(No Model.)

2 Sheets—Sheet 1.

G. DINKEL.

MAGMA PUMP.

No. 311,878. Patented Feb. 10, 1885.

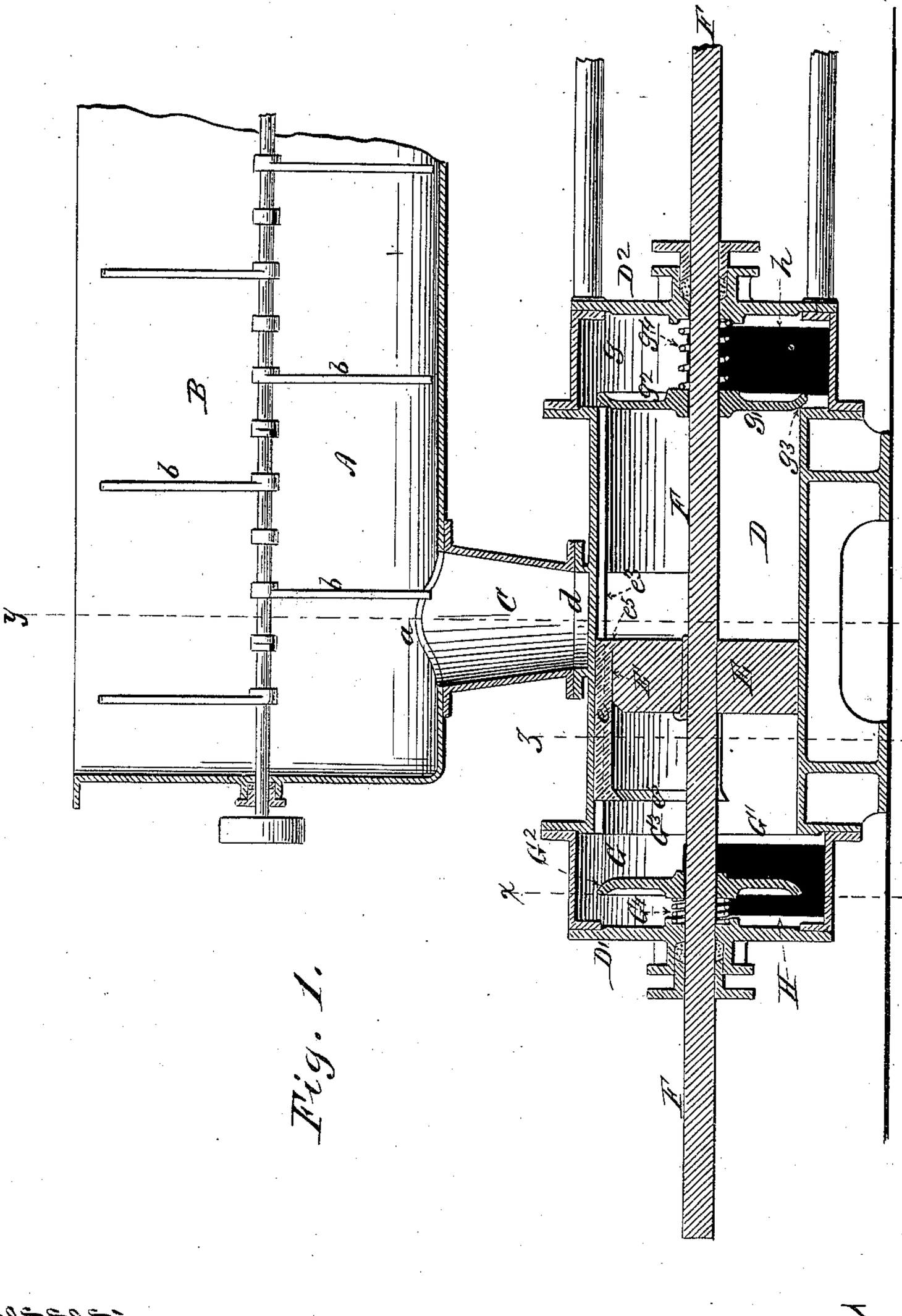

Fig. 1.

