

No. 768,208.

PATENTED AUG. 23, 1904.

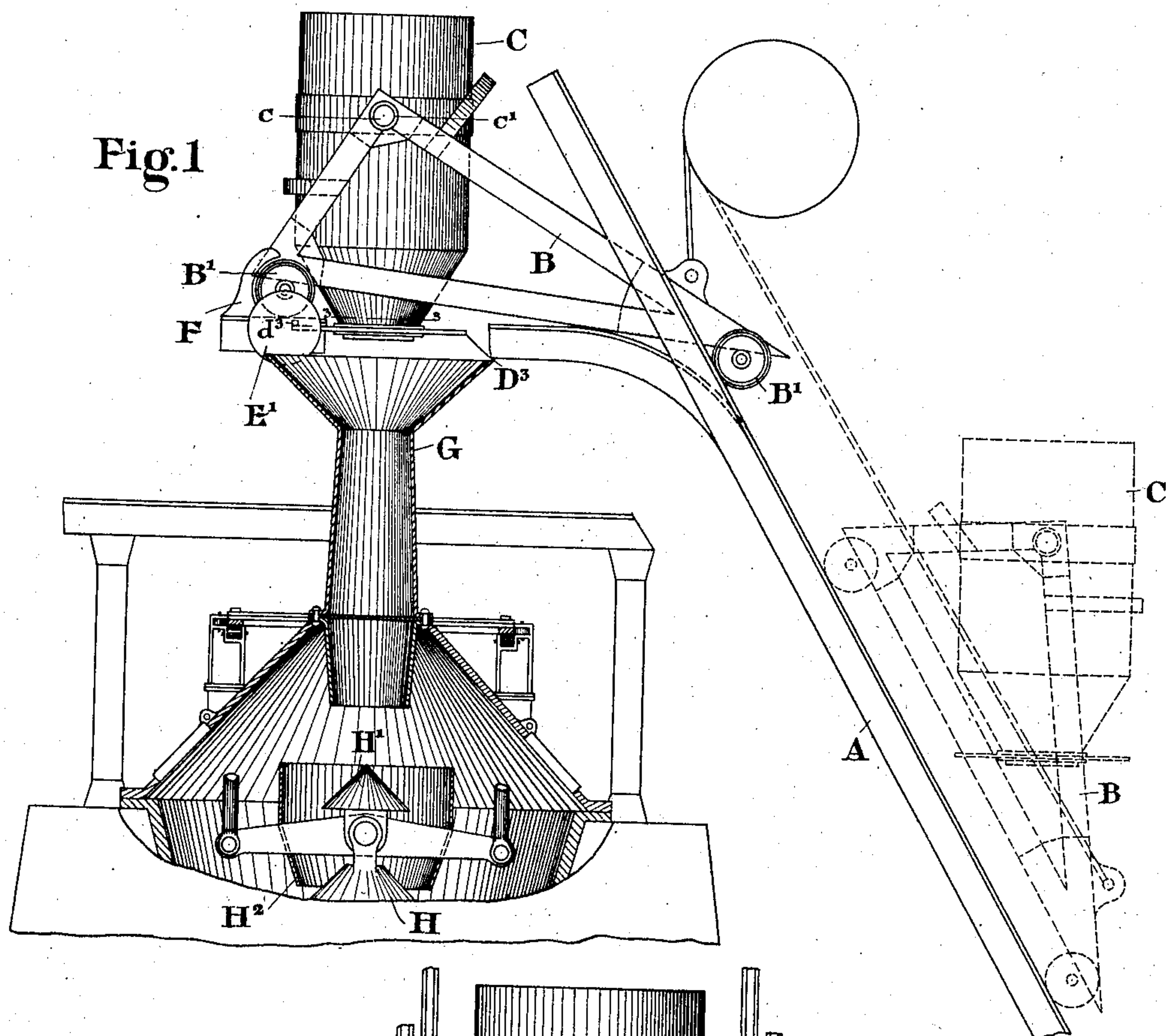
S. W. VAUGHEN, J. B. McCLURE & A. J. BOYNTON.

