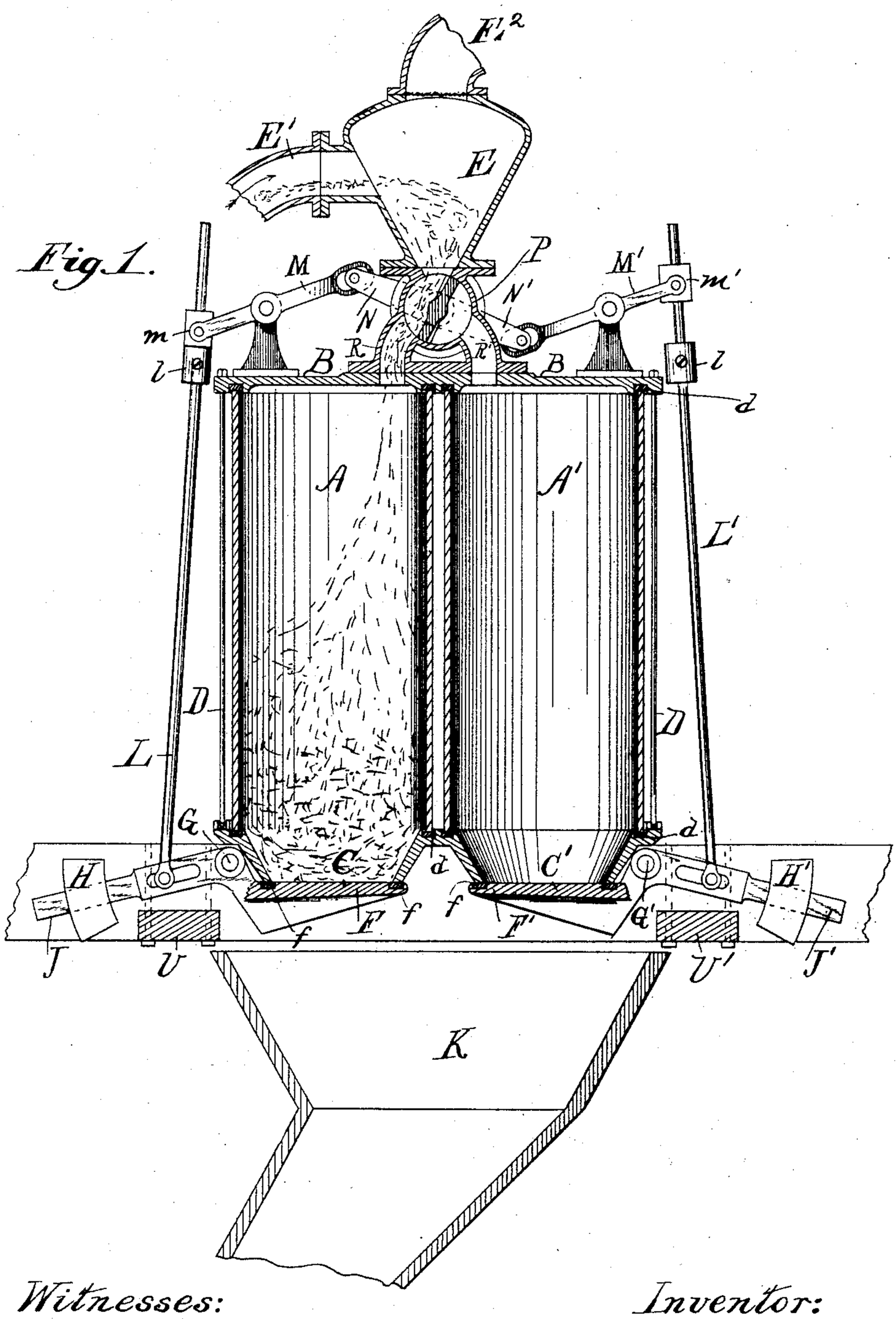
(No Model.) 2 Sheets—Sheet 1.

J. LEWIS.

PNEUMATIC ELEVATOR.

No. 287,033. Patented Oct. 23, 1883.

Fig. 1.



Witnesses:

S. Everett Brown

H. W. Munday.

Inventor:

Joseph Lewis

per Munday Evarts & Adcock

his Attorneys:

(No Model.) 2 Sheets—Sheet 2.

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Fig. 2.

