No. 781,615. PATENTED JAN. 31, 1905.

T. McDONALD.

BLAST FURNACE CHARGING APPARATUS.

APPLICATION FILED APR. 25, 1904.

3 SHEETS—SHEET 1.

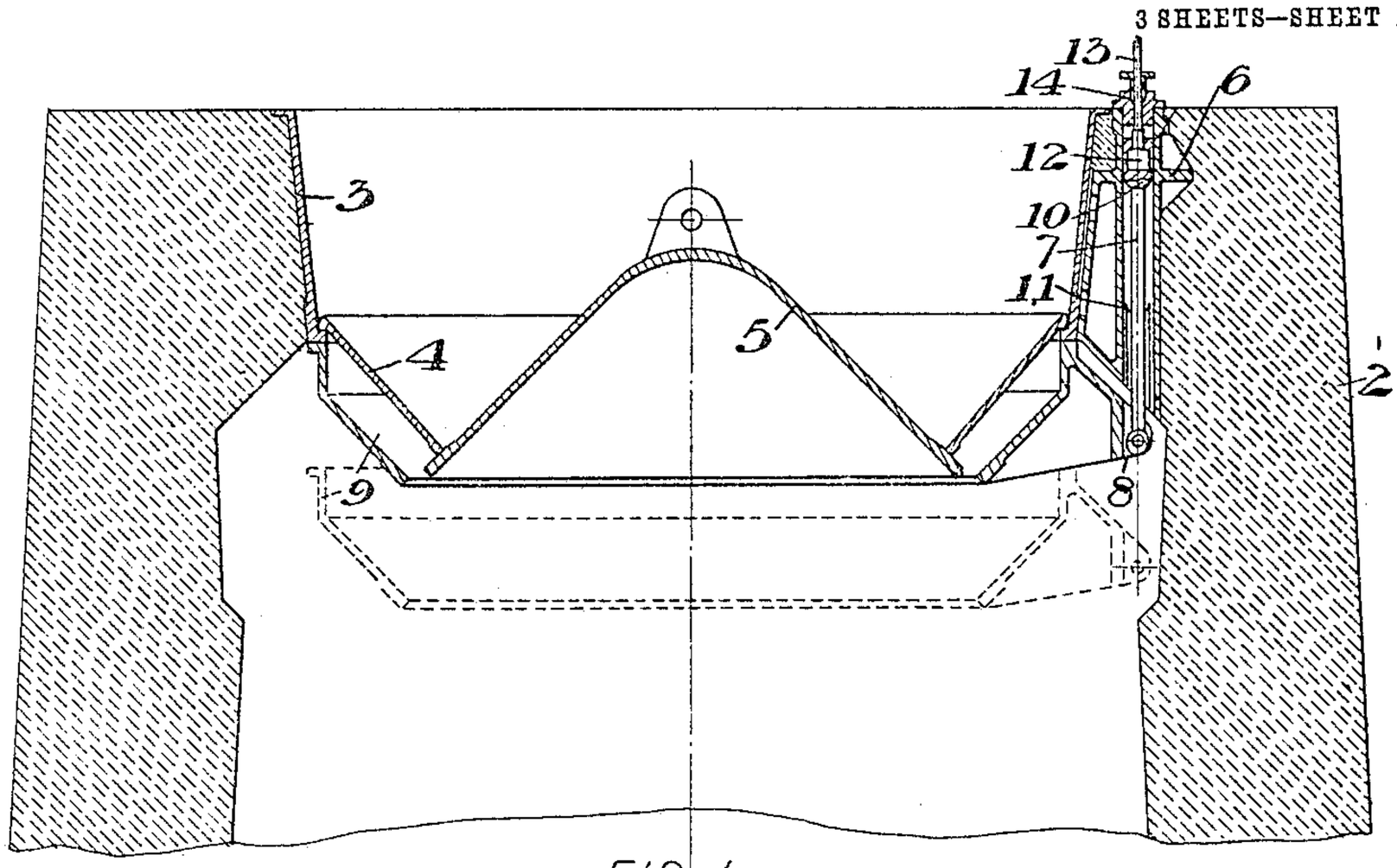

FIG. 1.