SKIP CAR OR HOIST FOR BLAST FURNACES.

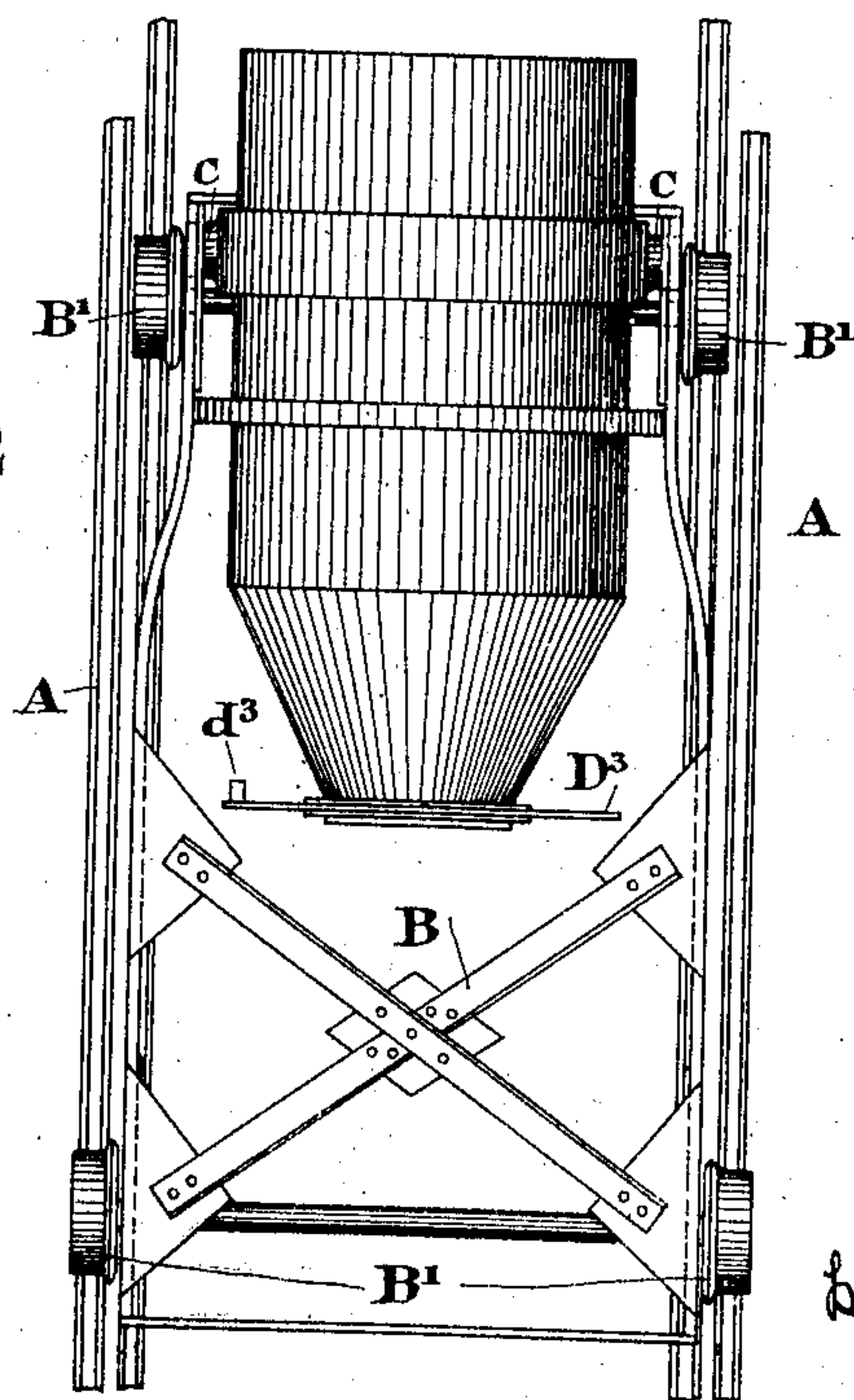
APPLICATION FILED APR. 7, 1903.

