

No. 689,775.

Patented Dec. 24, 1901.

L. D'AURIA.
NON-ROTATIVE PUMPING ENGINE.

(Application filed July 21, 1899.)

(No Model.)

2 Sheets—Sheet 1.

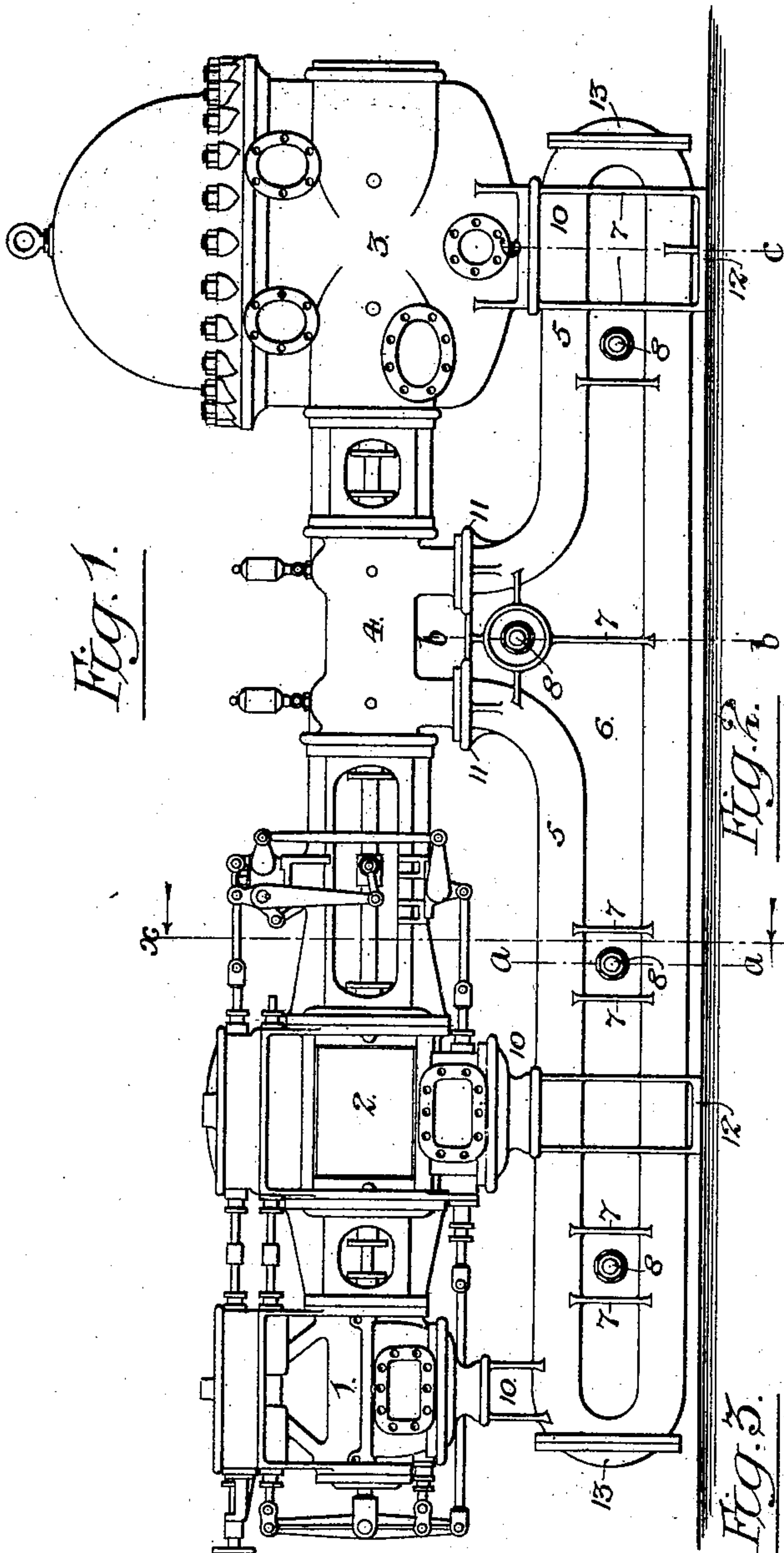


Fig. 1.

