

No. 661,066.

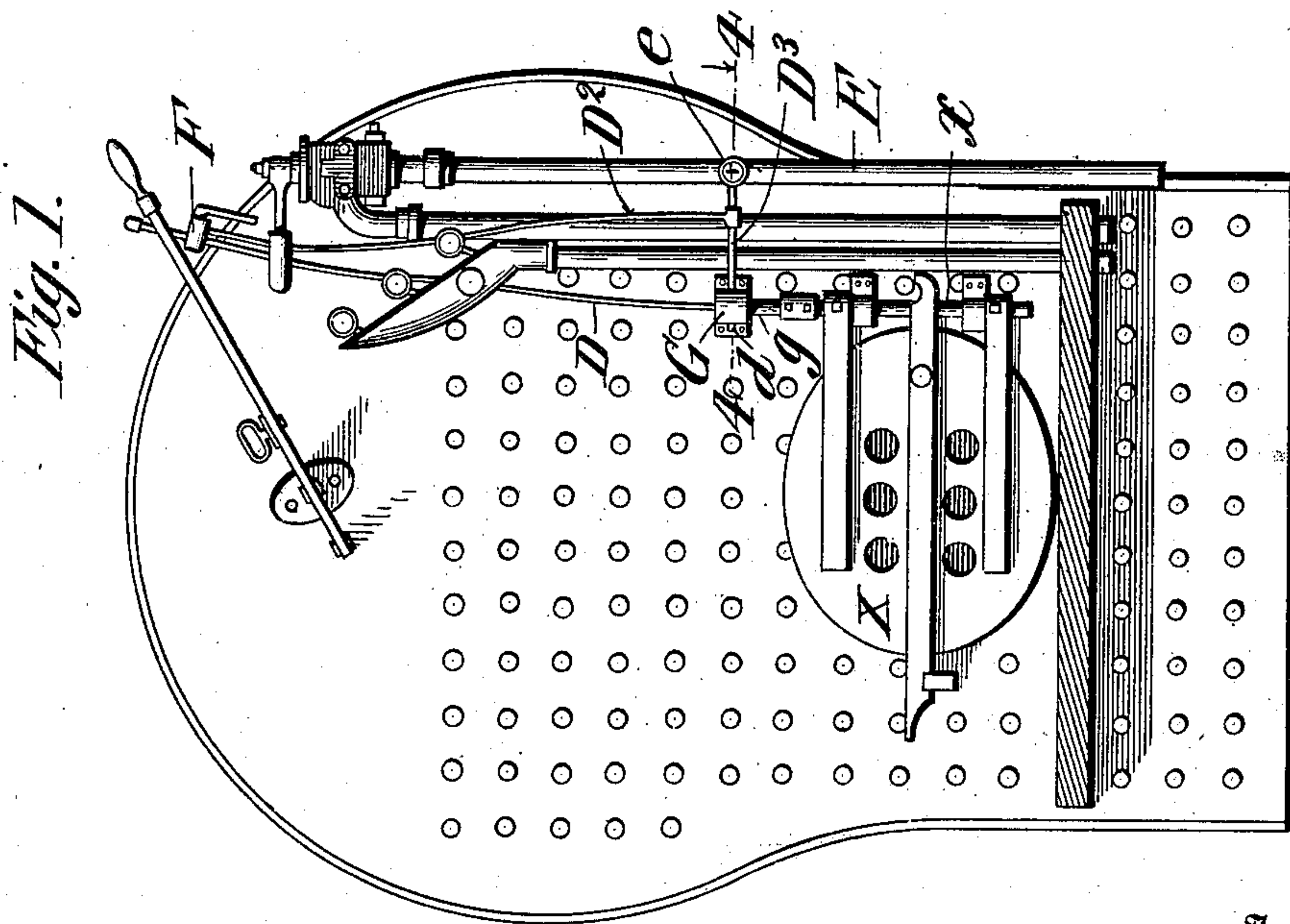
