G. B. PETSCHE.

BLOWING ENGINE OR COMPRESSOR.

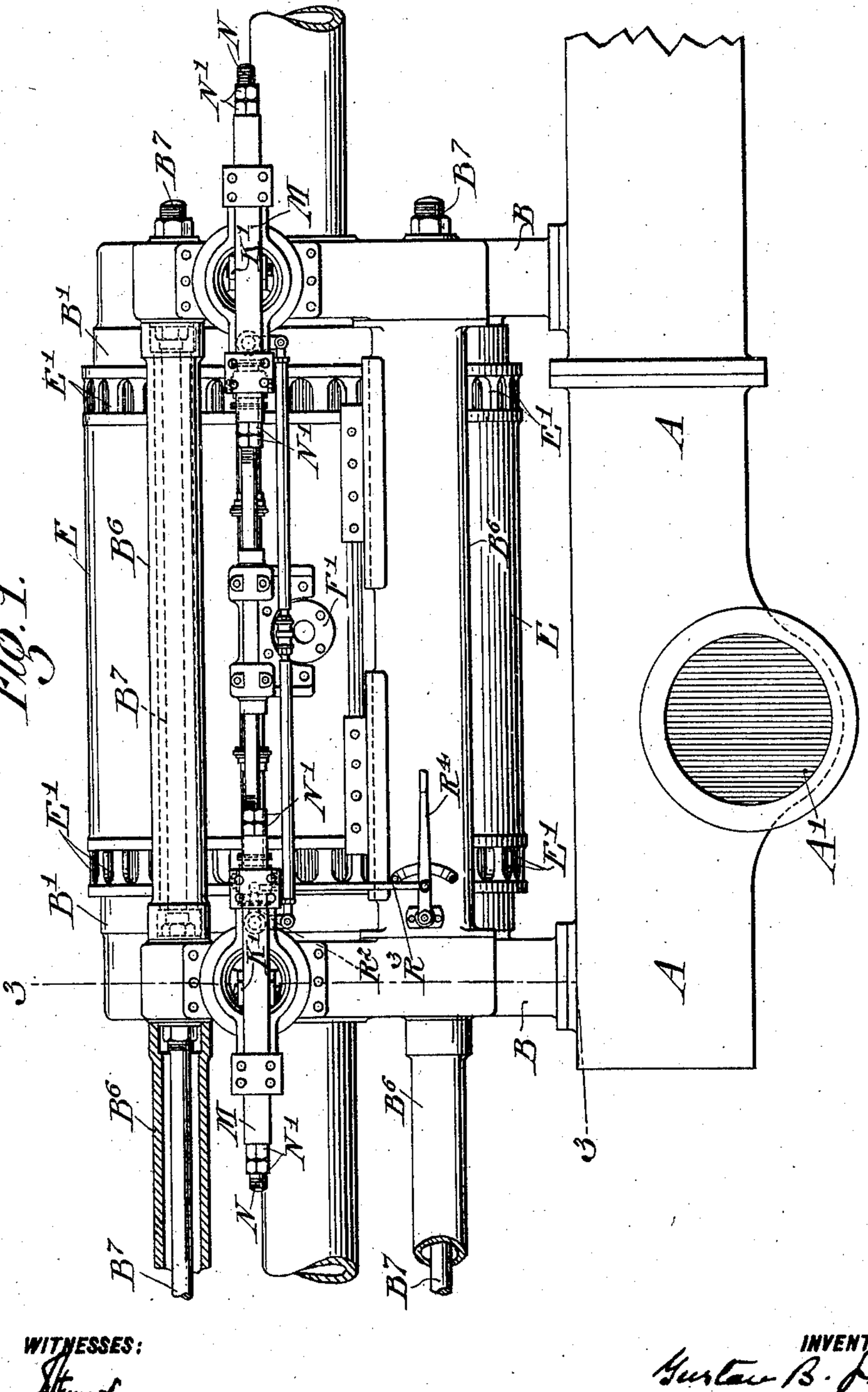
APPLICATION FILED MAY 28, 1909.

986,752.

Patented Mar. 14, 1911.

5 SHEETS—SHEET 1.

Fig. 1.



WITNESSES:

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5 SHEETS—SHEET 2.

