

(No Model.)

2 Sheets—Sheet 1.

W. P. SCATES.
STEAM ENGINE.

No. 503,988.

Patented Aug. 29, 1893.

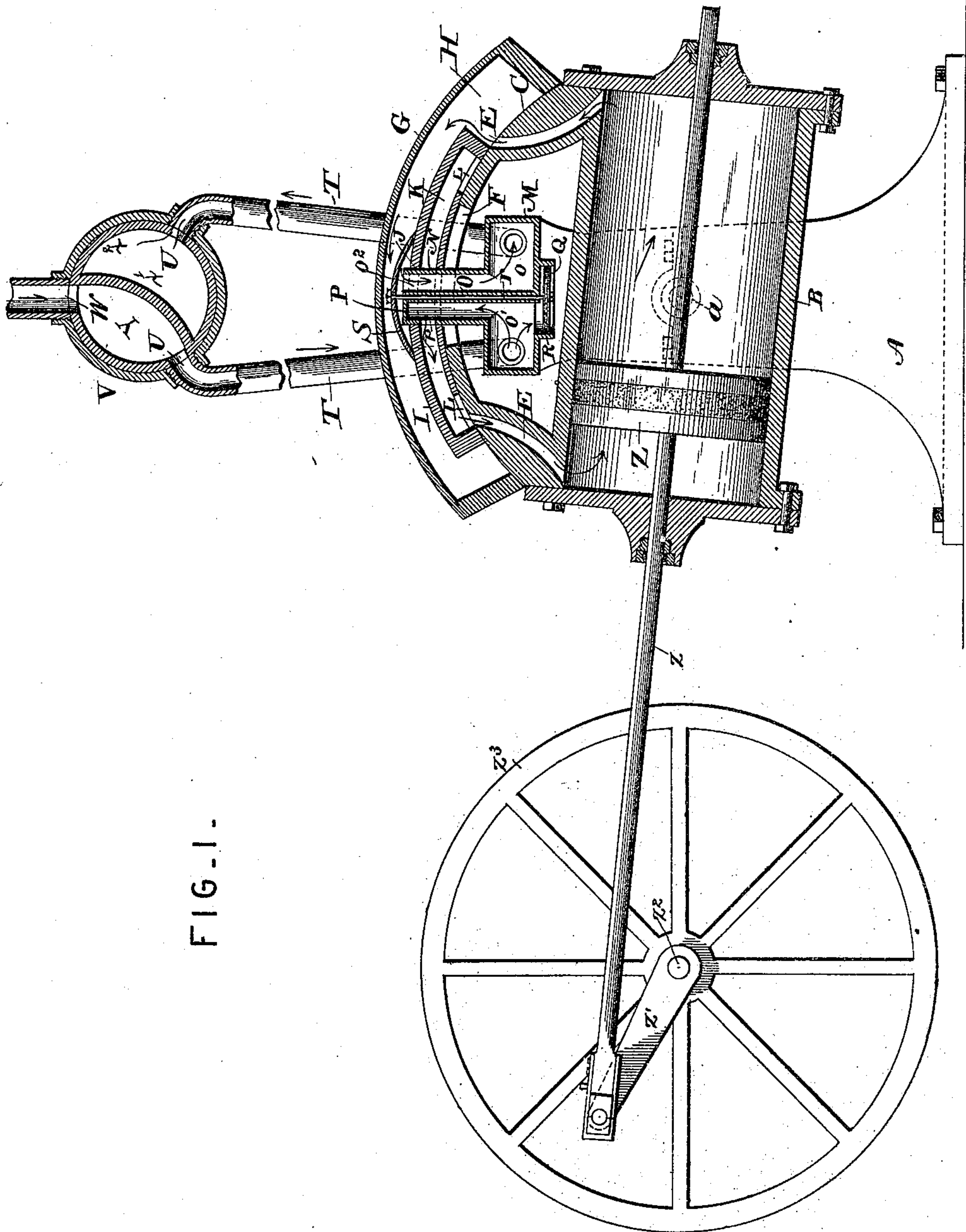


FIG. 1.