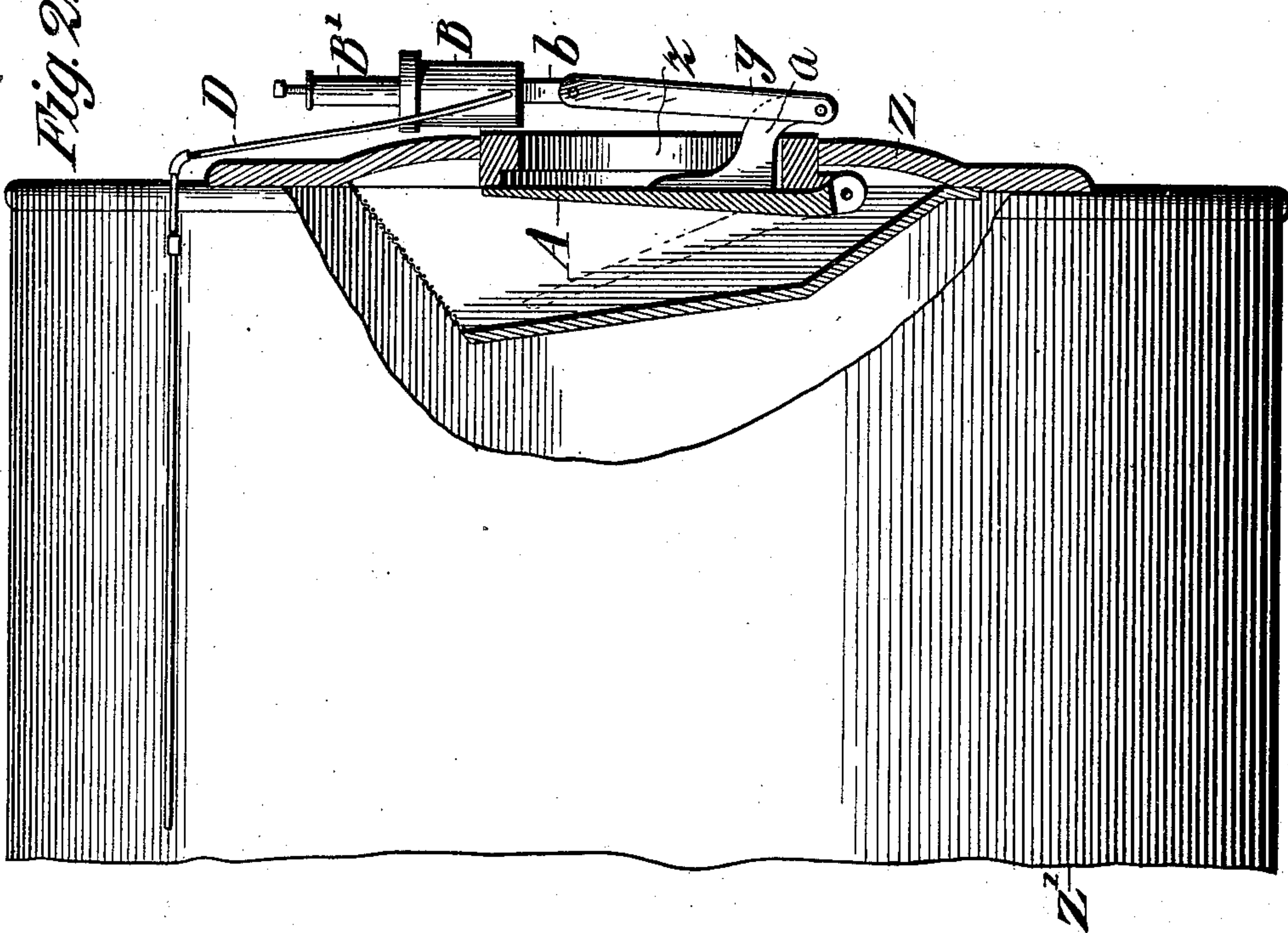
Patented Nov. 6, 1900.