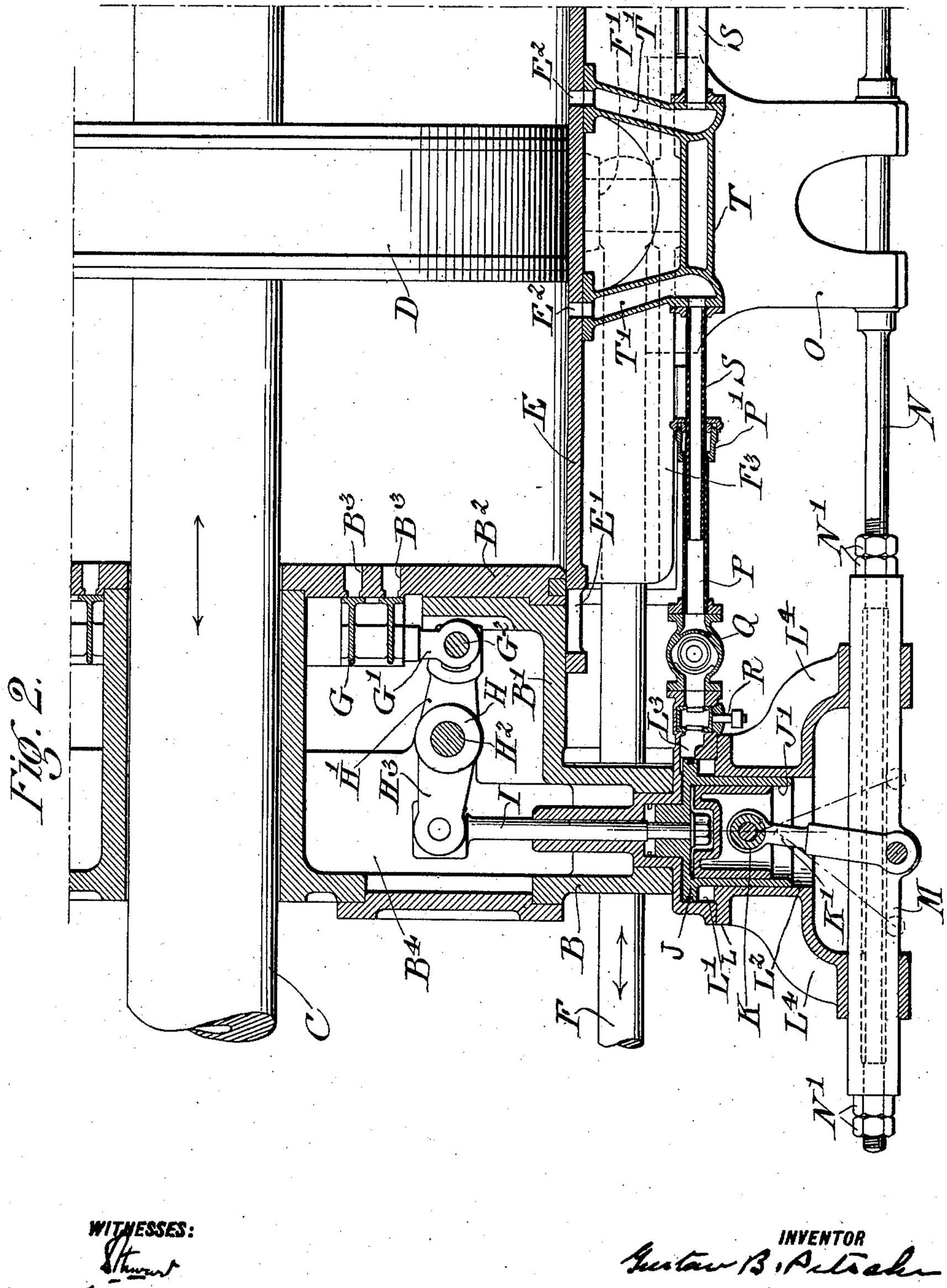

Fig. 2.