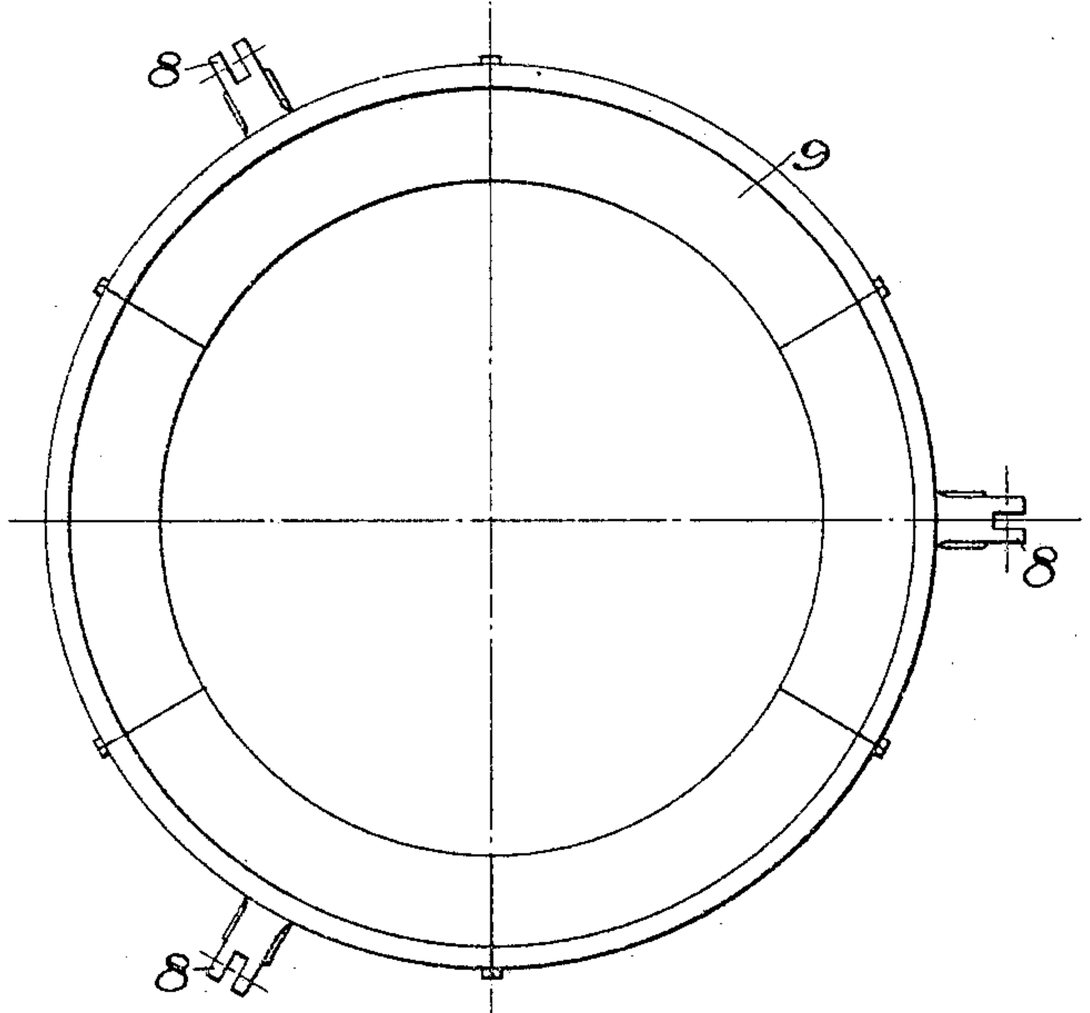

FIG. 2.

