

(No Model.)

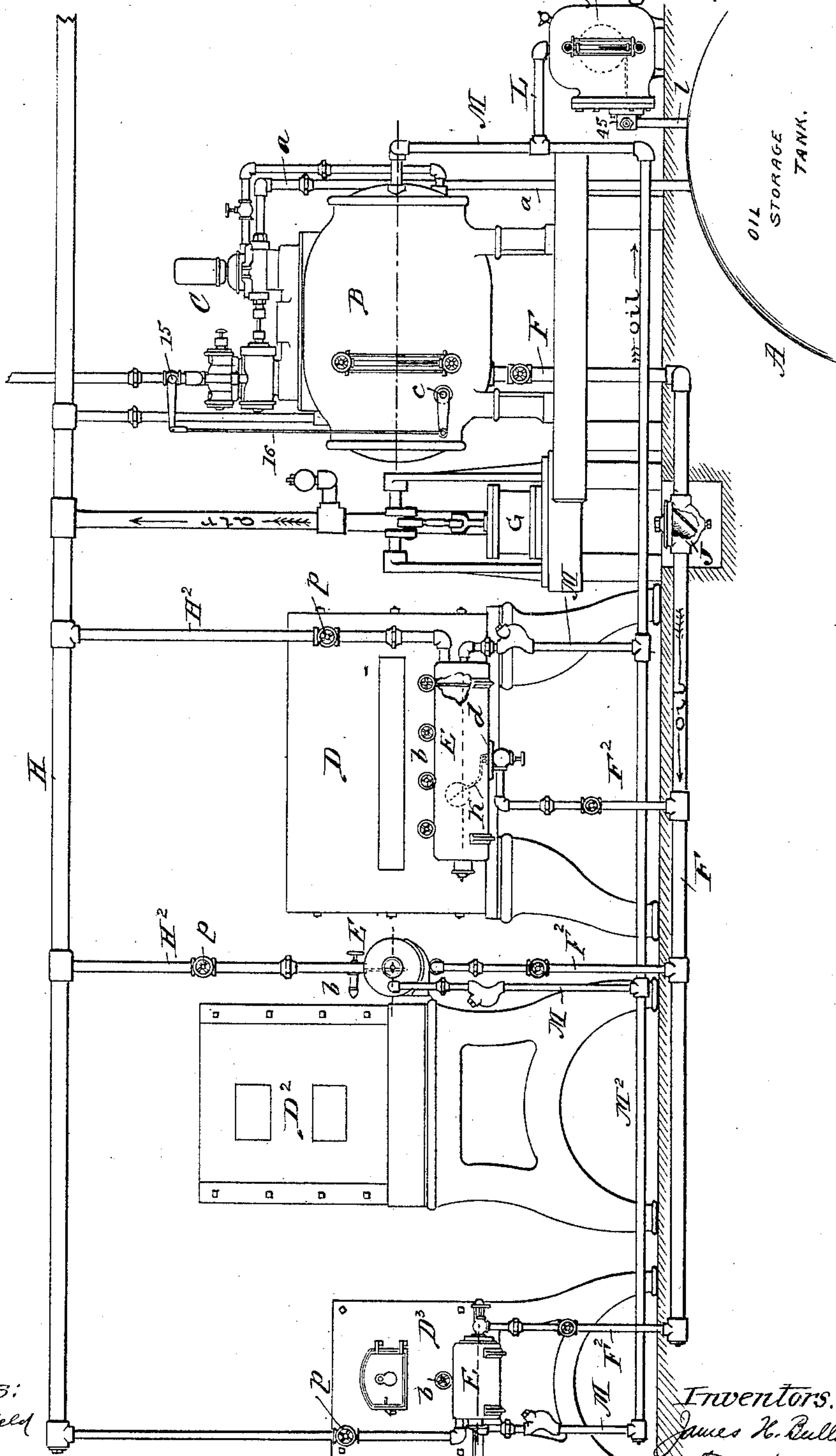
4 Sheets—Sheet 1.

J. H. BULLARD & F. A. NICKERSON.
APPARATUS FOR BURNING HYDROCARBON OILS.

No. 435,009.