Witnesses:
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R. B. Howes.

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(No Model.)

2 Sheets—Sheet 2.

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Fig. 3.

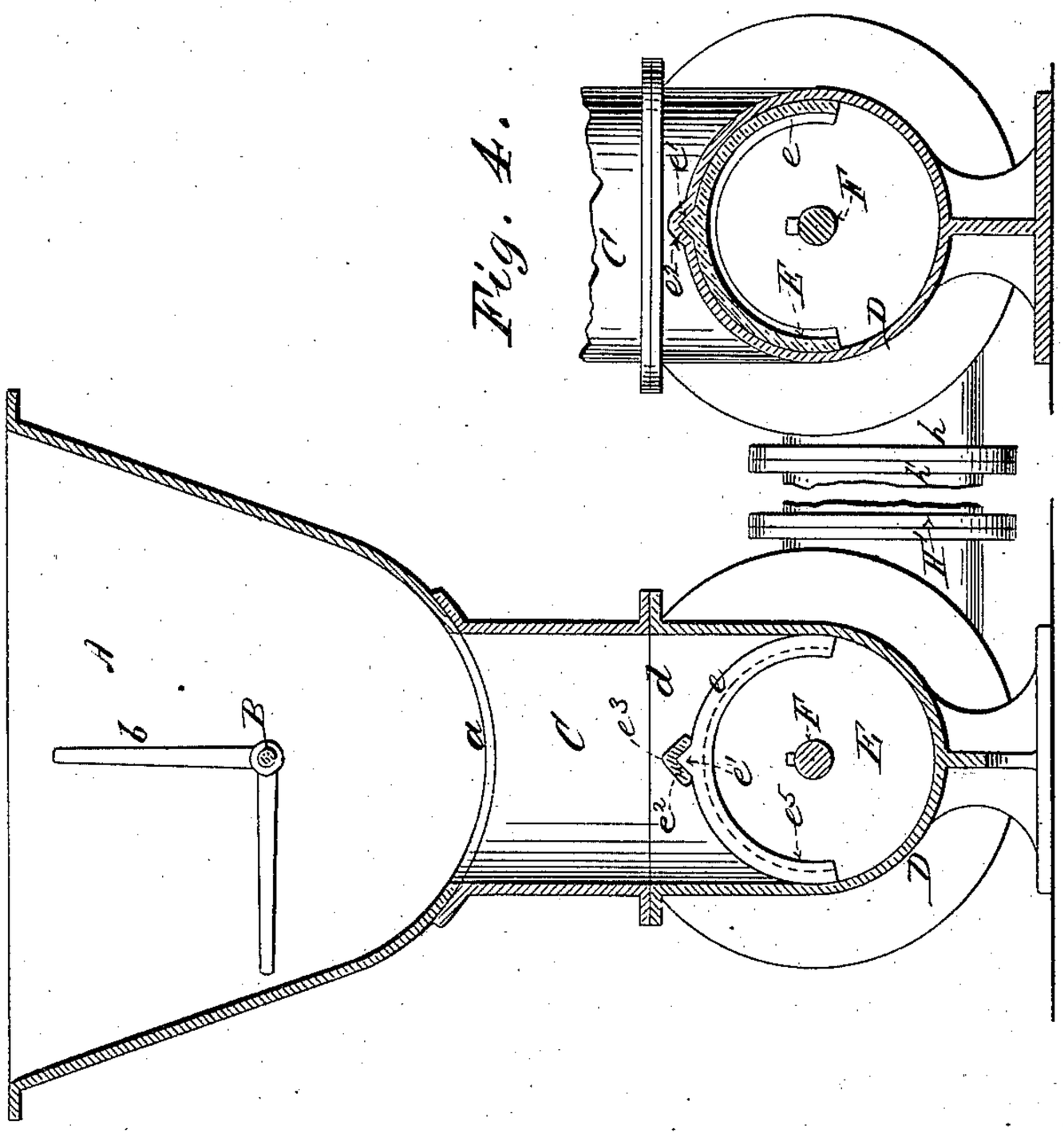
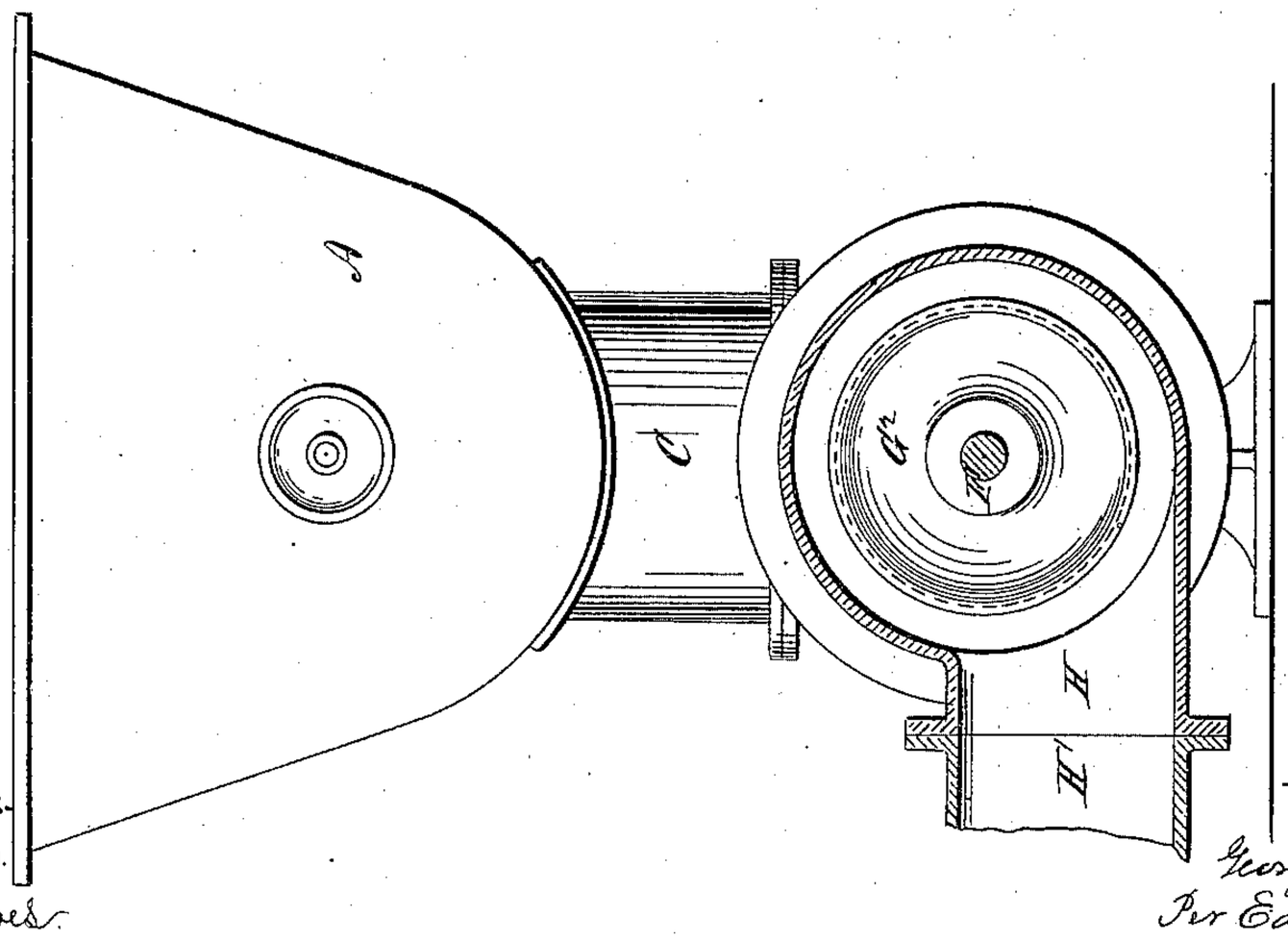


Fig. 4.

Fig. 2.