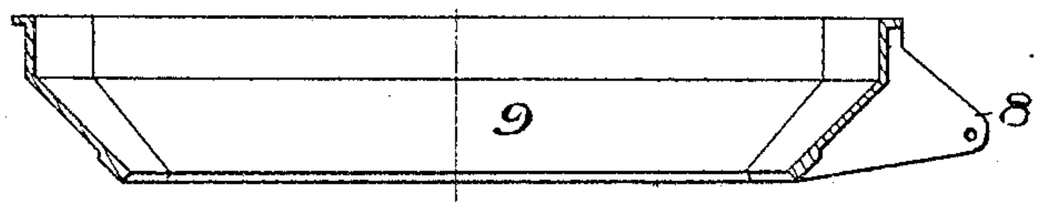

FIG. 3.

WITNESSES:

Warren W. Swartz

G. B. Fleming

INVENTOR:

Thomas McDonald

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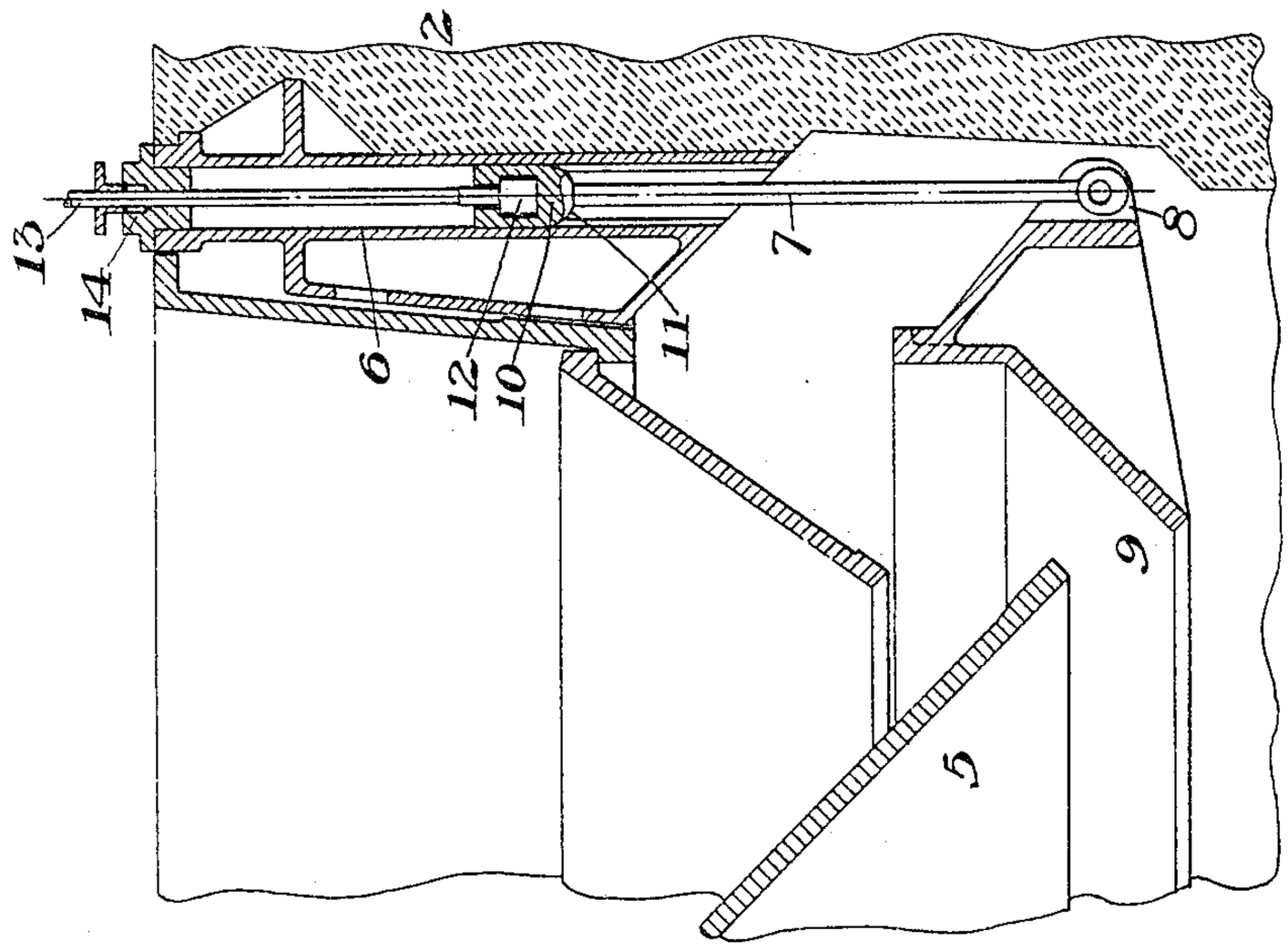
3 SHEETS—SHEET 2.



