

No. 651,837.

Patented June 19, 1900.

E. M. L. DUVAL.

CONSTRUCTION OF DOUBLE ACTING AIR COMPRESSORS.

(Application filed Apr. 6, 1899.)

(No Model.)

3 Sheets—Sheet 1.

FIG. 1

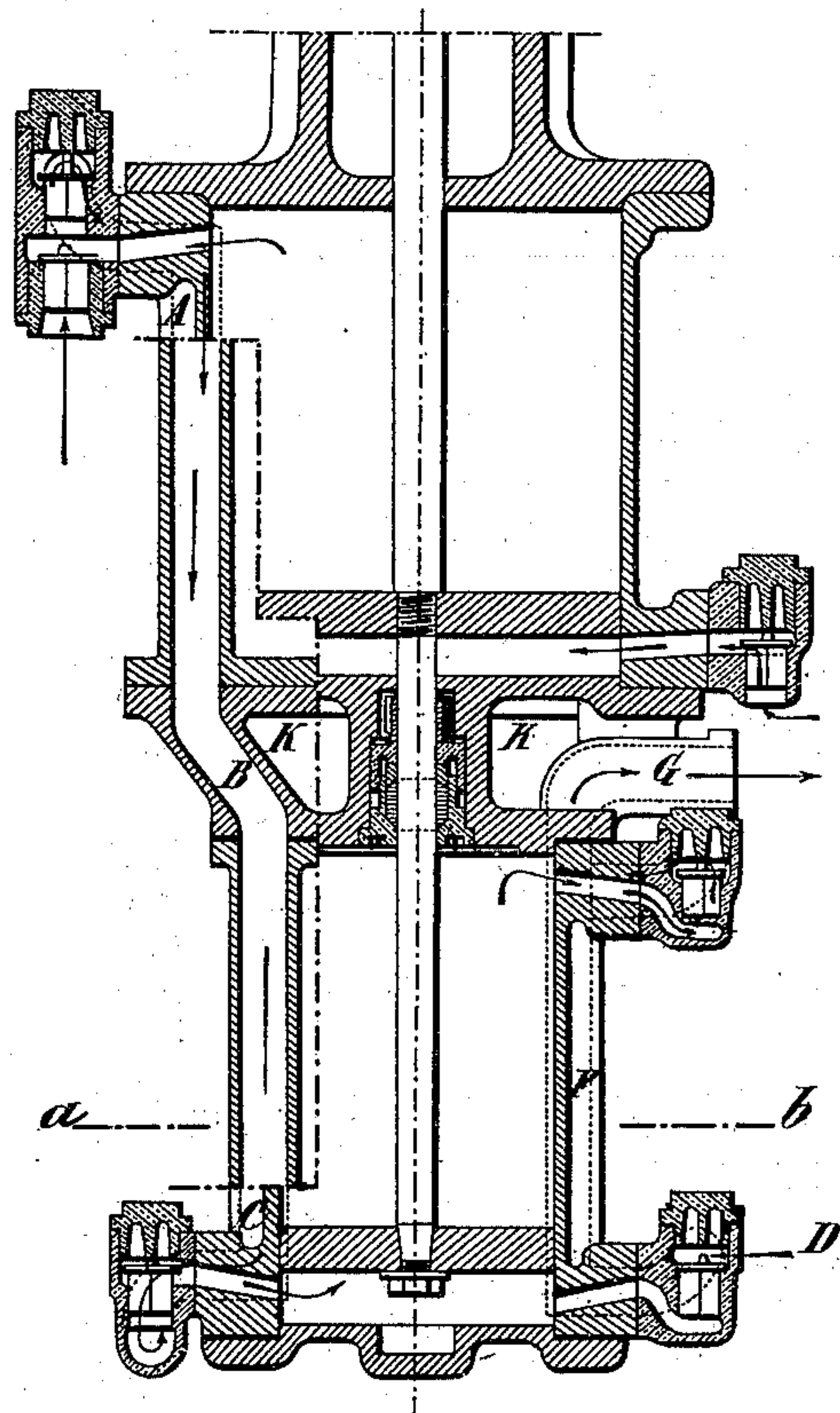


FIG. 2

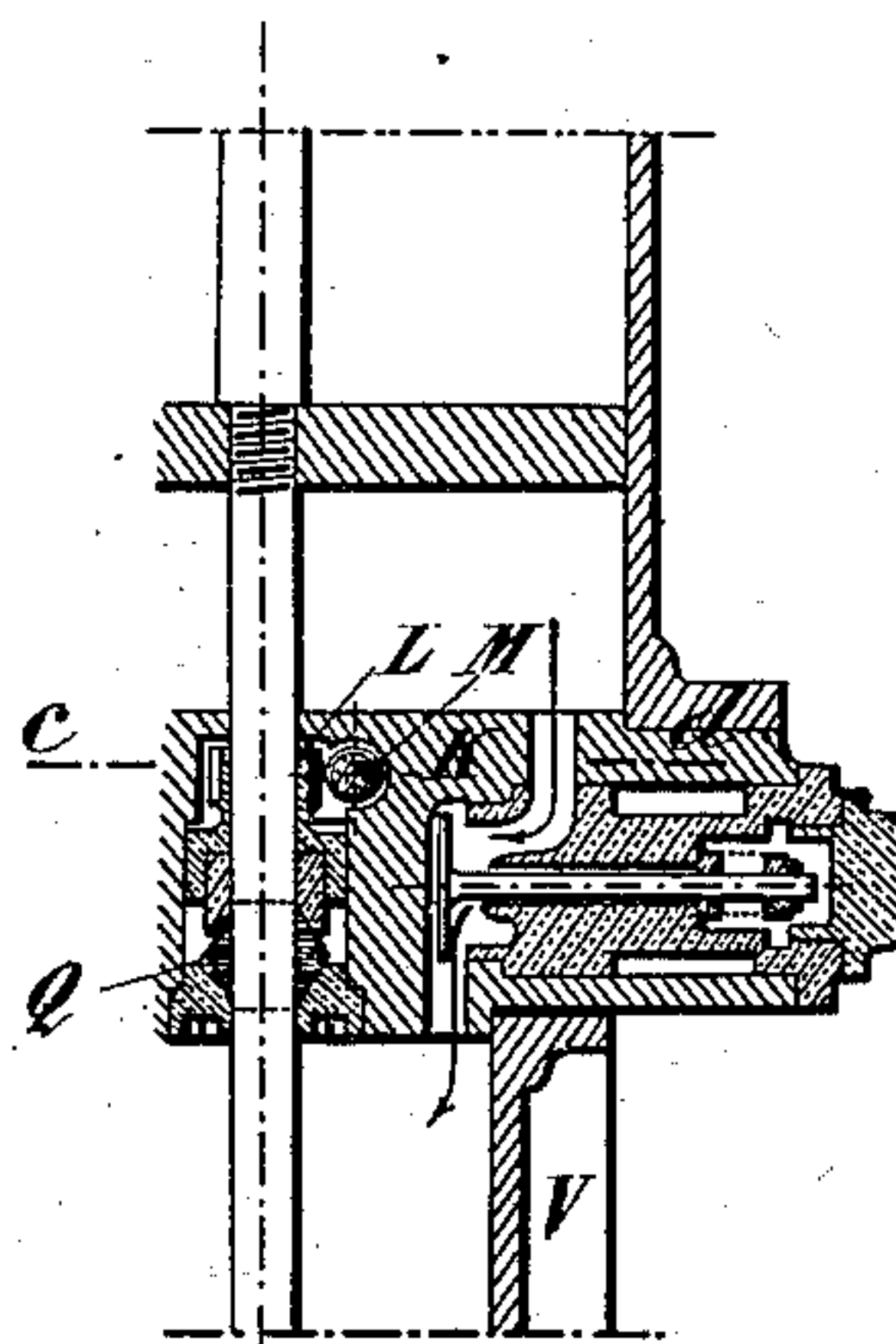