Witnesses

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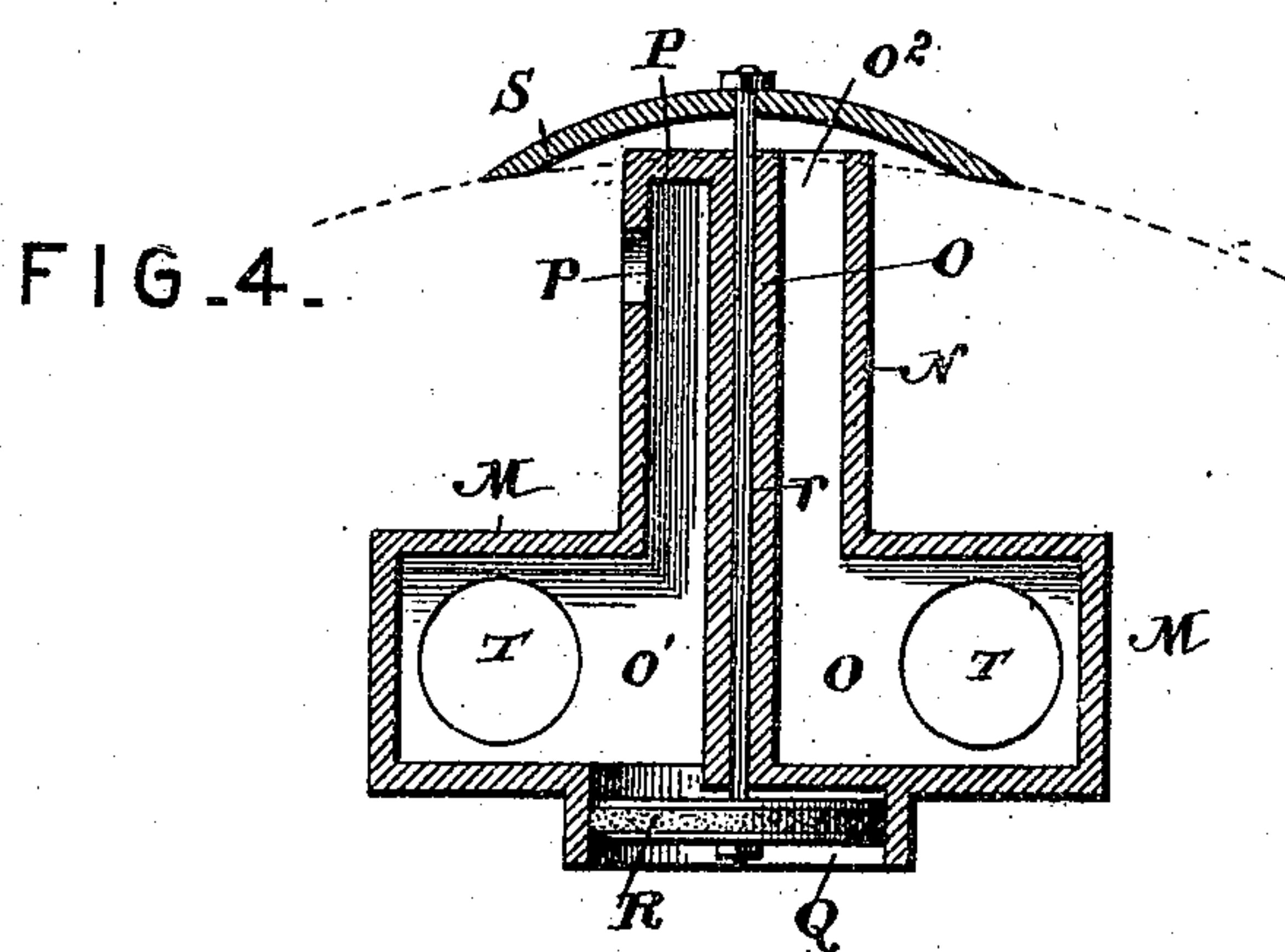
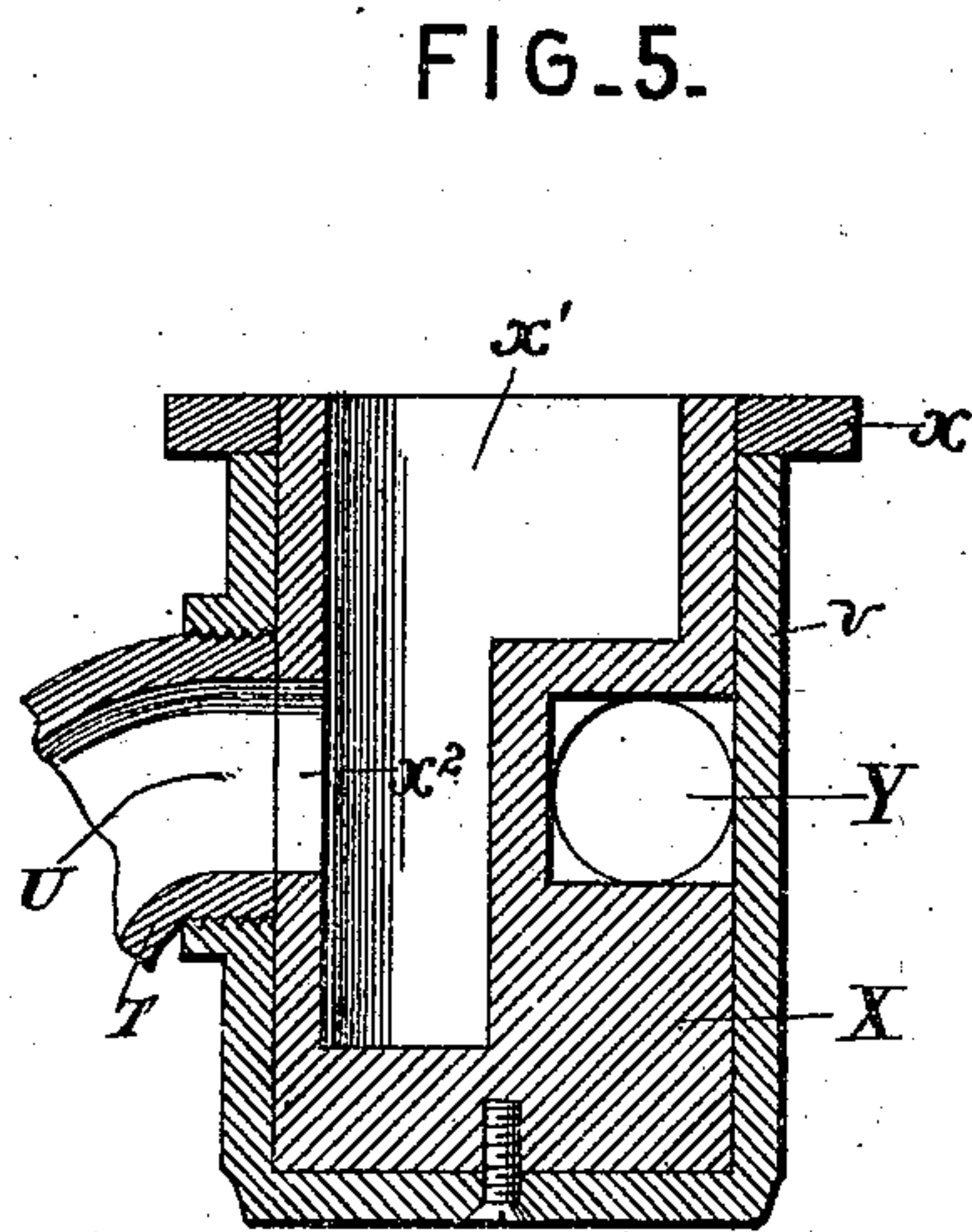
