No. 693,614. Patented Feb. 18, 1902.

C. O. LINDROTH.

VALVE ACTUATING MEANS FOR BLOWING ENGINES.

(Application filed Mar. 8, 1900.)

(No Model.)

2 Sheets—Sheet 1.

FIG. 1.

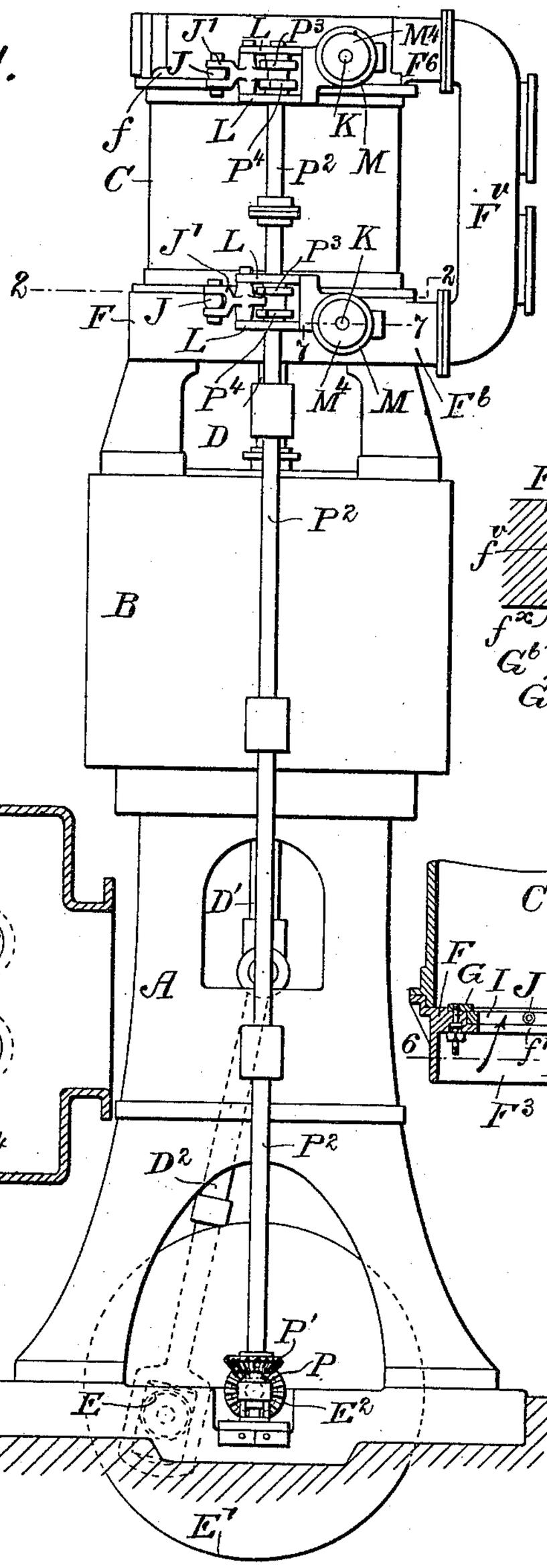


FIG. 5a.

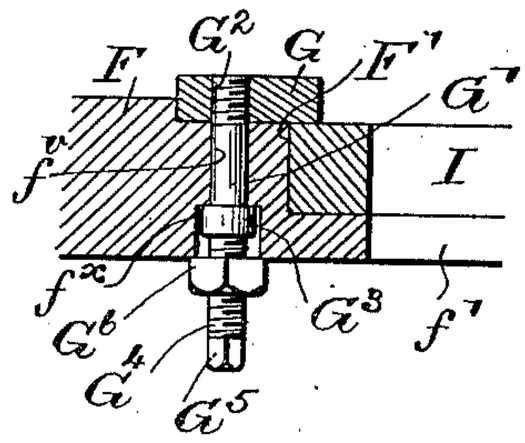


FIG. 6.