Witnesses:
M. L. Adams.
R. C. Howes.

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George Dinkel
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UNITED STATES PATENT OFFICE.

GEORGE DINKEL, OF JERSEY CITY, NEW JERSEY, ASSIGNOR TO F. O. MATTHIESSEN & WIECHER'S SUGAR REFINING COMPANY, OF SAME PLACE.

MAGMA-PUMP.

SPECIFICATION forming part of Letters Patent No. 311,878, dated February 10, 1885.

Application filed October 2, 1884. (No model.)

To all whom it may concern:

Be it known that I, GEORGE DINKEL, of Jersey City, New Jersey, have invented an Improved Magma-Pump, of which the following is a specification.

In the operation of sugar-refining it is frequently required to pump the sugar-magma from a lower to a higher elevation, which cannot easily be done by an ordinary suction-pump.

My invention consists of a simple pumping apparatus, especially adapted for pumping materials having the semi-fluid character of sugar-magma.

In carrying out my invention I employ a cylinder, preferably horizontal, arranged beneath the magma-tank and having eduction-ports at both ends, and having midway in its upper side a comparatively large induction-port connected with the magma-tank. Within the cylinder is a close-fitting, suitably long plunger affixed to the end of a piston-rod, which extends through the head of the cylinder and is connected with mechanism by which it is reciprocated. The plunger may be equal in length to the diameter of the induction-port. It is preferably provided upon its upper side with a longitudinally-sliding shield. This shield is longer than the plunger, and is therefore brought into collision alternately with the valves or with the opposite ends of the cylinder and held stationary during the latter part of each stroke of the plunger. At the commencement of each stroke the shield projects over in front of the advancing plunger, and hence covers the induction-port before the plunger reaches the middle of the cylinder under the induction-port. The eduction-ports are each provided with an outwardly-yielding self-closing valve, and are connected with the pipe or pipes through which the magma, forced alternately from the opposite ends of the pump-cylinder by the movements of the plunger, is conducted to any prescribed point.

The accompanying drawings represent my invention embodied in a pump operated by steam.

Figure 1 is a central vertical longitudinal section through the pump-cylinder and steam-cylinder, also showing in section a portion of the magma-tank. Fig. 2 is a transverse vertical section taken through the line *x x* on Fig. 1, showing the end of the magma-tank in elevation. Fig. 3 is a transverse vertical section of the magma-tank, induction-pipe, and pump-cylinder, taken through the line *y y* on Fig. 1. Fig. 4 is a transverse vertical section of the pump-cylinder and shield taken through the line *z z* on Fig. 1.

The drawings represent a round-bottomed tank, A, containing a horizontal rotating shaft, B, provided with radially-projecting spirally-arranged inclined paddles *b*, for the purpose of performing the double function of mixing the sugar and liquid introduced into the tank to form the magma, and propelling the magma toward the discharge-outlet *a* from the bottom of the tank. An induction-pipe, C, is connected at its upper end with the discharge-outlet *a*, and at its lower end with the induction opening or port *d* in the upper side of the pump-cylinder D, midway between its ends. Within the pump-cylinder is the close-fitting plunger E, which may be made equal in length to the width of the induction-port *d*. The plunger E is affixed to the piston-rod F, which extends through stuffing-boxes in the heads D′ and D² of the valve-chambers G *g*, at the opposite ends of the pump-cylinder, respectively. The piston-rod F may be affixed to the piston of a steam-cylinder, and be reciprocated by steam, or may be reciprocated in any other convenient way. Preferably the plunger E is provided upon its upper side with the recess E′ to receive the sliding shield or gate *e*, which, being longer than the plunger, covers the induction-port *d* before the plunger has made half its stroke, and thus prevents the magma in front of the advancing plunger from being forced back through the induction-port, and compels its discharge through that one of the induction-ports toward which the plunger is moving. The gate *e*, as will be seen, embraces the upper part of the plunger E, inclosing rather more than one-half of it, and is therefore capable of completely closing the induction-port *d*, which extends nearly half-way around the pump-cylinder. In the center of its upper side the gate is provided with the V-shaped longitudinal rib *e′*. This rib is engaged by the V-shaped groove *e*², formed lengthwise in