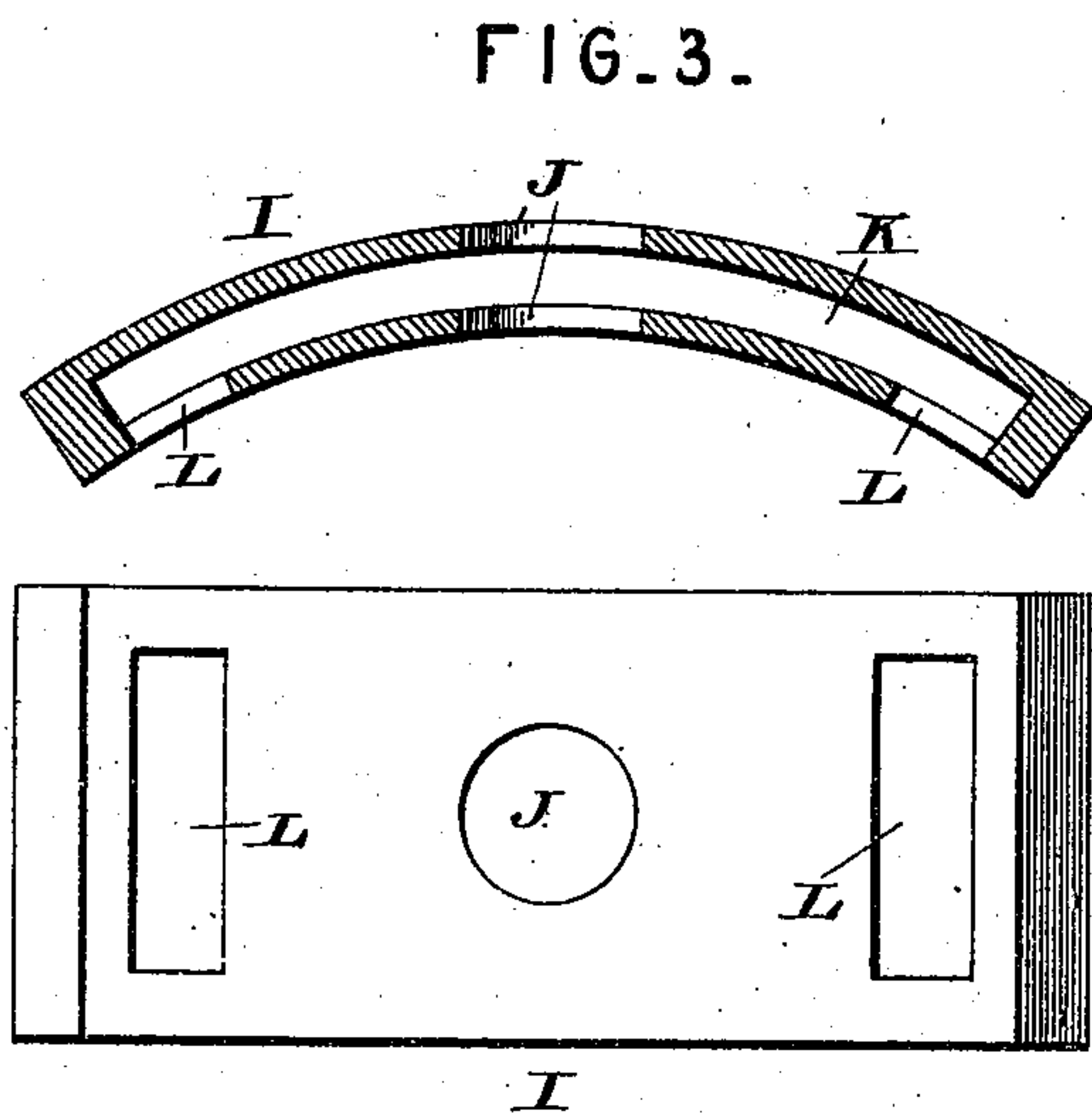
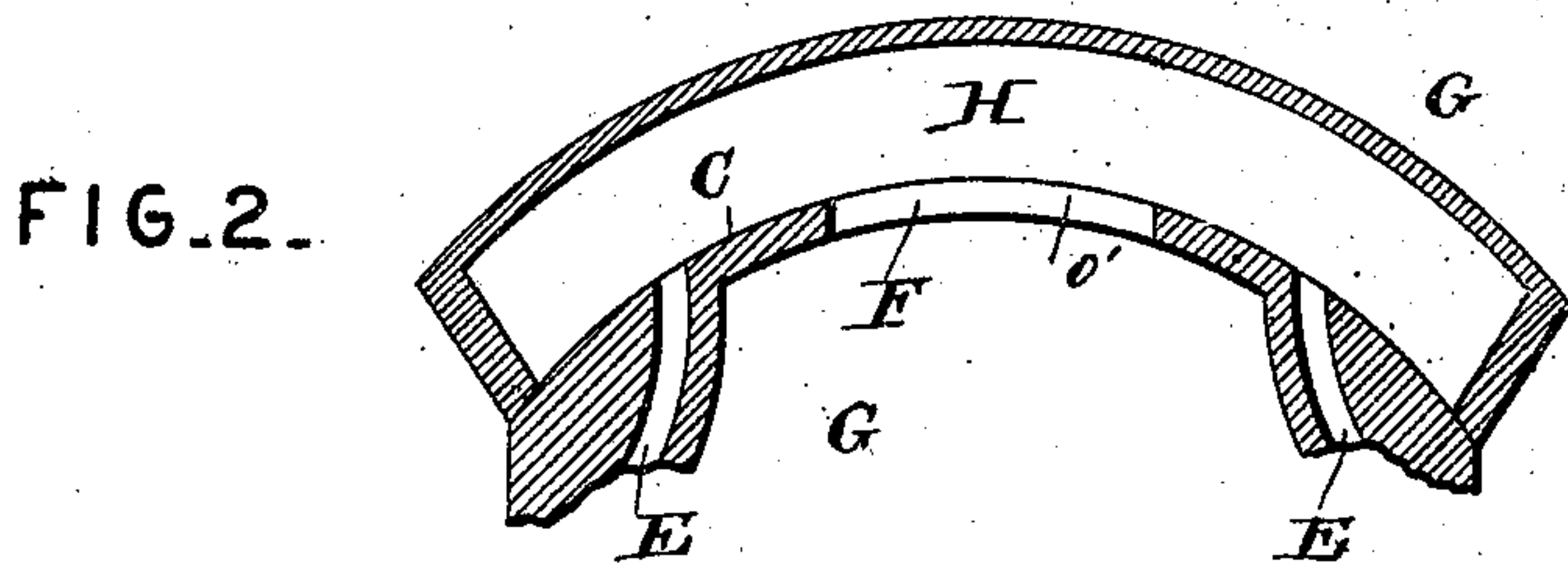
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2 Sheets—Sheet 2.