J. MILTON.
STEAM BOILER FURNACE.

(Application filed Jan. 10, 1900.)

(No Model.)

2 Sheets—Sheet 1.



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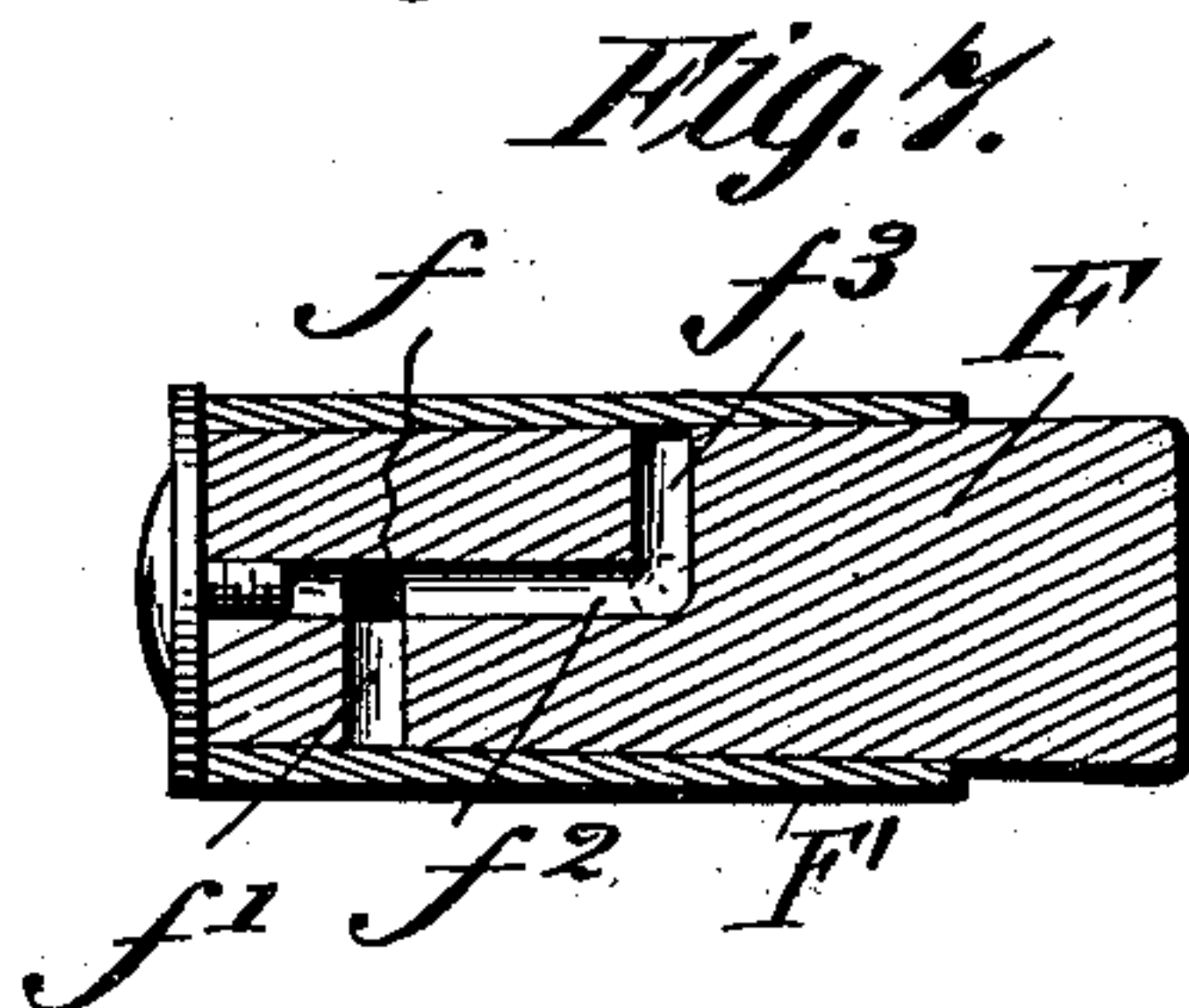
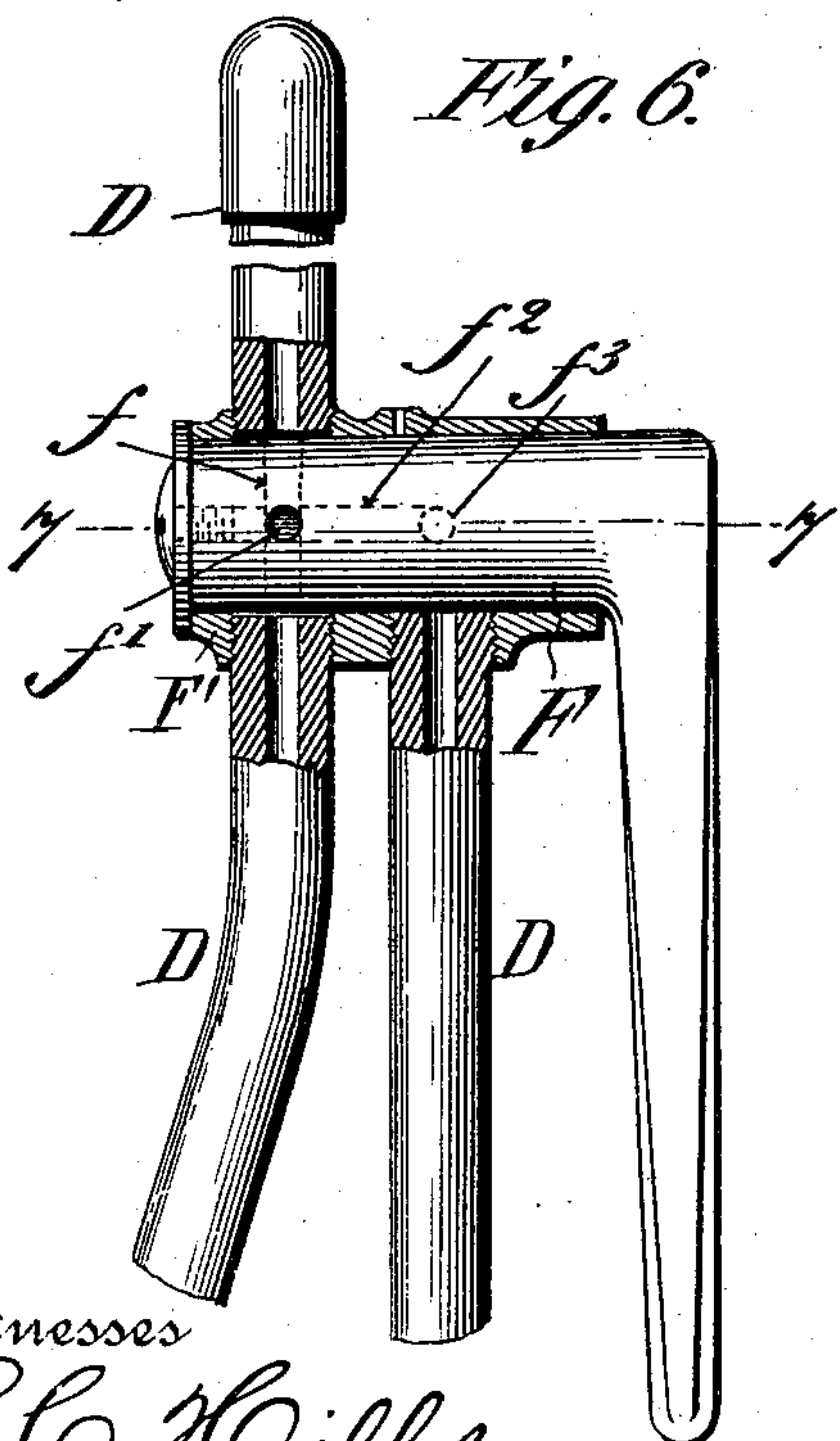
