

No. 623,854.

Patented Apr. 25, 1899.

S. T. WELLMAN, J. W. SEAVER & C. H. WELLMAN.

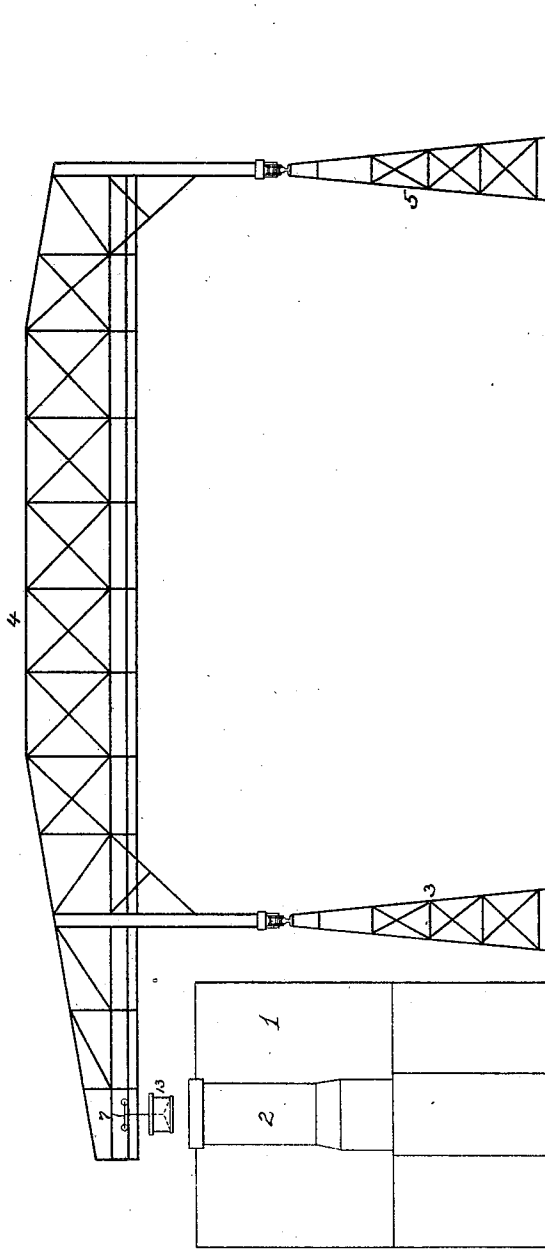
BLAST FURNACE CHARGING APPARATUS.

(Application filed Feb. 19, 1898.)

(No Model.)

3 Sheets—Sheet 1.

FIG. 1.