NO MODEL.

3 SHEETS—SHEET 1.



**Fig. 2**



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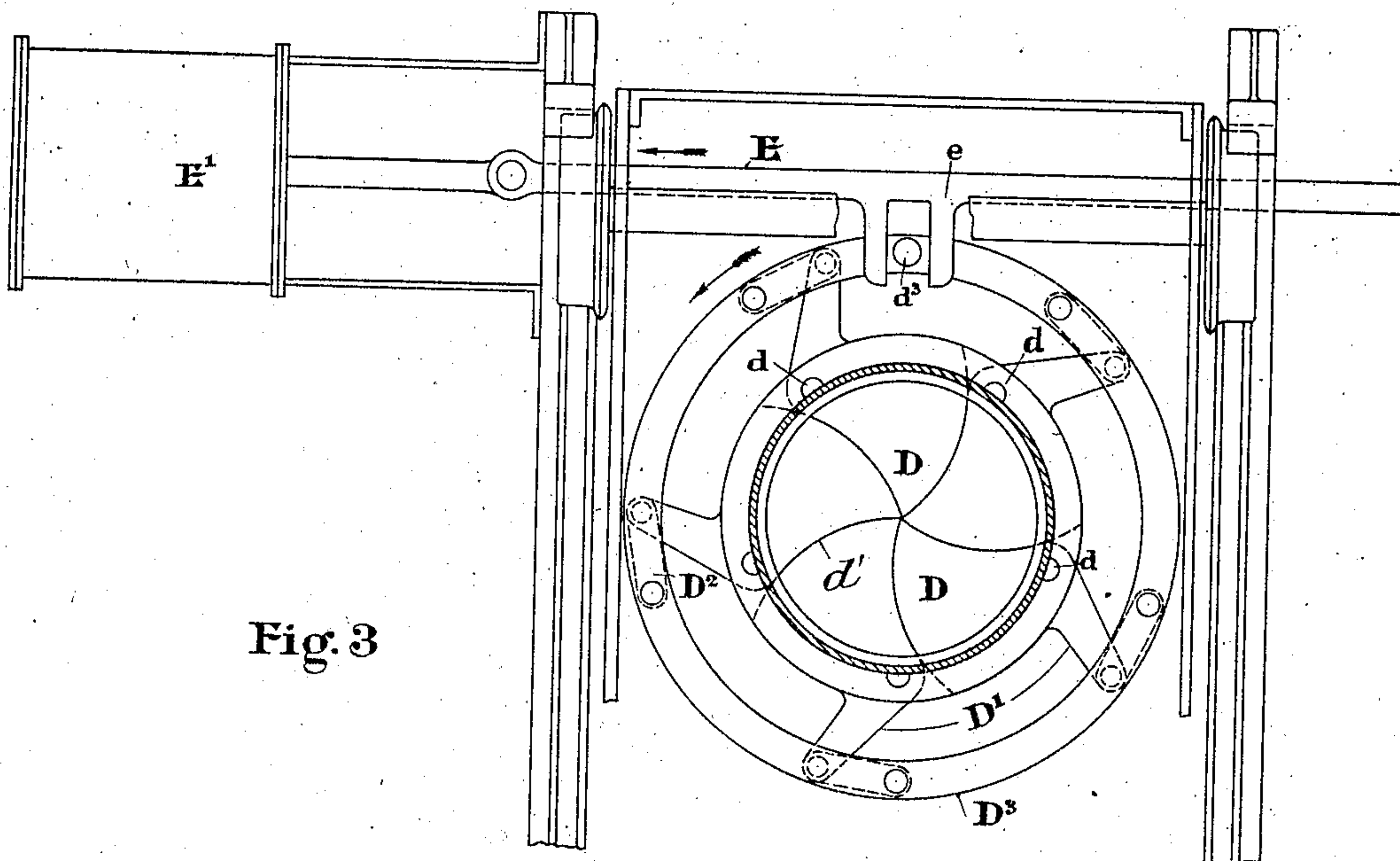
