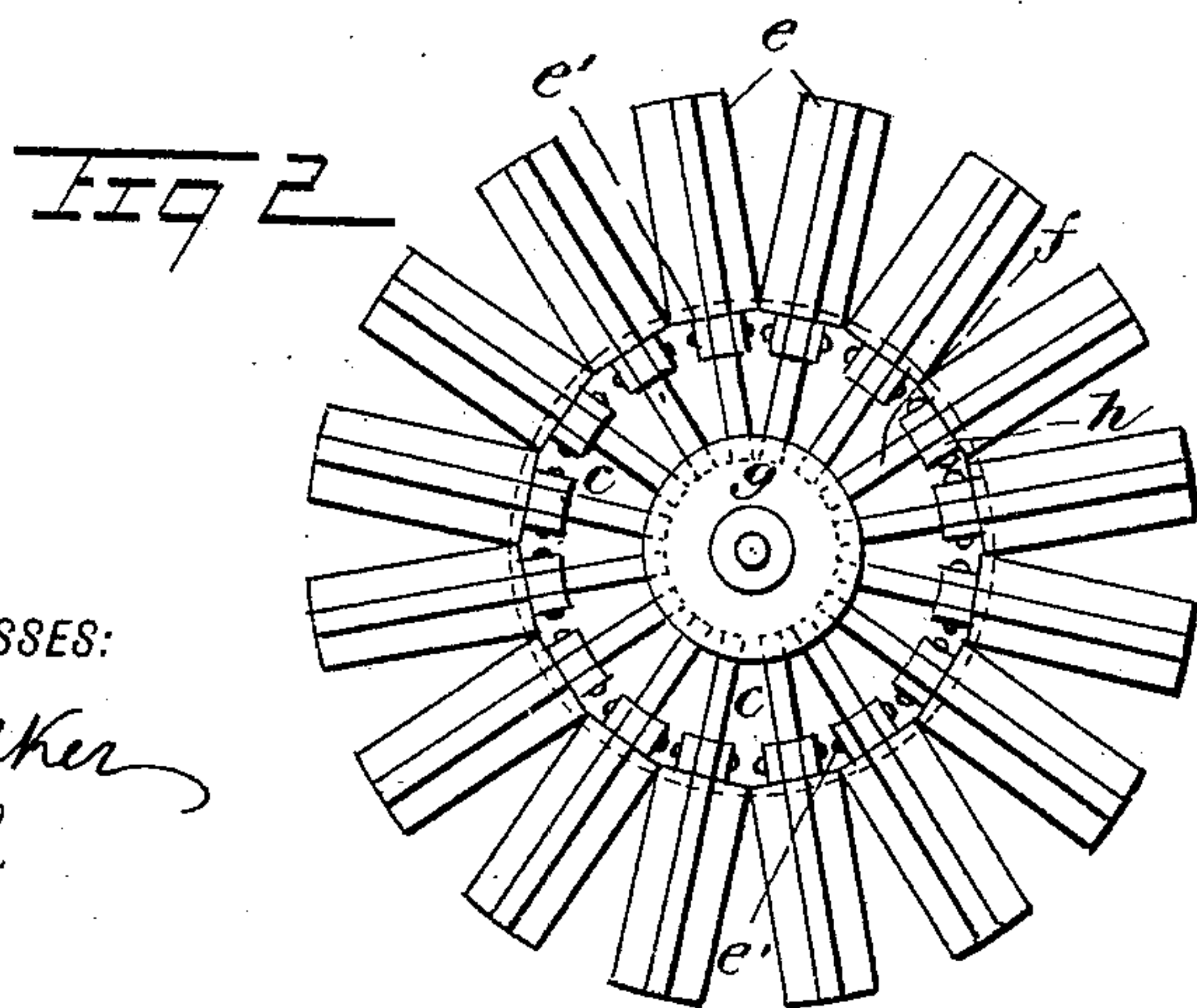