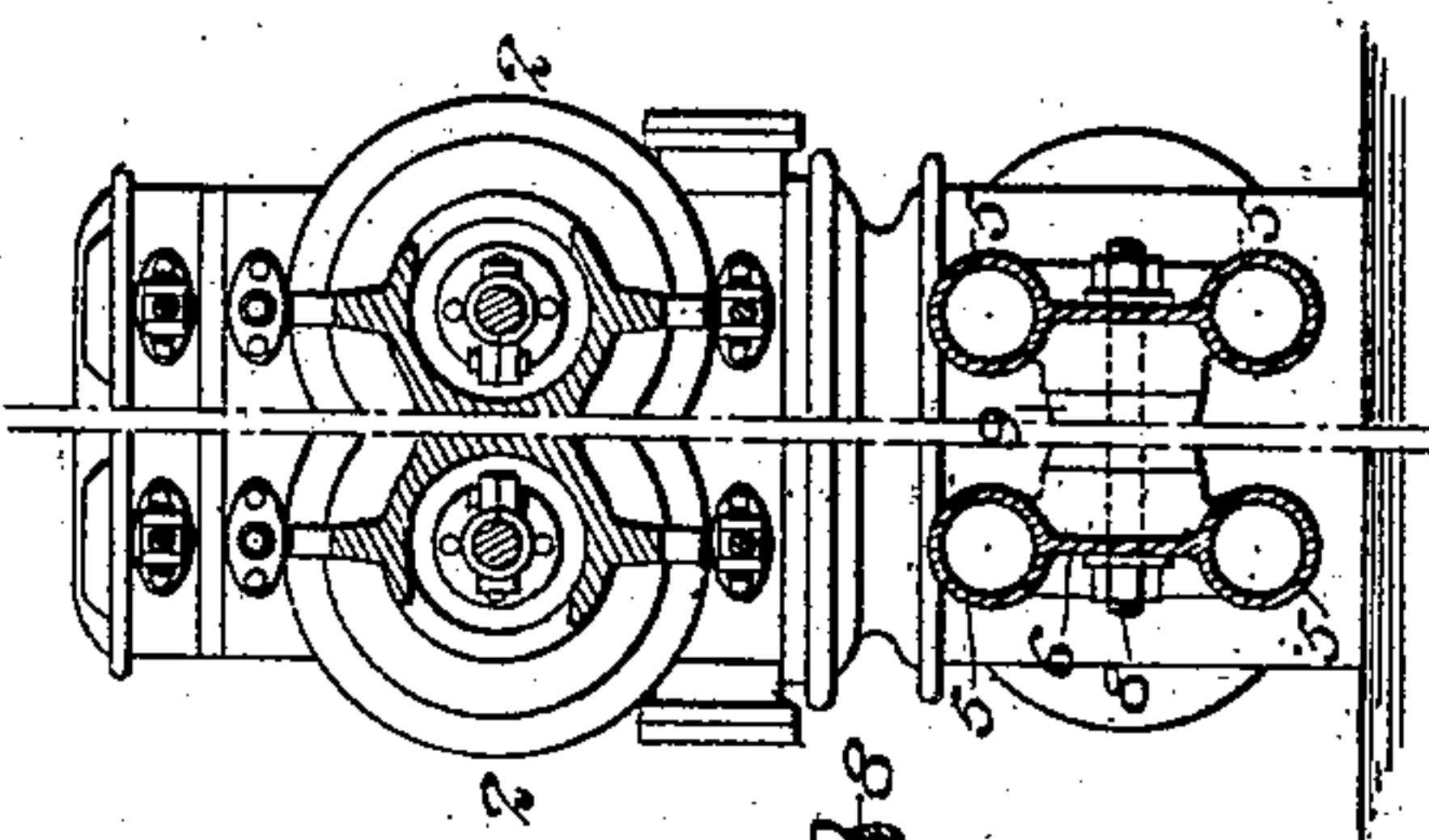


Fig. 2.