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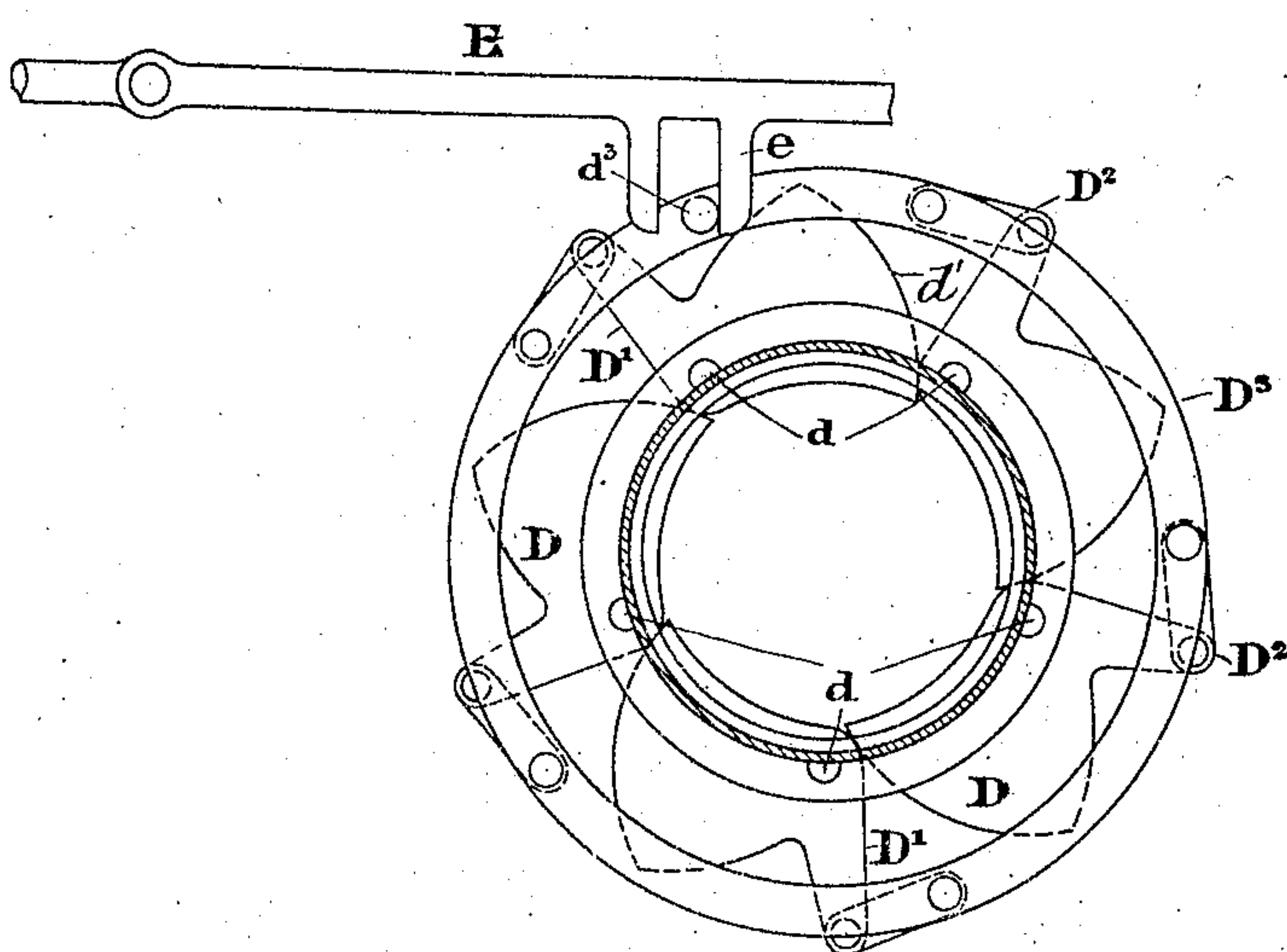
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NO MODEL.