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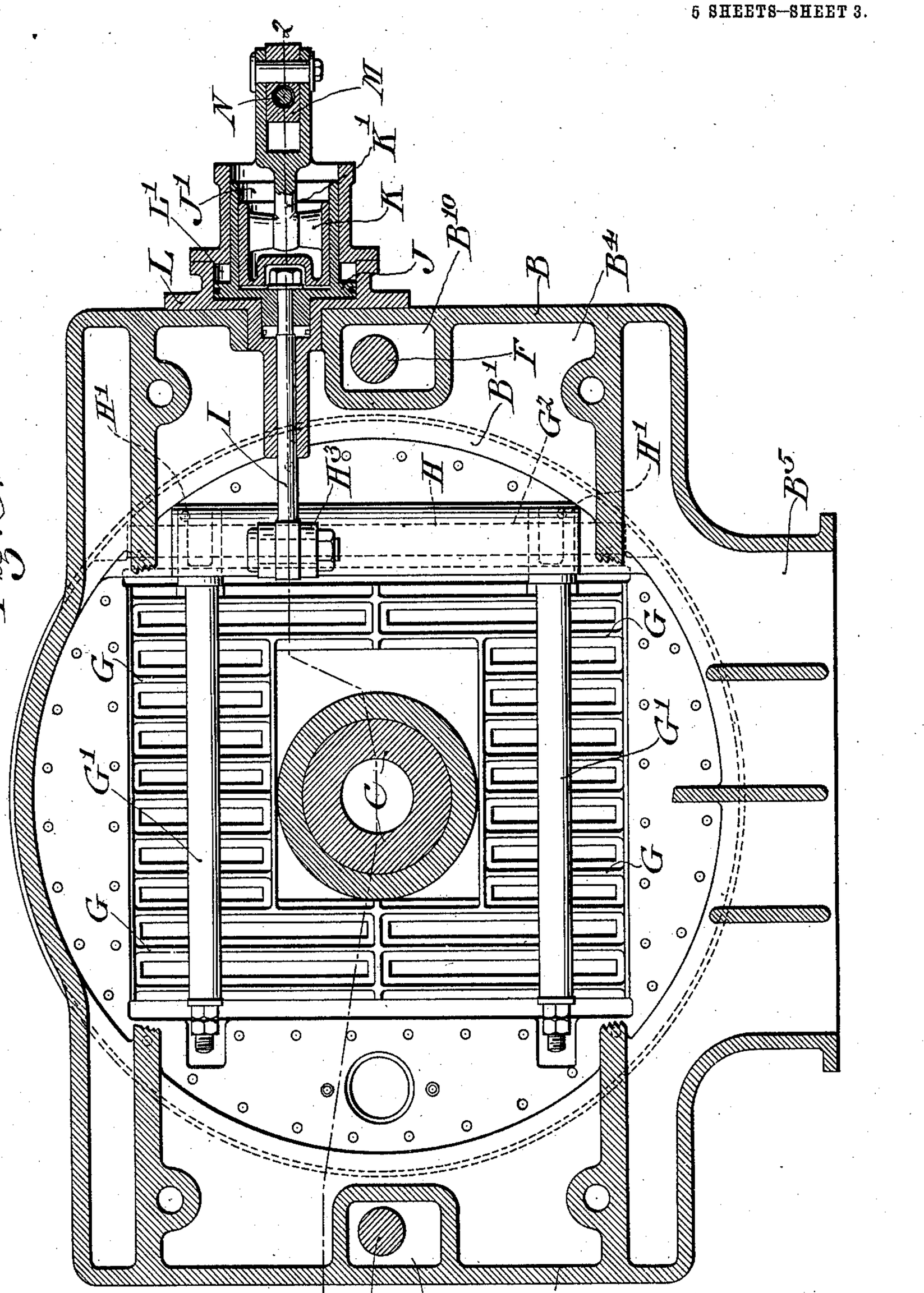
5 SHEETS—SHEET 3.

Fig. 3.



WITNESSES:

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5 SHEETS—SHEET 4.