FIG. 3

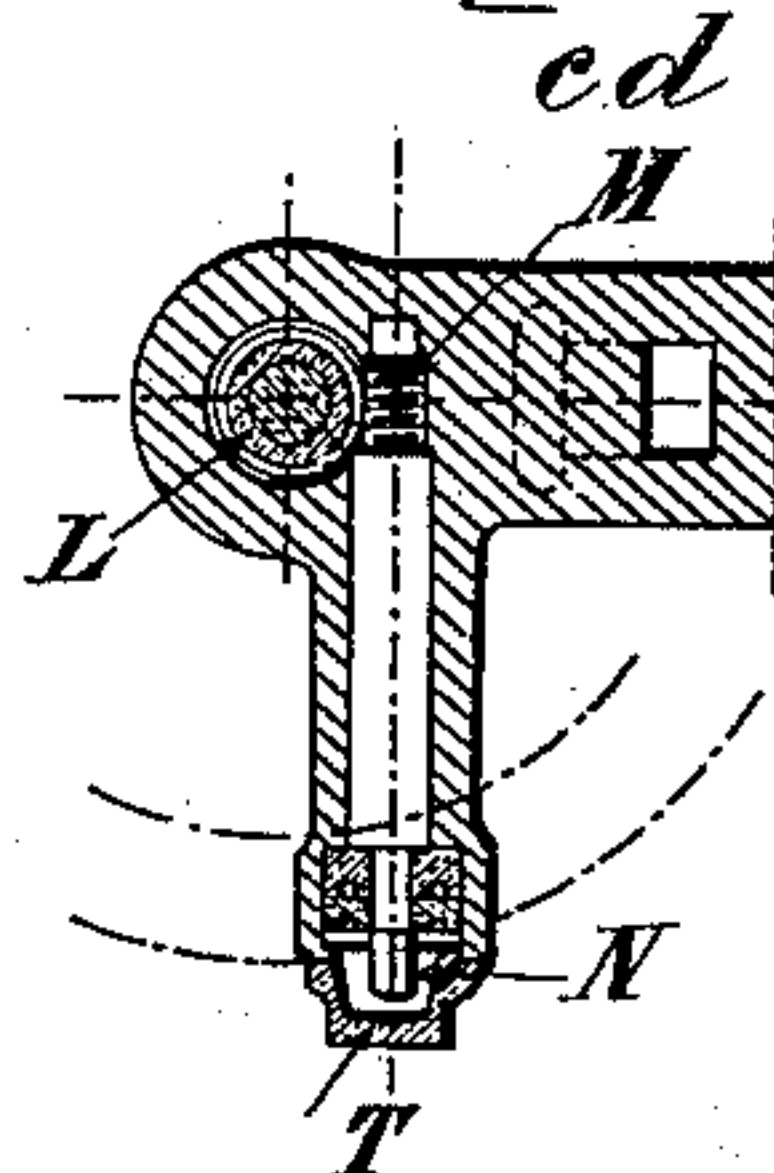
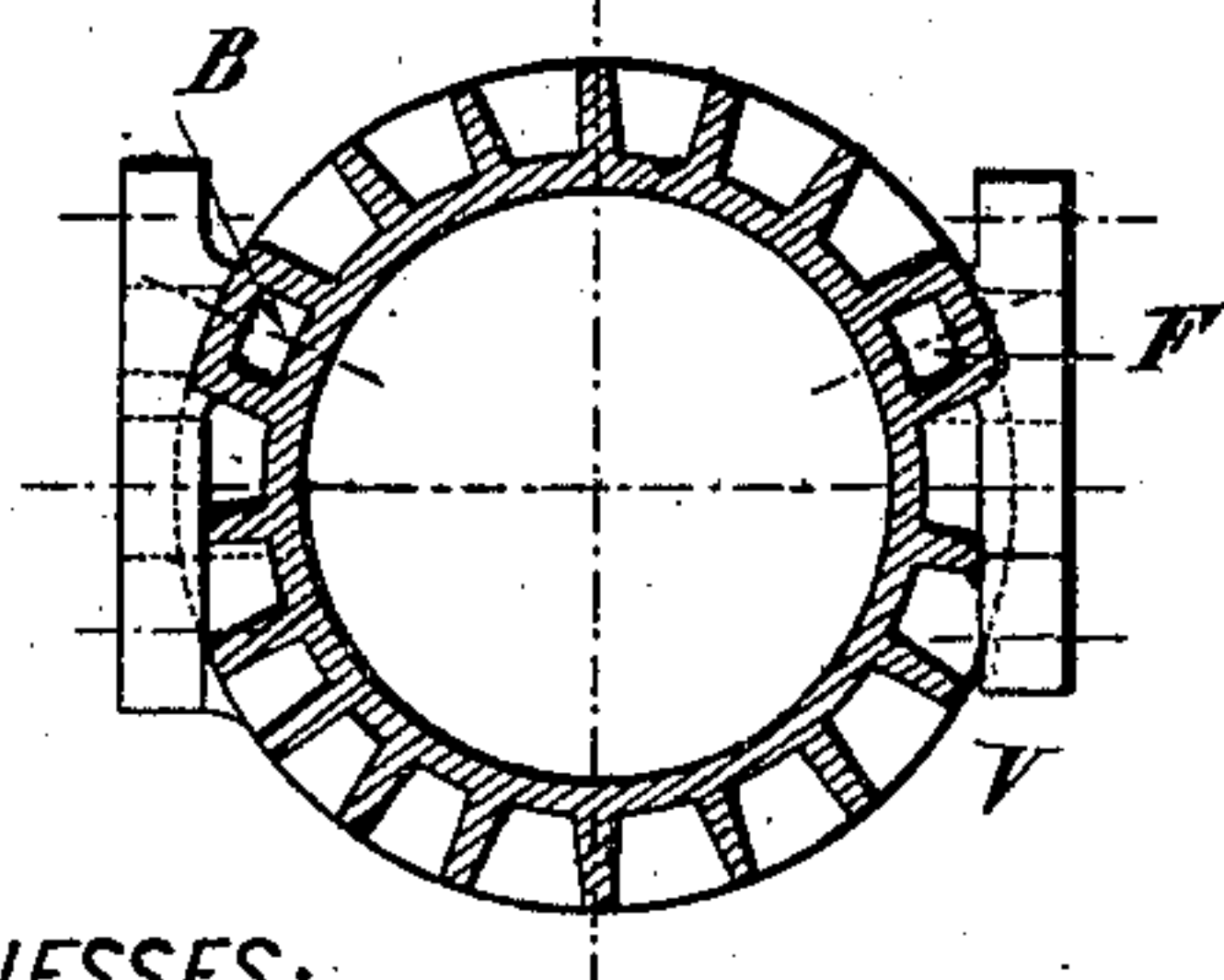