3 SHEETS—SHEET 2.



**Fig. 3**



**Fig. 4**

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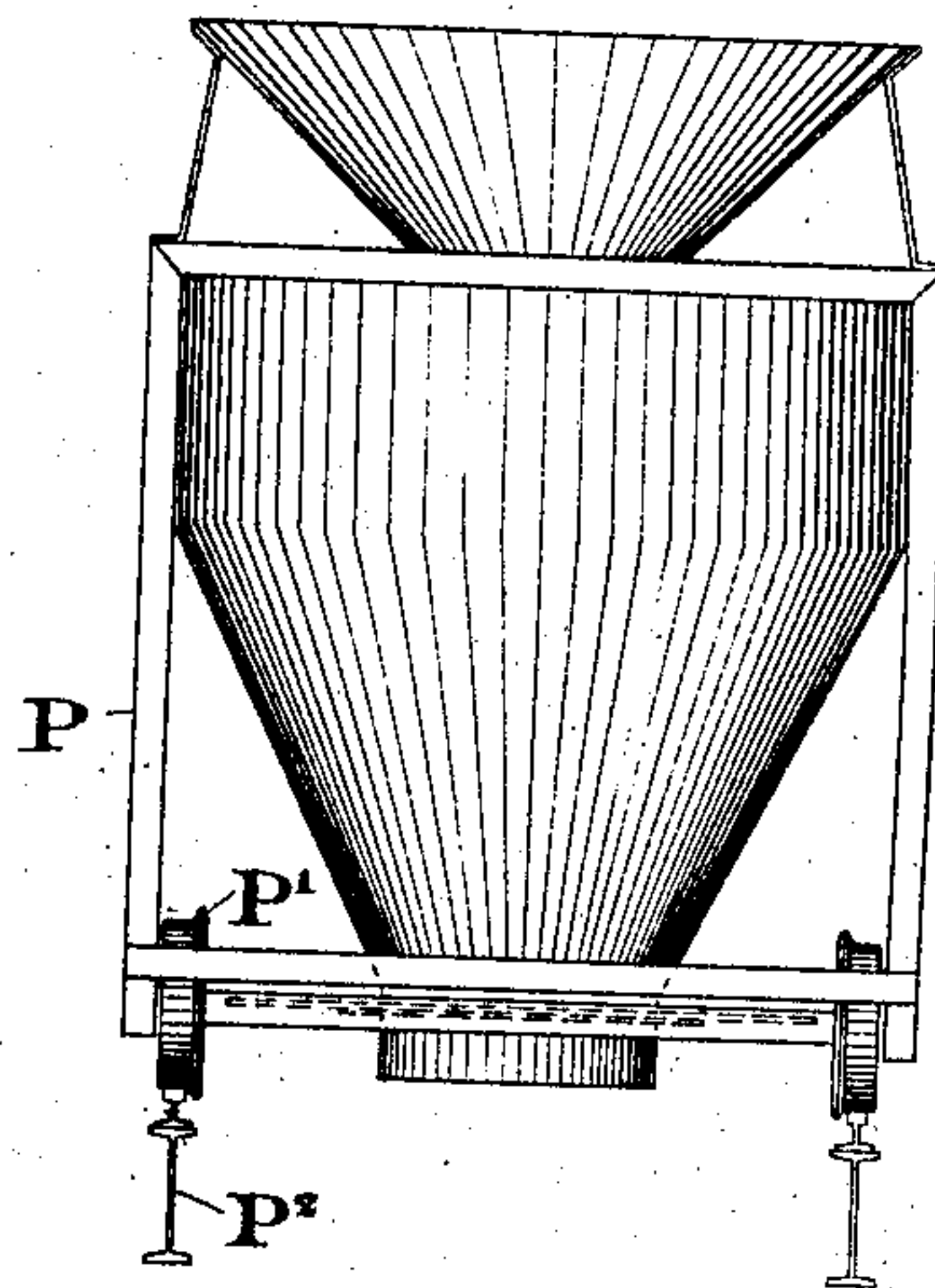