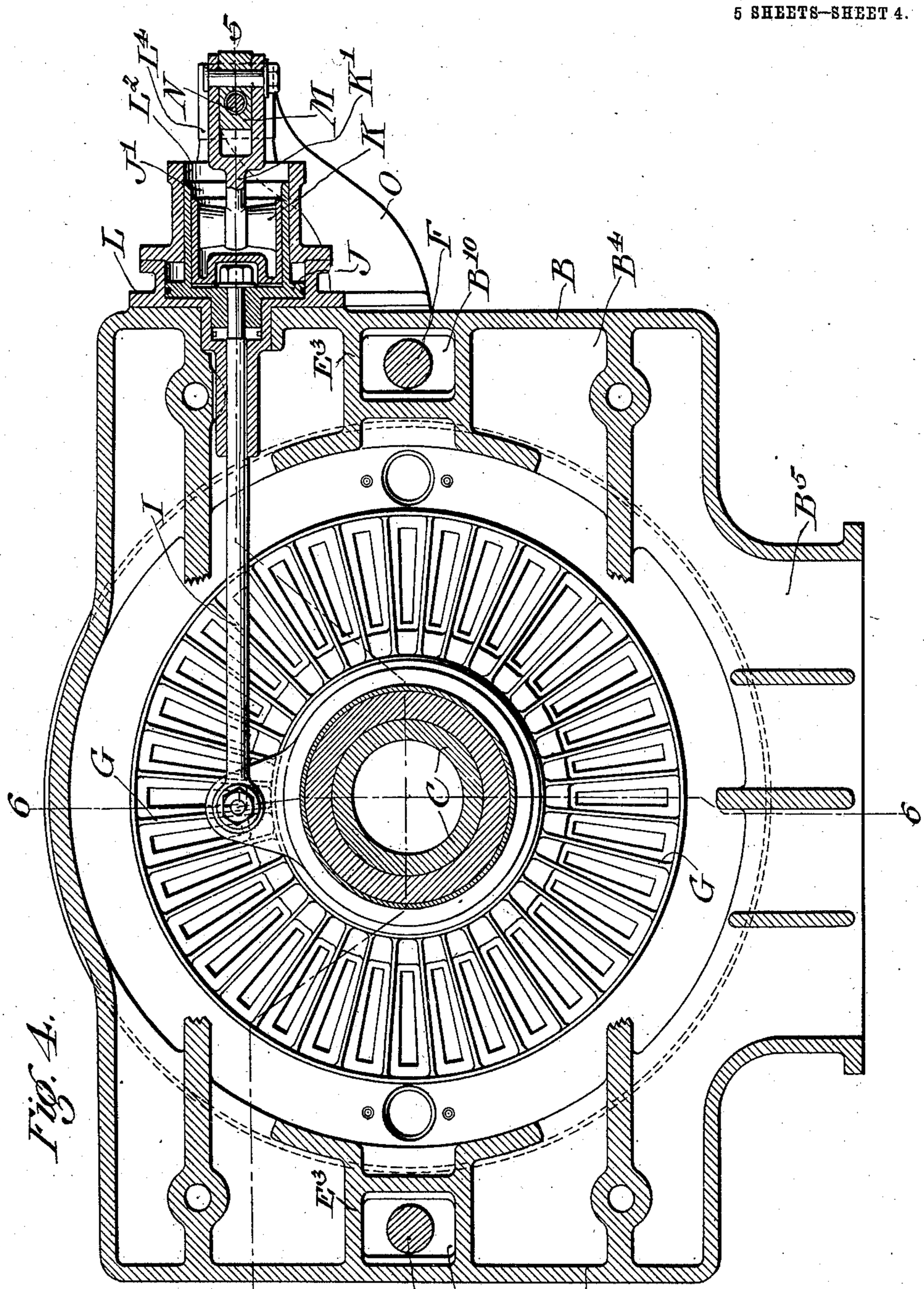

Fig. 4.

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5 SHEETS—SHEET 5.

