

No. 827,504.

PATENTED JULY 31, 1906.

A. E. COOPER.
LOCOMOTIVE VALVE.
APPLICATION FILED MAR. 17, 1906

2 SHEETS—SHEET 1.

Fig. 1.

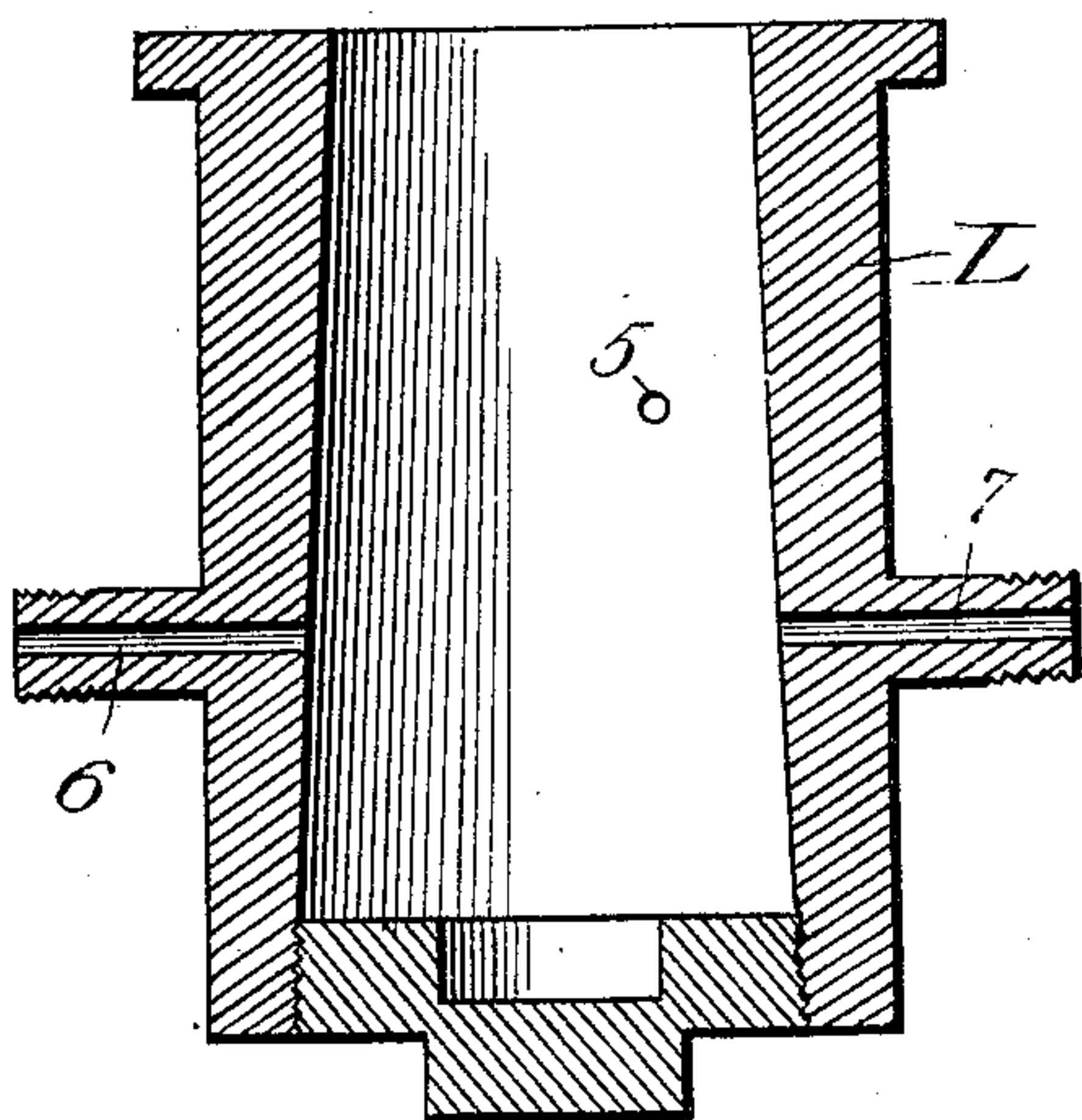


Fig. 2.