FIG. 4

a-b.



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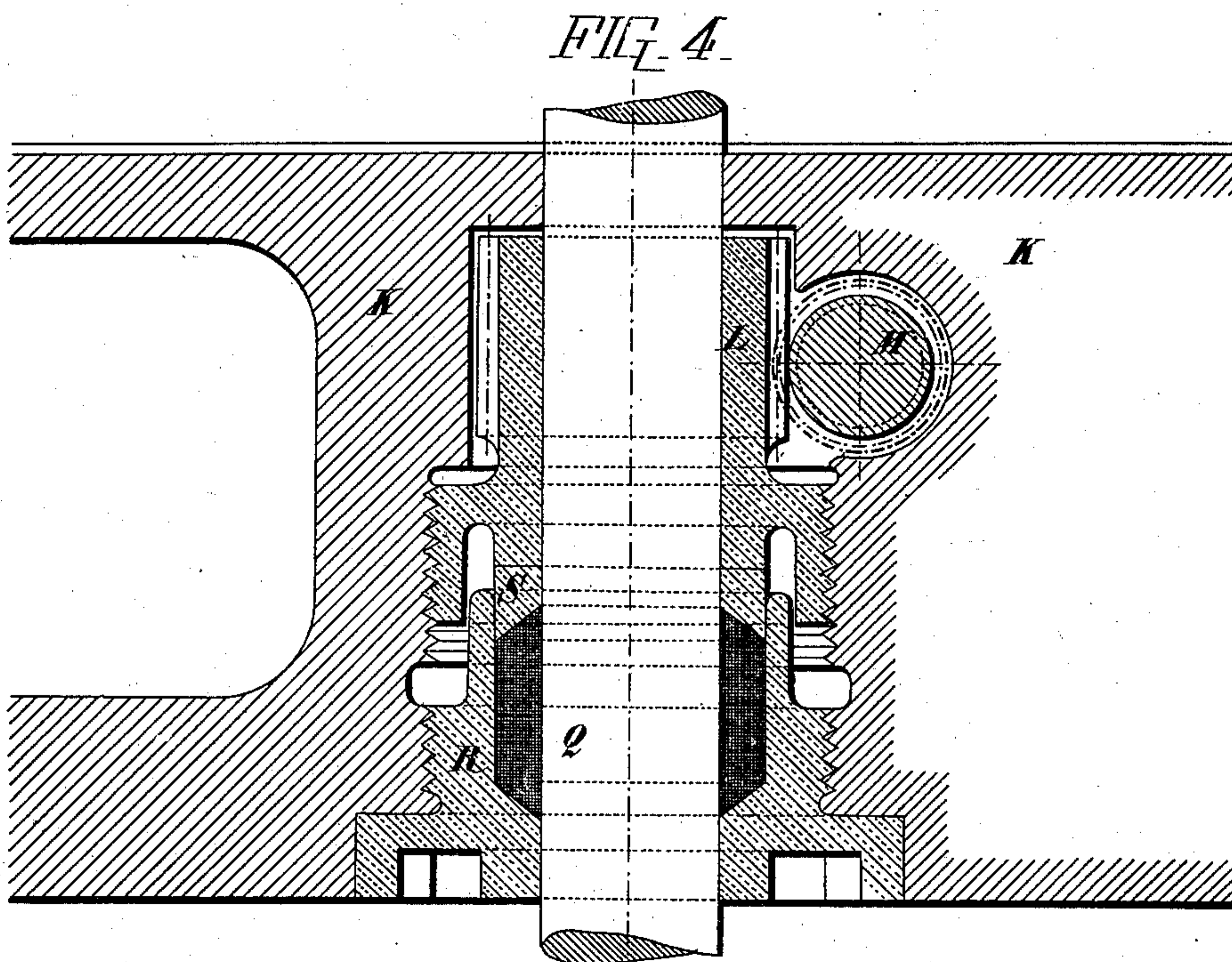