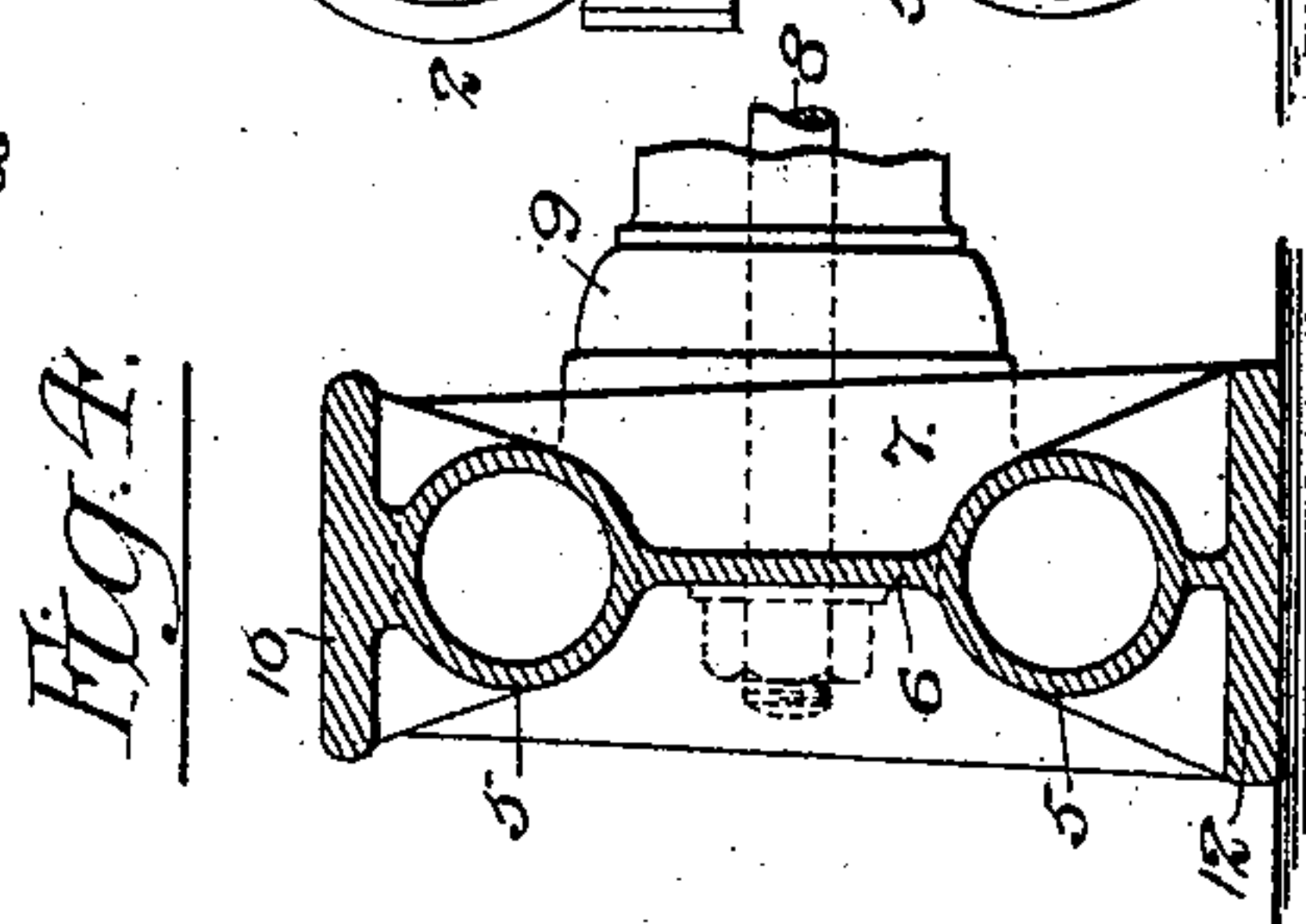


Fig. 3.