W. P. SCATES.
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No. 503,988.

Patented Aug. 29, 1893.



Witnesses

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UNITED STATES PATENT OFFICE.

WILLIAM P. SCATES, OF KNOXVILLE, ASSIGNOR OF ONE-HALF TO JAMES N. FREELS, OF SCARBOROUGH, TENNESSEE.

STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 503,988, dated August 29, 1893.

Application filed March 24, 1893. Serial No. 467,488. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM P. SCATES, a citizen of the United States, residing at Knoxville, in the county of Knox and State of Tennessee, have invented a new and useful Steam-Engine, of which the following is a specification.

This invention relates to steam engines, and it has for its object to provide certain improvements in that class of engines known as oscillating engines, whereby the operation of such engine will be rendered much more accurate, and also whereby the same can be more easily controlled by the engineer from any convenient point for the purpose of reversing, stopping and starting the same at will.

To this end the main and primary object of the invention is to provide special improvements in the valve gearing of such engines.

With these and many other objects in view which will readily appear as the nature of the invention is better understood, the same consists in the novel construction, combination and arrangement of parts hereinafter more fully described, illustrated and claimed.

In the accompanying drawings:—Figure 1 is a vertical longitudinal sectional view of an oscillating engine and the improved throttle devices embodying the features of my invention. Fig. 2 is a detail sectional view of one of the steam chests. Fig. 3 is an enlarged detail sectional view and bottom plan view of the stationary valve. Fig. 4 is an enlarged detail sectional view of the combined live steam and exhaust pipe or valve neck. Fig. 5 is a detail sectional view of the throttle valve.

Referring to the accompanying drawings:—A represents opposite uprights or standards, between which is pivotally mounted at its center at *a*, the oscillating steam cylinder B, adapted to be oscillated as the engine is in operation, which oscillation not only provides for a straight moving piston rod, but also at the same time provides for the regulation of the stationary valve, controlling the steam to and from the cylinder. The cylinder B, is provided upon the upper side thereof with the semi-circular or segmental valve seat C, which may be either integral with or cast separate from the cylinder. The said curved

or segmental valve seat is pierced by the opposite end steam ports E, leading into the opposite ends of the cylinder at the top side thereof, and the central pipe slot or opening F, intermediate of said end steam ports E, and opening into the space between the top side of the cylinder and said valve seat. The ports piercing the valve seat are inclosed by the segmental cap G, which forms the steam chest H, and is of sufficient length to provide for the proper oscillation of the cylinder, in order to insure the accurate regulation of the hollow stationary segmental or curved valve I, arranged within said steam chest and adapted to control the ingress and egress of the steam by means of the steam chest oscillating thereover. The said valve I, is provided with central circular openings J, piercing the top and bottom thereof, an inclosed longitudinal steam passage K, extending the entire length of the valve, and live steam and exhaust ports L, arranged near the opposite ends of the valve and leading into the longitudinal steam passage K. Said parts L, are adapted to alternately register with the opposite steam ports E, of the cylinder as the same is oscillated, one of said exhaust ports L, serving to direct the live steam into one of the steam ports of the cylinder from the longitudinal passage of the valve, while the other port is at the same time closed by the valve seat to allow the steam to exhaust at one end of the valve. This occurs when the engine is running in one direction, but the use of the ports is reversed when the engine is reversed.

Steam is led to and from the stationary valve and therefore the steam chest, through the combined live steam and exhaust pipe M. The combined live steam and exhaust pipe M, is suitably arranged or supported in the space between the top side of the cylinder and its valve seat under the pipe slot F, and is provided with an upwardly extending partitioned neck N. The neck N, is provided with a central longitudinal partition O, which extends from the upper end thereof to the lower side of the pipe M, and connects with said lower side of the pipe M, at one side of the same, so as to separate the neck into opposite passages *o*, and *o'*, each of which communicates with a portion of the pipe M, at opposite

sides of the partition O. The passage *o*, in one side of the neck N, is open at its upper end at *o*², so as to allow a free passage of steam in either direction through such upper open end, 5 while the opposite neck passage is closed at its upper end at P, and is provided with a side steam opening *p*, just below such upper open end for the purposes to be presently described. The passage *o*', opens into one side 10 of the pipe M, which side of the pipe is unconnected with the lower end of the partition O, so as to communicate directly with the open piston or plunger cup Q, extended from the under side of the pipe M. The plunger 15 cup Q, accommodates the pressure plunger or piston R, to which is connected the lower end of the rod *r*. The rod *r*, extends longitudinally through a suitable guide formed at one side of the partition O, and has clamped to the extreme upper end thereof above the upper end 20 of the neck N, the transverse valve cap or bar S, which has its ends bearing on the upper side of the stationary valve I, and holds the steam neck N, in position in such valve. 25 Now it will be clear that the pipe neck N, registers with and fits within the central circular openings J, in the top and bottom sides of the valve I, so that the upper open end *o*², of the neck passage *o*, opens into the steam chest H, above the stationary valve, while the side steam opening *p*, in the opposite neck 30 passage communicates with the longitudinal steam passage K, of the stationary valve which in turn has the ports L, at each end thereof. Pipes T, are connected at one end 35 to the combined live steam and exhaust pipe M, at opposite sides of the central neck portion thereof, and with a throttle device to be presently referred to. 40 Now assuming the engine to be in the position illustrated in Fig. 1, so that the live steam is entering the pipe M, and the neck passage *o*'. Therefore it passes through the side steam opening *p*, near the upper end of 45 said neck passage directly into the longitudinal passage of the valve. When the steam passes through this neck passage *o*', as live steam, the same is also free to enter the cup Q, and exert its pressure on the plunger, R, 50 therein, which therefore pulls down on the valve cap or bar S, and draws the same tighter down upon the top of the stationary valve, so as to hold the valve firmly to its seat, by means of the steam pressure itself, without 55 the use of springs, and thus providing means for preventing the valve from being raised from its seat by the pressure of the steam. The steam passes from the opening *p*, through the longitudinal steam passage of the valve 60 and the end port thereof which is in alignment with one of the steam ports E, of the cylinder, while the other steam port of the cylinder is uncovered by the valve, so that the exhaust steam passes into the steam chest 65 outside of the valve and down through the neck passage *o*, and out through the pipe T,