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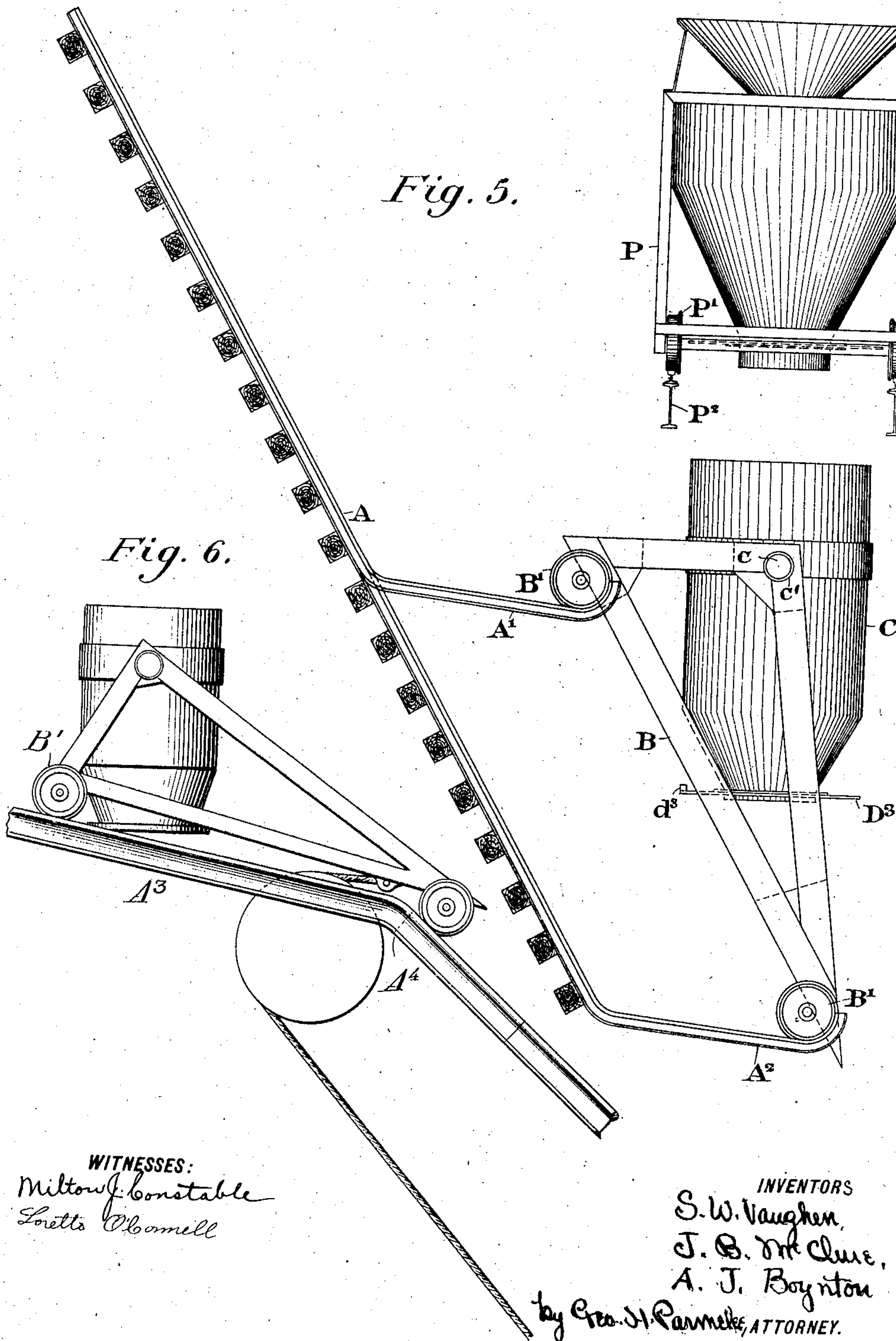
NO MODEL.