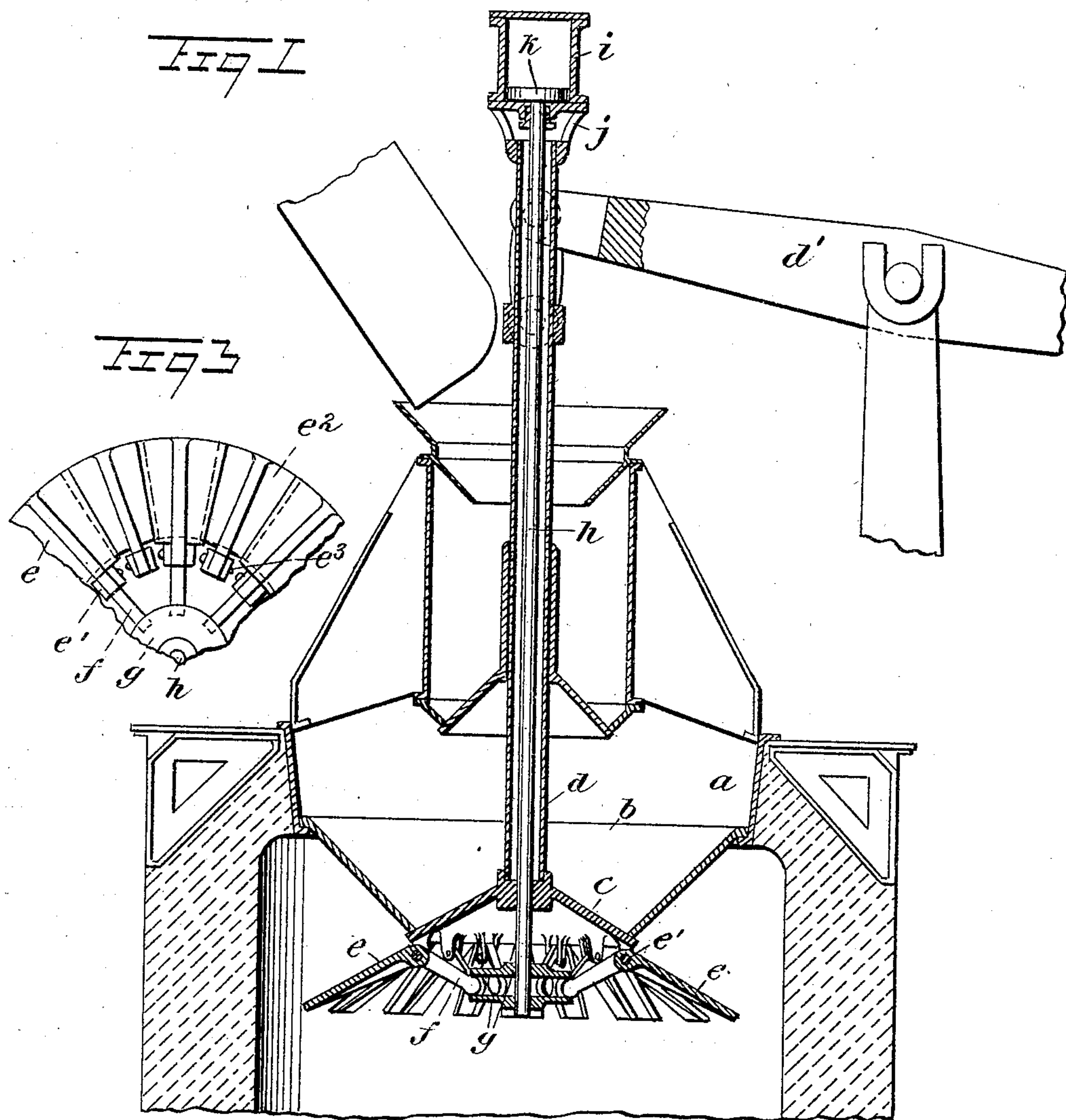


