

(No Model.)

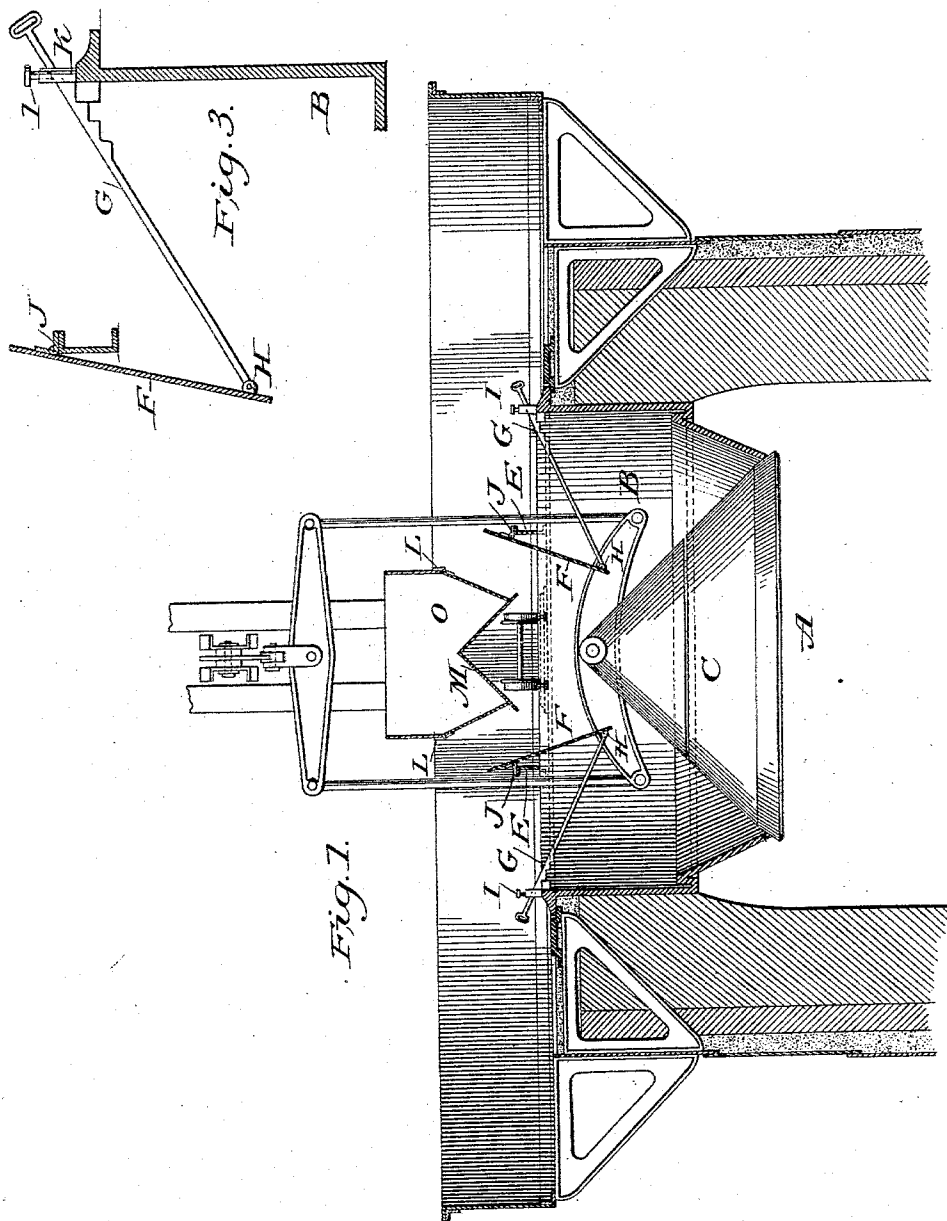
2 Sheets—Sheet 1.

F. C. ROBERTS.

CHARGING APPARATUS FOR BLAST FURNACES.

No. 548,658.

Patented Oct. 29, 1895.



Witnesses.