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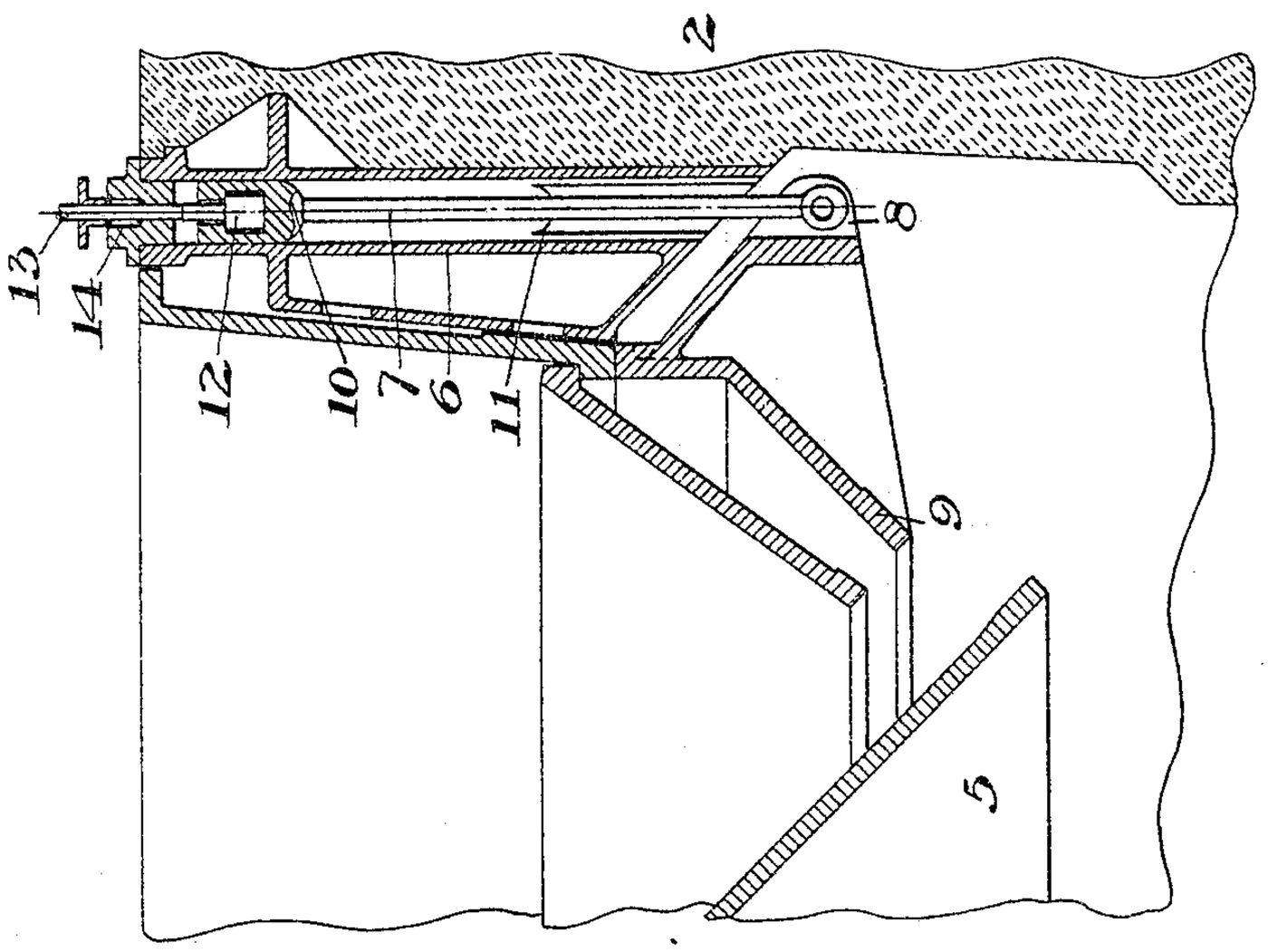