No. 796,784.

PATENTED AUG. 8, 1905.

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



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

CHARGING APPARATUS.

No. 796,784.

Specification of Letters Patent.

Patented Aug. 8, 1905.

Application filed August 15, 1904. Serial No. 220,794.

To all whom it may concern:

Be it known that we, JOHN GILMAN WITHERBEE and THOMAS FRANCIS 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 which is capable of many uses, but is especially designed for use on blast-furnaces.

The principal object of our invention is to provide a bell and hopper which can be used in connection with a modern "skip-hoist," as well as with a hand-filled furnace.

A further object is to provide a bell with a variable diameter, so as to allow a varied distribution of the charge within certain limits in the furnace.

With all of the single bells which have hitherto been devised the effect has generally been to leave a more open center in the charge, for the reason that coarse fuel, ore, and flux roll into the center, while most of the fine fuel and flux and practically all of the fine ore remain at or near the circumference.

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 all the figures.

Figure 1 is a vertical central section of the upper end of a blast-furnace, showing a preferred form of our invention applied thereto. Fig. 2 is a bottom view of the bell in an expanded position; and Fig. 3 is a fragmentary bottom view of the bell in contracted position, showing a modification.

The usual hopper *a* and lip-ring *b* are provided, and a bell *c* is constructed with its main portion only large enough to close the bottom of the lip-ring. The bell *c* is supported by a hollow sleeve *d*. Suspended from the lower edge of the bell are a series of hinged wings *e*, pivoted to the bell at the points *e'* and having rearwardly-extending portions *f*. They may be all of the bell-crank form, as shown in Figs. 1 and 2, or each alternate one may be of that form and the others may be shorter, as shown at *e''* in Fig. 3, and pivoted at *e''* to the edge of the bell without having any rearwardly-extending portion *f*. The rearwardly-extending portion *f* is de-

signed for engagement with a double-flanged projection *g* upon the lower end of a rod *h*, which extends through the sleeve *d*.

It will be seen that by reciprocating the rod *h* the wings will be swung about their pivots, so as to provide for a larger or smaller diameter of the bell, as desired. By bringing the wings *e* into nearly vertical position the bell will be given its minimum diameter and will be of substantially the same size as the main portion *c*, while by spreading them out the diameter may be increased to as great a size as may be desired. It will be understood that in the modification shown in Fig. 3 the operation of the wings *e*, which are wide enough to engage with the outer edges of the wings *e''*, which are freely hung upon their pivots *e''*, will cause the wings *e''* to move with the wings *e*. This will accomplish the same result as the operation of the device shown in Fig. 2.

It will be obvious that any desired ratio between the minimum and maximum diameters may be provided, according to the design of the parts of the bell and the conditions prevailing, and also that any size of bell may be produced between these extremes by fixing the wings at the proper intermediate angle. The rod *h* may be raised and lowered in any desired manner; but we prefer to operate it by a cylinder *i*, mounted upon the sleeve *d* by means of a yoke *j* and carrying a piston *k*, mounted upon the upper end of the rod *h*. The piston may be operated by gas, compressed air, liquid, water, or the like, and the sleeve *d* may be operated by a lever *d'* in the usual manner or in any other desired way. By means of this construction the bell may be allowed to collapse while delivering the charge into the furnace by simply allowing the pressure to escape, and thus the materials are deposited in a wide ring, thereby approaching hand-filling. The same result could also be accomplished by expanding the bell by a contrary application of the cylinder.

It will be understood that while we have described and illustrated a particular embodiment of the invention, the latter is not limited to the form shown, but many modifications may be made therein without departing from the spirit of the invention.

Having thus described our invention, we

claim as new and desire to secure by Letters Patent—

1. The combination of a hopper, a lip-ring, a bell for distributing material, said bell being capable of closing the bottom of the ring and moving down below it, wings movably mounted on the bell, a support for the bell, and means mounted on said support for swinging the wings, said means comprising a piston and cylinder.

2. A charging device, comprising a bell having movable wings, a hollow support for the bell, a rod in said support pivotally connected with the wings, means for reciprocating the rod to positively move the wings in either direction, and means for moving said support.

3. In a charging device, the combination of a hopper, a lip-ring, a bell adapted to close said lip-ring, a series of wings pivoted to said bell and having inwardly-extending projections, and a reciprocatory rod having means for engaging opposite sides of said projections upon the wings whereby the wings may be positively moved by the rod in either direction.

4. In a charging device, the combination of a hopper, a lip-ring, a bell adapted to close said lip-ring, a series of wings pivoted to said bell and having inwardly-extending projections, a reciprocatory rod having means for engaging said projections upon the wings, a piston connected with said rod, a sleeve secured to the bell and having a passage for the reception of said rod, and means mounted on said sleeve for moving the rod.

5. In a blast-furnace-charging device, the combination of a bell, a series of wings pivoted to the lower edge thereof and having inwardly-extending projections, a reciprocatory

rod, and a double-flanged projection upon said rod engaging with the ends of said projections upon the wings for transmitting motion from the rod to the wings.

6. In a charging device, the combination of a charging-bell, a series of wings movably mounted thereon and having inwardly-extending projections, a reciprocatory rod, means on the rod for engaging said projections on the wings, a piston connected with said rod, a sleeve rigidly connected with the bell and having a passage therethrough for the reception of said rod, a power-cylinder mounted upon said sleeve and containing said piston, and a lever connected with said sleeve for reciprocating it.

7. In a blast-furnace-charging device, the combination of a hopper, a lip-ring, a bell adapted to close the lower end of said lip-ring, a series of wings pivoted to the lower edge of said bell and having inwardly-extending projections, a reciprocatory rod, a double-flanged projection upon said rod engaging with the ends of said projections upon the wings, a piston on the end of said rod, a sleeve rigidly secured to the bell and having a passage there-through for the reception of said rod, a power-cylinder mounted upon said sleeve and containing said piston, and a lever for reciprocating said sleeve.

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

JOHN GILMAN WITHERBEE.

THOMAS FRANCIS WITHERBEE.

Witnesses:

WM. VIGGERS,

E. L. CHATHAM.