Patented Aug. 26, 1890.

Fig. 1.



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Atty.s

(No Model.)

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Fig. 2.

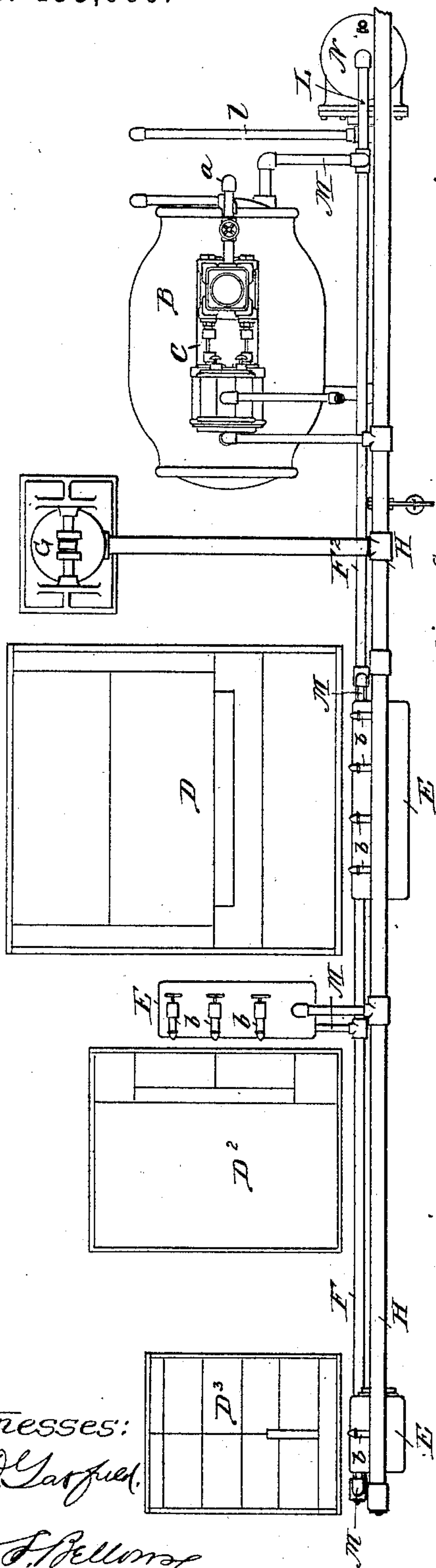


Fig. 5.