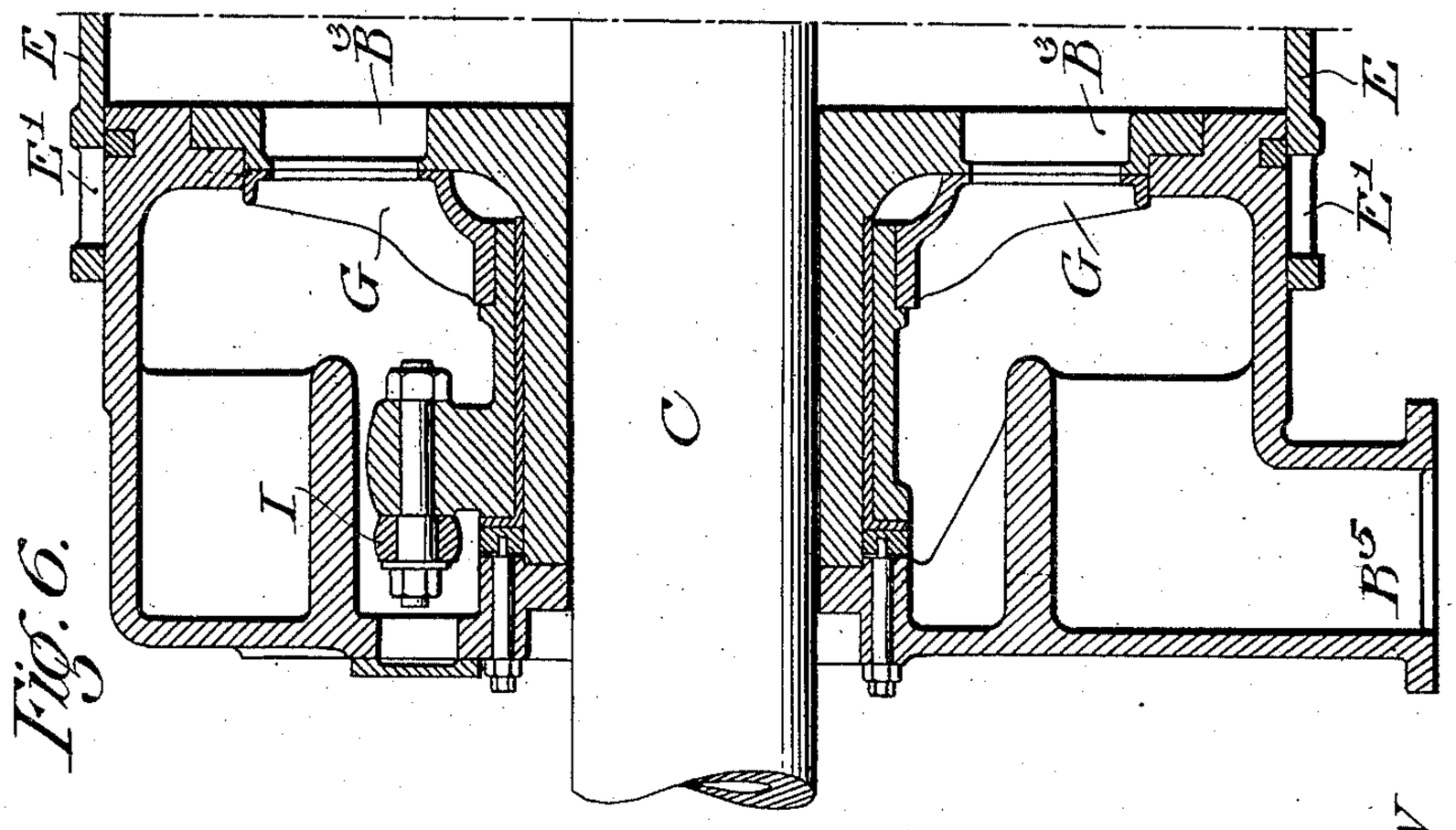

Fig. 6.