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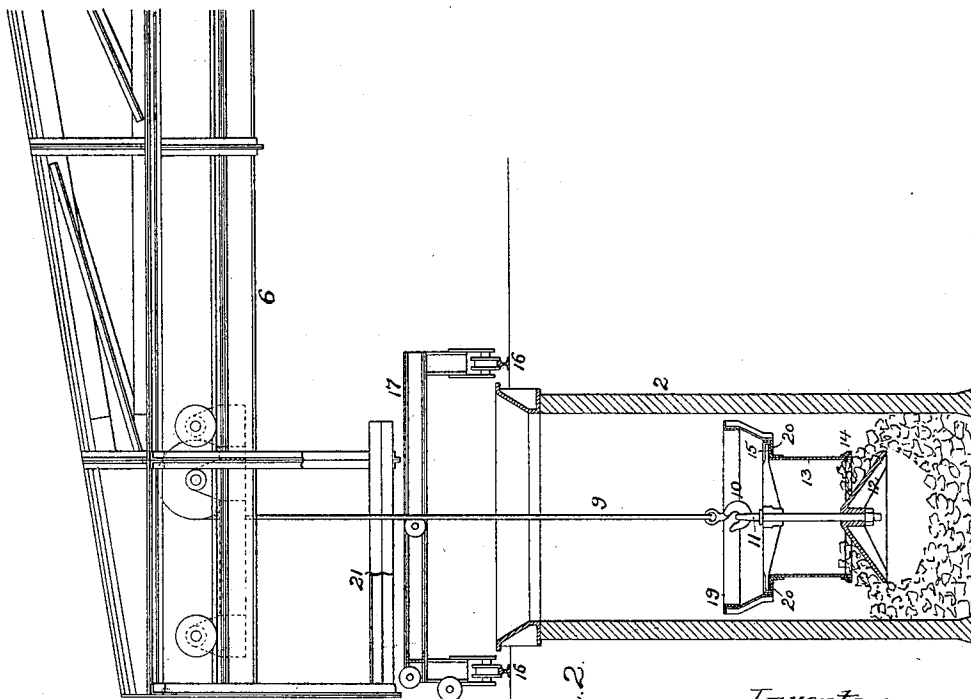
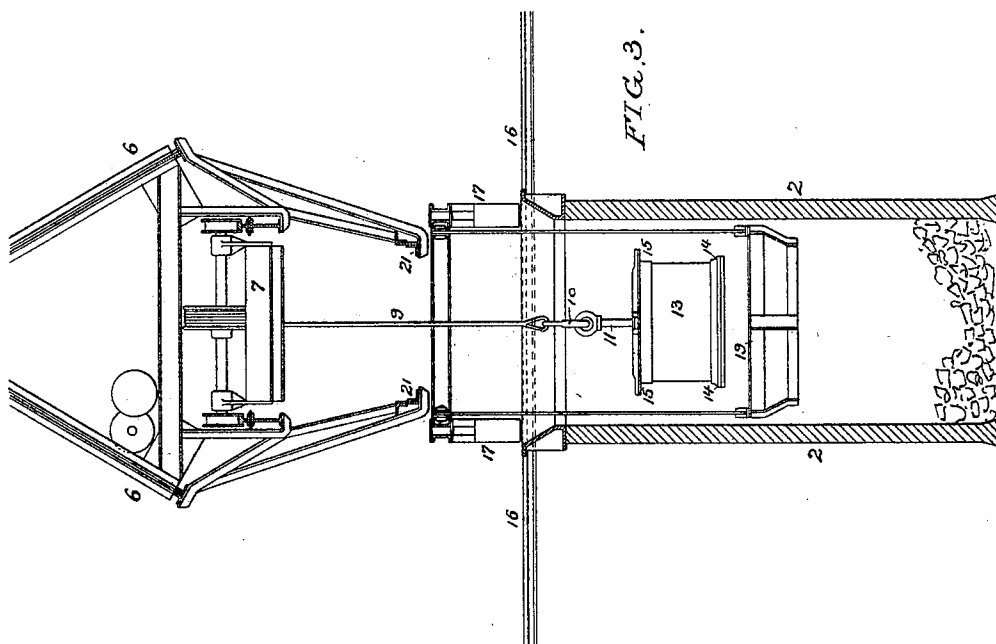
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3 Sheets—Sheet 2.



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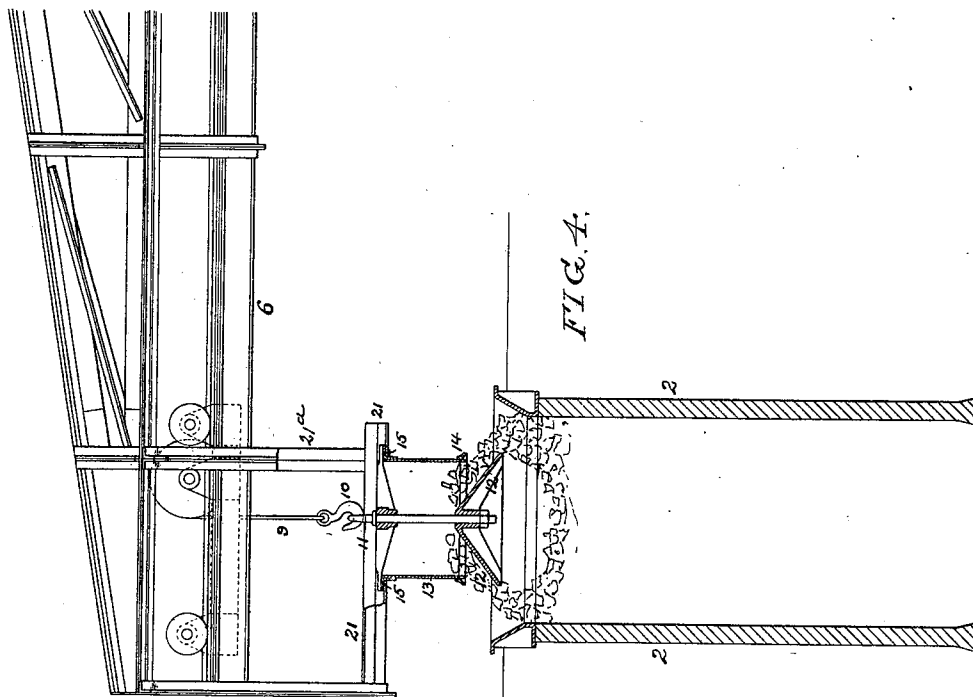
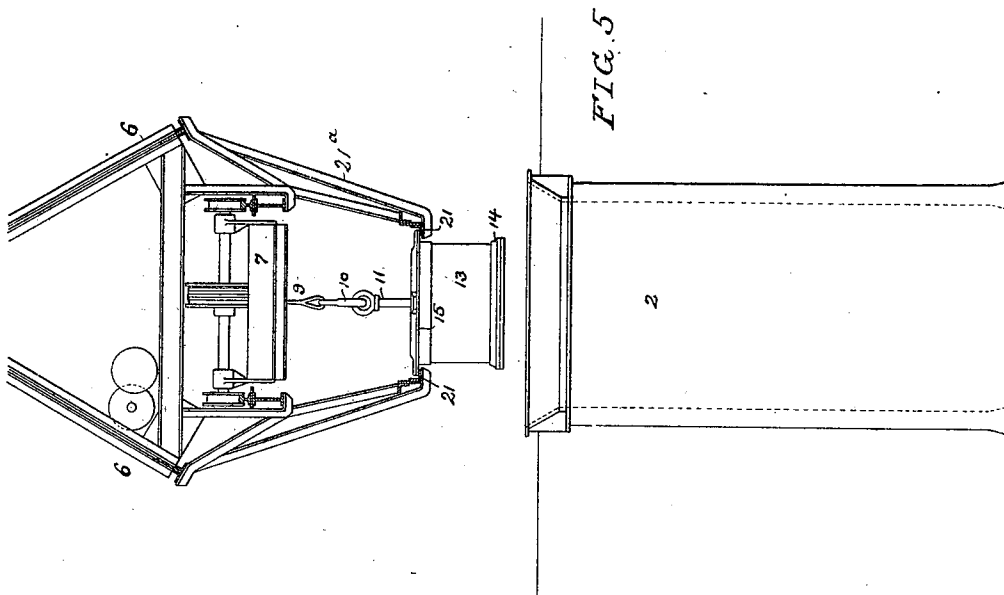
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3 Sheets—Sheet 3.