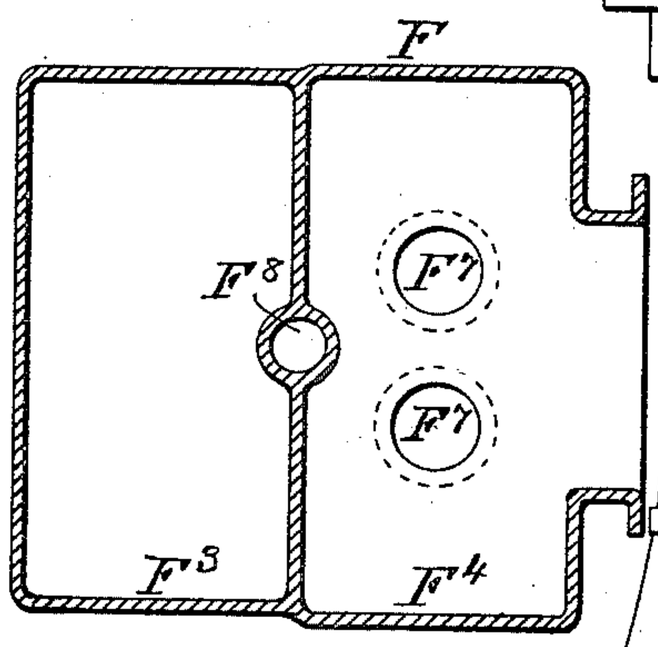
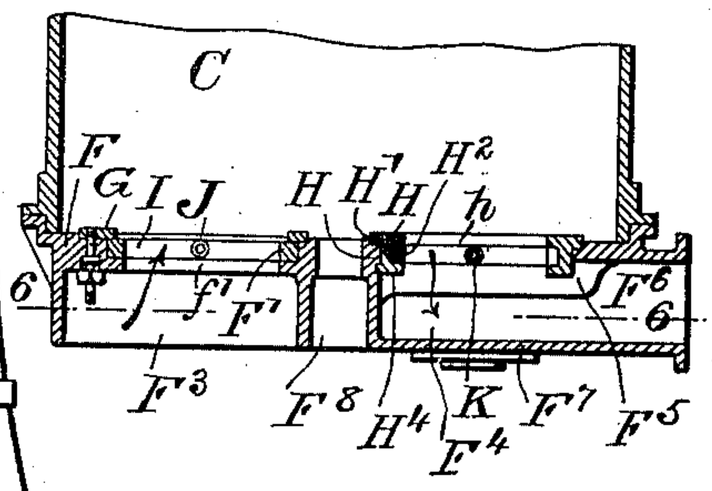


FIG. 5.



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VALVE ACTUATING MEANS FOR BLOWING ENGINES.

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(No Model.) 2 Sheets—Sheet 2.

FIG. 2.

