

No. 650,254.

Patented May 22, 1900.

J. KENNEDY.

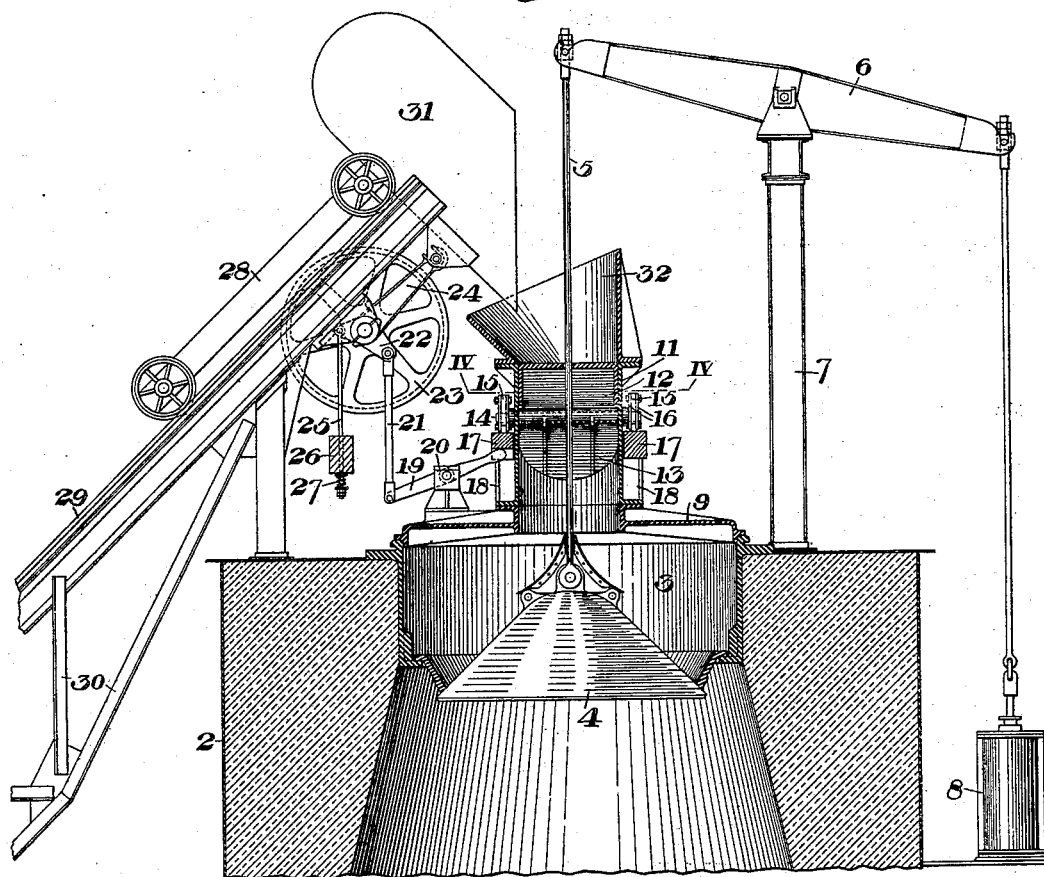
BLAST FURNACE CHARGING APPARATUS.

(Application filed May 17, 1899.)

(No Model.)

3 Sheets—Sheet 1.

Fig. 1.



WITNESSES

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Fig. 2.