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UNITED STATES PATENT OFFICE.

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BLAST-FURNACE-CHARGING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 623,854, dated April 25, 1899.

Application filed February 19, 1898. Serial No. 670,885. (No model.)

To all whom it may concern:

Be it known that we, SAMUEL T. WELLMAN, JOHN W. SEAVER, and CHARLES H. WELLMAN, citizens of the United States, and residents of Cleveland, Ohio, have invented certain Improvements in Cupola or Blast Furnace Charging Apparatus, of which the following is a specification.

The object of our invention is to provide mechanism for rapidly filling cupola or blast furnaces without subjecting any part of the charge to a fall of such extent as would be likely either to injure the lining of the furnace or cause the charge to pack too closely therein, the apparatus being also available for keeping up the charge after the furnace has been filled and put in operation.

In the accompanying drawings, Figure 1 is a diagram showing the relation between a cupola-furnace and a crane, which constitutes the main element of our improved charging device. Fig. 2 is a longitudinal sectional view, on a larger scale, of part of the cupola and the charging device, the latter being shown as it appears while the filling of the cupola is being carried on. Fig. 3 is a transverse section, partly in elevation, of the parts shown in Fig. 2, but illustrating the filling-bucket closed and in a different position from that shown in said Fig. 2. Fig. 4 is a longitudinal section showing the charging device as it appears when charging a full furnace, and Fig. 5 is a transverse section, partly in elevation, of the parts shown in Fig. 4, but with the charging-bucket closed.

We have illustrated and will describe our invention as applied to the charging of cupola-furnaces, and in the diagrammatic representation shown in Fig. 1 the cupola-house is represented at 1 and one of the cupola-furnaces contained therein at 2. Along the front of the cupola-house are a series of posts 3, which carry one of the runways for the gantry-crane 4, the other runway for the same being carried by similar posts 5, located at such a distance from the posts 3 as is necessitated by the length of the crane.

A portion of the crane 4 (represented at 6) overhangs the cupola-house and its cupolas, so that the trolley 7, which runs upon suit-

able longitudinal rails on the crane, can be run out until it is directly over a cupola, the crane 4 being movable along the front of the house, so as to include within its range the whole row of cupolas contained therein.

The crane may, if desired, be supported on runways on opposite sides of the cupola or cupola-house or may be constructed in any other available manner so long as it has a portion extending over the cupola.

It may be stated at the outset that suitable motive-power apparatus, preferably electrical, is provided for moving the crane 4 upon its runways and that the trolley is likewise provided with motive-power devices for traversing it to and fro upon the crane and for operating suitable hoisting mechanism carried by the trolley, and it may also be stated that at a suitable point upon the crane are located an operator's cab containing the various switches, regulators, and cut-outs necessary for the control of the various motors and at another point a weighman's cab, whereby the trolley and its load may be weighed when it reaches a certain point on the crane; but we have not considered it necessary to illustrate or describe in detail any of these parts, as they form no portion of our invention and may be made in accordance with any generally-accepted practice.