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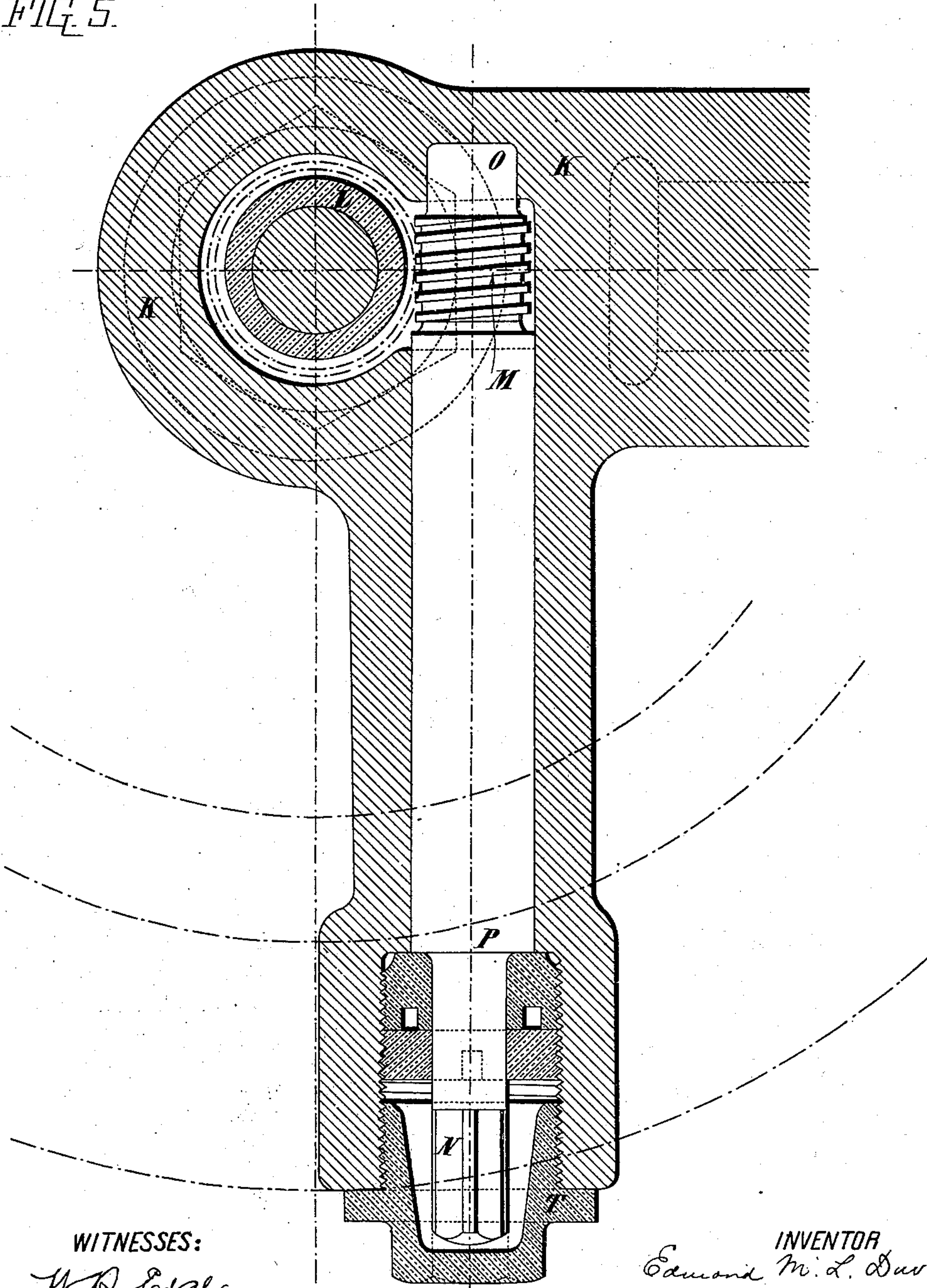
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FIG. 5.