FIG. 4.

FIG. 6.

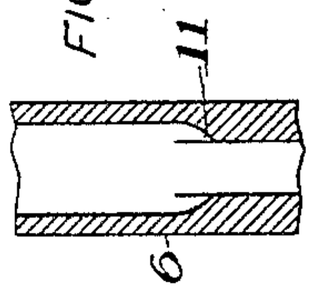
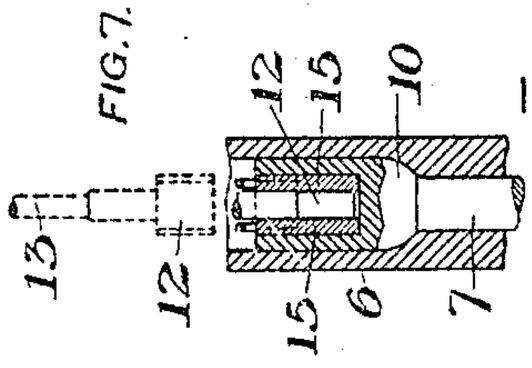


FIG. 7.



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No. 781,615. PATENTED JAN. 31, 1905.

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3 SHEETS—SHEET 3.

FIG. 8.

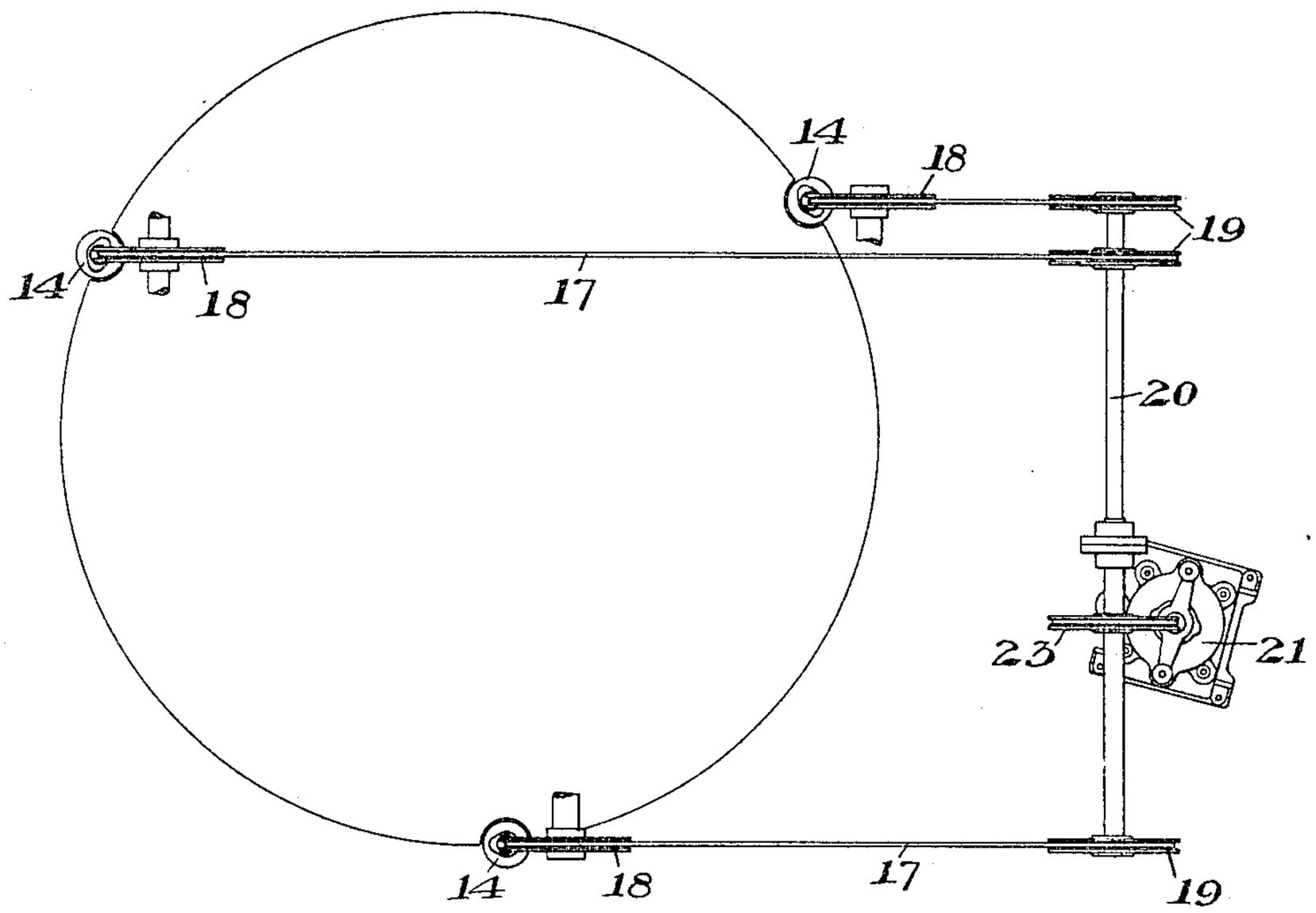
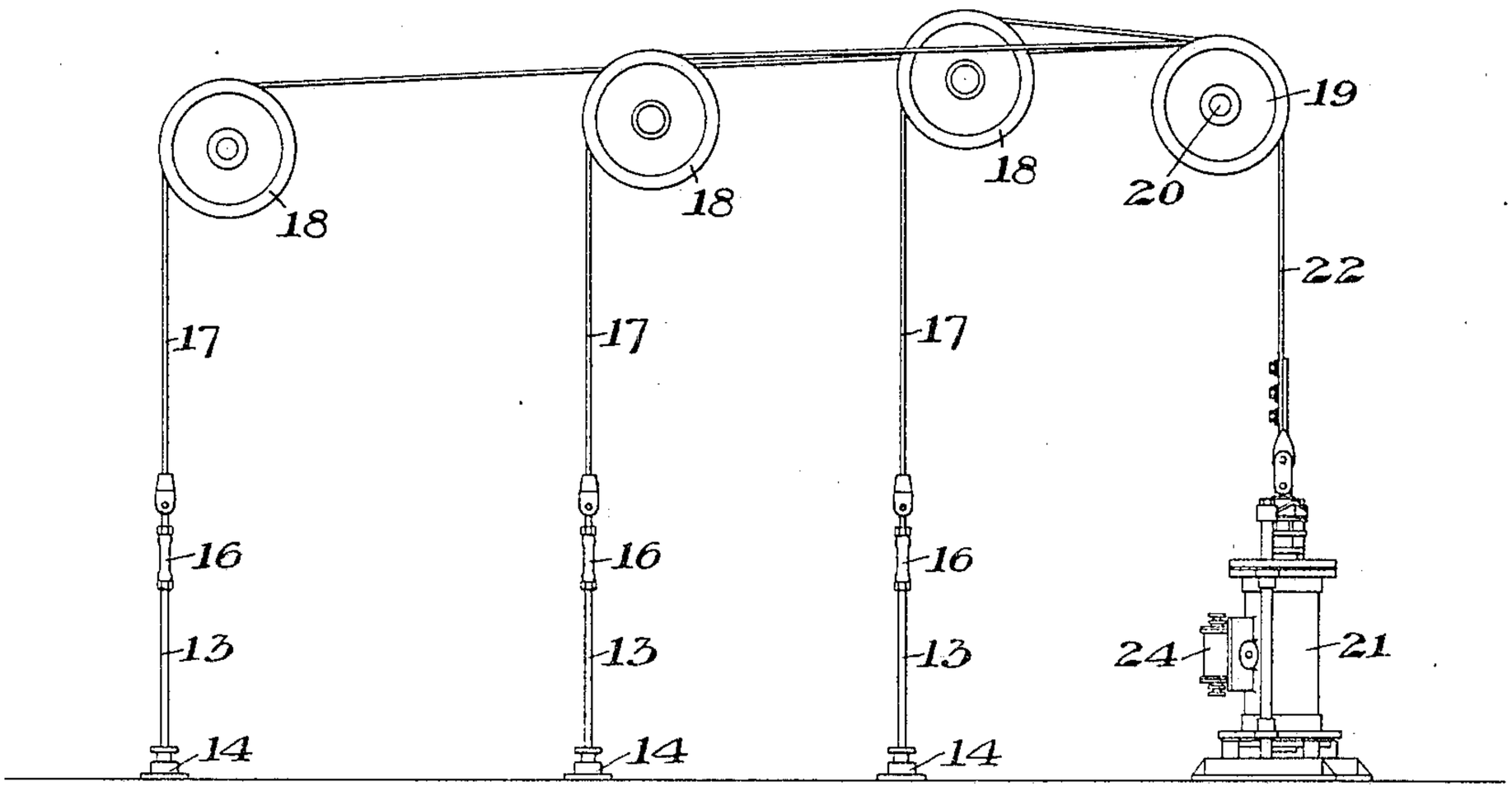


