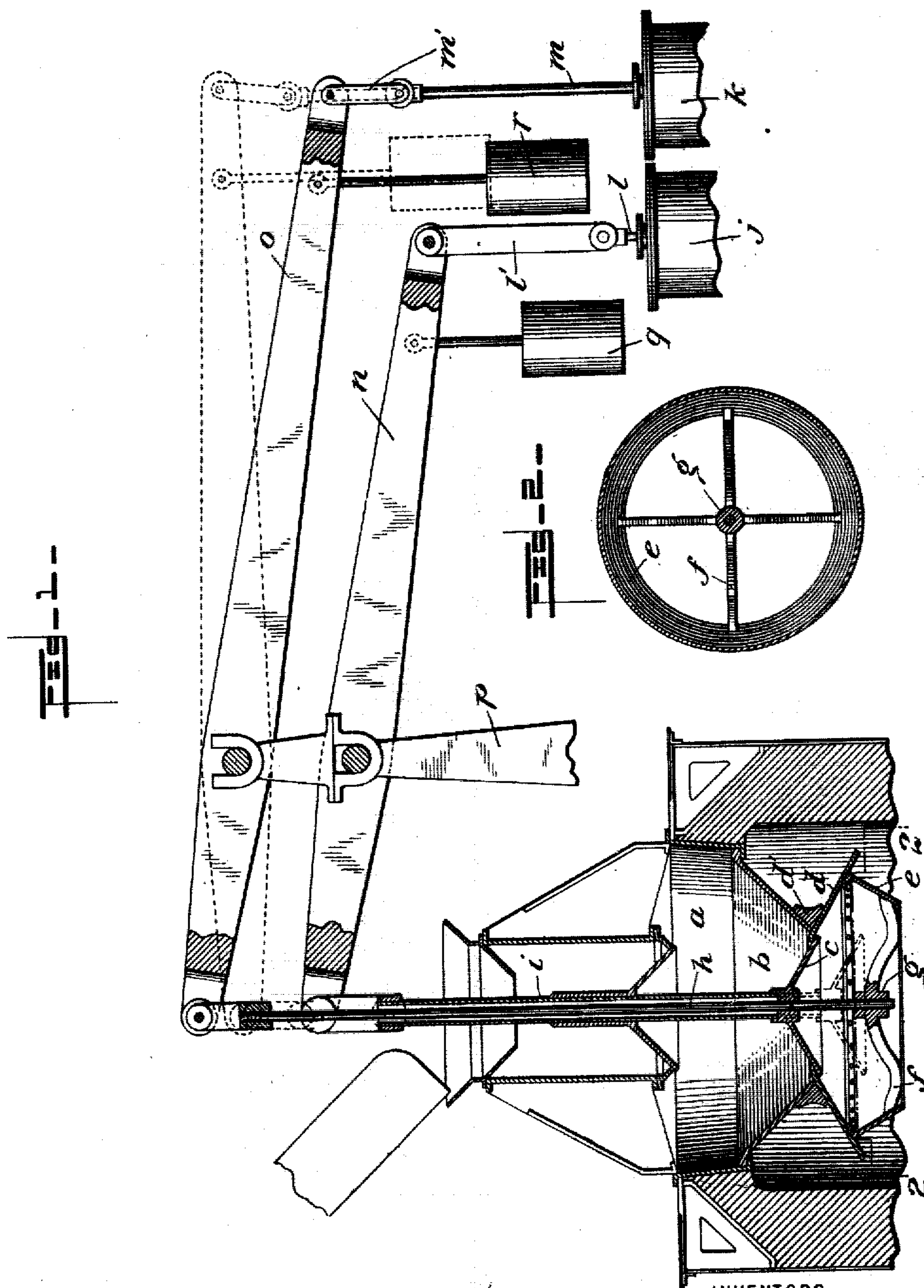


No. 828,796.

PATENTED AUG. 14, 1906.

T. F. & J. G. WITHERBEE.
CHARGING APPARATUS.
APPLICATION FILED AUG. 15, 1904.



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THOMAS FRANCIS WITHERBEE AND JOHN GILMAN WITHERBEE, OF
PORT HENRY, NEW YORK.

CHARGING APPARATUS.

No. 828,796.

Specification of Letters Patent.

Patented Aug. 14, 1906.

Application filed August 15, 1904. Serial No. 220,795.

To all whom it may concern:

Be it known that we, THOMAS FRANCIS WITHERBEE and JOHN GILMAN WITHERBEE, citizens of the United States, and residents of Port Henry, in the county of Essex and State of New York, have invented a new and Improved Charging Apparatus, of which the following is a full, clear, and exact description.

