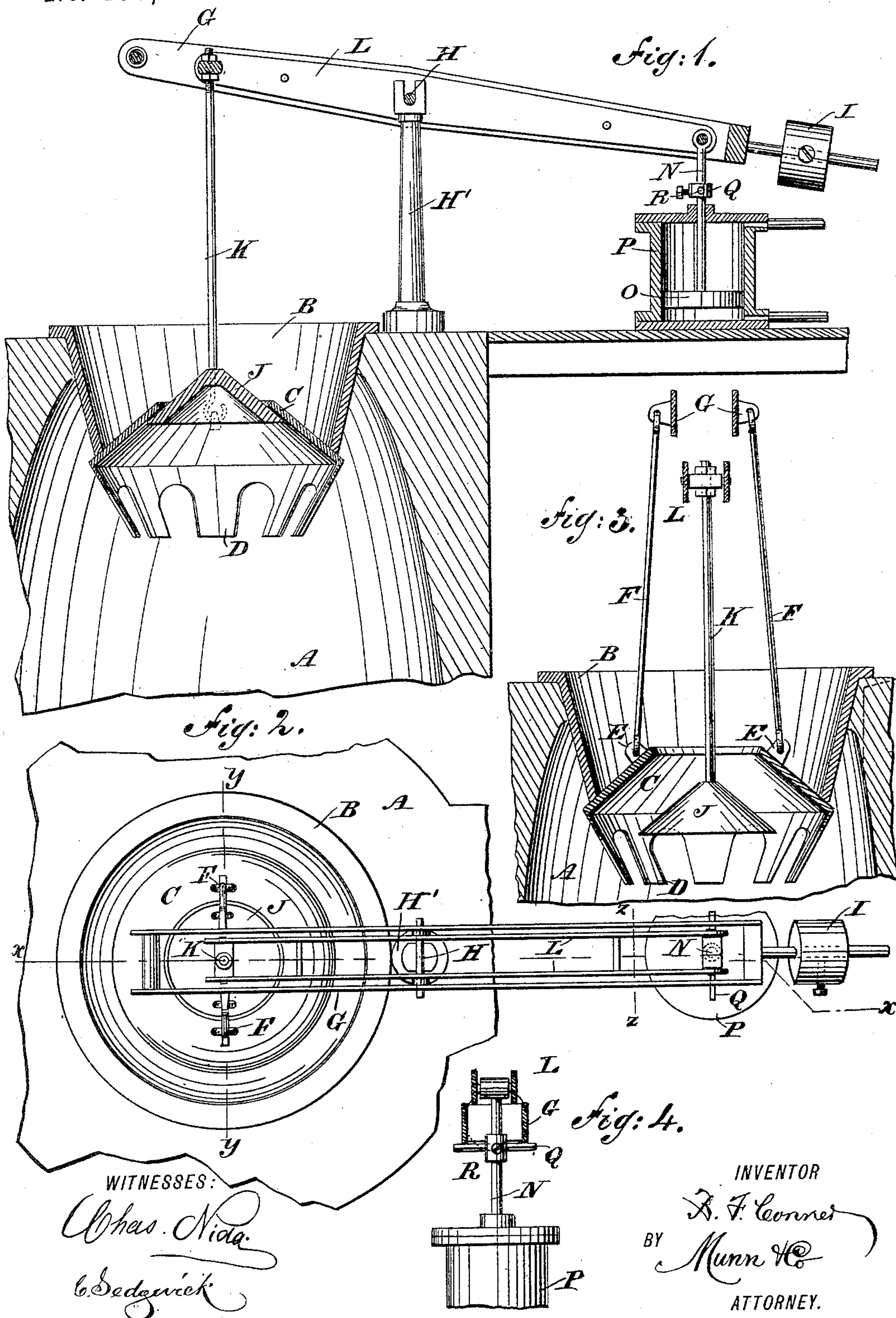


(No Model.)

B. F. CONNER.
BELL AND HOPPER FOR BLAST FURNACES.

No. 460,849.

Patented Oct. 6, 1891.



WITNESSES:

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BENJAMIN FRANKLIN CONNER, OF COLUMBIA, PENNSYLVANIA.

BELL AND HOPPER FOR BLAST-FURNACES.

SPECIFICATION forming part of Letters Patent No. 460,849, dated October 6, 1891.

Application filed May 1, 1891. Serial No. 391,197. (No model.)

To all whom it may concern:

Be it known that I, BENJAMIN FRANKLIN CONNER, of Columbia, in the county of Lancaster and State of Pennsylvania, have invented a new and Improved Bell and Hopper for Blast-Furnaces, of which the following is a full, clear, and exact description.

The invention relates to bells and hoppers for blast-furnaces, such as shown and described in the Letters Patent of the United States, No. 445,850, granted to me February 3, 1891.