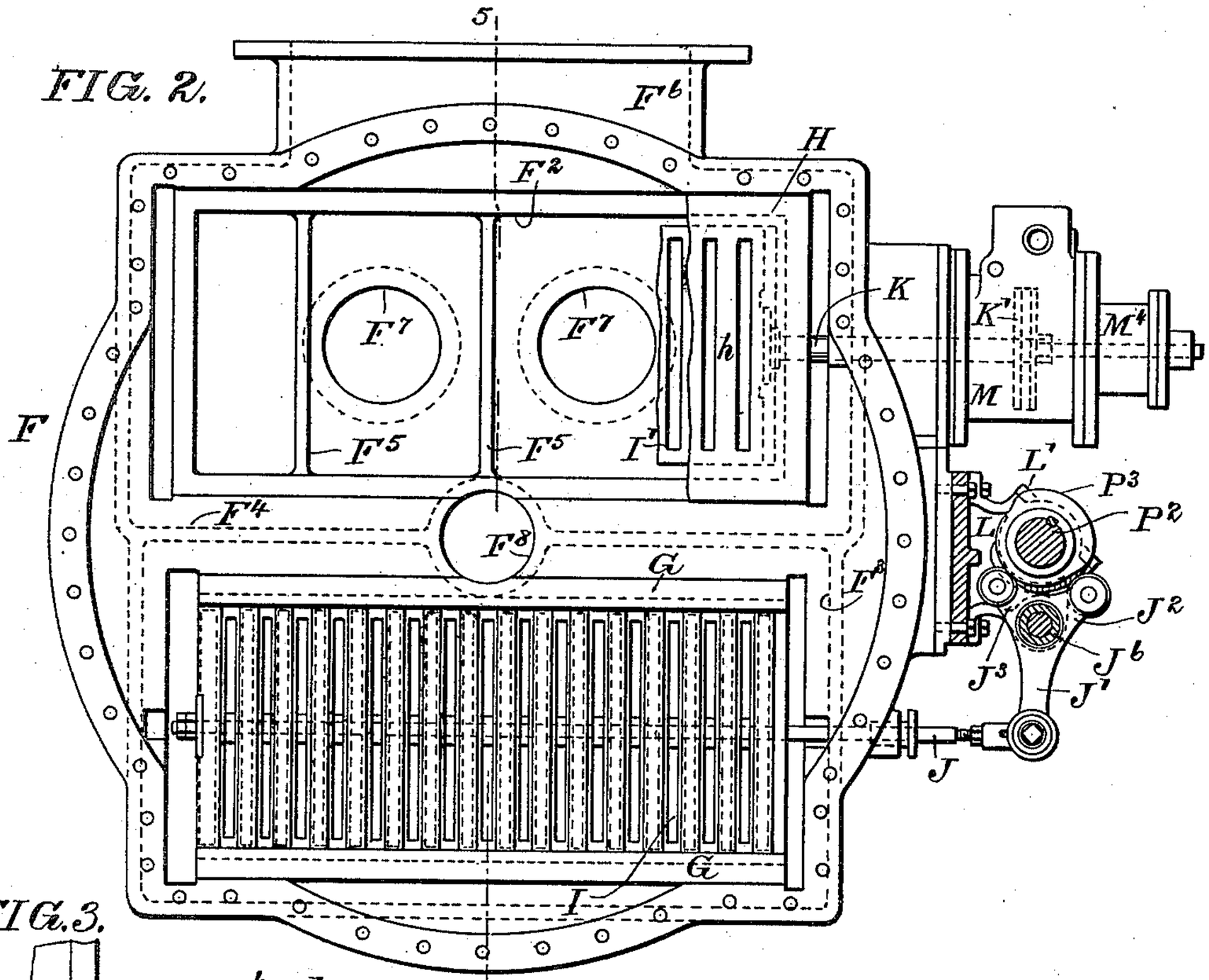


FIG. 3.