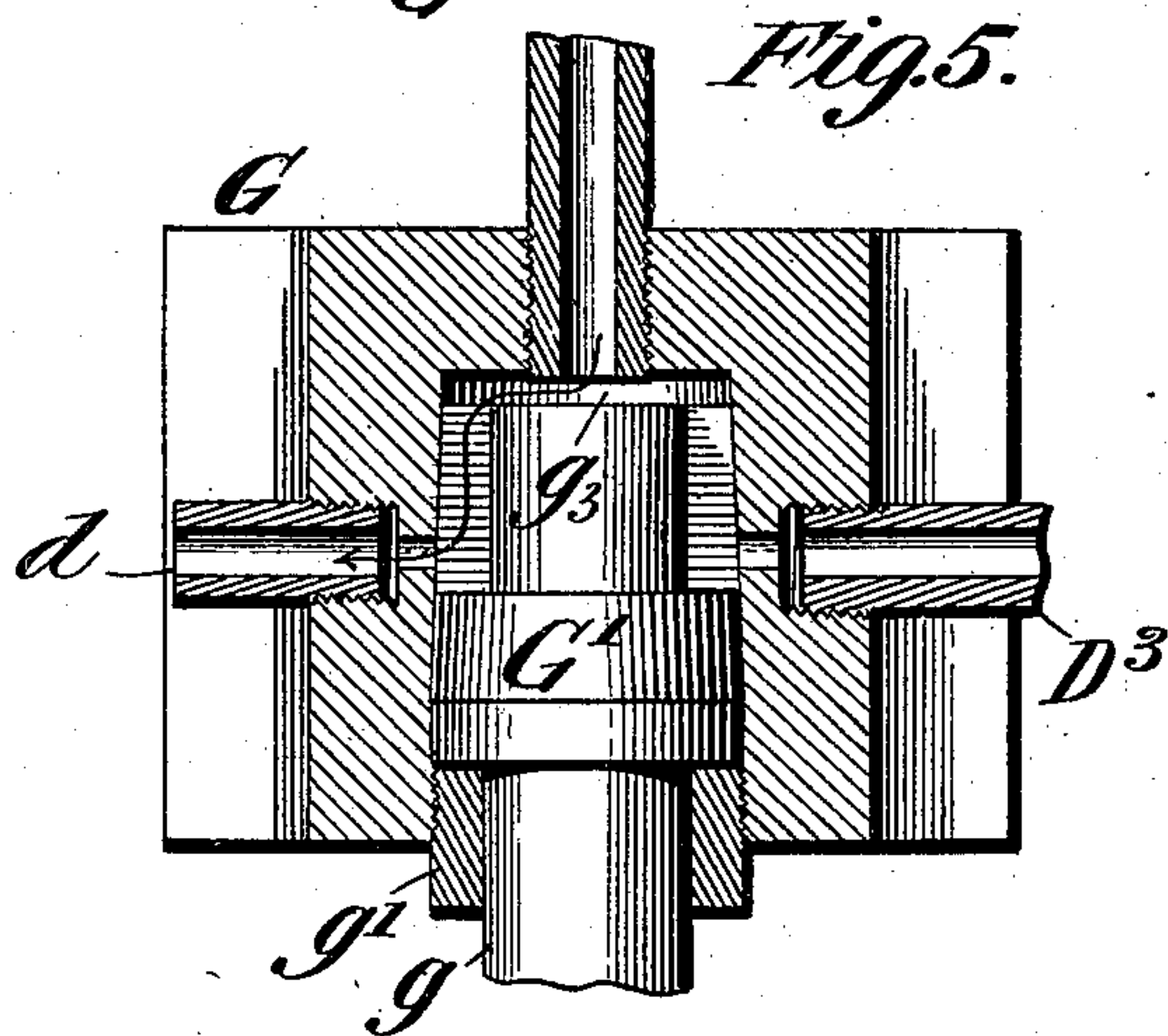
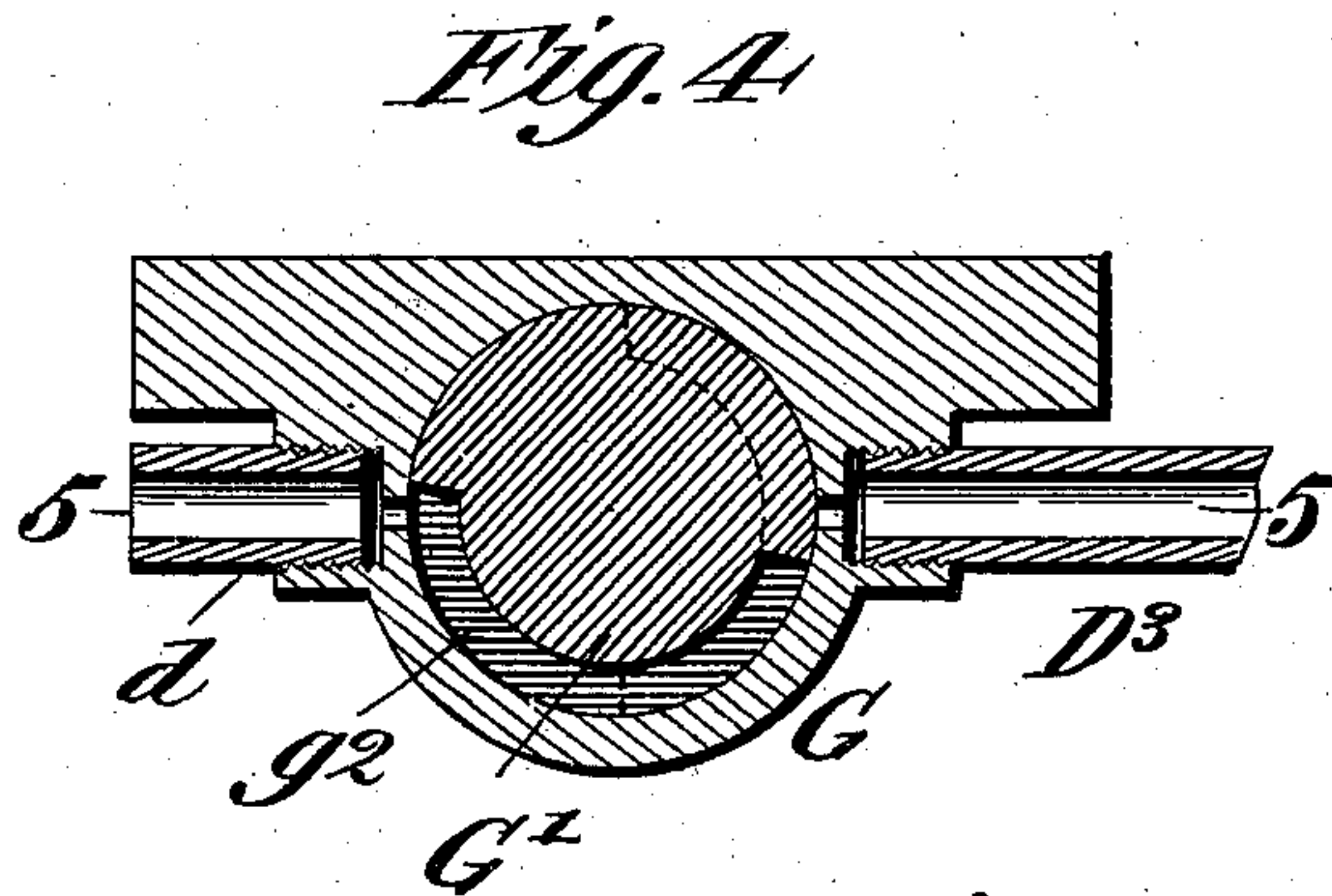