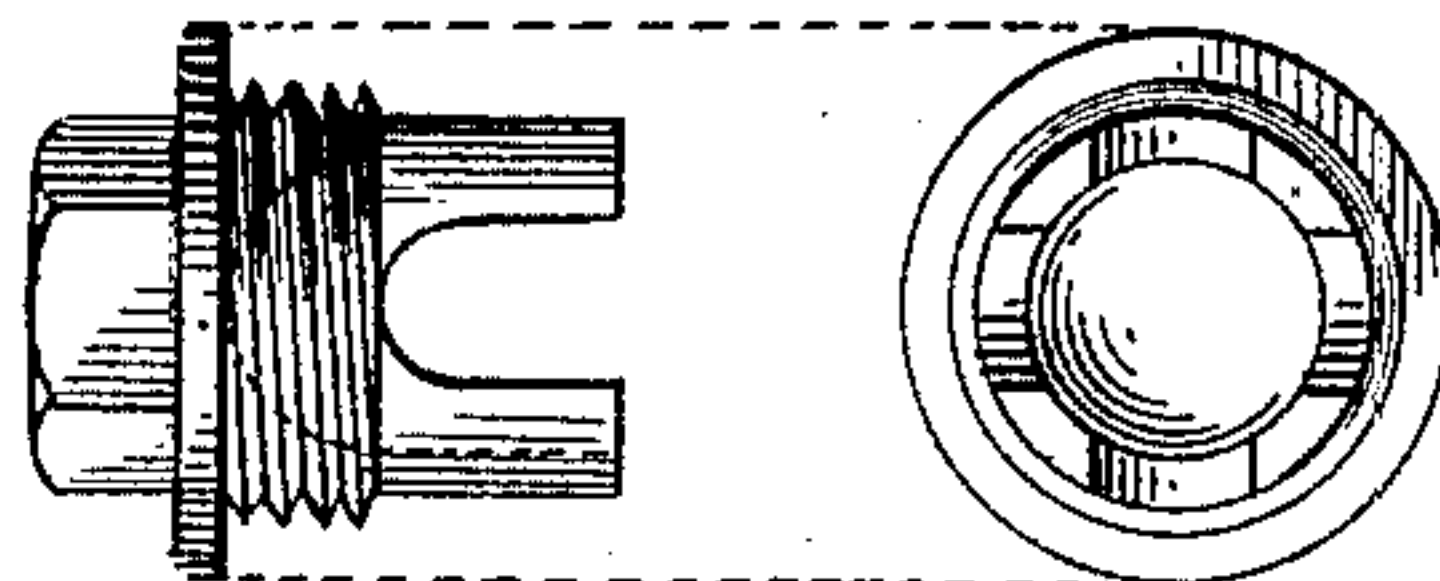


Fig. 4.