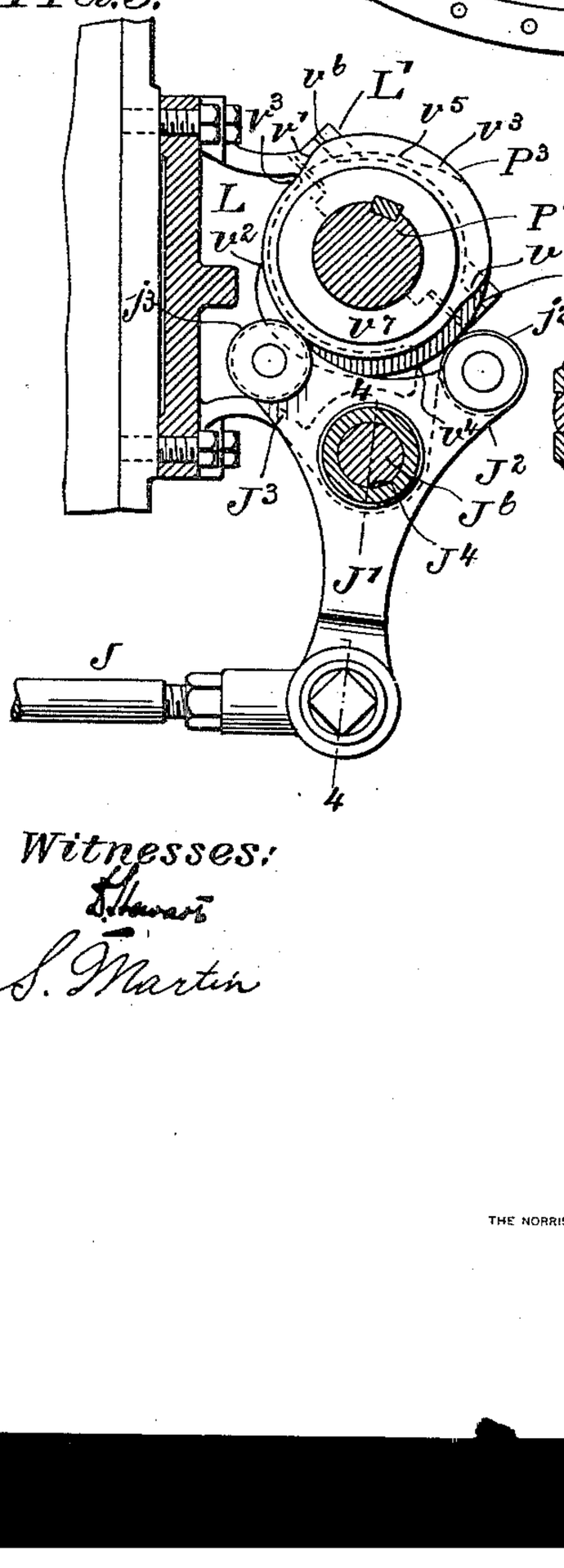
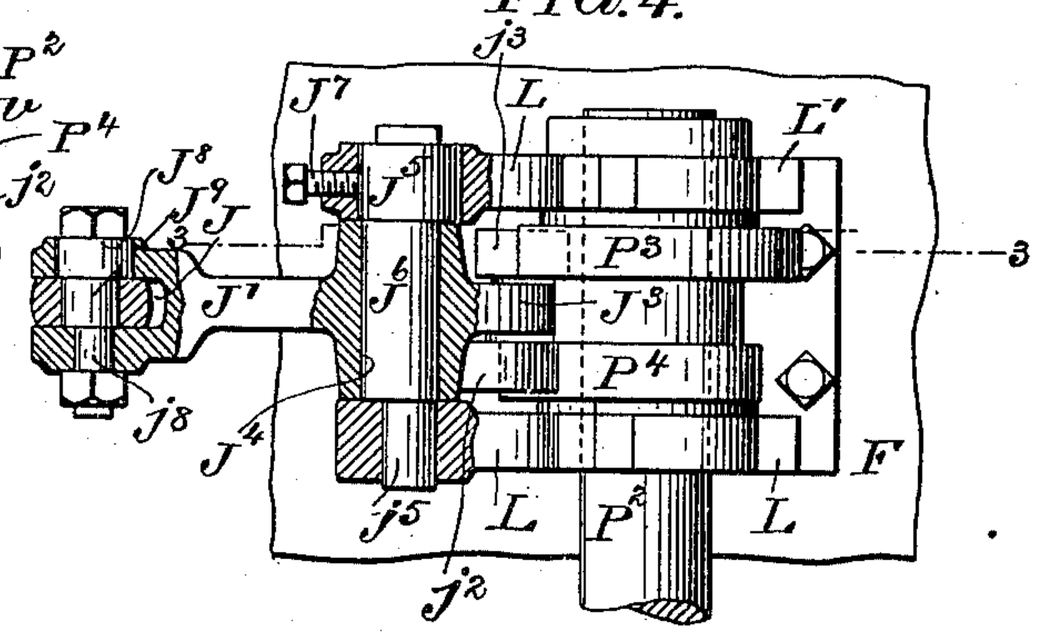


FIG. 4.



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VALVE-ACTUATING MEANS FOR BLOWING-ENGINES.

SPECIFICATION forming part of Letters Patent No. 693,614, dated February 18, 1902.

Application filed March 8, 1900. Serial No. 7,833. (No model.)

To all whom it may concern:

Be it known that I, CARL O. LINDROTH, a citizen of the United States of America, residing in the city and county of Philadelphia, in the State of Pennsylvania, have invented certain new and useful Improvements in Valve-Actuating Mechanism for Blowing-Engines, of which the following is a true and exact description, reference being had to the accompanying drawings, which form a part thereof.