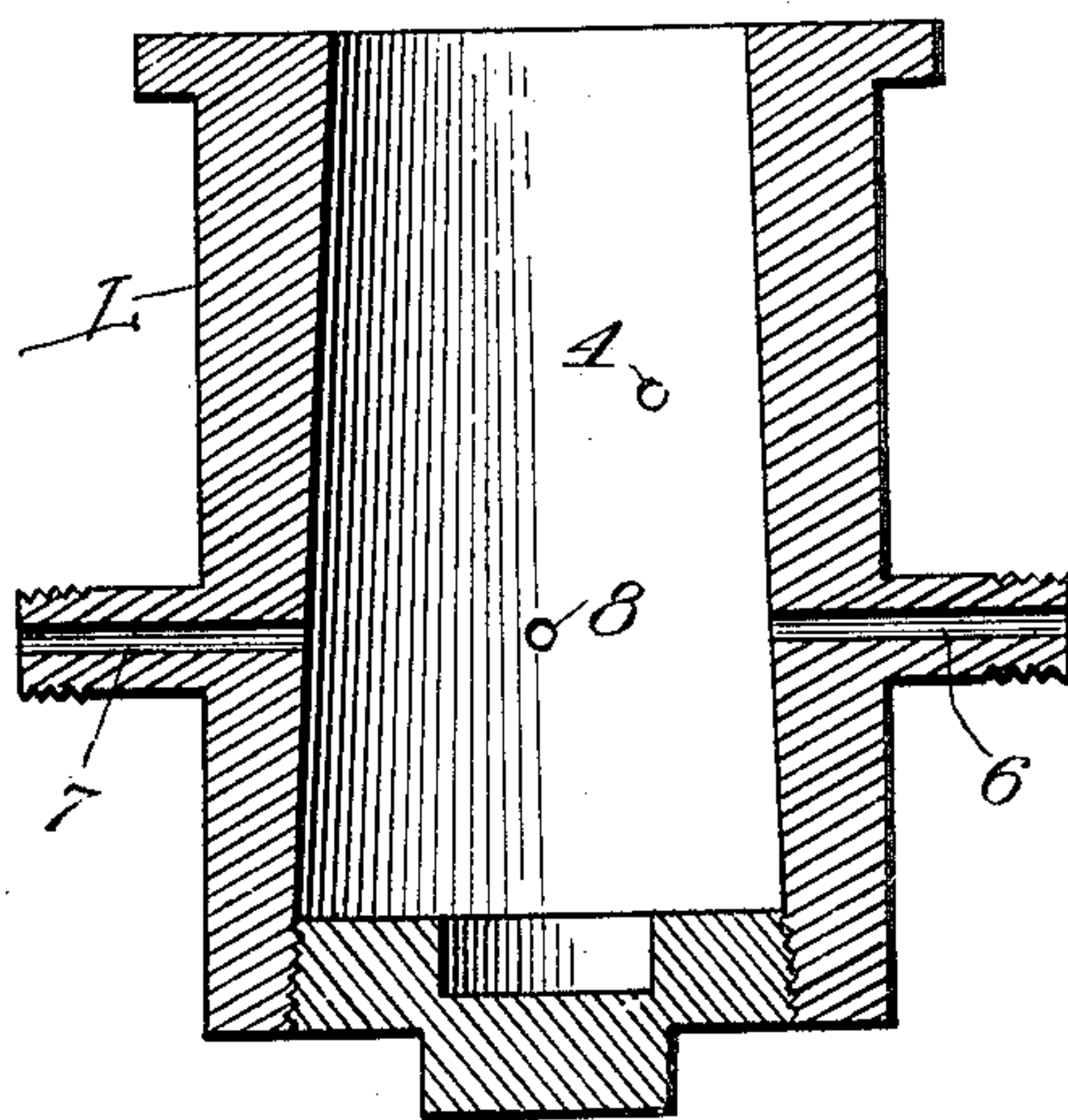


Fig. 3.