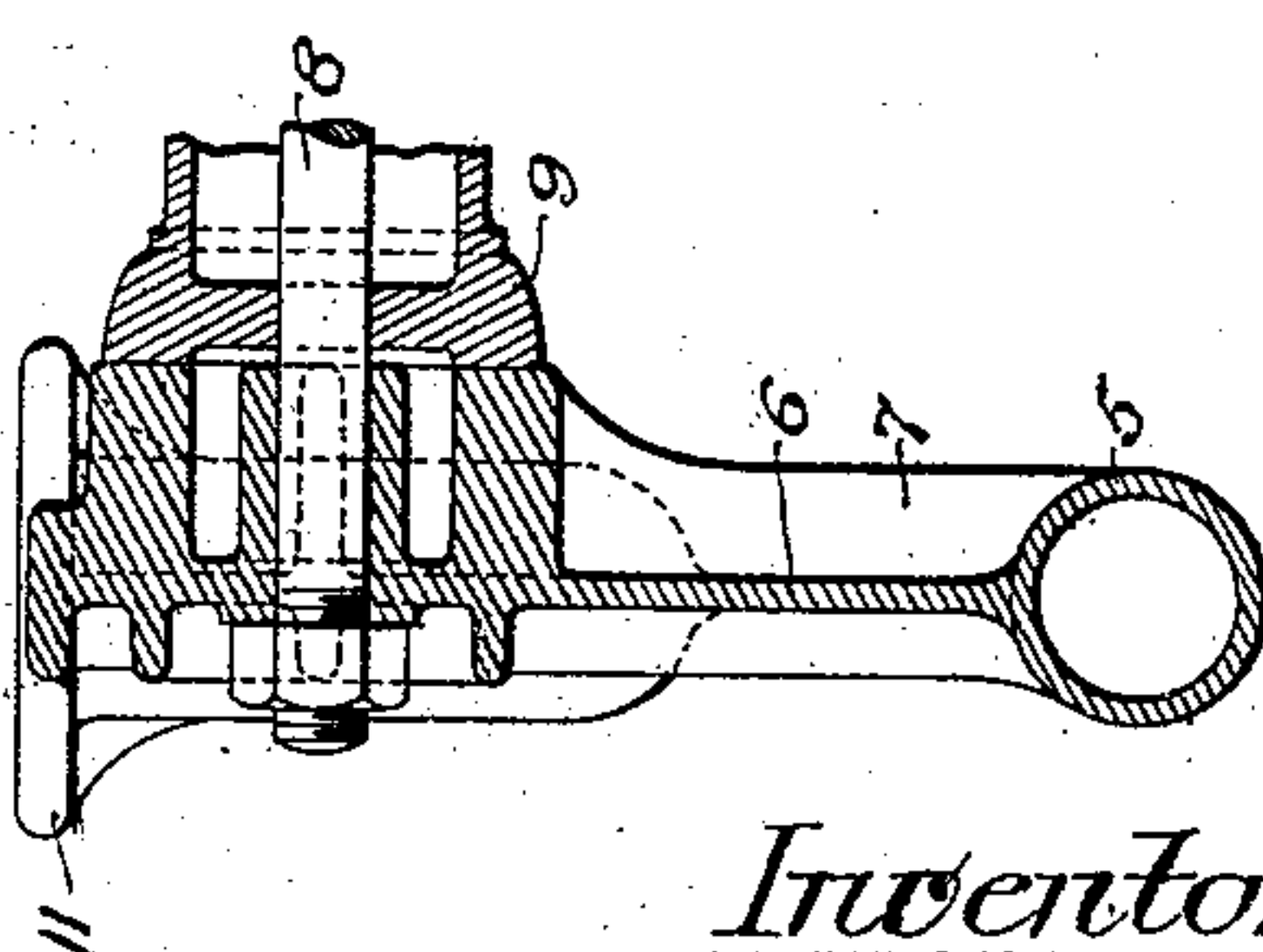


Fig. 4.