L. Kayden Lockman.

Albert H. Johnson.

Inventor.

Frank C. Roberts

(No Model.)

2 Sheets—Sheet 2.

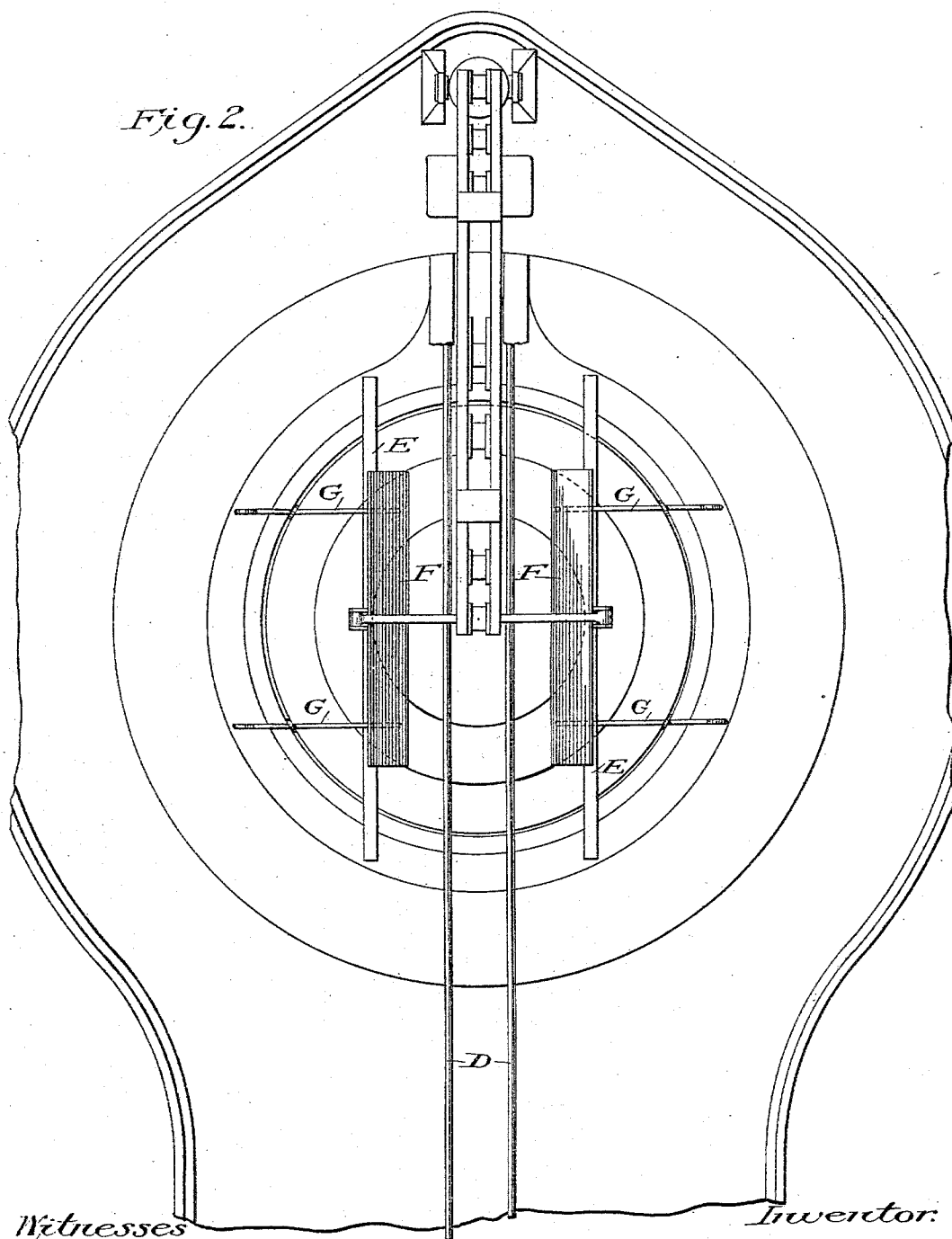
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Fig. 2.