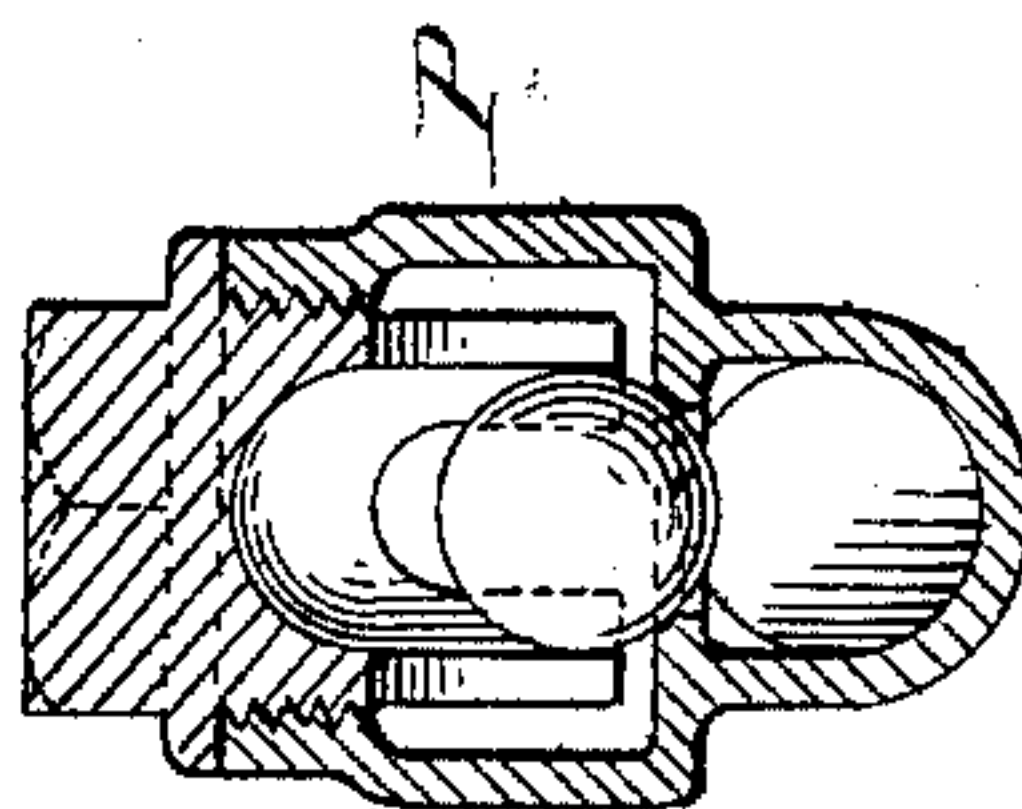
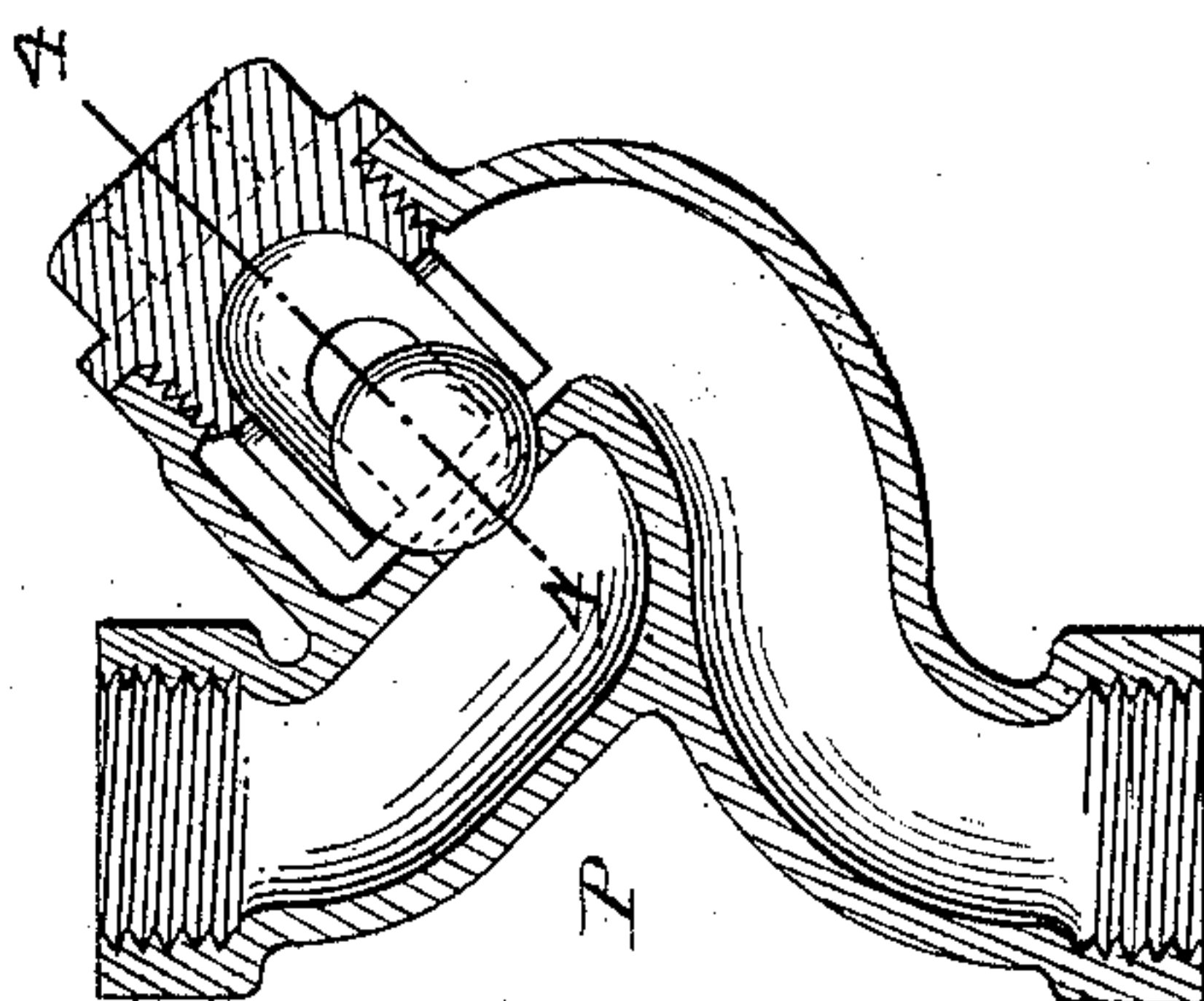


Fig. 3.



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(No Model.)