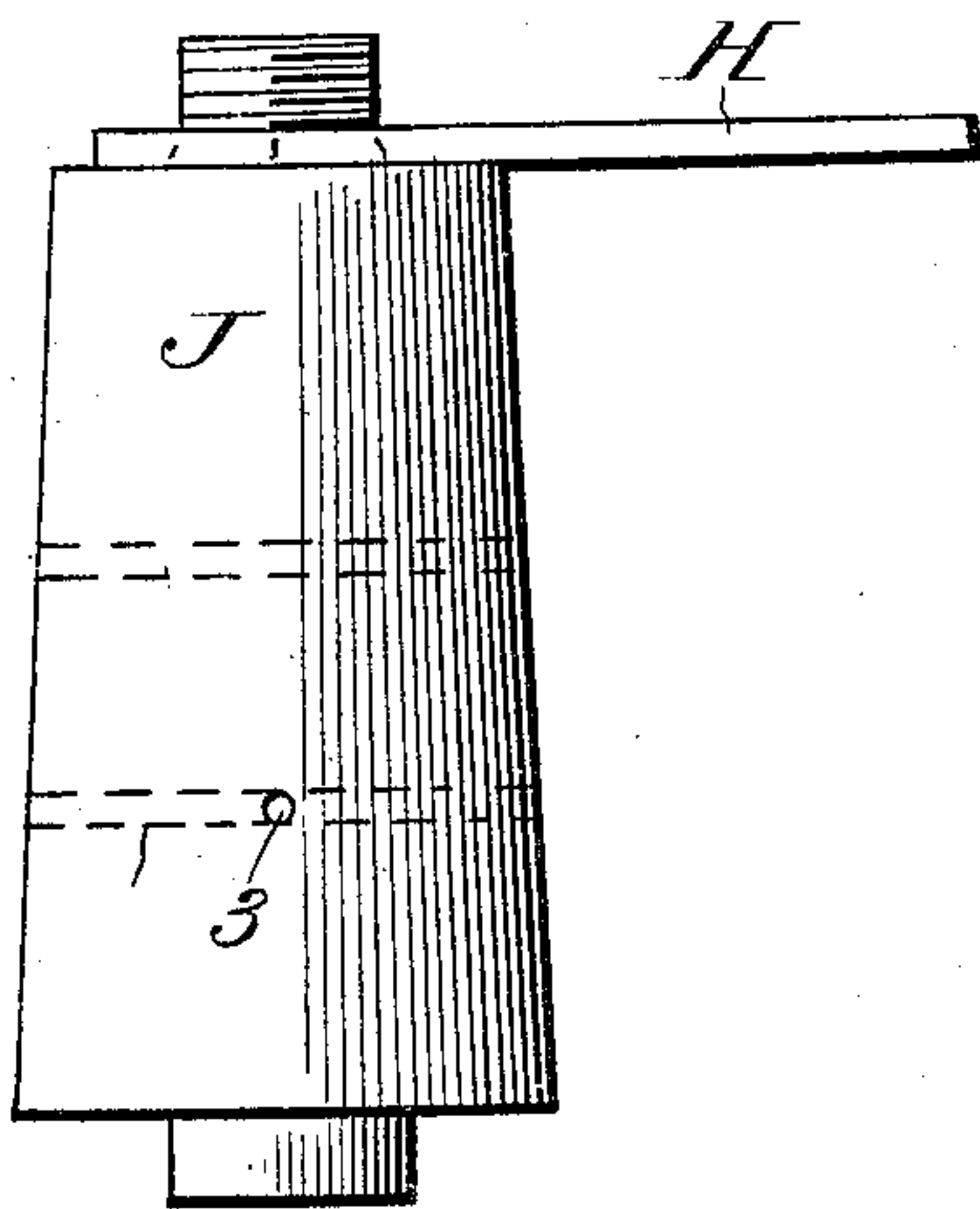