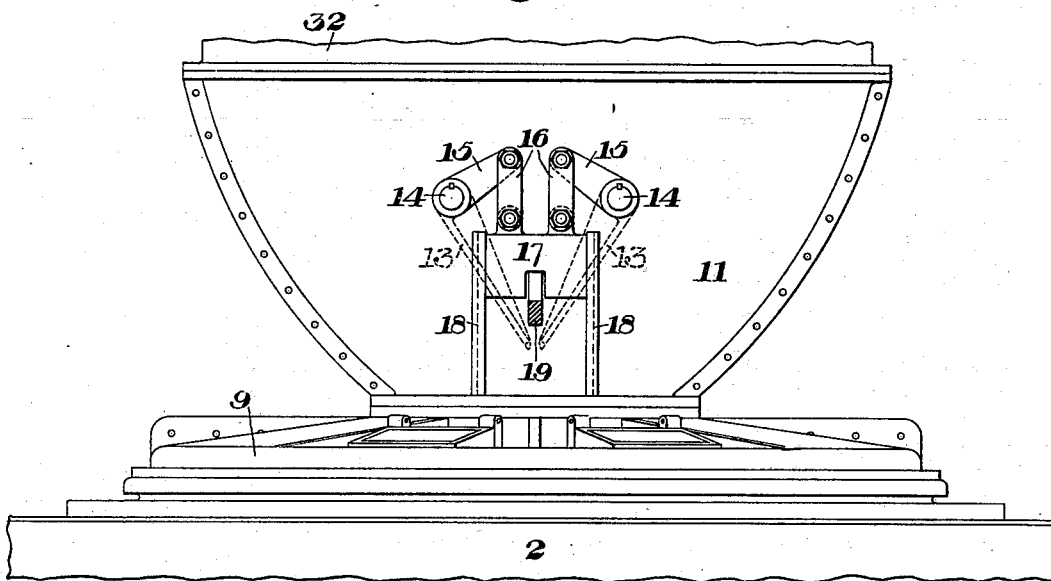
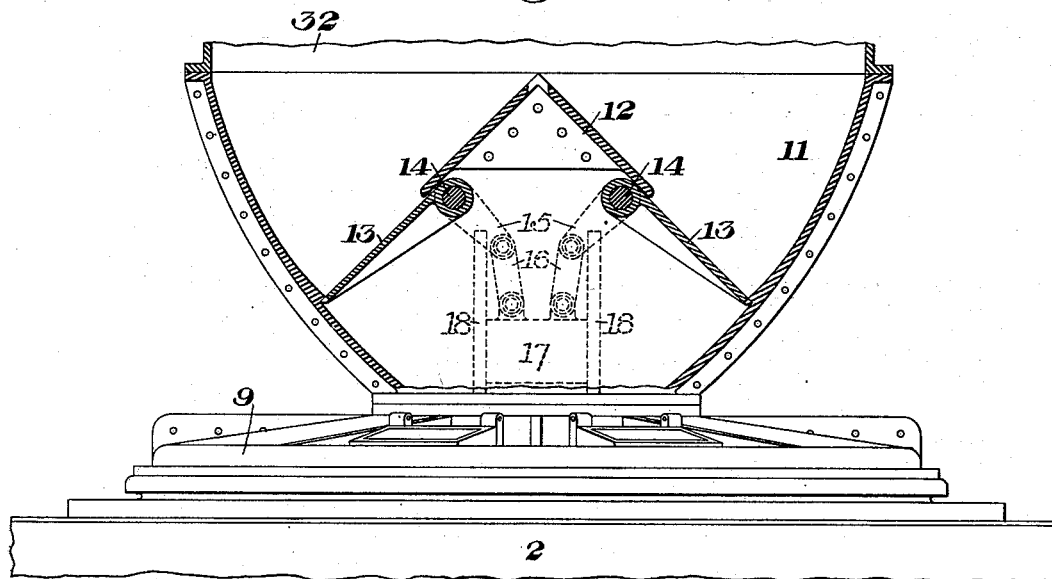


Fig. 3.