the wall of the pump-cylinder, and along the under side of the stay-bar e^3, erected across the middle of the induction-port *d*. The open opposite ends of the pump-cylinder constitute the eduction-ports G′ *g*′, respectively. The eduction-port G′ is closed by the outwardly-yielding valve G^2, and the eduction-port *g*′ is closed by the outwardly-yielding valve g^2. The valve-chambers are both of larger diameter than the pump-cylinder, and the ends of the pump-cylinder constitute the seats G^3 g^3 for the valves G^2 g^2, respectively. The valves G^2 g^2 are centrally-perforated disks sliding on the piston-rod F, and are pressed toward their seats G^3 g^3 by the expanding springs G^4 g^4, respectively. The magma is discharged from the valve-chambers through the outlets H and *h* into the pipes H′ *h*′ for conducting it in any prescribed directions. The two pipes H′ *h*′ may be employed for conducting the magma to two different points, or they may be joined to a single conducting-pipe in case all the magma is to be conducted to the same point.

In operation the edge of the sliding gate on the advancing side of the plunger is, near the close of the stroke, brought into collision with the valve and arrested, while the plunger completes its stroke. If desired, a stop may be arranged at each end of the pump-cylinder, so that the gate *e* may be arrested by being brought into collision with one of these stops at each stroke.

In order to prevent any possibility of the dislodgment of the gate from the plunger, the ends of the gate are provided, respectively, with the downwardly-projecting lips e^5 e^5.

The sliding shield or gate *e* may, if desired, be omitted, in which case the pump-plunger E may be provided upon its upper side with projecting flanges at both ends.

Without the sliding shield the plunger during the first part of each stroke will force some of the magma back through the induction-port *d*; but, after the advancing end of the plunger has passed the induction-port, the magma in front of the plunger during the remainder of the stroke will be expelled through the eduction-port toward which the plunger is moving. As the plunger passes the induction-port it permits the magma from the tank to fall behind it into the pump-cylinder, preparatory to being expelled through the eduction-port at the opposite end of the pump-cylinder by the return-stroke of the plunger.

I claim as my invention—

1. In pumps for pumping semi-fluids, a cylinder having midway between its ends an induction-port of suitably large area, and having at its ends eduction-ports, respectively provided with outwardly-yielding self-closing valves, in combination with a suitably elongated reciprocating plunger within the cylinder.

2. A cylinder having midway between its ends an induction-port of suitably large area, and having at its ends eduction-ports, respectively provided with outwardly-yielding self-closing valves, in combination with the reciprocating plunger E, provided with the sliding shield or gate *e*, as and for the purpose set forth.

3. The reciprocating plunger E, in combination with the sliding shield or gate *e*, provided upon its opposite ends with the downwardly-projecting lips e^5, as and for the purpose set forth.

4. The reciprocating plunger E, and the sliding shield or gate *e*, provided with the longitudinal rib *e*′, in combination with a groove, e^2, in the wall of the cylinder D, as and for the purpose set forth.

GEORGE DINKEL.

Witnesses:
M. L. ADAMS,
R. C. HOMES.

Correction in Letters Patent No. 311,878.

It is hereby certified that in Letters Patent No. 311,878, granted February 10, 1885, upon the application of George Dinkel, of Jersey City, New Jersey, for an improvement in "Magma-Pumps," the name of the assignee was erroneously written and printed "F. O. Matthiessen and Wiecher's Sugar Refining Company," whereas it should have been written and printed *F. O. Matthiessen and Wiechers Sugar Refining Company*; and that the proper correction has been made in the files and records pertaining to the case in the Patent Office, and should be read in the Letters Patent to make it conform thereto.

Signed, countersigned, and sealed this 17th day of March, A. D. 1885.

[SEAL.]

M. L. JOSLYN,
Acting Secretary of the Interior.

Countersigned:

R. G. DYRENFORTH,
Acting Commissioner of Patents.