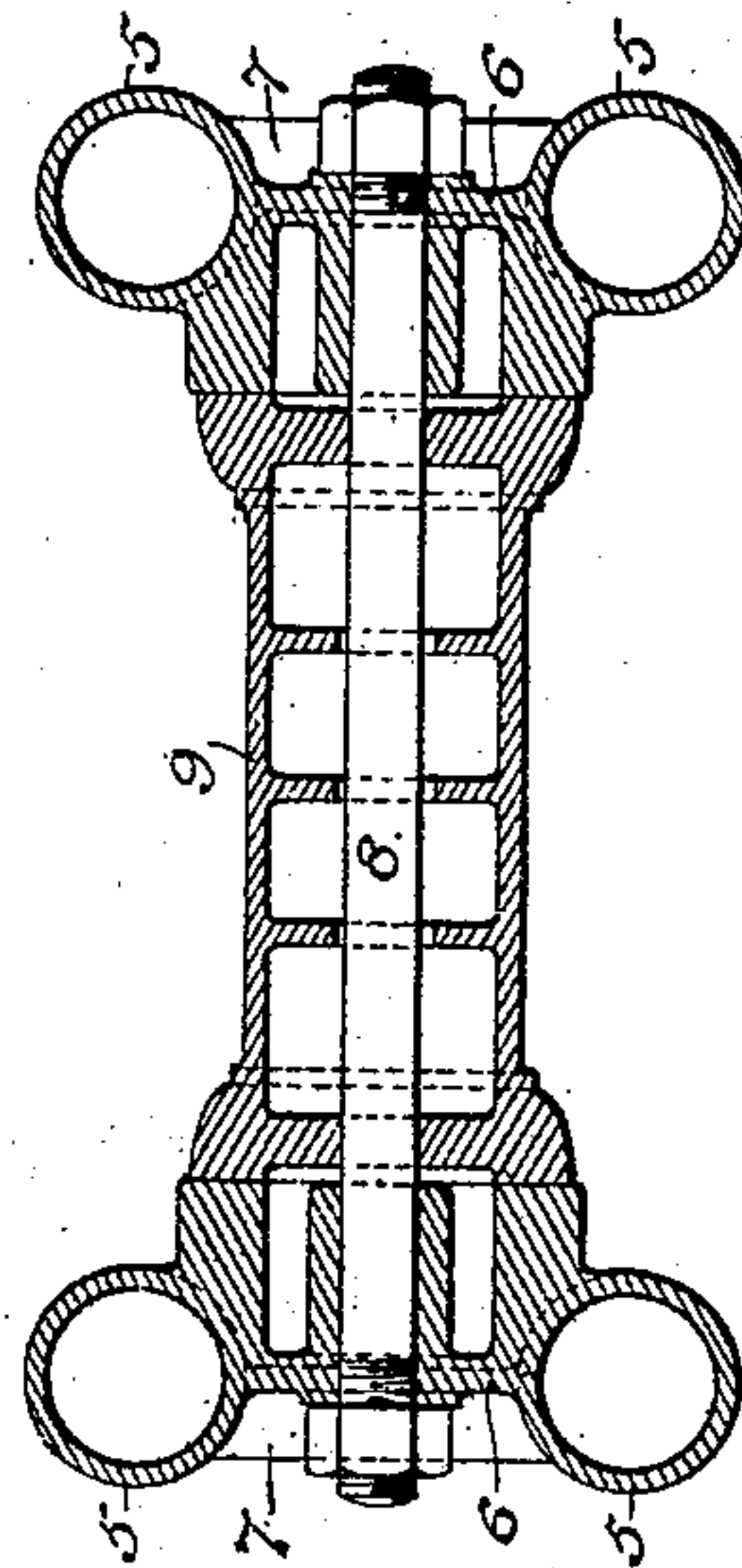


Fig. 5.