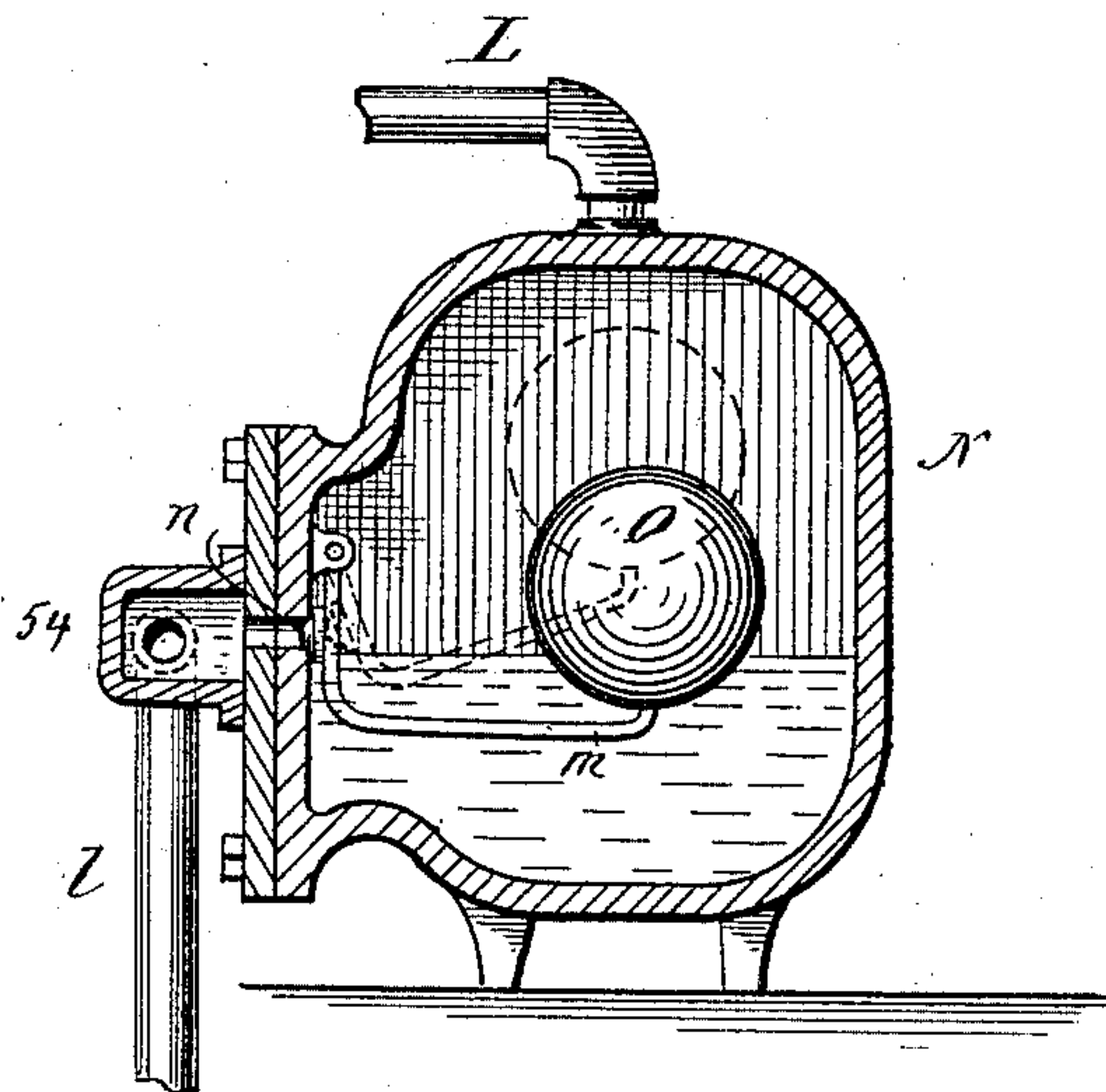
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Fig. 6.