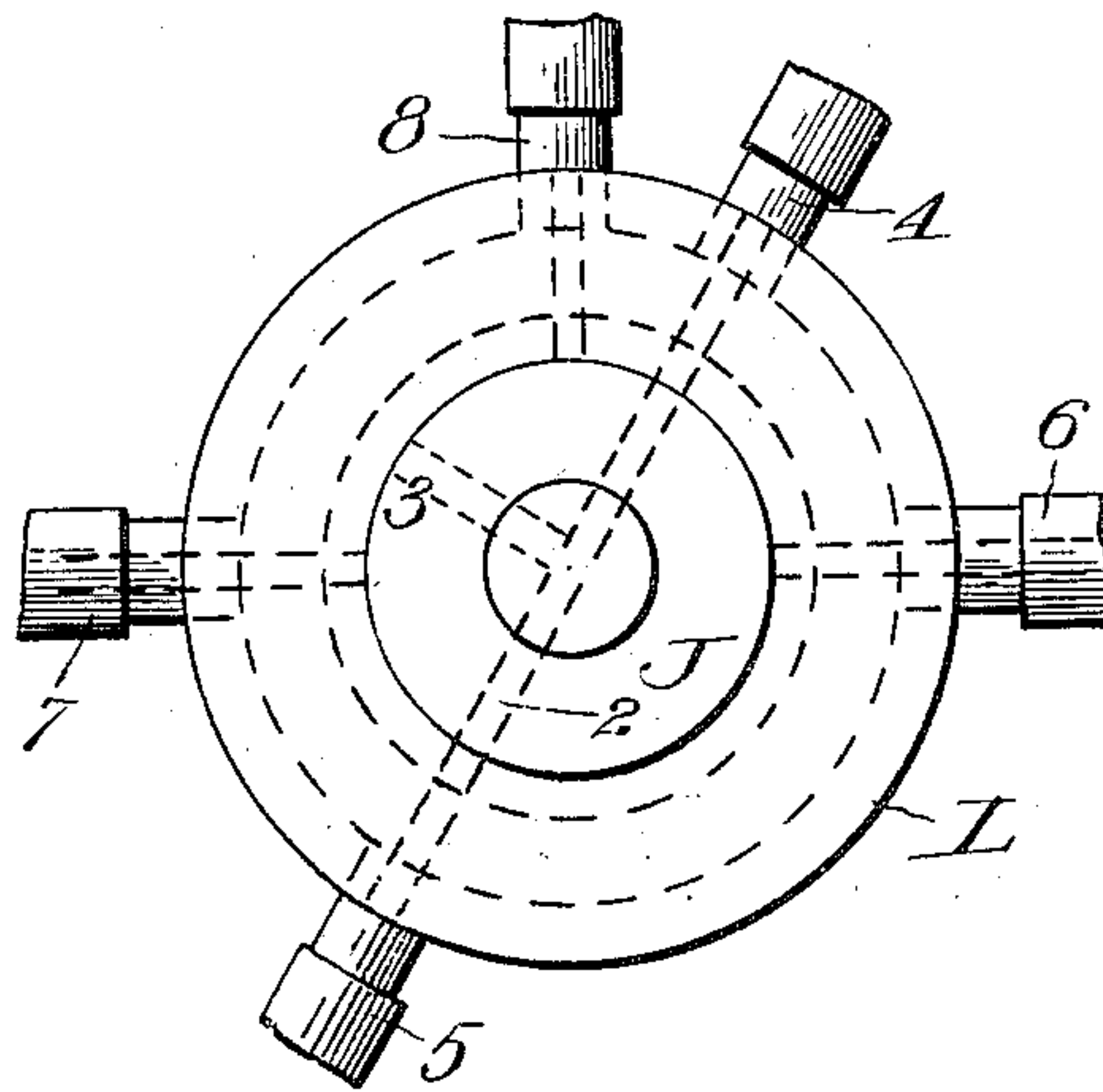