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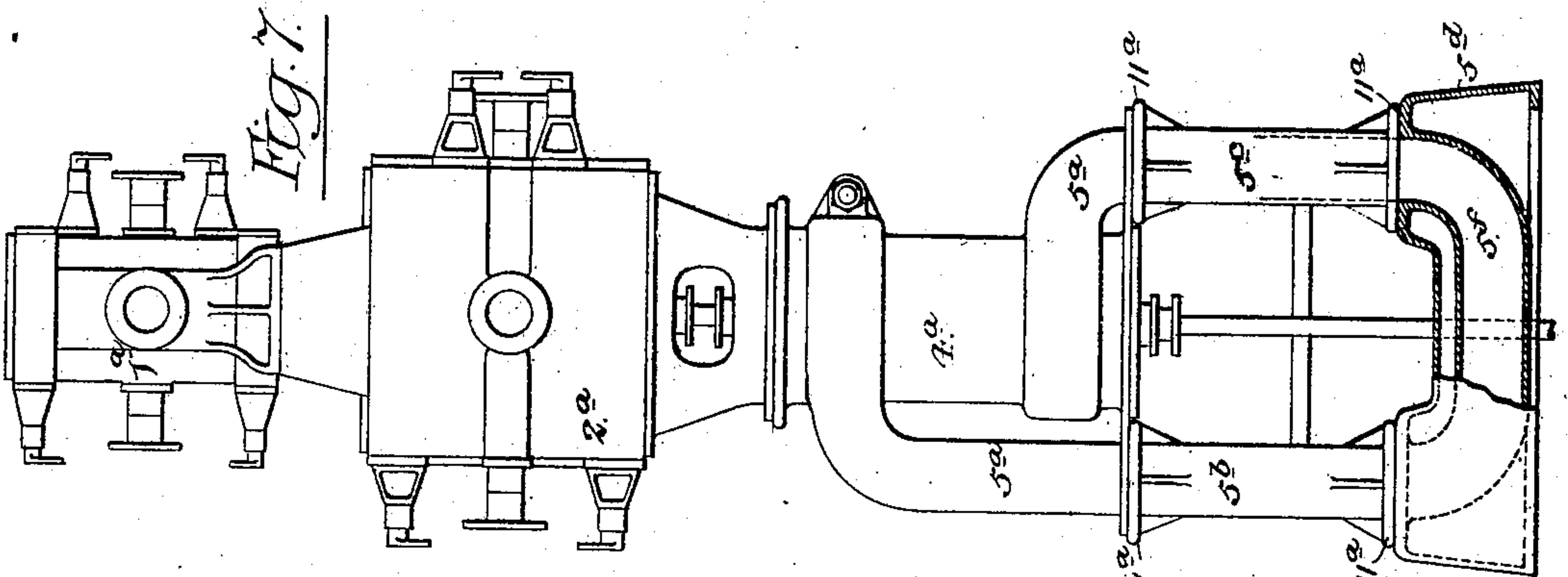
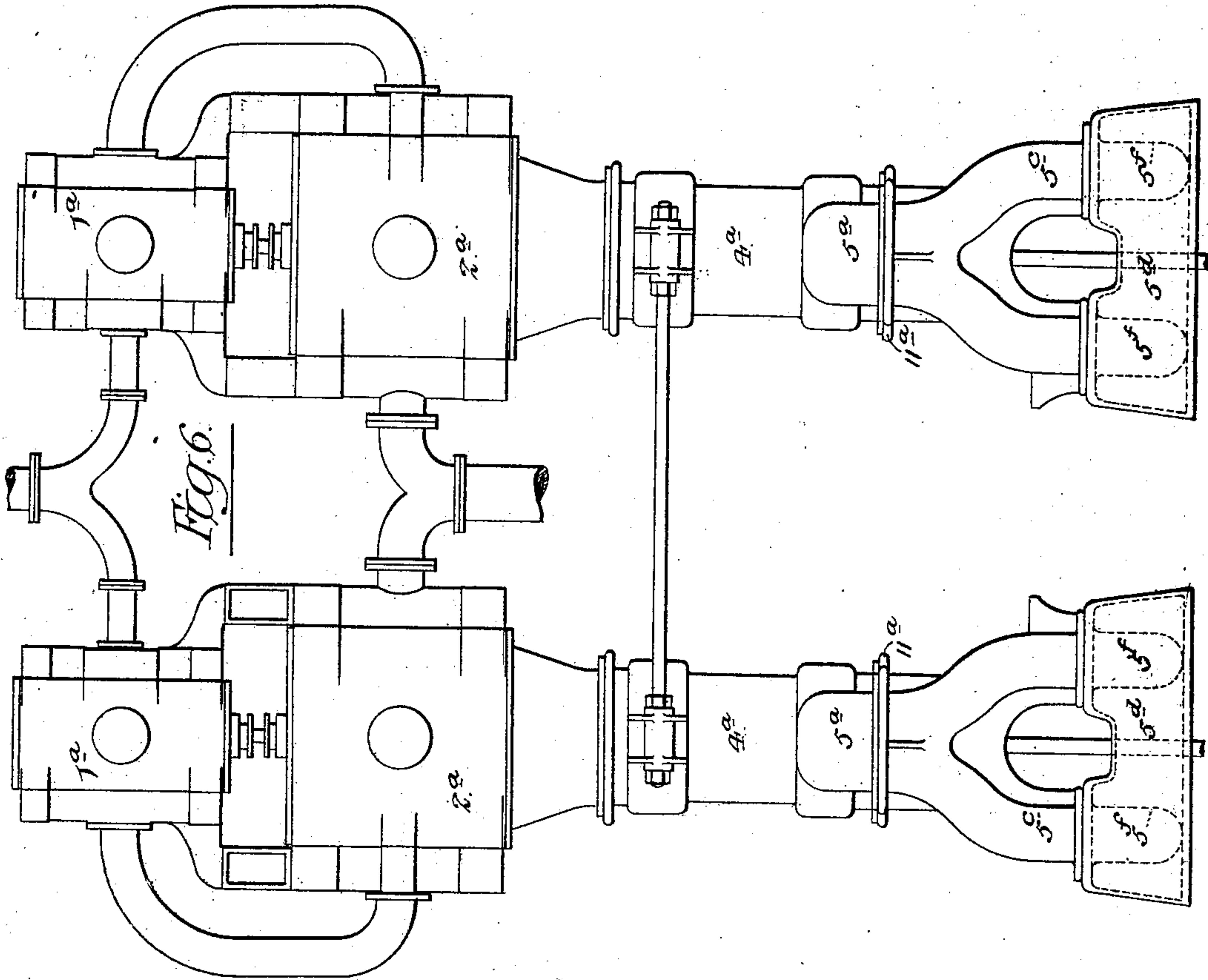
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Witnesses:
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UNITED STATES PATENT OFFICE.