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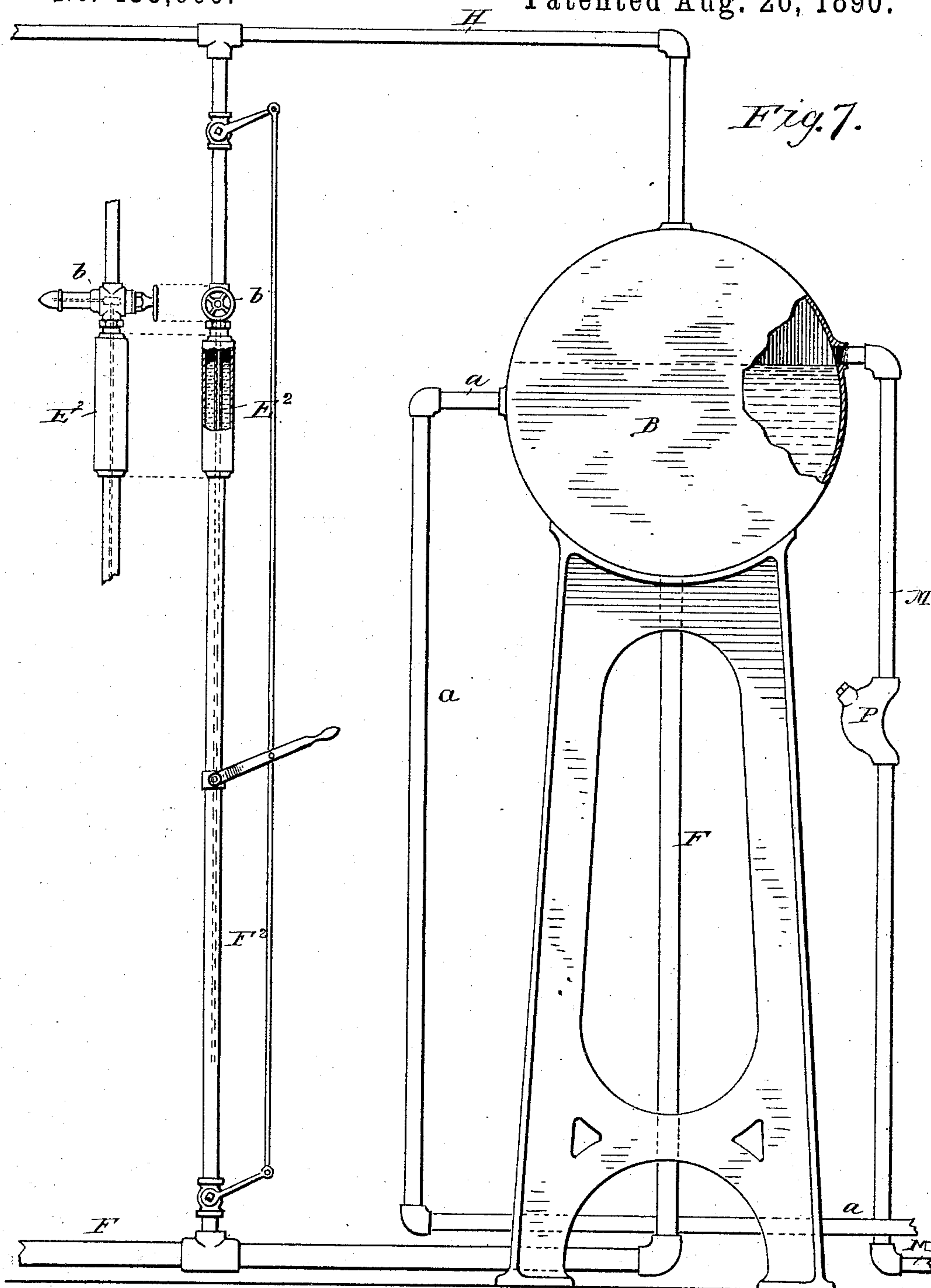
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UNITED STATES PATENT OFFICE.

JAMES H. BULLARD AND FRED A. NICKERSON, OF SPRINGFIELD, MASSACHUSETTS.

APPARATUS FOR BURNING HYDROCARBON OILS.

SPECIFICATION forming part of Letters Patent No. 435,009, dated August 26, 1890.

Application filed January 31, 1889. Serial No. 298,285. (No model.)

To all whom it may concern:

Be it known that we, JAMES H. BULLARD and FRED A. NICKERSON, citizens of the United States, residing at Springfield, in the county of Hampden and State of Massachusetts, have invented new and useful Improvements in Apparatus for Burning Hydrocarbon Oils, of which the following is a specification.

This invention relates to apparatus for the combustion of hydrocarbon oils as fuel in conjunction with air under a regulated pressure, the principal object thereof being to provide in said apparatus means whereby any certain or desired height of oil may be maintained in the burner-tanks, and by which any possibility of such height being exceeded is precluded, and under the invention the efficiency of the apparatus is increased; and the invention consists in the construction of certain apparatuses and in their correlative and cooperative combination one with another, substantially as hereinafter described, and pointed out in the claims.