My invention relates to blowing-engines, and particularly to the mechanism for actuating the admission-valves in such engines, my object being to provide a simple and efficient device for opening and closing the admission-valves with great rapidity and precision of movement and a device which will occupy a comparatively small space.

The nature of my improvements will be best understood as described in connection with the drawings, in which they are illustrated, and in which—

Figure 1 is a side elevation of a blowing-engine provided with my valve-actuating mechanism. Fig. 2 is a plan view of the lower head of the compressing-cylinder, showing the valves and valve-actuating connections, the parts being shown as on the section-line 2 2 of Fig. 1. Fig. 3 is a view of the admission-valve, actuating-cams, and connections shown in the same section as Fig. 2, but on a larger scale. Fig. 4 is an elevation of the cams and their immediate connections, partly shown in section on the line 4 4 of Fig. 3. Fig. 5 is a cross-section through the lower end of the compressing-cylinder and its head, taken as on the line 5 5 of Fig. 2, but shown on a reduced scale. Fig. 5^a is an enlarged view of the detail shown in Fig. 5, and Fig. 6 is a sectional plan view taken on the line 6 6 of Fig. 5.

A indicates the frame of the blowing-engine, B the steam-cylinder, and C the compressing-cylinder.

D is the piston-rod, connecting with the pistons (not shown) in the steam and air compressing cylinders.

D′ is a downward extension of the piston-rod connected by the connecting-rod D^2 with the crank-pin E, connected, through the crank-disks E′, with the main shaft of the engine, (indicated at E^2.)

F and *f* indicate, respectively, the lower and upper heads of the compressing-cylinder.

F′ indicates the seat for the admission-valve, which is of the gridiron type, the cross-bars being indicated at *f*′, the seat for the valve being arranged so that the face of the valve will be turned outward from the cylinder.

F^2 indicates an opening through the head of the cylinder in which is secured the seat for the delivery-valve.

F^3 indicates the flanged walls of the head-casting, which surround the admission-valve, and F^4 indicates the receiver, which surrounds and covers the delivery-valve, F^5 indicating cross-bars extending across the receiver in front of the delivery-valves, and F^6 the connections of the receivers at top and bottom with the common receiving-pipe F^v.

F^7 F^7 indicate openings formed in the top of the receiver opposite to the delivery-valves, which in use are covered by plates or caps.

F^8 indicates a cylindrical opening in the lower cylinder-head, through which the piston-rod passes.

G (best shown in Fig. 5^a) is the back bearing for the admission-valve, which back bearing is secured in place by a series of bolts (indicated at G′) threaded at both ends, as indicated at G^2 and G^4, and formed with a flange G^3 intermediate of its ends, which when the end G^2 is screwed into the back bearing G enters and rests against the bottom of a countersunk head f^x of a bolt-hole f^v, formed through the head of the cylinder.

G^5 indicates the squared end of the bolt, adapted to be engaged by a wrench, and G^6 is a binding-nut. This device is useful, as it avoids the use of any device for holding the back bearing in position, which in case of its coming loose could fall into the cylinder and cause breakage or trouble.

H is the detachable seat for the delivery-valve, which is inserted and secured in place in the opening F^2 and is formed with an outwardly-extending flange H′, which rests against the inside of the head, with a seat H^2 for the delivery-valve, *h* indicating cross-bars of the seat, and the seat being so arranged

that the delivery-valve will seat itself with its face turned toward the cylinder. The seat H has also a flange H^3, which extends through opening F^2, to which is secured a back bearing, (indicated at H^4.)

I indicates the admission-valve, and I′ the delivery-valve.

J is the valve-rod of the admission-valve, and K the valve-rod of the delivery-valve, the valve-rod K, as shown in Fig. 2, having attached to it a piston K^2, situated in an actuating-cylinder, (indicated at M,) M^4 indicating a dash-pot cylinder at the end of the cylinder M. The admission-valve rod J is connected with the long arm of a three-armed lever J′ J^2 J^3, the shorter arms J^2 and J^3 being symmetrically disposed on each side of the pivot of the lever and having radially equidistant cam contacting faces or rollers situated in parallel planes, as is best shown in Fig. 4. The three-armed lever is pivoted at its cylindrical bored hub J^4 (see Figs. 3 and 4) on a bearing J^6, eccentrically supported, as shown in Fig. 4, on a pin J^5 j^5, rotatably secured in the supporting-arms L L.