LUIGI D'AURIA, OF PHILADELPHIA, PENNSYLVANIA.

NON-ROTATIVE PUMPING-ENGINE.

SPECIFICATION forming part of Letters Patent No. 689,775, dated December 24, 1901.

Application filed July 21, 1899. Serial No. 724,665. (No model.)

To all whom it may concern:

Be it known that I, LUIGI D'AURIA, formerly a subject of the King of Italy, but having declared my intention to become a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain Improvements in Non-Rotative Pumping-Engines, of which the following is a specification.

My invention consists of certain improvements in the non-rotative pumping-engine set forth in my Letters Patent No. 493,153, dated March 7, 1893, the object of my present invention being to render the structure more compact than before and to dispense with the necessity of any special foundation for the engine, an object which I attain by so disposing the liquid-flow pipe forming part of the "compensator" that said flow-pipe constitutes the foundation or support for the cylinder structure of the engine.

In the accompanying drawings, Figure 1 is a side view of a duplex non-rotative compound steam pumping-engine of the character to which my invention appertains and illustrating the novel disposition of the compensator flow-pipe whereby the same is rendered available as a foundation or support for the engine. Fig. 2 is a transverse section on the line $x x$, Fig. 1. Figs. 3, 4, and 5 are enlarged sections of the base or foundation structure, taken, respectively, on the lines $a a$, $b b$, and $c c$, Fig. 1. Fig. 6 is a side elevation of a vertical duplex non-rotative compound steam pumping-engine embodying my invention, and Fig. 7 is an end view of the same.

In non-rotative pumping-engines of the class to which my invention relates there is employed in connection with each pump-cylinder and its steam cylinder or cylinders a compensator having a cylinder and piston whereby a mass of liquid is set in reciprocation for the purpose of compensating for the varying pressure upon the power piston or pistons due to the use of steam expansibly, as is set forth in my before-mentioned Letters Patent No. 493,153 and in my Letters Patent No. 446,435, dated February 17, 1891. This reciprocating mass of liquid is contained mainly in a flow-pipe extending in the form of a loop from one end of the compensating

cylinder to the other, and as the mass of liquid employed is considerable a corresponding length of flow-pipe is rendered necessary, and this has been an objectionable feature of the engine as previously constructed. Thus the depending loop formed by the flow-pipe shown in my previous patent, No. 493,153, required a special pit or chamber for its reception and materially increased the space occupied by the engine. By my present invention, however, I am not only able to overcome this objection, but can also dispense with any special foundation or support for the cylinder structure of the engine, the flow-pipe serving this additional purpose.

In Fig. 1 of the drawings, 1 represents a high-pressure cylinder, and 2 a low-pressure cylinder, of a direct-acting non-rotative compound steam pumping-engine, 3 being the pumping-cylinder and 4 the compensating cylinder, the latter being interposed between the pump-cylinder and the low-pressure steam-cylinder. With the opposite end portions of the compensating cylinder 4 communicate the ends of the looped flow-pipe 5; but this loop instead of extending directly downward from the cylinder, as in my former patent, No. 493,153, is longitudinally flattened or expanded, so that the main dimensions of the loop are longitudinal, the terminations of the loop being bent upward for connection to the branches on the compensating cylinder 4.