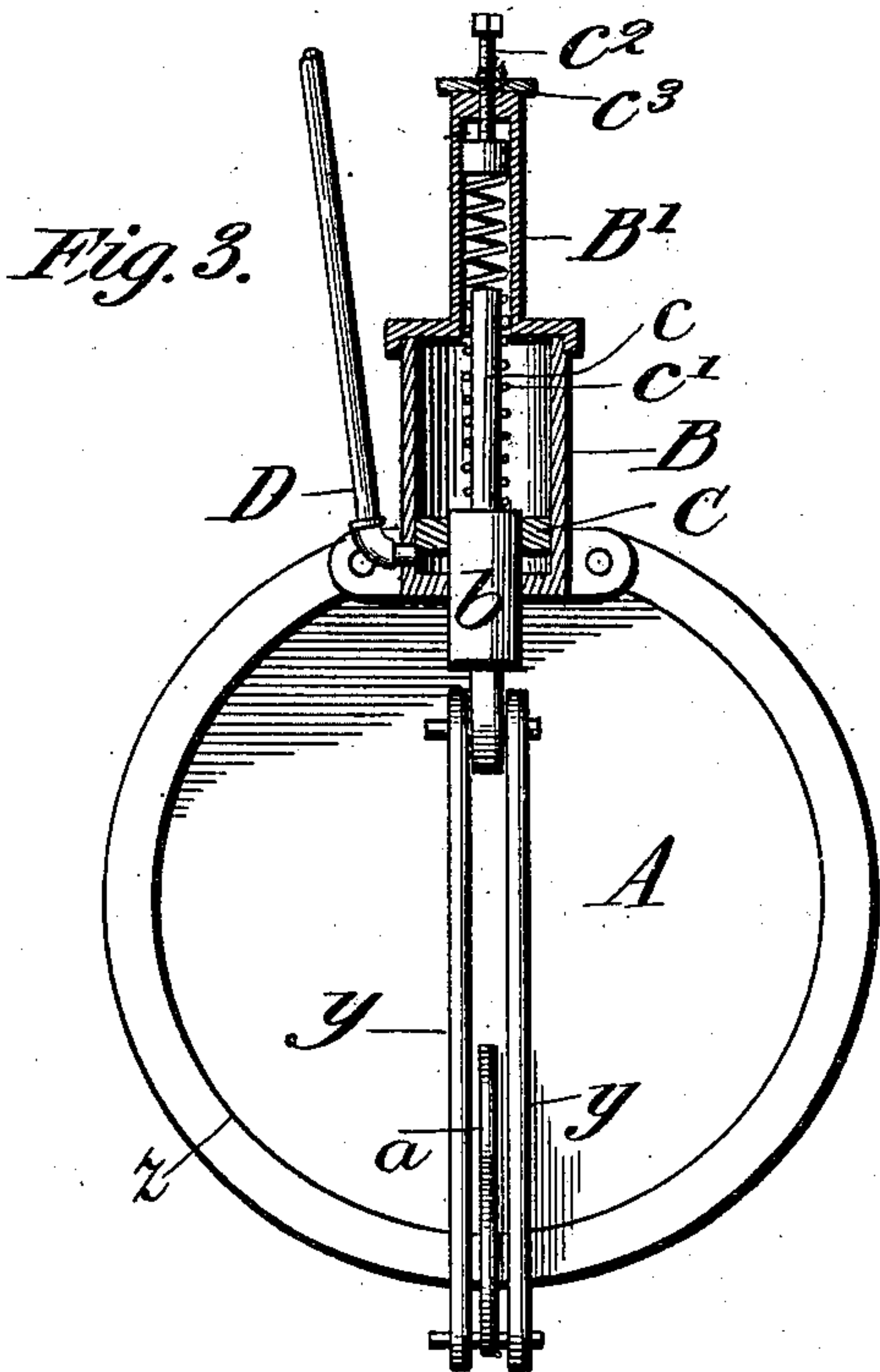
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STEAM BOILER FURNACE.