Reference is had to the accompanying drawings, in which similar characters of reference designate corresponding parts in all the views.

In the drawings, Figure 1 is a view in elevation showing the apparatus of this invention, comprising a storage-tank, a supply or service tank common to the several burner-tanks, and burners which are shown as applied in operative relation with forge-furnaces, an oil-pump for forcing oil from the storage-tank to the supply-tank, an air compressor or pump for affording a supply of air to certain of the apparatuses under a regulated pressure, overflow-pipes leading from certain of said apparatuses to a trap, which is also shown as employed in connection with the invention, devices for automatically controlling the operation of the oil-pump, and check-valves for said overflow-pipe. Fig. 2 is a plan view of the apparatus shown in Fig. 1. Figs. 3, 4, and 5 are views illustrative of a form of check-valve particularly applicable for use in this apparatus, Fig. 3 being a central vertical section of the valve, Fig. 4 a section of a part thereof on the line 4-4, Fig. 3, and 5 is a side

elevation and projected bottom plan of a part of the valve, as will be apparent from an inspection thereof. Fig. 6 is a central vertical section of the oil-trap shown in side elevation and plan in said Figs. 1 and 2. Fig. 7 is a view in elevation, certain parts thereof being broken away in section for clearer illustration of a modified form of apparatus embracing certain essential features of novelty which are also comprised in the apparatus shown in the preceding figures.

In the drawings, A represents an oil-storage tank, B a supply or service tank, and C an oil-pump for pumping oil through the pipe *a* from the storage to the supply-tank.

D, D², and D³ are forge or other furnaces, in which the hydrocarbon is to be burned, and E E are the burner-tanks, each provided with one or more burners *b*, adapted to permit the passage therethrough of the oil and air under regulated pressure, and said burners and burner-tanks are constructed substantially as described and shown in an application for Letters Patent of the United States filed December 1, 1887, Serial No. 256,588, by James H. Bullard, the oil-pipe which supplies the burner extending down into the burner-tank so as to enter the oil therein.

Oil is conveyed from the service-tank B through the pipe F and branches F² thereof to the said burner-tanks, and air is conveyed under a regulated pressure from the air-pump or compressor indicated at G, through the pipe H and branches H² thereof, to the service-tank and the various burner-tanks above the oil-levels thereof. With respect to the level of the oil in the service-tank the level of the oil in the burner-tanks under the present invention may be at any desired height which is below or at the level of the oil in the service-tank; but it is never intended that the oil-level of any of the burner-tanks shall be in a higher plane than the oil-level of the said service-tank.

The height of oil in the service-tank is to be automatically controlled in any desired manner—as, for instance, through means of a ball-float and arm carried by a rock-shaft *c*, having a lever, between which lever and a radial lever on the valve-stem 15 of the oil-pump is

interposed a connecting-rod 16, as described and shown in an application for Letters Patent of the United States filed February 6, 1888, Serial No. 263,128, by James H. Bullard.

5 The service-tank and each burner-tank is provided with an overflow-pipe M, leading from points thereof above the desired oil-level in each of said tanks, and said overflow-pipes from the burner-tanks connect with a common
10 pipe M², which is extended to an oil-trap N, or, as particularly shown, is connected with a pipe L, leading to said trap, and to said pipe L is also connected the overflow-pipe from
15 the service-tank. Said trap is shown in section in Fig. 6, and to the outlet 45 of said trap a pipe l is connected, leading to the storage-tank A.

A substantially uniform pressure is maintained above the oil in the service-tank and
20 in all the burner-tanks and also in the trap N, for when the oil is at its normal height in the service-tank the overflow-pipe M thereof forms communication between the trap and said tank, and of course the oil-level in any
25 of the burner-tanks will be coincident with that in the service-tank. The outlet of the said trap L is to be provided with automatic means for its closing when no overflow is taking place into said trap from any of the
30 tanks connected therewith, as described, and, as shown, a ball-float O is employed, on the pivotally-hung arm m of which is a stopper n, covering the outlet-opening; but when overflowage takes place and the oil in the
35 trap rises said outlet is uncovered, permitting the discharge of oil from said trap to the storage-tank until the normal oil-level in the trap is reached.