The engine shown in Figs. 1 and 2 is a duplex engine having the parts arranged in pairs, as shown in Fig. 2, and each of the looped flow-pipes 5 consists of a casting having a central web 6 interposed between the upper and lower runs of the loop and between the vertical branches thereof, these webs being suitably stiffened by side ribs 7, and the webs of the two castings being rigidly bolted together at appropriate intervals by means of bolts 8, passing through tubular sleeves 9, interposed between the webs and firmly seated at each end upon a thickened portion of each web, as shown in Figs. 3 and 5. Cast with each flow-pipe structure are pedestals 10, which are suitably faced on the top for the reception of the correspondingly-faced lower portions of the various cylinder structures 1,

2, and 3, and the upwardly-bent terminations of the flow-pipe 5 are provided with flanges 11 and are similarly faced for the reception of the faced lower ends of the branches on the compensating cylinder 4, so that when the cylinder structure is properly adjusted to the bed or foundation formed by the flow-pipe and the two are properly secured together perfect alinement of the various cylinders is insured, this result being attained in a simple, cheap, and expeditious manner. Certain of the pedestals 10 extend downward below the flow-pipe structure, so as to form feet 12 for the support of the same. By extending the flow-pipe structure longitudinally beneath the cylinder structure of the engine I am enabled to avail myself of the weight of metal in said flow-pipe structure and of the weight of the mass of liquid contained therein to provide a firm and secure foundation or support for said cylinder structure, and I have found in practice that the support thus furnished is so stable that the engine can be placed upon any support capable of sustaining its weight and can be operated without even bolting or otherwise securing it to such support.

In Figs. 6 and 7 I have illustrated my invention as applied to a duplex vertical direct-acting compound steam pumping-engine, of which 1^a and 2^a represent, respectively, high and low pressure steam-cylinders and 4^a compensating cylinders, the pump-cylinders being below the latter and not being illustrated in the drawings. In this case each flow-pipe structure is composed of four sections—namely, the curved portions 5^a, connected to and communicating with the compensating cylinder 4^a, the forked sections 5^b and 5^c, communicating, respectively, with the two curved sections 5^a of the cylinder, and the base-section 5^d, containing the two transversely-curved pipes 5^f, which form connections between the divided ends of the forked sections 5^b and 5^c of the structure. Both the upper and lower ends of the structures 5^b and 5^c are provided with flanges 11^a and are faced for being fitted to faced seats on the cylinder structure 4^a and base structure 5^d, respectively, so that the proper setting up of the engine is facilitated. By forming the flow-pipe structure in sections casting of the same is facilitated and ready access to any and all parts of the same is permitted, and like results are attained in the flow-pipe structure shown in Figs. 1 and 2 by providing the end portions of the same with detachable caps 13,

in which the looped ends of said flow-pipe structure are partially formed.

Having thus described my invention, I claim and desire to secure by Letters Patent—

1. A direct-acting pumping-engine, having a compensator with flow-pipe for containing a mass of liquid, said flow-pipe being disposed beneath the cylinder structure of the engine and serving as a support or foundation therefor, substantially as specified.

2. A direct-acting pumping-engine having a compensator with flow-pipe for containing a mass of liquid, said flow-pipe being made in the form of a loop with interposed stiffening and connecting web, and disposed so as to form a foundation or support for the cylinder structure of the engine.

3. A direct-acting pumping-engine, having a horizontal cylinder structure, a compensator and a flow-pipe containing a mass of liquid, said flow-pipe extending horizontally beneath the cylinder structure of the engine so as to serve as a support or foundation therefor, substantially as specified.

4. A duplex direct-acting pumping-engine having a compensator with two flow-pipes, each containing a mass of liquid, said flow-pipes being disposed horizontally beneath the cylinder structure of the engine so as to form a foundation or support therefor, and lateral braces or connections between said flow-pipes, substantially as specified.

5. A direct-acting pumping-engine, having a compensator with flow-pipe containing a mass of liquid, said flow-pipe being disposed horizontally beneath the cylinder structure of the engine, so as to form a foundation or support for said structure, and having pedestals upon which the said structure rests, substantially as described.

6. A direct-acting pumping-engine having a compensator with flow-pipes containing a mass of liquid, said flow-pipe structures being disposed side by side and constituting the foundation or support for the cylinder structure of the engine, transverse bolts whereby said flow-pipe structures are connected together, and sleeves or filling-pieces interposed between said flow-pipe structures.

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

LUIGI D'AURIA.

Witnesses:

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