which communicates with such neck passage. This direction of the steam through the valve and the partitioned-steam neck, provides for driving the engine in one direction. 70 By reversing the direction of the live and exhaust steam through the pipes T, so that the live steam enters into the steam chest through the neck passage *o*, the engine can be reversed. 75 When the live steam passes through the passage *o*, into the steam chest above the valve, the steam pressure is taken off from the plunger R, inasmuch as the live steam, which is now in the steam chest, bears directly on top of the valve and serves to hold it to its seat. 80 Under this condition the steam exhausts through the ports of the hollow valve and out through the neck passage *o*', of the steam neck which communicates with the longitudinal passage of the stationary valve. 85

In order to reverse the direction of the live and exhaust steam through the pipes T, the same are connected with the openings U, in the throttle valve casing V. The throttle valve casing V, is preferably cylindrical in 90 shape and is provided with the pipe ports U, and the live steam ports W, through which the steam is led from the boiler, all of said ports being in the same circular plane, so that the steam can be shifted from either of the 95 pipes T. The casing V, is open at one end and accommodates the oscillating throttle valve plug, mounted for rotation in the casing and having connected to the open end thereof the lever *x*, which provides for turning the 100 same. The said plug X, is provided with an end exhaust opening *x*', which opens at one end of the valve plug and has communicating therewith the exhaust port *x*², which is designed to be thrown in alignment with either 105 one of the pipe ports U. The plug is further provided with an intermediate transverse port or steam groove Y, which is designed to connect the port W, with either one of the pipe ports U. Now it will be readily seen that 110 while the live steam is passing through the throttle and one of the pipes T, the other pipe is exhausting through the exhaust space of the throttle. By turning the plug or throttle the engine can be instantly reversed, stopped 115 and started at will, the throttle valve being arranged in the pilot house of a steam boat or in any other location convenient to the person controlling the engine.

While I have specifically described a construction of throttle valve in order to elucidate the subject matter of the present application, still such valve does not form the subject matter of a claim in the present application, although the same may be embraced 125 in a subsequent application for the protection thereof.

An ordinary piston Z, moves in the cylinder B, and drives the straight piston rod *z*, connected to the crank *z*', of the drive shaft 130 *z*², which shaft communicates motion to the drive wheel *z*³, in the ordinary manner.

Changes in the form, proportion and the minor details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of this invention.

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

1. In an oscillating engine, the pivotally supported cylinder having a curved or segmental valve seat pierced by end steam ports, a steam chest inclosing the valve seat and said ports, a stationary curved valve arranged within said steam chest and provided with a central and end ports means substantially as described for supporting or holding said valve stationary, substantially as set forth.

2. In an oscillating engine, a pivotally supported cylinder having a curved or segmental valve seat pierced by end steam ports and an intermediate slot, a valve or steam chest inclosing said valve seat and the ports therein, a stationary segmental valve arranged in said chest on the valve seat and provided with a central and end steam ports, and a stationary steam pipe projecting through the slot in the valve seat and into the central port of the valve, substantially as set forth.