Fig. 4.



Witnesses

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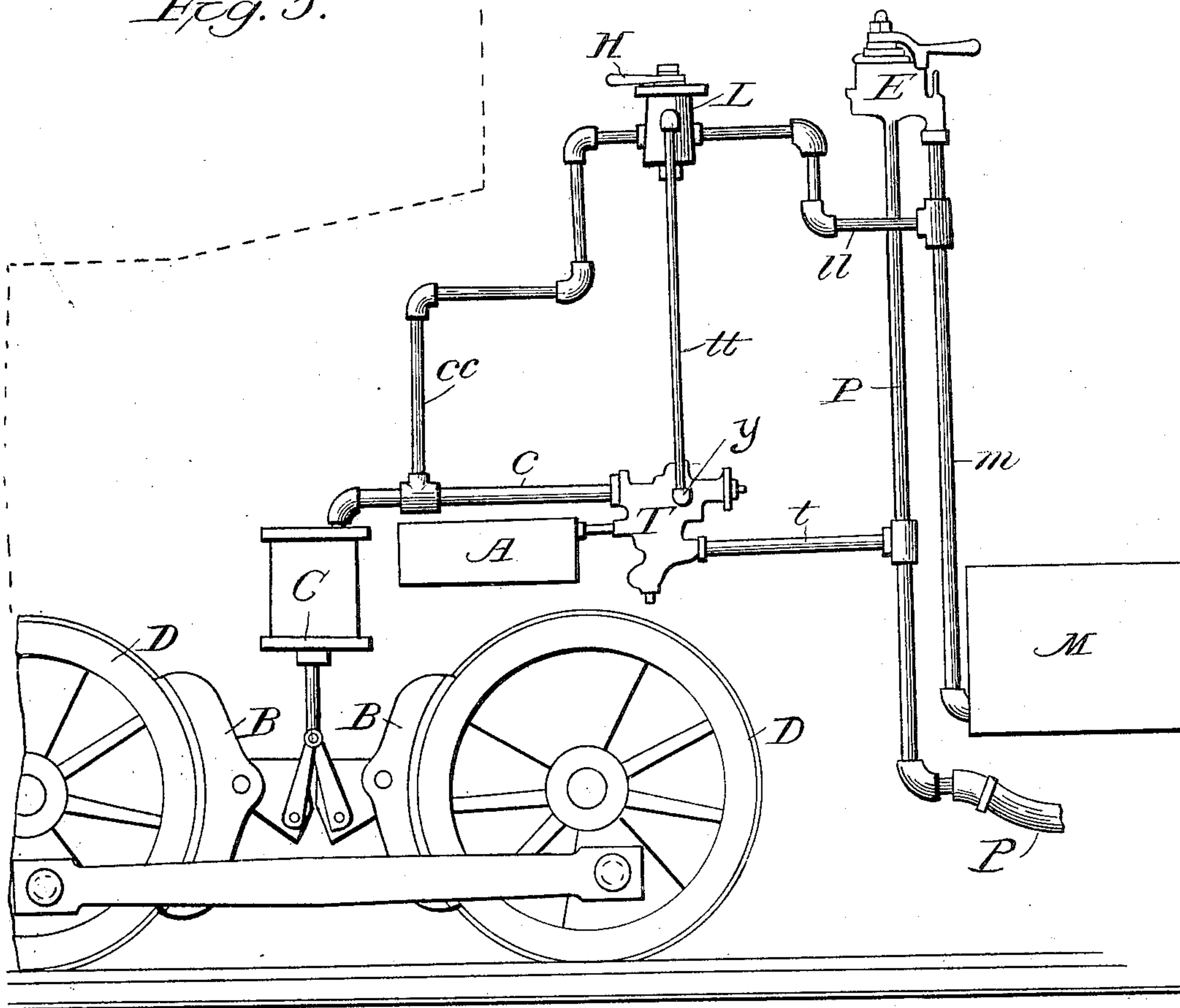
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2 SHEETS—SHEET 2.