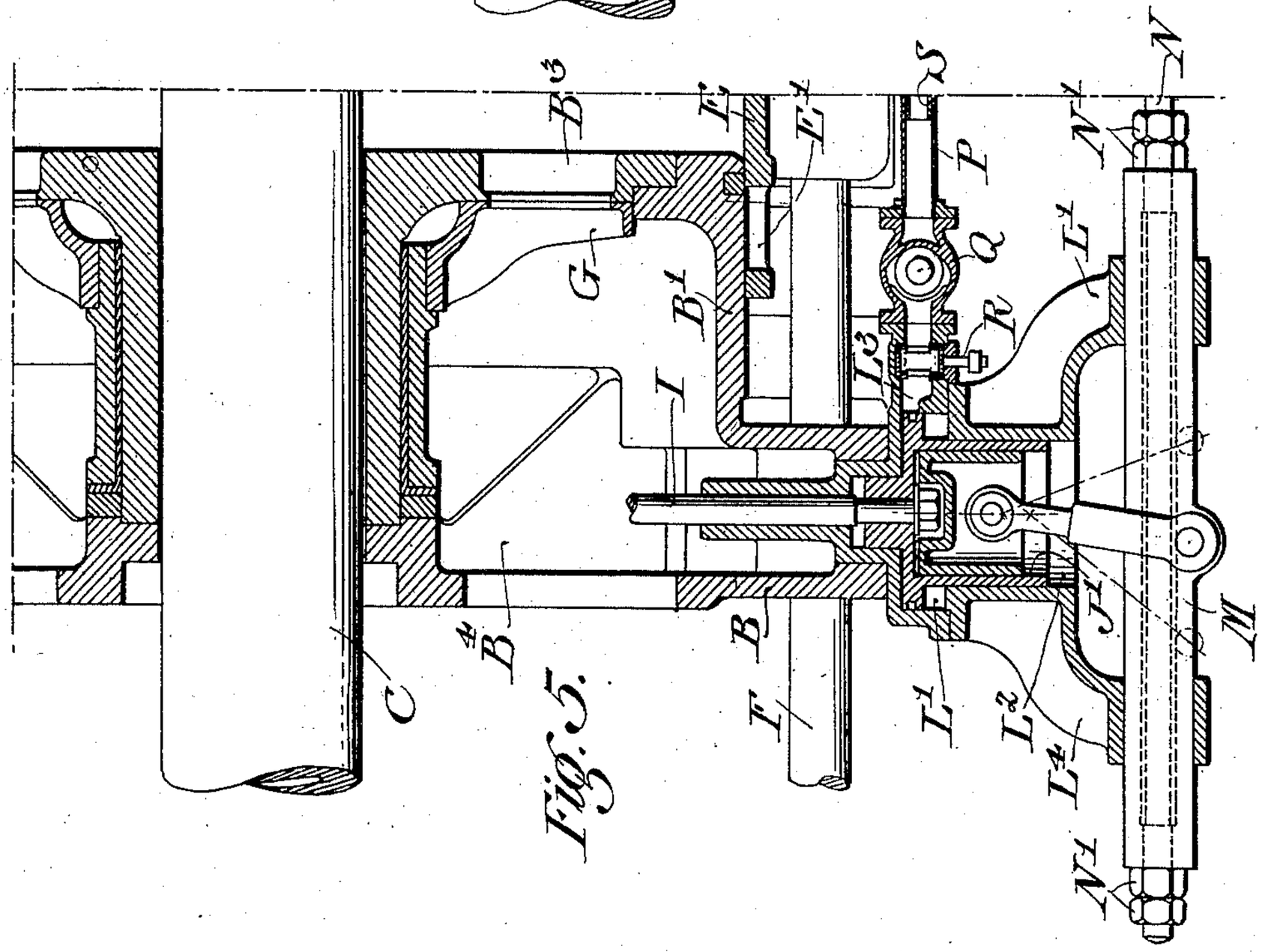

Fig. 5.

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UNITED STATES PATENT OFFICE.

GUSTAV B. PETSCHE, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO SOUTHWARK FOUNDRY AND MACHINE COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

BLOWING-ENGINE OR COMPRESSOR.

986,752. Specification of Letters Patent. **Patented Mar. 14, 1911.**

Application filed May 28, 1909. Serial No. 498,859.

To all whom it may concern:

Be it known that I, GUSTAV B. PETSCHE, a citizen of the United States, residing in the city and county of Philadelphia, in the State of Pennsylvania, have invented a certain new and useful Improvement in Blowing-Engines or Compressors, of which the following is a true and exact description, reference being had to the accompanying drawings, which form a part thereof.

My present invention relates to blowing engines, or compressors, and particularly to blowing engines of the type described and claimed in my prior Patent, No. 894,048, granted July 21st, 1908, in which admission ports are formed in the ends of the body of the cylinder, and the latter is reciprocated relative to the cylinder ends in a direction parallel to the axis of the cylinder to alternately open and close the admission ports, while the delivery ports are formed in the stationary heads of the cylinder and are controlled by oscillating or straight line reciprocating valves.

My present invention has for its object to improve engines of the kind disclosed in my said prior Patent, No. 894,048, in its general construction and particularly with respect to the means employed for operating the delivery valves, which in the present construction, as in my prior patent, are opened by fluid pressure mechanism at the instant when the pressure in the compressor becomes substantially equal to the pressure in the receiver into which the engine discharges, while the valves are closed at definite points in the strokes of the compressing piston by positively actuated means.

The various features of novelty which characterize my invention are pointed out with particularity in the claims annexed to and forming a part of this specification. For a better understanding of my invention, however, and the advantages possessed by it, reference may be had to the accompanying drawings and descriptive matter in which I have illustrated and described forms in which the invention may be embodied.

Of the drawings, Figure 1 is a side elevation of the air compressing portion of a blowing engine. Fig. 2 is a partial sectional elevation on the line 2—2 of Fig. 3. Fig. 3 is a partial sectional elevation on the line 3—3 of Fig. 1. Fig. 4 is a view taken, similarly to Fig. 3, showing a modified construction. Fig. 5 is a partial sectional plan taken on the line 5—5 of Fig. 4, and Fig. 6 is a partial sectional elevation taken on the line 6—6 of Fig. 4.