3 SHEETS—SHEET 3.

*Fig. 5.*



*Fig. 6.*



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# UNITED STATES PATENT OFFICE.

SAMUEL W. VAUGHEN AND JAMES B. McCLURE, OF LORAIN, AND  
ARTHUR J. BOYNTON, OF ELYRIA, OHIO.

## SKIP-CAR OR HOIST FOR BLAST-FURNACES.

**SPECIFICATION** forming part of Letters Patent No. 768,208, dated August 23, 1904.

Application filed April 7, 1903. Serial No. 151,506. (No model.)

*To all whom it may concern:*

Be it known that we, SAMUEL W. VAUGHEN and JAMES B. McCLURE, of Lorain, and ARTHUR J. BOYNTON, of Elyria, in the county of Lorain and State of Ohio, have invented a new and useful Improvement in Skip-Cars or Hoists for Blast-Furnaces, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, which form a part of this specification.

In our application Serial No. 151,505, of even-date herewith, we have described and claimed blast-furnace top and charging devices designed to secure a more even distribution of stock in the furnace, and in combination therewith we have described and claimed, broadly, a bottom-discharging skip-car. This application relates specifically to a skip-car of the character broadly claimed in such combination. As we have pointed out in the said application, it has been generally the custom heretofore to employ a skip-car arranged to be tipped to discharge its contents at one side into the receiving-hopper at the top of the furnace, and we have shown that this has been one of the causes leading to an uneven distribution of stock in the furnace, since when the car is dumped the thrust given the stock throws it over to the forward or farther side of the hopper, especially the coarser portions thereof, so that not only is more stock delivered at one side of the furnace than the other, but the coarser and finer portions of the stock are not uniformly admixed. Our present invention is designed to obviate this result by providing a skip-car having a central bottom discharge arranged to drop the material centrally into the receiving-hopper of the furnace and in uniform relation to the central vertical axis of such hopper. To this end we provide a car consisting of a suitable truck adapted to travel upon the usual inclined skip-tracks leading to the furnace-top and a stock-receptacle hung on trunnions on the said truck, so as to always maintain its vertical position. In the bottom of this receptacle is a centrally-opening valve or diaphragm, and means are pro-

vided whereby when said receptacle is centrally over the receiving-hopper of the furnace said valve may be opened to discharge the contents of the receptacle into said hopper. We also provide means whereby the skip-car bucket may itself receive its load from the stock-collecting car or lorry by a vertical bottom discharge from the latter, so that the stock is deposited uniformly and evenly in said bucket.

Our invention also consists in the novel construction, combination, and arrangement of parts, all substantially as hereinafter described, and pointed out in the appended claims, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation showing our improved skip-car as in use, the top portion of the furnace being shown in vertical section. Fig. 2 is an end elevation of the car standing upon its inclined track. Fig. 3 is a plan view showing the centrally-opening valve and the means for actuating the same, the car-bucket being cut away on the line 3-3 of Fig. 1. Fig. 4 is a plan view of the valve partially opened, and Fig. 5 is a side elevation of the lower portion of the skip-track with the car thereon in position to receive its load. Fig. 6 is an elevation showing a modified arrangement of the skip-car track and skip-car.

The letter A designates the usual inclined track running to the top of the furnace and having, as usual, two pairs of rails of different gage.

B is the truck of the skip-car, consisting of a suitable triangular frame carried by the wheels and axles B'.

C is the bucket, having trunnions c, which hang in bearings c' in the upper outer corner portions of the frame, whereby the bucket will always maintain its vertical position.