FIG. 9.



WITNESSES

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No. 781,615. Patented January 31, 1905.

UNITED STATES PATENT OFFICE.

THOMAS McDONALD, OF YOUNGSTOWN, OHIO.

BLAST-FURNACE-CHARGING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 781,615, dated January 31, 1905.

Application filed April 25, 1904. Serial No. 204,695.

To all whom it may concern:

Be it known that I, THOMAS McDONALD, of Youngstown, Mahoning county, Ohio, have invented a new and useful Blast-Furnace-Charging Apparatus, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a partial vertical section of a blast-furnace top provided with my improved movable deflector. Fig. 2 is a top plan view of the deflector-ring. Fig. 3 is a vertical cross-section of the same. Figs. 4 and 5 are partial vertical sections on a larger scale, showing the ring in raised and lowered positions, respectively. Figs. 6 and 7 are detail views hereinafter referred to, and Figs. 8 and 9 are respectively a top plan and a side elevation showing the operating connections for raising and lowering the deflector.

My invention relates to the deflectors employed in connection with blast-furnace-charging devices to distribute the charge. Heretofore these distributers, which are usually in the form of rings, have been held in a fixed position relative to the bell when in its lowered position—that is, when the bell was lowered to distribute the charge the distributing-ring acted upon the dropping charge in the same manner at all times.

I have found that a better distribution and more uniform working of the furnace can be obtained by employing a vertically-movable deflector, which is raised into inoperative position for a part of the charges and lowered into operative position for other of the charges.

In the drawings, 2 represents the top portion of a blast-furnace having the usual inclined hopper 3, with the hopper extension 4 and closed bell 5. Around the hopper I provide brackets 6, which are built into the masonry at separated points around the hopper, these brackets being of any suitable number. I have shown three of these tubular brackets, each having a vertical hole extending through it to receive a lifting-rod 7, the lower end of which is bolted between the forks 8 of wings projecting outwardly from the deflector-ring 9. The lifter-rod 7 is preferably provided with a head or enlargement 10, which rests on seat 11, formed in the lower portion of the casting, when the deflector-ring is in its lower operative position, as shown in dotted lines in Fig. 1.