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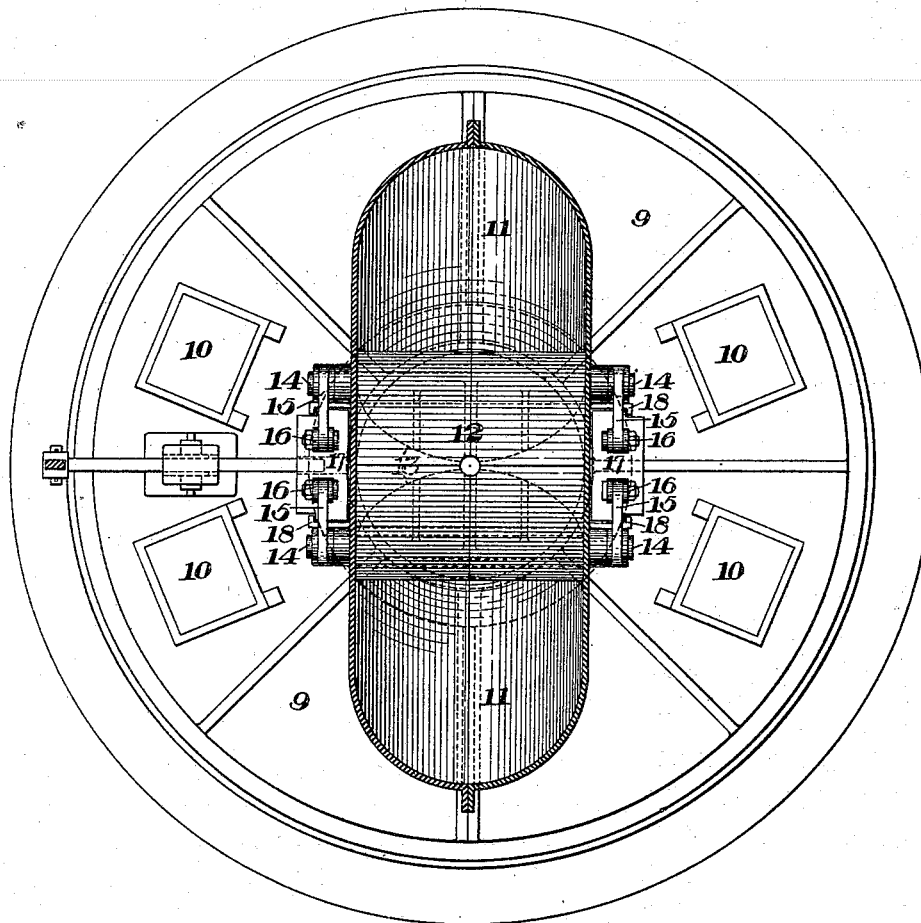
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Fig. 4.



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# UNITED STATES PATENT OFFICE.

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## BLAST-FURNACE-CHARGING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 650,254, dated May 22, 1900.

Application filed May 17, 1899. Serial No. 717,140. (No model.)

*To all whom it may concern:*

Be it known that I, JULIAN KENNEDY, of Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Blast-Furnace-Charging Apparatus, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a sectional side elevation of the upper part of a blast-furnace provided with my improved charging apparatus. Fig. 2 is an enlarged end elevation of the upper hopper. Fig. 3 is a vertical section of the same, showing the hopper doors or valves in closed position; and Fig. 4 is a horizontal section on the line IV IV of Fig. 1.

My invention relates to the charging of blast-furnaces, and is designed to provide a simple apparatus therefor with which a single tipping skip may be used and which will give the necessary distribution of the stock upon the main bell.

To that end it consists in a receiving-hopper containing a ridge or similar device which divides or splits up the stock, in connection with inwardly-inclined portions which direct the split-up portions inwardly, so that they fall upon the central portion of the main bell.

It also consists in a hopper having a closing valve or door which is operated in at least one direction by the movement of the skip, and, further, in the construction and arrangement of the parts, as hereinafter more fully described, and set forth in the claims.

In the drawings, 2 represents the upper portion of a blast-furnace, which is provided with the usual main hopper 3 and upwardly-seating bell 4 therefor, this bell being supported upon a vertical rod 5, carried on a tilting-lever 6, trunnioned on the post 7 and operated by motor-cylinder 8. The top of the main hopper is closed by a large plate or casting 9, preferably made in divided parts and containing suitable upwardly-opening explosion-doors 10. Above a central hole in the plate 9 is placed the supplemental hopper 11, having downwardly and inwardly curved or inclined sides, as shown in Figs. 2 and 3,

and provided with a central transverse ridge 12, which splits up and divides the stock falling thereon. The feed-openings between the lower edges of this ridge and the sides of the hopper are closed by two swinging doors or gates 13, each secured to a rock-shaft 14, mounted in bearings under the ridge portion. The shafts 14 extend through the ends of the hopper and are provided at both ends with arms 15, having links 16, connecting them to weights 17, which are arranged to slide vertically in suitable guides 18, secured to the ends of the hopper. The weights thus normally keep the gates shut against shoulders on the hopper, as shown, and they are opened by a lever 19, pivoted in stationary bearings 20 and having a rounded end portion which contacts with the lower end of one of the weights. The lever 19 is pivotally connected by link 21 with a rock-arm 22, secured to a collar loosely surrounding the shaft of the top wheel 23 for the hoisting-cable. There are preferably a pair of these loose sleeves or collars, each carrying a hooked arm 24, these arms being arranged to engage pins upon the lower portion of the skip or bucket and tip it into the position shown in Fig. 1 as the skip reaches the upper limit of its travel. The sleeves carrying the arms 24 are provided with lever-arms having depending rods 25 extending through the beam 26 and having spiral springs 27 interposed between the beam and nuts upon the rods. These spring-pressed rods normally hold the hooked arms in proper position to engage the pins upon the bucket and act to return the parts to this position as soon as the skip is lowered, allowing the weights to move down and close the hopper-gates. The skip consists of an ordinary wheeled truck 28, movable upon the inclined track 29, supported upon the usual truss structure 30. The bucket 31 is arranged to tilt upon the front axle of the skip and discharges into the chute 32, which is secured to the upper end of the hopper and is preferably inclined forwardly toward the skip, so as to give a more even distribution of the stock.