Fig. 5.



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UNITED STATES PATENT OFFICE.

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LOCOMOTIVE-VALVE.

No. 827,504.

Specification of Letters Patent.

Patented July 31, 1906.

Application filed March 17, 1906. Serial No. 306,562.

To all whom it may concern:

Be it known that I, ALBERT E. COOPER, a citizen of the United States, and a resident of Champaign, Champaign county, State of Illinois, have invented certain new and useful Improvements in Locomotive-Valves; and my preferred manner of carrying out the invention is set forth in the following full, clear, and exact description, terminating with claims particularly specifying the novelty.

This invention relates to the air-brakes for railway-trains, and more especially to a valve mechanism distinct from but employed in addition to the usual engineer's valve, my improved valve mechanism being by preference termed the "locomotive-valve," as it is mainly useful in controlling the brakes on a locomotive.

In the automatic brake systems now commonly employed all the brakes are released by a valve located in the cab of the engine and must be released from the engine-wheels first and then from each car back in succession. Hence when the engineer is bringing his train to a stop he applies his brakes on the whole train. If it is apparent that he is stopping too quickly and he desires to release the brakes to some extent, the usual construction necessitates his removing the brakes on the engine-wheels first. The result is that the engine dashes forward, while the rest of the train, with brakes not yet released, drags backward, and the engine is pulling against the dead weight of a large number of cars with their brakes set.

The object of the present invention is to provide a locomotive-valve whereby the brakes may remain set on the engine-wheels, so that it can hold back the train, and whereby the brakes on the cars back of the engine can be released in succession, thus giving the engineer complete control of his train and avoiding the damage frequently resulting to the couplings.

To this end the invention consists in the use in the cab of the valve mechanism hereinafter described and its connection with the well-known parts of the system, as described below and illustrated in the drawings herein.

Figures 1 and 2 are sections of the valve-casing. Fig. 3 is an elevation of the valve-plug. Fig. 4 is a plan view in diagram, showing the plug or core with its ports set, as hereinafter referred to. Fig. 5 is a diagrammatic elevation showing the arrangement within the cab and upon the engine.

Referring to the accompanying drawings, D designates the driving or other wheels of a locomotive, B their brake, and C the brake-cylinder. M is the main reservoir of an air-brake system, from which a pipe *m* leads to the engineer's valve E, and P is the train-pipe, leading from the latter backward under the train to similar brake mechanisms on the various cars, as well understood. T is the triple valve on the engine, having its auxiliary reservoir A. *t* is a pipe connecting the triple valve with the train-pipe, and *c* is another pipe, connecting the triple valve with the air end of the brake-cylinder C, all as also well understood and in common use on air-brake systems of this type.

The letter L designates what I call the "locomotive-valve," because it is a valve additional to the engineer's valve and useful mainly for controlling the brakes on the locomotive.

Heretofore it has been common to connect the release-port of the triple valve with a certain type of locomotive-valve by a pipe, as *t* in Fig. 5, the locomotive-valve then being arranged so that this release-port pipe *t* may be either opened to an exhaust or connected with the pipe *c*, which in turn leads to the brake-cylinder C. Heretofore also it has been proposed to arrange an exhaust between them, whereby the turning of the valve-core would in a measure control the locomotive-brakes. There is a certain type of locomotive-valve having a three-way passage in its core and three ports, one being an exhaust and the others connected, respectively, with the train-pipe and the triple valve, as in pipe *t* of Fig. 5. In one sense my present invention is a combination of these ideas, and in another sense it is a radical departure therefrom. It is capable of performing all that is mentioned in the first instance, and more; but it differs from the second instance mentioned in that it connects with the pipe *m* of the main reservoir M rather than with the train-pipe P, thus permitting the pressure from the main reservoir to be applied direct (and not through the engineer's valve E) to the brake-cylinder C, whether the train service-pipe P is in use or not.