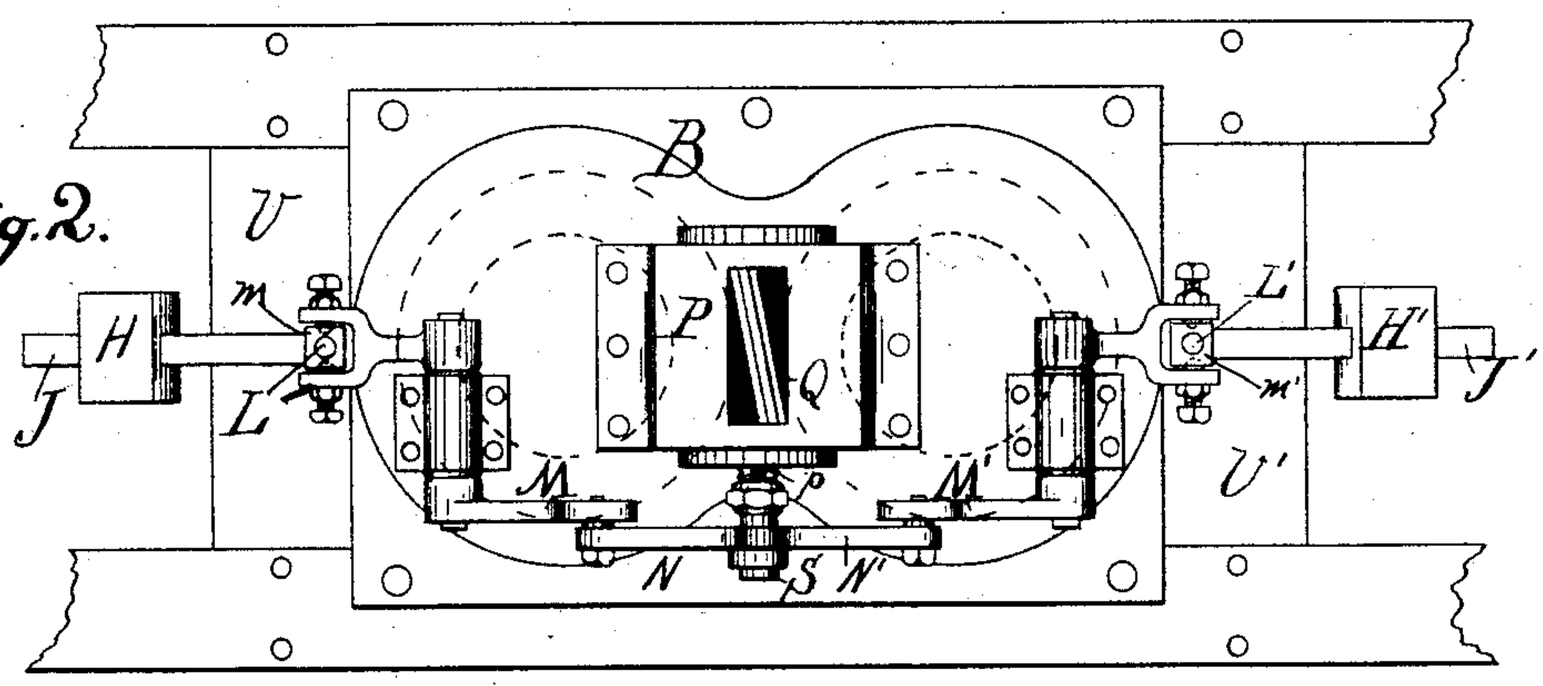


Fig. 3.