In order to raise and lower the suspension-rods and provide a detachable connection therewith, I preferably form the enlarged portion or head 10 with an undercut socket which engages the T-head 12 of a lifting-stem 13, which extends upwardly through stuffing-box 14 in the upper end of the bracket. The socket and T-head are arranged so that the T-head will slip into the socket, and when turned around will form a rigid connection by which the suspension-rods may be raised and lowered. To prevent the T-head from turning after it is in locked position, I preferably drive in the locking-blocks 15 at the ends of the entrance-slot. These are withdrawn when it is desired to unlock and detach the parts. The lifter-stems 13 are connected at their upper ends by turnbuckles 16 with three wire ropes 17, which extend over upper pulleys 18 to sheaves 19 on the shaft 20. Their ends are secured to the sheaves 19, and the shaft 20 may be rotated by any suitable mechanism, such as the steam-cylinder 21, the piston of which is provided with a wire rope 22, the upper end of which is secured to the sheave 23. The cylinder is provided with a valve 24, having rope connections leading to the operating-floor, so that the operator can shift the valve, and thereby move the deflector to either of its positions shown in Figs. 4 and 5.

In using the apparatus I prefer to lift the deflector-ring and hold it in its inoperative position back of the hopper extension while two charges are dropped into the furnace. These two charges being deflected outwardly by the bell will form an annular ridge-shape heap around the outer portion of the charge. I then lower the deflector-ring into position of Fig. 5 and drop, preferably, one charge into the furnace while thus lowered. The central conical cavity left by the two charges will thus be partially built up by the third charge, which is deflected toward the center by the deflector-ring. The order of charging, how-

ever, may be varied without departing from my invention.

The advantages of my invention result from the better distribution and more even working of the furnace. The movable deflector affords a means for varying the distribution to correspond with the manner of working of the furnace at any particular period.

The shape of the deflector may be cylindrical, conical, or of other desirable form. The mechanism for raising and lowering may be varied widely, and other variations may be made without departing from my invention, since I consider myself the first to provide a deflector which can be raised to inoperative position or lowered to operative position.

I claim—

1. In blast-furnace-charging apparatus, a hopper, a bell arranged to close the same, a deflector-ring outside of the bell and independent of its movements, and means for vertically adjusting the ring independently of the bell; substantially as described.

2. In blast-furnace-charging apparatus, a hopper, a bell seating upwardly against it, a deflector-ring and connections arranged to raise and lower the deflector-ring independently of the bell; substantially as described.

3. In blast-furnace-charging apparatus, a hopper, a bell seating upwardly against it, a deflector-ring independent of the bell and arranged around the lower portion of the hopper when in inoperative position, and means for raising and lowering the ring; substantially as described.

4. In blast-furnace-charging apparatus, a hopper, vertical guides located around it, a bell seating upwardly against said hopper, operating connections extending through said guides and a vertically-adjustable deflector suspended on said connections; substantially as described.

5. In blast-furnace-charging apparatus, a hopper, a bell seating upwardly against the hopper, a vertically-adjustable deflector-ring, connections independent of the bell and leading from the deflector to the exterior of the furnace, and mechanism arranged to actuate said connections to raise and lower the deflector.

6. A blast-furnace having a hopper, a bell seating upwardly against it, a vertically-adjustable deflector, connections independent of the bell leading from the deflector to the exterior of the furnace, and means at a lower level for actuating the connections to shift the deflector; substantially as described.

7. In blast-furnace-charging apparatus, the combination with a hopper and a bell seating upwardly against it, of a vertically-adjustable deflector suspended below the hopper independently of the bell and arranged to deflect the material charged toward the center of the furnace when in operative position; substantially as described.

In testimony whereof I have hereunto set my hand.

THOMAS McDONALD.

Witnesses:
PAUL L. OTT,
WARREN F. PERRY.