the distributing-hopper is then raised, and at the same time the distributing-plate is rotated a greater or less distance, so that the next skip-load will be discharged at a different point onto the distributing-bell 7, and consequently at a different point on the main bell when the distributing-hopper is discharged.

While any suitable means may be employed for effecting the opening and closing movements of the distributing-bell and the rotation of the distributing-plate, which is not moved vertically, it is preferred that the closing of the bell and the shifting of the plate be performed simultaneously and by the same mechanism. To this end a rope 17 is connected to the piston of the cylinder 18, said piston being also connected, as shown, to a lever 11 and passes around guide-pulley 19, the grooved wheel 20, loosely mounted on the sleeve 12, thence around another guide-pulley 21 to a counterweight, which is preferably arranged adjacent to the charging-floor, so that the men engaged in charging the furnace will have an indication as regards the position of the distributing bell and plate. A pawl-and-ratchet connection is provided between the loose wheel 20 and the sleeve 12, so arranged that when the lever 11 is shifted to lower the distributing-bell the rope 18 will be slackened, permitting the counterweight to turn the wheel 20 without shifting the sleeve and plate. When the lever 11 is shifted to raise the distributing-bell, the rope is so drawn as to raise the counterweight and rotate the wheel 20 and sleeve to shift the distributing-plate. When the distributing-plate is shifted by the mechanism employed for raising and lowering the distributing-bell, the operation of the bell-shifting mechanism should be uniform and provision should be made for adjusting the amount of rotation of the distributing-plate. To this end a tappet 22 is secured upon the portion of the rope connected to the piston of the cylinder, and a stationary stop 23 is connected or secured to the receiving-hopper or other suitable portion of the furnace. By this means the travel of the rope when drawn by the counterweight can be regulated by adjusting the tappet along the rope.

I claim herein as my invention—

1. In a blast-furnace-charging apparatus the combination of a main hopper and bell, a receiving-hopper, a distributing-plate arranged in said hopper whereby stock delivered to said hopper may be directed to one side of the hopper, means for horizontally shifting said plate and means movable independent of the plate for controlling the discharge of material from the hopper.

2. In a blast-furnace-charging apparatus the combination of a main hopper and bell, a receiving-hopper, a distributing-plate arranged in said hopper, means for shifting said plate horizontally, and means independent of the plate for controlling the discharge of material from the distributing-hopper.

3. In a blast-furnace-charging apparatus the combination of a main hopper and bell, a receiving-hopper and bell, and horizontally-movable means arranged in the receiving-hopper for varying the point of discharge of material onto the bell of the receiving-hopper.

4. In a blast-furnace-charging apparatus, the combination of a main bell and hopper, a distributing-hopper, an inclined plate extending partially across the distributing-hopper, means independent of said plate for controlling the discharge of material from the distributing-hopper and means for simultaneously shifting said plate and the discharge-controlling means.

5. In a blast-furnace-charging apparatus, the combination of a main hopper and bell, a distributing-hopper, a distributing-plate arranged in said hopper and constructed to permit the passage of material at one point, means for rotating the plate, a bell controlling the discharge of material from the distributing-hopper and means for shifting the bell relative to the plate and hopper.

6. In a blast-furnace-charging apparatus the combination of a main hopper and bell, a distributing-hopper, a closure for said hopper, a deflecting-plate for directing the material to one point on the closure and means for shifting the plate horizontally relative to the closure.

7. In a blast-furnace-charging apparatus, the combination of a main hopper and bell, a distributing-hopper, a closure for said hopper, a deflecting-plate, means for simultaneously shifting the closure and rotating the plate and means for varying the range of movement of the plate.

8. In a blast-furnace-charging apparatus, the combination of a main hopper and bell, a distributing-hopper, a closure for said hopper, a deflecting-plate, means for shifting the closure and rotating the plate to vary the point of discharge of material onto the closure and means for varying the range of movement of the plate.

In testimony whereof I have hereunto set my hand.

WALTER KENNEDY.

Witnesses:

CHARLES BARNETT,
HERBERT BRADLEY.