The hoisting mechanism of the trolley (shown in Figs. 2 to 5) has a depending rope or chain 9, provided at the lower end with a hook 10, which is adapted to an eye at the upper end of a rod 11, connected to the movable bottom 12 of the charging-bucket 13, said charging-bucket consisting of a box of sheet metal, preferably cylindrical and stiffened at bottom and top by suitable reinforcing rings or flanges 14 and 15. The movable bottom consists of a cone suitably strengthened by means of ribs and securely connected to the lower end of the rod 11.

Rails 16 are provided along the top of the cupola-house, one on each side of the row of cupolas contained therein, and upon these rails is mounted so as to traverse along the row of cupolas a small supplementary crane 17, which is provided with suitable mechanism for raising, lowering, or holding in any

desired position a bucket-supporter 19, consisting in the present instance of a partly-cylindrical and partly-conical structure of metal bars or plates having at the lower end an internally-projecting flange 20 for engaging with the top flange 15 of the bucket.

Depending from that portion of the crane 4 which extends over the cupola is a structure which supports a pair of rails 21 at such a distance apart that they also are adapted to engage with the projecting flange at the top of the charging-bucket when said flange is run in over such rails.

The operation of the device in charging the cupola before firing the same is as follows: The crane 17 being run over the top of the cupola, the bucket-supporting device 19 is lowered into the cupola until it reaches the desired point above the bottom of the same and is there held. The bucket 13, with the bottom drawn up against the same, is filled with the desired charge, and the bucket, with its load, is then lifted by the hoisting mechanism of the trolley and carried forward on the crane until the bucket is directly above the mouth of the cupola, into which said bucket is then lowered until its upper flange 15 is caught by the flange 20 of the supporting device 19, continuing lowering of the rope or chain 9 then permitting the bottom 12 of the bucket to drop, so as to discharge its contents into the cupola. The bucket is then raised and carried off to receive another load. At suitable intervals the supporting device 19 is raised in the cupola, so as to be maintained therein at the proper distance above the charge, the aim always being to discharge the contents of the buckets 13 into the cupola or onto the charge already deposited therein with as little drop as possible in order to prevent injury to the walls or lining of the cupola and to prevent too close packing of the charge. When the cupola has been filled up to the top, the crane 17, with its bucket-supporting device 19, is run out of the way, and the rails 21 on the depending structure of the crane 4 are used to support the bucket when the bottom of the same is dropped so as to discharge its contents, as shown in Fig. 4.

It will be observed that the depending structure 21^a extends only a short distance from the projecting end of the main crane 6 and is a sufficient distance above the top of the furnace to permit the bucket to be raised clear of the furnace and traversed by the trolley 7 beyond the ends of the rails 21, in which position the said bucket can be readily hoisted above the bottom of said depending structure and moved outwardly by the trolley and lowered upon the rails 21, the flange 15 supporting the bucket in the position shown in Fig. 4, and when the bucket is to be lowered into

the furnace it may be hoisted clear of the rails 21, traversed by the trolley 7, clear of the ends of the rails, lowered, and then moved over the top of the furnace.

It will be evident that instead of a traveling gauntree-crane such as we have shown and described a swinging-jib crane or other form of traveling or swinging crane may be used.

Having thus described our invention, we claim and desire to secure by Letters Patent—

1. A furnace-charging device in which are combined a crane having a portion extending over the furnace, a bucket, a raising and lowering device on the crane for said bucket, said bucket also having a projecting flange, a ring adapted to engage said flange and support the bucket and a supplementary crane having raising and lowering mechanism for said ring, substantially as specified.

2. A furnace-charging device in which are combined a crane having a portion extending over the furnace, a bucket having a movable bottom connected to a suspension device on the crane, a bucket-supporter independent of the suspension device, and a movable crane carrying said bucket-supporter and provided with means for raising and lowering the same, said crane being independent of the main crane.

3. A furnace feeding or charging device in which are combined a crane having a portion extending over the furnace, a bucket suspended from said crane and having a movable bottom connected to said suspension device, a structure depending from the overhanging portion of the crane, and adapted to support the bucket when the support of the suspension device is removed.

4. An apparatus for feeding or charging a furnace, comprising a main crane having a portion extending over the furnace, a bucket suspended from said crane and having a movable bottom connected to the suspension device, a raising and lowering device on the crane for said bucket, a flange on the bucket and a ring adapted to engage said flange and support the bucket, a supplementary crane having raising and lowering mechanism for said ring, a structure depending from the main crane and adapted to support the bucket when the support of the suspension device is removed, substantially as described.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

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JOHN W. SEAVER.
CHARLES H. WELLMAN.

Witnesses:

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