The object of the present invention is to provide a new and improved bell and hopper mechanism, which is simple and durable in construction, and is adapted to evenly distribute the charging material in the furnace, or to throw part of the said material to the center only or to the walls, as desired.

The invention consists of certain parts and details and combinations of the same, as will be described hereinafter, and then pointed out in the claims.

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

Figure 1 is a sectional side elevation of the improvement on the line xx of Fig. 2. Fig. 2 is a plan view of the same. Fig. 3 is a transverse section of the same on the line yy of Fig. 2, and Fig. 4 is a transverse section of part of the improvement on the line zz of Fig. 2.

The stack-furnace A supports at its upper end the usual cone-shaped hopper B, adapted to be closed at its lower or small end by a bell C, formed in the shape of a truncated cone, as is plainly illustrated in the drawings, the base of the cone being formed with inwardly and downwardly projecting prongs or arms D, arranged in the form of a truncated cone, but in an inverted position, as is shown in Figs. 1 and 3.

The outer surface of the truncated cone-shaped bell C is formed with lugs E, connected with rods F, extending upward and connected with beams G, pivoted on a pivot H, held in a post H', arranged on top of the stack-furnace A. The rear ends of the beams G are provided with an adjustable weight I,

serving to counterbalance the weight of the bell C and the charge thereon.

Into the small opening of the hopper B fits from underneath a second bell J, made cone-shaped and having its base extended a short distance within the upper end of the cone C, and on the under side thereof, as is plainly illustrated in Fig. 1, so that when the two bells are in a closed position, as shown in Fig. 1, the bell J forms a cap for the bell C. The bell J is provided at its apex with a rod K, extending upward and pivotally connected with a lever L, fulcrumed on the pivot H, carrying the beam G. The rear end of the lever L is pivotally connected with a piston-rod N, carrying a piston O, fitted to slide in a cylinder P and adapted to be actuated by a suitable motive power permitted to enter the cylinder at either end. On the piston-rod N outside of the cylinder P is fitted to slide an arm Q, adapted to be secured in place by means of a set-screw R or other suitable device. When the two bells are closed, as illustrated in Fig. 1, the piston O is in its lowest position and the arm Q is held a suitable distance below the beam G.

When it is desired to charge the furnace near the middle, the piston O is actuated so as to slide upward in the cylinder P, whereby the lever L is caused to swing, and thereby the bell J is lowered. An opening is thus established between the bells J and C at the upper or small end of the latter, so that the material within the middle of the hopper B is free to slide through the said opening and over the bell J upon the arms D, which guide part of the material to the center, and part passes farther out near to the wall of the stack through the spaces between the said arms D. When it is desired to charge the balance of the material contained in the hopper B, then a farther upward motion of the piston O brings the arm Q into engagement with the under sides of the beams G, so that the latter are caused to swing, whereby the front ends of the said beams descend and the bell C is unseated from the lower end of the hopper B, and the material from the latter passes into the stack close to the wall of the same. When it is desired to discharge all the material contained in the hopper B close to the wall of the

stack, then the beams G are caused to swing downward at their front ends, so that the bell C swings in the same direction and carries with it the bell J, which remains seated within the small end of the bell C. All the material in the hopper B now passes out over the bells J and C close to the wall of the stack.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is--

1. The combination, with a bell made in the shape of a truncated cone and arranged to close the hopper and arms or prongs extending downward and inward from the base of the said bell, of a second bell made in the shape of a cone and adapted to fit into the top opening of the said truncated cone, and mechanism for supporting and operating the bells independently of each other, substantially as shown and described.

2. The combination, with a bell made in the shape of a truncated cone and arranged to close the hopper and arms or prongs extending downward and inward from the base of the said bell, of a second bell made in the shape of a cone and adapted to fit into the top opening of the said truncated cone, and means for raising and lowering the said second cone, so as to permit the material to pass through the small opening in the truncated cone upon the second cone and from the lat-

ter upon the said arms to pass to the center of the stack or through the spaces between the said arms, and mechanism for supporting and operating the bells independently of each other, substantially as shown and described.

3. The combination, with a hopper, of an upper or outer bell closing the hopper and having a central opening, a lower or inner bell arranged to close said opening, a counter-balanced beam above the hopper and supporting the outermost bell, a lever connected with the innermost bell, and a cylinder containing a piston, said piston connected with the said lever, substantially as shown and described.

4. The combination, with a hopper, of an upper or outer bell closing the hopper and having a central opening, a lower or inner bell arranged to close said opening, a counter-balanced beam above the hopper and supporting the outermost bell, a lever connected with the innermost bell, a cylinder containing a piston, said piston connected with the said lever, and an adjustable arm held on the piston-rod of the said piston and adapted to engage the said beam, substantially as shown and described.

BENJAMIN FRANKLIN CONNER.

Witnesses:

F. P. D. MILLER,
GEO. D. MILLER.