Figs. 1 to 4 are detailed views of the construction of my so-called "locomotive-valve," in which the letter L is here employed to designate the casing, J the core or plug, and H the operating-handle, which holds the latter in the former, as well understood.

This plug has bored diametrically through it a port 1, directly beneath and in line therewith a second diametric port 2, (this latter being shown in Fig. 4, while the former is immediately above it and not here illustrated,) and a radial port 3 in a plane with and at right angles to the lowermost port 2 and connecting with it at the center of its length. The casing is provided with an exhaust 4 and directly opposite thereto a port 5, which communicates, through the release-port pipe *t t*, with the triple valve, as shown in Fig. 5, this exhaust and port being in line with the port 1. At a lower level the casing also has a port 6 at one side communicating with the pipe *l l* of Fig. 5 directly opposite a port 7, communicating with the pipe *c c*, and at right angles thereto an exhaust-port 3, opening into the atmosphere, these three ports being arranged quartering, so that they can simultaneously communicate with the ports 2 and 3 in the core J. It will be observed that the ports 4 and 5 are on a line oblique to the ports 6 and 7, and hence when the upper port 1 in the core communicates with the ports 4 and 5 all of the lower ports are closed. Also when all of the lower ports in the casing are in communication with the three lower ports in the plug the upper ports are closed. For this reason this form of valve combines in one casing, plug, and handle the possibilities of two valves which are never intended to be opened simultaneously, and the connection illustrated in the diagrammatic view of Fig. 5 will permit the following results:

In running position the plug J is set within the casing L, as shown in Fig. 4, which connects the pipe *t t* from the triple valve with the exhaust 4 of the locomotive-valve L. Heretofore the triple valve exhausted at *y*, and the engineer had no control of this exhaust. Manifestly with the ports set as in Fig. 4 the exhaust is open and the automatic air-brake system operates just as if the locomotive-valve were not employed. To set the brakes on the entire train, the engineer's valve E is operated to close the pressure from the main reservoir M to the train-pipe P. If now it is desired to lock the brakes, the locomotive-valve L is set to close all the ports, and as the exhaust from the cylinder C is closed the locomotive-brakes are held set. If next it is desired to release the brakes on the cars first and the engine last, the engineer's valve is operated to admit pressure from the main reservoir to the train-pipe; but as the pressure in the brake-cylinder C is still trapped the brakes on the engine will remain set. Having released the brakes on the cars one by one until the train is under full control, the engineer can then release the brakes on the engine by restoring the locomotive-valve to the position shown in Fig. 4. So much for what is possible to be done by

use of the uppermost port 1 in the locomotive-valve.

If the plug J be turned in the casing of the valve L so that the port 2 communicates with the exhaust 8 and the port 3 with the port 7 and thence through pipe *c c* to the brake-cylinder C, all the air in said brake-cylinder on the engine is allowed to escape, thus releasing the brake on the locomotive no matter how set and preventing the setting of the brakes thereon by the automatic air-brake system. This is called "full-release position." If the plug J be further turned in the casing so that the port 3 is vertical in Fig. 4 and the port 2 connects the ports 6 and 7, air from the main reservoir M is permitted to pass directly into the brake-cylinder C, thereby setting the brakes on the engine only with the full and direct air-pressure from the reservoir. This is called "straight-air application;" but should the engineer find that the locomotive-wheels are sliding or that he has attained sufficient brake-power he can turn the plug J backward slightly until all the ports are closed. Should the train-pipe P become broken or defective, the engineer can still attain this position of "straight-air application" by manipulating the engineer's valve to shut off communication between the main reservoir and the train-pipe. So much for what is possible to be done by use of the lower ports in this improved locomotive-valve when used on an air-brake system.

What is claimed as new is—

1. In an air-brake apparatus, the combination with the locomotive brakes and cylinder, the triple valve, the main reservoir, and the usual connections between these members; of a locomotive-valve having two ports in its casing, one being an exhaust and the other connected with the exhaust of the triple valve, the plug of said valve having a port adapted to put said two ports into or out of communication independent of the operation of the engineer's valve; other ports in said casing, one being an exhaust and the other connected with said cylinder, and other ports in the plug adapted to put the last two into communication when the exhaust from the triple valve is closed and also independent of the engineer's valve.