Each overflow-pipe leading from the burner-
40 tanks is provided with a check-valve P, a preferred construction of which will be seen on reference to Figs. 3, 4, and 5. Any overflowage from the burner-tank of course is permitted to pass through the check-valve, the
45 ball of which rises at such time, closing by gravity when there is no overflow.

As the delivery of oil for consumption through the burner is dependent upon the degree of the regulated pressure in the burner-
50 tank above the oil, when it is desired to regulate the burning of oil at any particular furnace, the cock p in each branch pipe H² for conveying air to the burner-tank is turned, regulating the air-pressure, and were it not
55 for the provision of the check-valve in the overflow-pipe air under pressure would be conveyed through said pipe to the burner-tank above the oil-level, making the regulation of the pressure practically impossible
60 without the employment of cocks in the oil-supply branch-pipes F², and it will be apparent that the feed of oil through the burner at any desired furnace may be entirely shut off by simply closing the cock in its air-
65 supply pipe H².

It will be apparent on an inspection of the illustrations accompanying, and from the fore-

going description, that under the provisions of the system of overflow-pipes no accidental flooding by oil at any part of the apparatus
70 can take place, even should the devices controlled by the ball-float become inoperative.

In Fig. 7 a modified form of the apparatus embracing the essential features of this invention is shown, and in said figure the
75 burner-tank is shown as with its axis coincident with and as an enlargement of the branch oil-pipe F², but operating in substantially the same way.

What we claim as our invention is—

1. An apparatus for burning hydrocarbon, comprising one or more burner-tanks, a service-tank, and a storage-tank, means, substantially as described, for conveying oil from the
80 storage-tank to the service-tank, an oil-conduit leading from said service-tank to each of said burner-tanks, and overflow-pipes leading from said service-tank and each of said
85 burner-tanks to said storage-tank, whereby the oil in said service and burner tanks is prevented from rising above a given level, substantially as described.

2. An apparatus for burning hydrocarbon, comprising, in correlative and co-operative
90 combination, one or more burner-tanks and burners therefor, a service-tank, an oil-storage tank, and an oil-trap, means, substantially as described, for conveying oil from the said storage to the service tank, an oil-
95 conduit leading from said service-tank to each of said burner-tanks, and overflow-pipes leading from said service-tank and each of said burner-tanks to said trap, and a pipe leading from said trap to said storage-tank, substantially as described.

3. An apparatus for burning hydrocarbon, comprising, in correlative and co-operative
100 combination, one or more burner-tanks and burners therefor, a service-tank, an oil-storage tank, and an oil-trap, means, substantially as described, for conveying oil from the said storage to the service tank, an oil-conduit leading from said service-tank to each
105 of said burner-tanks, means, substantially as described, for supplying air under a regulated pressure to said burner and service tanks, and overflow-pipes leading from said
110 service-tank and each of said burner-tanks to said trap, and a pipe leading from said trap to said storage-tank, substantially as described.

4. An apparatus for burning hydrocarbon, comprising, in correlative and co-operative
115 combination, one or more burner-tanks and burners therefor, a service and an oil-storage tank, and an oil-trap, means, substantially as described, for conveying oil from the said storage to the said service tank, an oil-conduit leading from said service-tank to each
120 of said burner-tanks, means, substantially as described, for supplying oil under a regulated pressure to said burner and service tanks, an overflow-pipe leading from said service-tank to said trap, and an overflow-pipe leading

from each of said burner-tanks to said trap, and a check-valve in the overflow-pipe between said trap and each of said burner-tanks, and a pipe leading from said trap to
5 said storage-tank, substantially as described.

5. An apparatus for burning hydrocarbon, comprising a burner, a burner-tank in proximity thereto, an overflow-tank, and a pipe above the level of the oil-entrance to the

burners at the burner-tank and leading to the overflow-tank, and an air-forcer by which the air is maintained above the normal pressure in said pipes, substantially as described.

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