J^7 indicates a binding-screw, and it will be obvious that by turning the pin J^5 j^5 the pivot of the three-armed lever will be shifted, thus enabling compensation to be made for wear and a nice fit to be attained. The pivotal connection of the long arm J′ of the lever with the rod J is of a similar character, as shown in Fig. 4, the end of the lever-arm J′ being bifurcated and serving as a support for the pin J^8 j^8, having the eccentric bearing J^9 formed in its center, upon which the rod J is pivoted. By shifting this bearing compensation can be made at this point in the same way as described above.

j^2 j^3 indicate the cam-rollers on the lever-arms J^2 J^3.

The arms L, already described, serve also to support the bearings for a vertical rotating shaft P^2, having, as shown, a miter-wheel P′ secured to the end of the shaft P^2 and driven by a miter-wheel P, which, as shown, is secured on the end of the main shaft of the engine.

L′ indicates the removable outer portion of the bearing, and P^3 P^4 indicate a pair of cams secured to the shaft P^2 in such a position as to contact one with the cam-roller j^2 and the other with the cam-roller j^3. The shape of these cams is best shown in Fig. 3. They each consist of two oppositely-disposed segmental surfaces of different radius, those of the upper cam being indicated at v^6 v^7 and the similar surfaces of the lower cam being indicated at v^4 v^5. These segmental portions of the cam are connected by symmetrical outlines, which in case of the upper cam are indicated at v' and v and in case of the lower cam at v^2 and v^3, and the parts are so shaped and arranged, as shown in Fig. 3, that the one cam-roller will always pass from the higher to the lower segmental surface at the same time that the other cam-roller is passing from the lower to the higher segmental surface, and vice versa, the cam-rollers always remaining in contact with the surfaces of the cam upon which they work.

It will readily be seen that this device is of great simplicity and compactness of construction, that it necessarily works with great precision, and results in a very rapid movement of the admission-valve both in opening and closing.

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

1. In a blowing-engine, the combination with the rod of a sliding air-admission valve of a three-armed pivoted actuating-lever J′ J^2 J^3 pivotally attached by its arm J′ to the valve-rod and having on its arms J^2 J^3 cam contacting faces or rollers j^2 j^3 arranged in parallel planes but equidistant from the pivot of the lever, a positively-driven rotating spindle P^2 and cams P^3 P^4 secured on said spindle so as to act respectively on the cam-rollers j^2 j^3, the cams and cam-rollers being so formed and arranged as to maintain contact between each cam and its roller through the revolutions of the cams.

2. In a blowing-engine, the combination with the rod of a sliding air-admission valve of a three-armed adjustably-pivoted actuating-lever J′ J^2 J^3 pivotally attached by its arm J′ to the valve-rod, and having on its arms J^2 J^3 cam contacting faces or rollers j^2 j^3 arranged in parallel planes but equidistant from the pivot of the lever, a positively-driven rotating spindle P^2 and cams P^3 P^4 secured on said spindle so as to act respectively on the cam-rollers j^2 j^3, the cams and cam-rollers being so formed and arranged as to maintain contact between each cam and its roller throughout the revolutions of the cams.

3. In a blowing-engine, the combination with the rod of a sliding air-admission valve of a three-armed adjustably-pivoted actuating-lever J′ J^2 J^3 pivotally attached through adjustable mechanism by its arm J′ to the valve-rod, and having on its arms J^2 J^3 cam contacting faces or rollers j^2 j^3 arranged in parallel planes but equidistant from the pivot of the lever, a positively-driven rotating spindle P^2 and cams P^3 P^4 secured on said spindle so as to act respectively on the cam-rollers j^2 j^3 the cams and cam-rollers being so formed and arranged as to maintain contact between each cam and its roller throughout the revolutions of the cams.

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