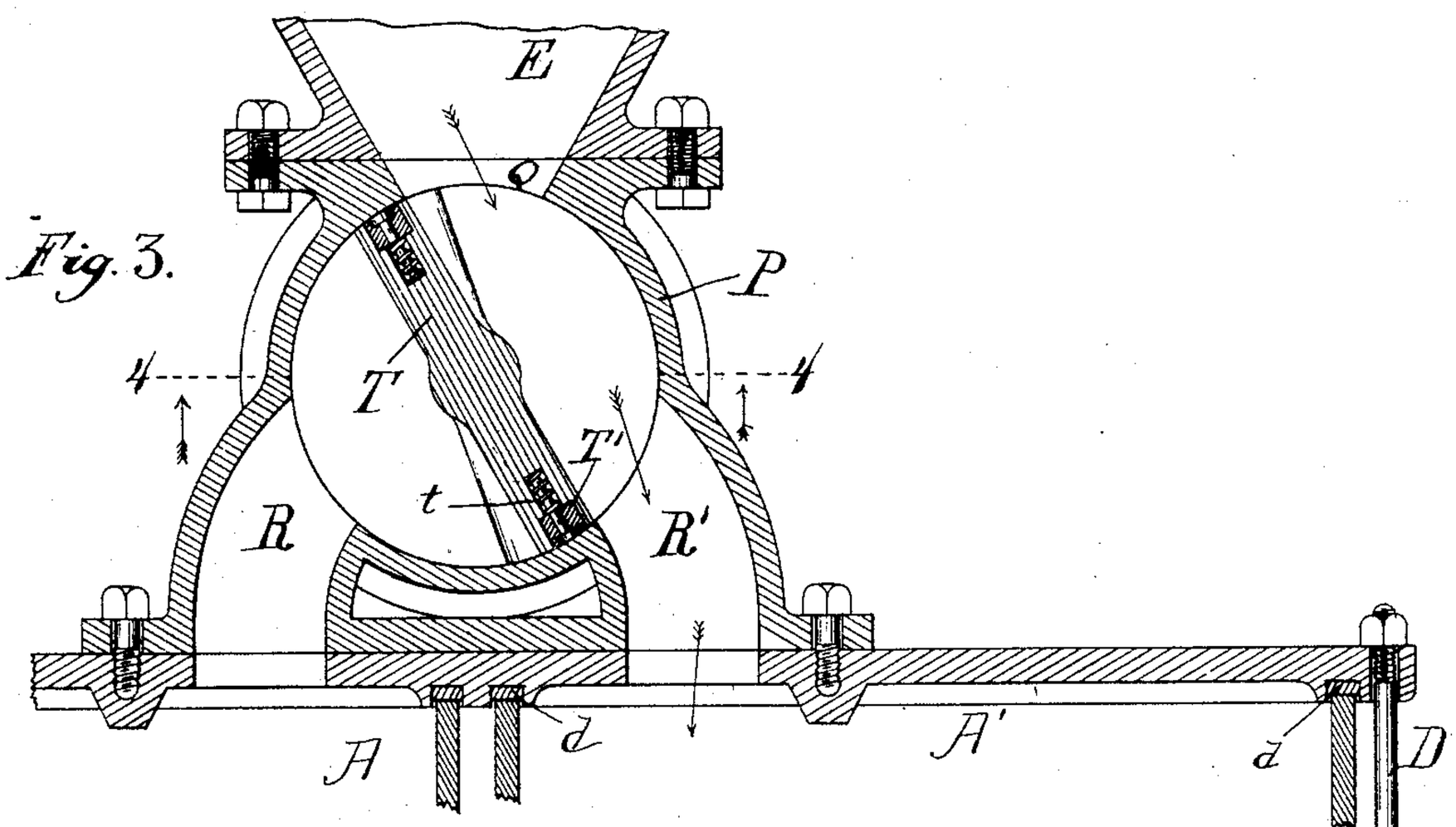
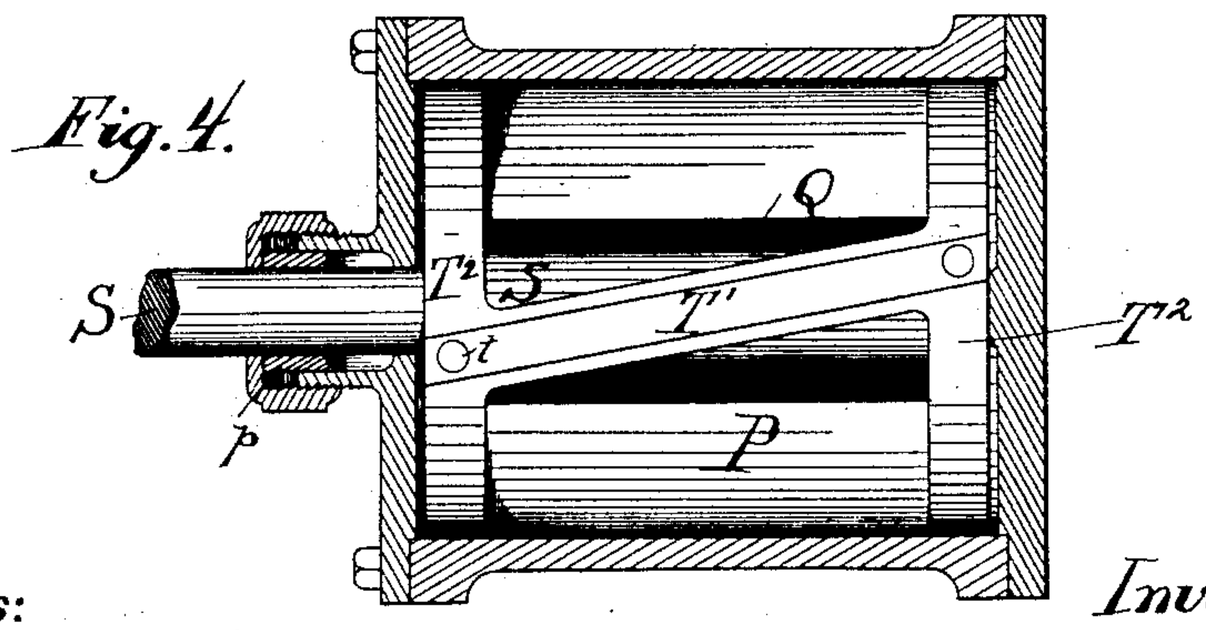