Our invention relates to a charging device for blast-furnaces and the like.

The requirements of a charging apparatus at the present time are that it shall be capable of varying the manner of distributing the charge at will and that it shall be adapted to mechanical filling.

It is the principal object of our invention to attain these results.

We are aware that double charging-bells have been used to distribute the charge in a certain manner; but they have consisted of an annular bell in the form of an inverted V combined with a small bell carried by the annular bell and with an inner hopper rising from the apex of the annular bell, as shown by Patent No. 518,769, issued to T. F. Witherbee on April 24, 1894. Such apparatus is not adapted to mechanical filling, and so fails to meet one of the conditions now desired to suit the present blast-furnaces.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in both the figures.

Figure 1 is a vertical sectional view of the upper part of a blast-furnace, showing in section a preferred form of our invention; and Fig. 2 is a bottom view of the bell shown in Fig. 1.

The furnace is provided with the usual hopper *a* and lip-ring *b*. A bell *c* is employed to close the lower portion of the lip-ring. A conical ring *d* is also provided below the bell, but having a surface mounted above the lower edge thereof, so that the bell will support the conical ring in an obvious manner. To prevent the upper edge of the ring *d* from catching on the lip-ring *b*, guides *d'* are provided upon the latter.

An inverted conical ring *e* is placed below the ring *d* and may be formed integral with said ring or may be secured to it in any desired or convenient manner. The ring *e* is provided with a skeleton frame consisting of

arms *f*, and with a hub *g*, preferably integrally connected with the arms, and is supported by a rod *h*, secured to the hub and passing through a hollow sleeve *i*, which supports the bell *c*. The rings *d* and *e* are designed as distributors for the material charged into the hopper. It will be obvious that the lowering of the bell *c* without lowering the ring *d* will permit the material to be charged through the bottom of the lip-ring and distributed in the center of the furnace, the ring *e* acting to prevent its distribution near the walls and to keep the material in the center. This operation is indicated in dotted lines in Fig. 1. It will also be obvious that by lowering both the bell *c* and ring *d* the two will constitute a single bell to operate in the same manner as the single bells now employed and that the material will then be distributed over the outer portion of the furnace near its walls. For the purpose of accomplishing these operations cylinders *j* and *k* are provided, having piston-rods *l* and *m*, respectively. These rods are connected by links *l'* and *m'* with levers *n* and *o*, which are pivoted to a stationary part *p* of the furnace and are connected with the sleeve *i* and rod *h*, respectively. Counterweights *q* and *r* may also be provided to keep the bell and ring in their highest position and prevent the discharge of materials from the hopper at undesired times.

It will be understood that the charge passing through the space left by the bell *c* will freely drop through the skeleton frame *f*. It will also be understood that the angle of the ring *e* to the vertical may be changed to suit the conditions prevailing in the furnace or the particular kind of material employed and that, if desired, it may be vertical, as well as inclined.

As the central and circumferential charging are done by separate operations, by varying the kind or quantity of the materials previously deposited in the hopper beneficial results may be obtained. For instance, should the furnace be too open or free in the center, more fine materials may be deposited in that locality simply by loading the hopper *a* with that class of material and lowering the bell *c*. A similar operation may be performed for causing the outside of the charge to be less free.

It will be understood that the particular

form of the device which we have illustrated and described merely represents one embodiment of our invention and that the latter is not limited thereto.

5 Many modifications may obviously be made and other forms of operating devices may be substituted for those shown without departing from the spirit of the invention.

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

In a charging device the combination of a feed-hopper provided with a lip-ring having an open bottom, a conical ring having an
15 open top movable downwardly from the bottom of said lip-ring and adapted to be seated against the lower edge of the lip-ring, the opening in the top of said ring being of slightly less diameter than the opening in the
20 bottom of the lip-ring, said conical ring also having an inverted conical distributor extending downwardly therefrom near the

outer edge of the conical ring, a spider connected with the lower edge of said distributor, a rod connected with the spider for raising
25 and lowering the conical bell, means for raising and lowering the rod, a main bell located within the conical ring and of a diameter greater than the diameter of the opening therein, whereby the bell is adapted to close
30 the opening in the conical ring, and the ring and bell together close the opening in the lip-ring, and means for moving the main bell downwardly from the opening in the conical ring independently of the motion of the lat-
35 ter.

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

THOMAS FRANCIS WITHERBEE.
JOHN GILMAN WITHERBEE.

Witnesses:

WM. VIGGERS,
E. L. CHATHAM.