2. In an air-brake apparatus, the combination with the locomotive brakes and cylinder, the triple valve, the main reservoir, and the usual connections between these members; of a locomotive-valve having two ports in its casing, one being an exhaust and the other connected with the exhaust of the triple valve, the plug of said valve having a port adapted to put said two ports into or out of communication independent of the operation of the engineer's valve; other ports in the casing, one connected with said cylinder and the other with the main reservoir,

and another port in the plug adapted to put the last two ports into communication independent of the operation of the engineer's valve.

5 3. In an air-brake apparatus, the combination with the main reservoir, engineer's valve, a pipe between them, the train-pipe, the locomotive-brakes and their cylinder, and the triple valve; of a locomotive-valve having
10 two ports in its casing, one connected with said pipe from the main reservoir and the other with said cylinder, its plug having a port adapted to put said two ports into communication independent of the operation of
15 the engineer's valve.

4. In an air-brake apparatus, the combination with the main reservoir, engineer's valve, a pipe between them, the train-pipe, the locomotive-brakes and their cylinder, and the
20 triple valve; of a locomotive-valve having two ports in its casing, one being an exhaust and the other connected with said cylinder, its plug having a port adapted to open or close the exhaust from the cylinder independent
25 of the operation of the engineer's valve.

5. In an air-brake apparatus, the combination with the main reservoir, engineer's valve, a pipe between them, the train-pipe, the locomotive-brakes and their cylinder, and the
30 triple valve; of a locomotive-valve having three ports in its casing, one connected with said pipe between the main reservoir and engineer's valve, another connected with said cylinder, and the third being an exhaust, the
35 plug in said valve having a three-way port adapted to connect the cylinder with the exhaust or with the main reservoir independent of the operation of the engineer's valve.

6. In an air-brake apparatus, the combination with the main reservoir, engineer's valve, a pipe between them, the train-pipe, the locomotive-brakes and their cylinder, and the
40 triple valve; of a locomotive-valve having two ports in its casing, one being an exhaust and the other connected with said cylinder, its plug having a port adapted to open or close the exhaust from the cylinder independent
45 of the operation of the engineer's valve; and additional ports in and connections from

said locomotive-valve to the triple valve for
50 controlling the exhaust from the latter independent of the other functions of the locomotive-valve and also independent of the operation of the engineer's valve.

7. In an air-brake apparatus, the combination with the main reservoir, engineer's valve, a pipe between them, the train-pipe, the locomotive-brakes and their cylinder, and the
55 triple valve; of a locomotive-valve having three ports in its casing, one connected with
60 said pipe between the main reservoir and engineer's valve, another connected with said cylinder, and the third being an exhaust, the plug in said valve having a three-way port to connect the cylinder with the exhaust or
65 with the main reservoir independent of the operation of the engineer's valve; and additional ports in and connection from said locomotive-valve to the triple valve for controlling the exhaust from the latter independent
70 of the other functions of the locomotive-valve and also independent of the operation of the engineer's valve.

8. In an air-brake apparatus, the combination with the main reservoir, engineer's valve, a pipe between them, the train-pipe, the locomotive-brakes and their cylinder, and the
75 triple valve; of a locomotive-valve having two ports in its casing, one connected with said pipe from the main reservoir and the
80 other with said cylinder, its plug having a port adapted to put said two ports into communication independent of the operation of the engineer's valve; and additional ports in and connection from said locomotive-valve
85 to the triple valve for controlling the exhaust from the latter independent of the other functions of the locomotive-valve and also independent of the operation of the engineer's
90 valve.

In testimony whereof I have hereunto subscribed my signature this the 14th day of March, A. D. 1906.

ALBERT E. COOPER.

Witnesses:

H. B. SCOTT,
R. F. MUSSON.