Witnesses

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UNITED STATES PATENT OFFICE.

FRANK C. ROBERTS, OF PHILADELPHIA, PENNSYLVANIA.

CHARGING APPARATUS FOR BLAST-FURNACES.

SPECIFICATION forming part of Letters Patent No. 548,658, dated October 29, 1895.

Application filed January 25, 1895. Serial No. 536,162. (No model.)

To all whom it may concern:

Be it known that I, FRANK C. ROBERTS, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia, State of Pennsylvania, have invented a new and useful Stock-Distributing Device to be Used in Connection with the Charging of Blast-Furnaces, of which the following, taken in connection with the accompanying drawings, is a full and clear specification.

My invention relates to improvements in the method of distributing around the hopper located in the top of a blast-furnace the materials or stock which it is necessary to charge into the furnace where such materials or stock are conveyed to the top of the furnace in cars.

It is well known that in order to properly and efficiently charge or fill a blast-furnace it is essential that the material when dumped into the hopper at the top of the furnace shall be distributed around the said hopper in as regular and uniform a manner as possible. When cars are used for conveying the material to the top of the furnace, it is somewhat difficult to secure this desired distribution of material around the hopper. One of the two following methods is usually employed for this purpose:

First. A supplementary hopper is placed above and concentric with the usual hopper and so designed and located that materials delivered into this supplementary hopper are discharged over the center or apex of the bell. Among the difficulties with this device is that if the discharge-opening in the supplementary hopper is made small enough to insure a good distribution around the main hopper the material is apt to jam and hold itself in the supplementary hopper, requiring the use of a bar or other appliance to release it. An improved form of supplementary hopper is that wherein the sides of the hopper are composed of hinged sections, whereby the hopper may be opened or closed, thus providing for the accumulation of the charge of materials in the supplementary hopper. When the supplementary hopper is properly filled, the hinged sides are dropped and the accumulated materials thus allowed to fall directly on the apex of the bell.

Second. Bottom or end dumping cars are employed, which discharge themselves over

the cone or apex of the bell, the material passing to all sides. Among the objections to bottom-dumping cars is the wide gage of track required, the tendency for some of the discharged material to lodge on the rail and thus interfere with the movement of the car, and the liability for some material to remain in the car until removed by hand unless the opening in the bottom is made of such size as not to interfere with the proper distribution of materials. The end-dumping car is objectionable owing to the difficulty of securing such adjustment of the point of discharge as to render the distribution in the hopper satisfactory for the various materials.

The object of my invention is to provide a device which will distribute the materials around the hopper of a blast-furnace in a fairly uniform manner without involving the objectionable features of the above-mentioned methods and at the same time provide a means of adjusting the distribution of materials to suit varying conditions. I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a section through the top of a blast-furnace, taken normally to the direction of the movement of the car. Fig. 2 is a plan showing the top of a blast-furnace together with the track leading from the elevator to the furnace. Fig. 3 is a partial section showing the method of adjusting the distributing leaves or shutters.

Similar letters refer to similar parts throughout the three views.

A is the upper part of a blast-furnace.

B is the furnace-hopper into which the materials are dumped.

C is the bell which closes the hopper, said bell being supported by the rods, levers, &c., indicated.

D is the track or tracks leading from the elevator over the hopper B and on which the cars O are transferred from the elevator to and over the hopper.

Extending across the hopper B are two beams E, supporting leaves or shutters F, which leaves or shutters are hinged to the beams E at points J on their upper edges. The bars G hinged to the leaves F at H pass through an opening in clevis K on top of the hopper B and provide a means for adjusting

the leaves or shutters F by moving their lower edges toward or away from the furnace center. Notches are provided on the bar G, fitting a corresponding tooth in the opening in K, as indicated, and a set-screw I, passing through the top of K and bearing on the top of G, holds the tooth and notch in contact, and thus firmly secures the bars G and shutters F in any position to which they may be adjusted.

10 The car O is provided with a bottom M, sloping down and away from the center on each side and extending beyond the wheels of the car. The sides of the car are hinged along the lines L.