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UNITED STATES PATENT OFFICE.

EDMOND MARTIN LÉONARD DUVAL, OF PARIS, FRANCE, ASSIGNOR TO
"LA COMPAGNIE DE FIVES LILLE," OF SAME PLACE.

CONSTRUCTION OF DOUBLE-ACTING AIR-COMPRESSORS.

SPECIFICATION forming part of Letters Patent No. 651,837, dated June 19, 1900.

Application filed April 6, 1899. Serial No. 712,013. (No model.)

To all whom it may concern:

Be it known that I, EDMOND MARTIN LÉONARD DUVAL, a citizen of the Republic of France, and a resident of Paris, in the Republic of France, have invented a new and useful Improvement in the Construction of Double-Action Air-Compressors, which is fully set forth in the following specification.

The present invention relates to improvements in the construction of double-action air-compressors, with a view of facilitating the work of these machines.

In the accompanying drawings a practicable form of the apparatus is illustrated.

Figure 1 is a vertical section of the apparatus, the section being taken on an irregular line. Fig. 2 represents in detail the direct communication between the two cylinders. Fig. 3 is a section on the line *c d* of Fig. 2. Figs. 4 and 5 illustrate, on a larger scale, the stuffing-box between the two cylinders and the device for pressing down the packing without having first to remove the cylinders. Fig. 6 is a horizontal section on the line *a b* of Fig. 1.

In the apparatus as used at present the air of the low-pressure cylinder is driven into the high-pressure cylinder and thence into the main compressed-air reservoir by means of a cumbrous and complicated outside system of pipes and passages. This is avoided in my apparatus, the air being driven from the low-pressure cylinder during the upstroke of that cylinder's piston and entering the high-pressure cylinder from below through passages A B C, Fig. 1, which are all formed in one piece with the two cylinders and with the intermediate body K between the cylinders. The driving of the air from the lower part of the low-pressure cylinder into the upper part of the high-pressure cylinder is effected in the same way as hitherto and as represented in Figs. 2 and 3. The driving of the air from the high-pressure cylinder into the main reservoir takes place through the passages D, E, and G, which are likewise each with the body of the apparatus.

The most important improvement consists in the arrangement of the packing material surrounding the rod common to both the pistons in the intermediate body K of the appa-

ratus. This packing may be metallic or of asbestos fiber or of any other material; but the distinguishing feature compared with devices hitherto in use is the special mechanism by means of which it is possible to tighten the packing from the outside without it being necessary to dismount the high-pressure cylinder. This mechanism consists principally of a metallic ring or sleeve L, Figs. 2 to 5, screwing and engaging at its lower end in the intermediate part K. At its upper end the sleeve is provided with helical teeth engaging with a small endless screw M, the shaft of which is prolonged to the outside of the apparatus, where it terminates in a square head N, adapted to receive a key by which it can be turned. This shaft is held in position as regards the movable sleeve L by means of fixed bearings at O and P. The stuffing-box Q is formed by a sleeve R, screwed or otherwise connected to the part K. A metal ring S separates the packing material from the movable sleeve with which the ring is in contact.

In order to tighten the packing, the cover T is unscrewed and the shaft and its screw turned by means of the key fitted on its squared end. A rotary motion is thus imparted to the sleeve L, which therefore is caused to descend, and thereby tighten the packing. The intermediate ring S is provided simply to prevent any friction when the packing consists of non-metallic material between the tightening-ring and the packing, the friction taking place, preferably, upon the annular surface.

It should be understood that I reserve to myself the right of substituting for the devices above described any others—such as, for instance, conical pinions which are adapted to be actuated at a distance and of producing the described results.

In order to increase the useful effect of the compressor it is of importance to facilitate the quick cooling of the air when it is compressed in the high-pressure cylinder. I therefore provide the periphery of that cylinder with thin ribs V, thus increasing the radiating-surface in contact with the cooling outside air. These ribs are represented in the section shown in Fig. 6.

Finally, I claim as my exclusive property in the construction of double-cylinder air-compressors such as are suitable for brakes in railway-trains the following improvements:

5 The combination with the high and low pressure cylinders arranged tandemwise, pistons therefor, and a piston-rod common to both pistons, of an intermediate part interposed between and closing the inner ends of
10 the cylinders and through which the piston-rod passes and has a bearing, an interiorly-screw-threaded recess about the piston-rod extending part way through the intermediate part, a movable compressing-sleeve about the
15 piston-rod at the inner end of the recess formed at one end with gear-teeth and at the other end with exterior screw-threads in en-

gagement with the interior threads of the recess, a fixed sleeve about the piston-rod screw-threaded into and closing the open end 20 of the recess, packing interposed between the fixed and movable sleeves, a worm in engagement with the gear-teeth on the movable sleeve, and an operating-shaft for turning said worm, said worm and shaft being mount- 25 ed entirely within the intermediate section.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

EDMOND MARTIN LÉONARD DUVAL.

Witnesses:

EMILE LEOBRET,

EDWARD P. MACLEAN.