Referring first to the construction shown in Figs. 1, 2 and 3, A represents the base member on which the compressor proper is mounted. The base member A is hollow and serves as a receiver into which the compressor discharges. A′ represents the outlet port from the receiving space in the base. On the base A are mounted the cylinder end members, or heads, B, which are made hollow, a chamber B^4 in each head communicating with the receiving space in the base A through the passage B^5. The heads B are connected to each other and the frame (not shown) of the driving engine, by bolts B^7 and struts B^6. Each head is formed on its inner side with a cylindrical portion B′ on which the corresponding end of the body E of the compressing cylinder telescopes. The inner end of each portion B′ is closed by a diaphragm B^2 which may be formed, as shown, of a separate piece. The discharge or delivery ports B^3 from the compressing cylinder are formed in the diaphragms B^2. The ports B^3 in each diaphragm are controlled by a sliding gridiron valve G, having two stems G′ which are connected together by a rod or bolt G^2. The rod G^2 of each delivery valve is engaged by the slotted end of each of one or more arms H′ of a sleeve like rock shaft H journaled on a shaft H^2 secured at its ends to the corresponding head B. Each rock shaft H has an arm H^3 connected by the rod I with a piston J outside the corresponding head B and working in a cylinder L. Each cylinder L is provided with a cylinder space L′ in which its piston J proper works, and is provided with a bearing L^2 in which a reduced hollow cylinder portion J′ of the piston J works. A piston, or crosshead, K, working in the hollow cylinder portion J′ of the piston J, serves as a means for positively closing the corresponding delivery valve at the proper point in the stroke of the compressing piston, and also to cushion the opening movement of the valve in a well known manner. Each piston K is connected by a rod K′ to a corresponding sleeve M guided in brackets L^4 of the cylinder L. Each of the two

sleeves M is mounted on a rod N, being adjustably secured in place by nuts N′. The rod N is secured at its middle to a bracket O, which is secured to the side of the movable compression cylinder body E.

The cylinder E is formed with ports E′ at its end, and the cylinder E is reciprocated to alternately open and close these ports through its movement relative to the stationary heads by means of connecting rods F which extend through passages B^{10} formed in one of the end heads, and are connected to the cylinder at its middle portion, as through trunnions F′ formed on the cylinder. Preferably, the cylinder is stiffened, and the rods F partially inclosed by integral housings or hollow ribs E^3 formed on the side of the cylinder. The rods F and the piston rod C attached to the compressing piston D are connected as through connecting rods and eccentrics (not shown) with the shaft of the driving engine, the connections being such that while of course the piston D and cylinder E have the same time of reciprocation, the cylinder E is about ninety degrees in advance of the piston D in its cycle of motion.

It will, of course, be apparent that as the cylinder E is reciprocated, the sleeves M are correspondingly reciprocated, and the pistons K are thus moved in and out, closing the delivery valves when they are moved in, and permitting the delivery valves to open when they are out, while at the same time they serve to cushion the opening movement of the delivery valves. Each delivery valve is opened, as in my said prior Patent No. 894,048, by air under pressure admitted to the cylinder space L′ back of the piston J from the corresponding end of the compressing cylinder. In the form shown, a bracket T, secured to the side of the cylinder E has passages T′ formed in it which communicate with ports E^2 in the wall of the cylinder E.

A pipe S leading from the outer end of each passage T′ and secured in the bracket T, telescopes in a pipe P having a stuffing box P′ at one end, and connected at its other end through the usual loaded and restricted return valve Q with the passage L^3 in the cylinder L which leads to the space L′. Valves R are provided, one in each passage L^3, and are connected through suitable links R^2, R^3, to an operating lever R^4. By means of the valves R, lever R^4, and connections, the passages L^3 may be manually closed when desired in order to prevent the delivery valves from opening. Each port E^2 is located near enough to the corresponding end of the cylinder E so that it will not be cut off by the piston D until after the pressure in that end of the cylinder has been built up by the piston D to the point at which the corresponding delivery valve should open. Each port E^2 is also placed far enough away from the corresponding end of the cylinder E so that the port will be uncovered by the piston as the latter approaches the end of its stroke in time to permit the air from the corresponding cylinder space L′ to flow back into the cylinder E behind the piston D, and permit the valve G to be readily closed by the piston K at the proper instant.

Among the advantages possessed by the construction are the following. The slides M may be perfectly alined, and their motions properly timed, and hence operate with little friction. The provisions for getting the air from the compressing cylinder into the cylinder spaces L′ are simple, reliable and effective. The cylindrical portions B′ of the heads B are long enough so that guide surfaces of ample area are provided for the cylinder E. This is made possible with the reciprocating valves G shown in Figs. 1, 2 and 3 by the provision of the rock shaft H extending transversely to the axis of the cylinder, with its arms H′ and H^3 extending parallel to the axis of the cylinder, whereby the connecting rods I are laterally displaced from the valves G.

The construction shown in Figs. 4, 5 and 6 differs from that shown in Figs. 1, 2 and 3 in the fact that each delivery valve G is annular, and that the ports in the valve, as well as the corresponding ports in the cylinder heads, are radial. In this form each delivery valve is formed with a hub journaled on a sleeve carried by the corresponding cylinder head and surrounding the piston rod C, said sleeve being provided at one side with an arm which extends in a line with the axis of the piston J and is directly connected thereto by the connecting rod I.