15 The operation of this device is as follows: From the design of the car it is evident that its contents are discharged in approximately-equal volumes on each side of the center. Were the leaves F not used, it is evident that 20 the contents of the car would be discharged at two diametrically-opposite points of the hopper, and, furthermore, it is evident that if the leaves F were adjusted so that their lower edges came in contact with the bell C the contents of the car would be discharged at approximately two diametrically-opposite points of the hopper at right angles to the former. As a result, it is evident that at some intermediate point the influence of the leaves upon 30 the materials discharged will be such as to distribute the material in a fairly-uniform manner around the hopper. The leaves or shutters F, being hinged at J, may be adjusted to this intermediate position by experiment 35 and secured by means of the bars G, tooth in K, and set-screw I.

I do not limit my invention to the design of car, hopper, bell, or bell-supporting device herein set forth. Any suitable designs may 40 be employed for these parts.

I do not limit my invention to leaves F, which are capable of adjustment. These leaves may be fixed in position.

45 I do not limit my invention to the means herein set forth for adjusting and securing the leaves F by means of the bars G, opening K, and set-screw I. Any suitable mechanical device may be used for this purpose.

50 I do not limit my invention to the design herein set forth for supporting the leaves F. Any method of support may be employed.

I do not limit my invention to leaves F, having plane surfaces. The surface may be curved transversely or longitudinally, or both.

55 I do not limit my invention to the position for the leaves F, shown on the drawings.

It is evident that in my invention it is not essential that the materials be discharged along the sides of the car, as indicated. The 60 materials may be discharged in any direction relative to the axis of the car, provided they are discharged in approximately two equal volumes and that the general direction of discharge be toward two diametrically-opposite points of the hopper B. It is essential, 65 however, that the materials be discharged against the leaves F. It is also evident that

in order to secure a fairly-uniform distribution of material around the hopper B it is essential that the lower edges of the leaves F 70 be located below the apex of the bell C and at such distance from the surface of the bell C as to limit the amount of material which will pass between the surface of the bell C and the lower edges of the leaves F at the 75 points where these two parts most nearly approach each other. These least distances between the lower edges of the leaves F and the surface of the bell C will vary according to the character of the material supplied to the 80 furnace. In consequence of the foregoing the leaves F may be located in any position, provided that a horizontal section through each leaf is approximately normal to the vertical plane containing the two diametrically-op- 85 posite points of the hopper B, toward which the car discharges its contents, and provided the lower edges of the leaves F are located below the apex of the bell C in such position as to secure a fairly-uniform distribution of 90 materials around the hopper B.

Having fully described my invention, what I claim, and desire to cover by Letters Patent, is—

1. In a blast furnace charging apparatus, 95 the combination of the bell C, the hopper B, a car O so constructed that its contents are discharged, in approximately two equal volumes, in a general direction toward two diametrically opposite points of the hopper B, 100 the leaves F against which the materials contained in the car O are discharged, said leaves being placed on opposite sides of the center of the hopper B and having their lower edges below the apex of the bell C and at such distance from the bell C that the combined influence of the leaves F and the surface of the bell C operates to distribute the materials discharged from the car O in a fairly uniform manner around the hopper B. 110

2. In a blast furnace charging apparatus, the combination of the bell C, the hopper B, a car O so constructed that its contents are discharged, in approximately two equal volumes, in a general direction toward two diametrically opposite points of the hopper B, 115 the leaves F against which the materials contained in the car are discharged, said leaves being placed on opposite sides of the center of the hopper B and having their lower edges 120 below the apex of the bell C and capable of being adjusted so that their lower edges may be moved toward or away from the surface of the bell C in order that the lower edges of the leaves F may be so placed that the combined influence of the leaves F and the surface of the bell C will operate to distribute 125 the materials discharged from the car O in a fairly uniform manner around the hopper B.

FRANK C. ROBERTS.

Witnesses:

ALBERT H. JOHNSON,
L. KRYDER LOCHMAN.