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2 Sheets—Sheet 2.



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UNITED STATES PATENT OFFICE.

JOHN MILTON, OF WASHINGTON, DISTRICT OF COLUMBIA.

STEAM-BOILER FURNACE.

SPECIFICATION forming part of Letters Patent No. 661,066, dated November 6, 1900.

Application filed January 10, 1900. Serial No. 984. (No model.)

To all whom it may concern:

Be it known that I, JOHN MILTON, a citizen of the United States, residing at Dunbarton Hotel, Washington, District of Columbia, have invented certain new and useful Improvements in Steam-Boiler Furnaces; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

In my Letters Patents numbered 590,846 and 631,528, dated, respectively, September 28, 1897, and August 22, 1899, I have shown, described, and claimed certain improvements in exhaust-regulating attachments which are adapted for utilization, more especially in connection with the furnaces of locomotive-engines, and which are designed to counteract the influence of the air-blast occasioned by opening the furnace-door and to overcome the effects of excessive exhausts produced in starting, in mounting heavy grades, and when the wheels slip in rotation. The constructions covered by the above-stated patents involve an air-inlet adjacent to the locomotive-stack, which inlet is controlled by a valve openable under the action of excessive exhausts and also through connection with the stoking-door. The action of the valve under the influence of the exhausts is automatic; but the inlet is controlled coincidentally with the manipulation of the stoking-door through the operation of mechanical means in the nature of lever-and-rod connections between said valve and door, whereby movement of the latter is communicated to the valve to open the same.

My present invention, while involving the same general principle of the patented constructions, contemplates the utilization of fluid under pressure for effecting the mechanical operation of the inlet-controlling valve, which fluid is preferably air and is in the application of the invention to locomotive-engines supplied from the air-brake pipe.

In addition to the improvements in construction resulting from the employment of compressed fluid as the means for mechan-

ically operating the valve the present invention contemplates other valuable improvements, among which is a means by which the air-inlet valve may be operated independently of the action of the exhausts and of the movement of the door to admit air for the purpose of checking the steaming of the boiler when the pressure is at the blowing-off point, whereby the present objectionable practice of opening the stoking-door and admitting cold air into the fire-box for this purpose is avoided.

The details of construction and operation are fully set forth in the following description, which is to be read in connection with the accompanying drawings, in which—

Figure 1 is an elevation of the head of a locomotive-boiler furnace with my invention applied. Fig. 2 is an enlarged sectional view of the extension-front or smoke-box of a locomotive, showing the manner of mounting the air-inlet valve and the means for operating said valve. Fig. 3 is a detail view showing the valve and its actuating means in front elevation. Fig. 4 is an enlarged sectional detail view taken on line 4 4 of Fig. 1. Fig. 5 is a sectional view taken on line 5 5 of Fig. 4. Fig. 6 is an enlarged detail view, partly in section, of the hand-valve and connections for operating the air-inlet valve. Fig. 7 is a sectional view on line 7 7 of Fig. 6.

Referring to the said drawings by letter, A denotes the air-inlet valve, which is pivoted, preferably at its lower end, to the inner side of the door Z of the extension-front Z' and normally closes the air inlet or opening z. The valve carries a lug a, which extends outwardly through the inlet, and a link y is pivotally connected to this lug and to the rod b of a piston C, movable in a cylinder B. The cylinder has a reduced upper end B', providing a recess which receives a reduced extension c of the piston-rod b, around which is coiled a spring c'. This spring bears at its lower end against the shoulder of the piston-rod and at its upper end against a follower, the latter being moved to vary the tension of the spring by a screw c², and c³ is a jam-nut to maintain the adjustment. The spring c' operates to depress the piston, and through the connection between the piston-rod and valve the latter is forced to its seat, the degree of pres-

sure being governed by the degree of compression of the spring. The valve is automatically opened under the action of excessive exhausts, the partial vacuum created in the smoke-box causing the external air to exert pressure against the valve and force it from its seat, and when the normal conditions are restored the spring, which is put under compression by the movement of the door, operates to return the valve to its closing position. The means for mechanically operating the valve through movement of the stoking-door comprise a compressed-fluid-supply pipe E, which in a locomotive-engine may be the train-pipe, and a fluid-conducting pipe D, leading from the pipe E to the cylinder B below the piston C, and in which is a valve operated in the movement of the stoking-door to open and close the passage for the air. The controlling-valve, as shown at G', is of the rotary type, its stem g being coupled to the pintle x of the stoking-door X to turn therewith, and said valve is mounted in a casing G, supported from the head in any suitable manner. The valve is preferably tapered and fits closely a correspondingly-formed recess in the casing G, being confined therein by a ring-nut g' . The upper portion of the valve is cut away to afford a passage g^2 , and a space g^3 is left between the top of the valve and the end of the recess. The pipe D, which may be of relatively small diameter, communicates with the space or chamber g^3 and extends to the front of the engine, where, as above stated, it connects with the cylinder B. D³ is a pipe which leads from the supply-pipe to the interior of the casing at a point in line with the passage g^2 of the valve. A valve e in the pipe D³ controls the supply of air. In the casing G opposite to the connection with pipe D³ is an opening d , affording an exhaust-outlet.