The operation is as follows: The skip is drawn by the usual hoisting-cable to the upper end of the inclined track, and as it nears its final upper position the hooked arms engage

the pins upon the bucket and tilt the bucket to discharge its contents. At the same time the swinging of the collars which carry the hooked arms operates the lever 19, which acting upon one of the weights lifts it and rocks the door-shafts, so as to open these doors. The stock therefore as it drops upon the central ridge will be split into two oppositely-directed currents. These outwardly-directed currents striking the inwardly-inclined sides of the hopper will be deflected toward each other and joining as a single stream drop upon the central portion of the main bell and will be evenly distributed thereon. As the skip is again moved downwardly the bucket will be tilted back to its normal position and the springs 27 will restore the hooked arms and the lever 19 to normal position, thus closing the gates in the hopper against the shoulders provided therefor. These doors provide a gas seal which prevents escape of gas when the main bell is lowered to discharge the stock into the furnace.

The advantages of my invention result largely from the simplicity of the apparatus, from its adaptability to existing furnaces, and from the fact that a single skip may be used in connection with it. The even distribution of the stock results from dropping it upon a splitting or dividing device and then directing these divided currents inwardly toward the center of the bell.

Many variations may be made in the form and arrangement of the parts without departure from my invention, since

What I claim is—

1. A blast-furnace, having a main charging bell and hopper, a stationary supplemental hopper above the main hopper, and containing a splitting or dividing device for the stock, a movable closure located within the supplemental hopper, said closure being separate from and movable independent of the sides of the supplemental hopper and of its splitting device, and mechanism for moving the closure; substantially as described.

2. The combination with a blast-furnace, having a main charging hopper and bell, of a stationary supplemental upper hopper containing within it a splitting device for the stock, movable doors independent of the sides of the supplemental hopper and of its splitting device, and located within the upper

hopper, and mechanism for operating said doors; substantially as described. 55

3. A blast-furnace having a main charging bell and hopper, a supplemental hopper provided with a closing device, a skip, mechanism arranged to move the closing device in at least one direction, and connections for the closing device arranged to be actuated by the skip; substantially as described. 60

4. A blast-furnace having a main charging bell and hopper, a supplemental hopper provided with a splitting device, a closing gate or valve for said hopper, a skip, and mechanism connected to the gate and arranged to be actuated by the skip to open the same when the skip approaches the upper limit of its travel; substantially as described. 65 70

5. A blast-furnace having a main charging bell and hopper, a stationary supplemental hopper above the main hopper, and containing a stationary splitting device, and mechanism independent of the sides of the supplemental hopper for closing it, said hopper having downwardly and inwardly converging sides; substantially as described. 75

6. The combination with a blast-furnace having a main charging hopper and bell, of a supplemental upper hopper, having downwardly and inwardly converging sides, and a central ridge arranged to split up the stock, doors arranged to close the upper hopper, a skip, and connections arranged to be operated by the skip for opening said doors; substantially as described. 80 85

7. A blast-furnace having a main charging hopper and bell, a supplemental hopper above the main hopper, and having downwardly and inwardly converging sides, and a central ridge arranged to split up the stock, swinging doors arranged to close the openings between the ridge and the sides of the hopper, a weight or similar device arranged to normally close said doors, a skip, and lever connections arranged to be operated by the movement of the skip, and arranged to open the doors when the skip nears the upper limit of its travel; substantially as described. 90 95 100

In testimony whereof I have hereunto set my hand.

JULIAN KENNEDY.

Witnesses:

REID KENNEDY,  
G. I. HOLDSHIP.