D is the centrally-opening valve which closes the discharge-orifice in the bottom of the contracted or funnel-shaped lower portion of the bucket. This valve is preferably of the character described and claimed in our said application Serial No. 151,505, consisting of a circular diaphragm divided on curved radial lines into a number of sections D,



each of which is pivoted at  $d$  at a point near the outer circumference of the diaphragm. The convex edge  $d'$  of each section is formed by a curve whose center is the center of the pivot  $d$ . Each section has a lever-arm  $D'$  connected by a link  $D^2$  to a circularly-movable annulus  $D^3$ . When the said annulus is moved in the direction of the arrow, Fig. 3, the several sections  $D$  are simultaneously swung outward on the pivots  $d$ . It will be readily seen that the discharge-opening thus formed is symmetrical with respect to the vertical axis of the bucket and that as the several sections are moved outwardly the diameter of this opening increases equally in all directions from such axis. This feature is one of great importance, since it causes the stock to be discharged in a true vertical direction.

The term "centrally opening" as used herein and in the appended claims is to be construed as meaning a valve having this mode of operation as distinguished from those valves composed of hinged or laterally-sliding levers, the opening formed by which simply widens in one direction. Such valves do not meet the purpose of our invention, since they either give a thrust to the material being discharged which throws it to one side or the other or else they discharge more of the material along the line of the long axis of their opening. We do not, however, wish to limit ourselves herein to the particular valve shown and described, as modified forms thereof may be employed.

For the purpose of operating the annulus  $D^3$  it is formed with a pin or projection  $d^3$ , which when the car reaches its discharging position at the top of the furnace enters a slotted jaw or lug  $e$  of an endwise-movable bar  $E$ . This bar is connected to any suitable opening device, such as the motive cylinder  $E'$ .

$F$  designates stops or buffers for stopping the car centrally over the receiving-hopper  $G$  of the furnace.

$H$  designates the main bell of the furnace;  $H'$ , a smaller bell onto which the stock falls from the throat of the hopper  $G$ , and  $H^2$  is a collecting-hopper surrounding the bell  $H'$ , as more fully described and claimed in our said application.

It is important that the skip-car bucket shall receive its load in substantially the same manner as the receiving-hopper of the furnace, since if the stock is loaded into this bucket by a side dump the column of stock therein is not uniformly distributed with respect to its central vertical axis and is not uniformly discharged therefrom. We therefore preferably provide means, as shown in Fig. 5, where-

by the skip-car may be run underneath a stock-collecting car or lorry having a central bottom discharge. To this end the skip-track rails at their lower ends are bent horizontally outward, as shown at  $A^1 A^2$ . This permits the skip-car to be run closely in under the stock-collecting car or lorry  $P$ , which is mounted on the truck  $P'$ , running on the track  $P^2$ . This car or lorry has a central bottom discharge which will deliver the stock centrally into the bucket of the skip-car. Said stock car or lorry is more fully described and forms the subject-matter of the claims in our pending application Serial No. 151,507, of even date herewith.

When the means shown in Fig. 5 are employed, it is necessary to modify somewhat the construction of the skip-car and of its track. The upper trucks  $B'$  of the car must be of wider gage than the lower truck, and the outer rails of the track instead of the inner ones must be carried horizontally over the top of the furnace, as shown at  $A^3$  in Fig. 6, the inner rails, upon which the lower trucks travel, being cut off or stopped at the point  $A^4$ .

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

1. The herein-described skip-car, consisting of a wheeled supporting frame or truck, and a bucket hung on trunnions on said frame or truck and having a centrally-opening discharge-valve at its bottom.

2. In a skip-car, the combination with the pivoted bucket having the discharge-orifice in its bottom, of the centrally-opening valve or diaphragm which controls the said orifice.

3. In a skip-car, the combination with the bucket having the centrally-opening valve consisting of the pivoted sections, and the circularly-movable annulus to which said sections are connected, of the sliding bar on the furnace-top arranged to engage said annulus, and means for operating the said bar.

4. The combination with the skip-car having its bucket hung on trunnions and provided with a bottom discharge, of the inclined track having its lower portions extended horizontally outward underneath the adjacent track for a stock-collecting car or lorry.

In testimony whereof we have affixed our signatures in presence of two witnesses.

SAMUEL W. VAUGHEN.  
JAMES B. McCLURE.  
ARTHUR J. BOYNTON.

Witnesses:

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ROBERT J. ASPIN.