3. In an oscillating engine, the combination with the steam chest carried by the oscillating cylinder; of a hollow stationary valve arranged within said chest and having end ports and central openings therethrough, and a combined steam and exhaust pipe projecting through the central openings of the valve and having separated passages communicating with the interior of the valve and the interior of the steam chest above the valve, respectively, substantially as set forth.

4. In an oscillating engine, an oscillating cylinder having an inclosed curved seat and opposite steam ports piercing said seat, and a hollow curved valve held stationary on the valve seat and provided with a central steam passage and end ports communicating with the interior thereof, substantially as set forth.

5. In an oscillating engine, an oscillating cylinder having a valve chest carried therewith, a stationary valve mounted within the chest and provided with suitably arranged ports means substantially as described for supporting or holding said valve stationary, substantially as set forth.

6. In an oscillating engine, the combination of the segmental steam chest carried by an oscillating cylinder and having end steam ports and an intermediate slot, a curved or segmental stationary valve arranged within the steam chest and provided with central circular openings in the top and bottom thereof, an inclosed longitudinal passage extending from end to end thereof, and bottom ports near the opposite ends and opening into the longitudinal passage, and a combined steam and exhaust pipe projecting through the central openings of the valve and having separated

passages communicating with the longitudinal passage of the valve and the interior of the steam chest respectively, substantially as set forth.

7. In an oscillating engine, the combination with the oscillating cylinder having a curved or segmental valve seat pierced by end steam ports and an intermediate slot; of a stationary segmental valve arranged upon the valve seat and having central circular steam openings, an inclosed longitudinal steam passage, and bottom ports near the opposite ends thereof and opening into said longitudinal passage, and a combined steam and exhaust pipe projecting through the central openings of the valve, substantially as set forth.

8. In an oscillating engine the combination with the stationary valve thereof, having a longitudinal steam passage and central openings; of a combined live steam and exhaust pipe having a partitioned neck projecting through the central openings of the valve, each passage of the neck having an opening communicating with the longitudinal passage of the valve and the interior of the steam chest respectively, substantially as set forth.

9. In an oscillating engine, the combination with the moving steam chest and a stationary hollow valve; of a combined live steam and exhaust pipe provided with an upwardly extending neck projecting through the center of the stationary valve, a partition separating the neck and the pipe into two passages one of which communicates with the interior of the hollow valve and the other of which opens into the steam chest, substantially as set forth.

10. The combination with a moving steam chest and a stationary hollow valve having end ports; of a combined live steam and exhaust pipe provided with an upwardly extending neck projecting through the center of the stationary valve, a partition separating the neck and the pipe into two passages communicating with the interior of the valve and the steam chest respectively, a steam cup extended below the pipe and communicating with the passage opening in the hollow valve, a plunger arranged in said cup, and a valve cap or bar arranged to bear on the top of the valve of the steam chest and connected with said plunger, substantially as set forth.

11. The combination with a moving steam chest and a stationary hollow valve having end ports; of a combined live steam and exhaust pipe provided with an upwardly extending neck projecting through the center of the stationary valve, a partition separating the neck and the pipe into two passages, one of the neck passages being closed at its upper end and opening at one side into the hollow valve, and the other neck passage opening at its upper end into the valve chest above the valve, a steam cup extended below the pipe and communicating with the neck passage opening into the hollow valve, a plunger arranged in said cup, a plunger stem or rod con-

needed to the plunger and passing through
the neck, a valve cap or bar secured to the
upper end of said stem or rod and bearing on
the top of the valve, separate pipes connected
5 to opposite portions of the partitioned pipe,
and a two-way throttle valve connected to said
pipes, substantially as set forth.

In testimony that I claim the foregoing as

my own I have hereto affixed my signature in
the presence of two witnesses.

WILLIAM P. ^{his} × SCATES.
mark

Witnesses:

W. R. YARNELL,
A. A. YARNELL.