In practice, the valve e being turned to admit air and the door X swung open, the valve assumes the position approximately as shown in dotted lines in Fig. 4, in which adjustment the exhaust-outlet d is closed and a passage is opened between the pipe D³ and the pipe D. The air is thus free to pass to the under side of the piston C, and as the latter rises the valve A opens and admits air into the smoke box or front, the result being the counter action of the effects of the air-blast in the opening of the door during stoking and manipulation of the fire. The closing of the door brings the valve into the position shown in full lines in Fig. 4. It will be noted that the passage g^2 extends the proper distance to insure in the movement of the valve the uncovering of the inlet-port and the exhaust-port successively, whereby in the closed position of the door the pipe D may exhaust and in the open position of the door the full air-pressure may be utilized to actuate the piston.

At F, I have shown what I term a "hand-valve," by the operation of which the open-

ing of the valve A may be effected independently of the action of the exhausts and of the opening of the stoking-door. This valve F, which is also of the rotary type, is mounted in a casing F', which is interposed or let into the pipe D. The valve F is provided with a straight transverse passage or aperture f , which when the valve is in the position shown in Figs. 6 and 7 is in alinement with and opens communication between the sections of the pipe D. Leading from the pipe D³ to the valve-casing F' is a pipe D², and in the valve is a second passage, of approximately Z form, having, in the position shown in Figs. 6 and 7, a transverse branch f^3 , leading to the center, a central longitudinal branch f^2 , and a transverse branch f' , leading from the center in a direction opposite to the branch f^3 . Giving the valve a quarter-turn closes the passage between the sections of pipe D; but communication is thereby established between the supply-pipe E and piston-cylinder through the pipe D² and the section of the pipe D beyond the valve F. In other words, during the time the valve A remains open through manipulation of the valve F the valve G' and connections are shunted from the air-supply; but the ingress of air through the opening z being constant the stoking-door may be opened for any purpose without subjecting the fuel to the cooling action of an air-blast. The provision of means by which air is at will admitted through the inlet enables the steaming of the boiler to be kept under full control without the necessity of admitting a volume of cold air in the fire-box through the stoking-opening, inasmuch as such admission of air adjacent to the stack practically neutralizes the effect of the exhaust and relieves the draft. By the means provided also the stoking-door need never be opened except for stoking purposes.

I claim as my invention—

1. In a steam-boiler furnace of the character described, an air-inlet adjacent to the furnace-stack and exhaust-outlet, a self-closing valve at said inlet openable under the action of excessive exhaust, fluid-pressure means for transmitting motion to said valve to open the same, said means being adapted to be set in operation by movement of the furnace-door or independently of said door.

2. In a steam-boiler furnace of the character described, an air-inlet adjacent to the furnace-stack and exhaust-outlet, a valve at said inlet openable under the action of excessive exhaust, means for operating the valve actuated by fluid-pressure, a valve in the fluid-pipe operatively connected with the stoking-door whereby movement of the latter controls the inlet-valve-operating means, and a hand-valve in the fluid-pipe adapted to shunt the door-valve and independently control the inlet-valve-operating means.

3. In a steam-boiler furnace of the character described, an air-inlet adjacent to the furnace-stack and exhaust-outlet, a self-clos-

ing valve at said inlet openable under the action of excessive exhausts, means for operating the valve actuated by fluid-pressure, and a controlling-valve in the fluid-pipe operatively connected with the stoking-door and adapted in one position to admit fluid to the valve-operating means and in another position to cut off the fluid-supply and exhaust said pipe.

10 4. In a steam-boiler furnace of the character described, an air-inlet adjacent to the furnace-stack and exhaust-outlet, a self-closing valve at said inlet openable under the action of excessive exhausts, means for operating the valve actuated by fluid-pressure, and a controlling-valve in the fluid-pipe operatively connected with the stoking-door and adapted in one position to admit fluid to the valve-operating means and in another position to cut off the fluid-supply and exhaust said pipe, and a hand-valve in the fluid-pipe adapted in one position to open a passage between the door-valve and inlet-valve-operating means and in another position to shunt the door-valve and admit fluid to the inlet-valve-operating means.

5. In a steam-boiler furnace, the combination of a valve controlling an air-inlet adjacent to the stack, means actuated by fluid-pressure for operating the valve, a compressed-fluid-delivery pipe leading to the valve-actuating means, a valve in the delivery-pipe operatively connected with the stoking-door to be moved thereby, a hand-controlled valve in the delivery-pipe beyond the aforesaid valve, said hand-valve having a passage adapted in the movement of the valve to open and close communication between the valve-actuating means and the fluid-supply pipe through the door-operated valve, and having a by-passage adapted in the movement of the valve to shunt the delivery of fluid through the door-operated valve, and establish direct delivery to the valve-actuated means through a by-pipe connection with the fluid-supply pipe.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN MILTON.

Witnesses:

W. T. NORTON,
ARTHUR BROWNING.