Fig. 4.



Witnesses:
J. Everett Brown
A. McMurray.

Inventor:
Joseph Lewis
per Munday Evarts & Adcock
his Attorneys:

UNITED STATES PATENT OFFICE.

JOSEPH LEWIS, OF CHICAGO, ILLINOIS.

PNEUMATIC ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 287,033, dated October 23, 1883.

Application filed June 11, 1883. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH LEWIS, a subject of the Queen of Great Britain, residing in Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Pneumatic Elevators, of which the following is a specification.

This invention relates to a pneumatic apparatus for elevating grain and similar substances, and the same is an improvement upon the apparatus patented to John and George Richards, in Letters Patent of the United States No. 143,254, dated September 30, 1873, rendering the apparatus practical and automatic.

In the accompanying drawings, which form a part of this specification, and in which similar letters of reference indicate like parts, Figure 1 is a sectional side elevation of my improved apparatus. Fig. 2 is a top or plan view of the same. Fig. 3 is an enlarged cross-section of the valve, and Fig. 4 is a section on the line 4 4 of Fig. 3.

In said drawings, A A′ are two cylindrical chambers of considerable size, made of any suitable material, preferably metal, and strong enough to contain and hold grain. At the top the chambers are covered by a casing, B, and each chamber at the bottom is provided with funnel-mouthed discharges C and C′. A feasible method of construction is to make the cylinders of wrought or cast iron, and to cast the upper casing or head-plate all in one piece, with grooves to receive the ends of the cylinders. The funnel-mouthed discharges C C′ are also cast in one piece and furnished with annular grooves to receive the lower ends of the cylinders. India-rubber gaskets *d* are placed in the grooves of the two parts above named, and the cylinders are then held together and to the upper and lower castings by bolt-rods D D.

E is an air chamber or hopper provided with the inlet-pipe E′, leading to the grain which is to be elevated, and provided also with an eduction-pipe, E^2, leading to an exhaust-pump or other air engine or fan, (not shown in the drawings,) which may be of any ordinary construction. The vacuum-hopper E opens at its lower extremity into a valve—presently to be described—so contrived as to direct the contents of the hopper into one or the other of the cylinders A A′, accordingly as the valve is turned in one or the other direction. Each cylinder is closed at the bottom by a valve, F F′, made to fit air-tight against the bottom of the cylinder-discharge by means of rubber-gasket bearing-surfaces *f*. The valves are pivoted at G G′, are independent of each other, and each is provided with an adjustable counterbalance-weight, H H′, affixed to the lever J J′, which weight in each case is sufficient to return the valve promptly to its seat after it has been opened and the contents of the cylinder discharged.

The grain is drawn up from the car, vessel, or storage-tank into the vacuum-hopper E by the operation of the atmospheric pressure, and falls into one of the chambers or cylinders—say into cylinder A—through the vacuum-hopper valve, which chamber is also at the same time exhausted of its air by being in communication with the vacuum-hopper. When the weight of the grain thus accumulated in the cylinder is sufficient to overcome the atmospheric pressure exerted from the outside against the discharge-valve F, said valve is thereby opened and the grain falls into the chute K, whence it is led to the point desired. The vacuum-hopper valve must at this moment of discharge be reversed in order to direct the grain into the other cylinder. To accomplish this reversal of the hopper-valve automatically, I employ rods L L′, connected to the levers J J′ of the discharge-valves, which rods impart movement to levers M M′, connected to the arms N N′ of the hopper-valve. The outer ends of the levers M M′ are pivoted to sliding heads *m m′*, and adjustable stops *l l′* are fixed to the rods L L′, so that the upward movement of one of said rods will operate the hopper-valve, while at the same time said rod will be free to fall when the discharge-valve closes by operation of the counterbalance-weight, so that when either cylinder is discharged automatically by the weight of grain contained in it, the hopper-valve will be reversed to the other cylinder, and at the same time the discharge-valve of the cylinder just emptied will close automatically. The object of closing the discharge-valve as soon as its cylinder is discharged is not only to