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 of a movable open ended compressing cylinder wall, stationary cylinder heads provided at their inner sides with bearings for the ends of said wall, and having delivery ports formed in them, said wall having admission ports at its ends which are alternately opened and closed when said wall is reciprocated in the direction of its axis, a fluid pressure delivery valve operating mechanism supported on each cylinder head, and pipe sections, one for each delivery valve mechanism, attached to said movable wall and each in communication with the interior of the compressing cylinder and each formed with a portion extending parallel to the axis of the cylinder and telescoping with the corresponding fluid pressure mechanism as the cylinder wall is reciprocated.

2. In a blowing engine, the combination of a movable open ended compressing cylinder wall, stationary cylinder heads provided on their inner sides with bearings for the

ends of said cylinder wall and formed with delivery ports, a delivery valve controlling the ports in each head, said cylinder wall having admission ports formed through it at its ends whereby when the cylinder is reciprocated in the direction of its axis the admission ports at each end are alternately opened and closed, and fluid pressure mechanism for opening the delivery valves comprising a cylinder attached to each delivery head, a piston working in each cylinder, a connection between each piston and the corresponding delivery valve, a pipe section attached to each fluid pressure cylinder and in communication with the space therein, and a pair of pipe sections attached to said movable cylinder wall and in communication with the interior of the compressing cylinder and arranged, one to telescope with one, and the other to telescope with the other of the pipe sections attached to the fluid pressure cylinders.

3. In a blowing engine, the combination of a movable open ended compressing cylinder wall, stationary cylinder heads provided with bearings on their inner sides on which the ends of said movable wall telescope, and formed with delivery ports at their inner ends, delivery valves controlling said ports, and operating mechanism therefor, comprising a rock shaft located within and pivotally supported by each head with its axis transverse to the axis of the cylinder, a fluid pressure device located without and supported by each cylinder head, and mechanical connections between each rock shaft and the corresponding fluid pressure device and the corresponding delivery valve.

4. In a blowing engine, the combination of an open ended movable compressing cylinder wall formed with admission ports at its ends, stationary cylinder heads provided with bearings on which the ends of said movable wall telescope, and formed with delivery ports at their inner ends, delivery valves controlling said ports and operating mechanism therefor comprising a cross head supported by each cylinder head and movable in a direction transverse to the axis of the compressing cylinder, a shaft at the side of and parallel to the axis of said movable wall and secured thereto, guides for said shaft carried by each cylinder head, and a link connecting each cross head with said shaft whereby when the cylinder wall is reciprocated, the admission ports at its ends are alternately opened and closed, and the cross heads are alternately moved in and out.

5. In a blowing engine, the combination of an open ended movable compressing cylinder wall formed with admission ports at its ends, stationary cylinder heads provided with bearings on which the ends of said movable wall telescope, and formed with delivery ports at their inner ends, delivery valves controlling said ports and operating mechanism therefor comprising a cross head supported by each cylinder head and movable in a direction transverse to the axis of the compressing cylinder, a shaft at the side of and parallel to the axis of said movable wall and secured thereto, sleeves one for each cylinder head, secured on, and longitudinally adjustable with respect to said shaft, a guide for its sleeve carried by each cylinder head, and a link connecting each cross head with one of said sleeves, whereby when the cylinder wall is reciprocated, the admission ports at its ends are alternately opened and closed, and the cross heads are alternately moved in and out.

6. In a blowing engine, the combination of a movable open-ended compressing cylinder wall, stationary cylinder heads provided at their inner sides with bearings for the ends of said wall, said heads having delivery ports formed in them and said wall having admission ports at its ends which are alternately opened and closed when said wall is reciprocated in the direction of its axis, a fluid pressure delivery valve operating mechanism supported on each cylinder head, a bracket secured to the side of the cylinder wall and formed with a pair of passages, each open at its inner end to the interior of the compressing cylinder, and a pair of pipes secured to said bracket and extending, one toward one, and the other toward the opposite cylinder head, one of said pipes being in communication with one, and the other pipe with the other of said bracket passages, and each pipe telescoping with the fluid pressure mechanism supported by the cylinder toward which the pipe extends.

7. In a blowing engine, the combination of a movable open-ended compressing cylinder wall, stationary cylinder heads provided at their inner ends with bearings for the ends of said wall, said wall having admission ports at its ends which are alternately opened and closed when said wall is reciprocated in the direction of its axis, and being formed at opposite sides with hollow stiffening ribs extending parallel to the axis of the cylinder, and connecting rods, for reciprocating said wall, which extend into said hollow ribs and are connected to the wall.

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Witnesses:
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