have it ready to receive the next charge of grain, but also to prevent access of air to the vacuum-hopper through said cylinder in case of any leakage at the vacuum-hopper valve.

The vacuum-hopper valve, which I shall now describe, is an oscillating valve contained in a valve-cylinder, P, provided with a single ingress-port, Q, and two egress-ports, R R′.

p is a stuffing-box; S, the valve-shaft. T is the valve itself, extending radially across the valve-cylinder, and furnished at its outer face with a spring compensating-plate, T′, set out against the inner surface of the valve-cylinder by means of the coiled springs *t*. T^2 T^2 are disks connected to the valve and the shaft, and affording the bearing upon which the valve oscillates. In order that this valve may certainly clear itself in case of grain lodging therein, I make it diagonal in direction to the axis of the valve-cylinder, so that the outer edge of the valve, which is made sharp for this purpose, will cut through any grain which may lodge between it and the edge of the port or ports. The diagonal position of the valve will cause it to operate with a shearing cut, and the weight of the grain, when accumulated sufficiently to cause a discharge of one of the cylinders, will operate the valve with sufficient force and power to cause it to cut its way through any obstacle which may by chance become wedged in the port.

In order to prevent any of the grain from entering the pipe E^2, which leads to the air-engine, I sometimes, and preferably, cover the opening of said pipe at its junction with the vacuum-hopper with a wire-netting applied conveniently in the joint between said pipe and the hopper. A disk of wire-gauze, of suitable fineness to permit the passage of the air, and yet stop the grain, is placed in said joint between a pair of rubber gasket-rings and held, making an air-tight joint by the same means which secures the pipe to the chamber.

The cylinder A′ is shown in the drawings as though just dumped or emptied, the discharge-valve F′ having of course returned instantly to its position, ready to receive a new charge, and operating to close the chamber against the leakage of air. The discharge-valves F F′, when they are thrown open by the weight of grain in discharging, strike against the bumper-beams V V′, which act as stops to prevent an excess of motion in the rods L L′ and levers which operate the hopper-valve.

I am aware of the construction shown in Patent No. 268,305, and disclaim the same. In several particulars said patent is different from my invention.

I claim—

1. The combination, with the vacuum-hopper and the chambers A and A′, of the valve-cylinder P, interposed between said hopper and said chambers, and provided with an inlet-port opening from the hopper and an outlet-port opening into each of the chambers, the valve oscillating in said cylinder, and means for actuating said valve, substantially as specified.

2. The receiving-chambers, the discharge-valves independent of each other, the vacuum-hopper, the vacuum-hopper valve, and the connections between the hopper-valve and each of the discharge-valves, whereby the former valve is reversed at each operation of the latter, all combined and operating substantially as specified.

3. In a vacuum grain-elevator, the independent discharge-valves arranged to automatically open under the weight of grain in the receiving-chambers, and each provided with its own counter-balance, for automatically closing it as soon as the grain has been discharged, substantially as specified.

4. The combination, with the hopper-valve and the discharge-valve provided with a closing counter-balance, of the connections whereby the former is operated from the latter, such connections consisting of the rod L, having a stop, *l*, the lever M, having the head *m*, and arm N, substantially as specified.

5. In a vacuum-elevator of the kind specified, the oscillating valve having the valve-diaphragm arranged diagonal to the edge of the valve-ports, so as to produce a shearing cut upon any grain or obstacle which may lodge in the valve, substantially as specified.

6. The construction of the two cylinders A A′, made plain and independent of each other, and placed between upper and lower plates, each of said plates having grooves cast therein to receive the ends of both the cylinders, and furnished with rubber packing-rings, so that the whole may be held together air-tight by bolt-rods, substantially as specified.

JOSEPH LEWIS.

Witnesses:

T. EVERETT BROWN,

H. M. MUNDAY.