

(No Model.)

F. J. FERRELL.  
VALVE, GATE, OR SIMILAR DEVICE.

No. 468,334.

Patented Feb. 9, 1892.

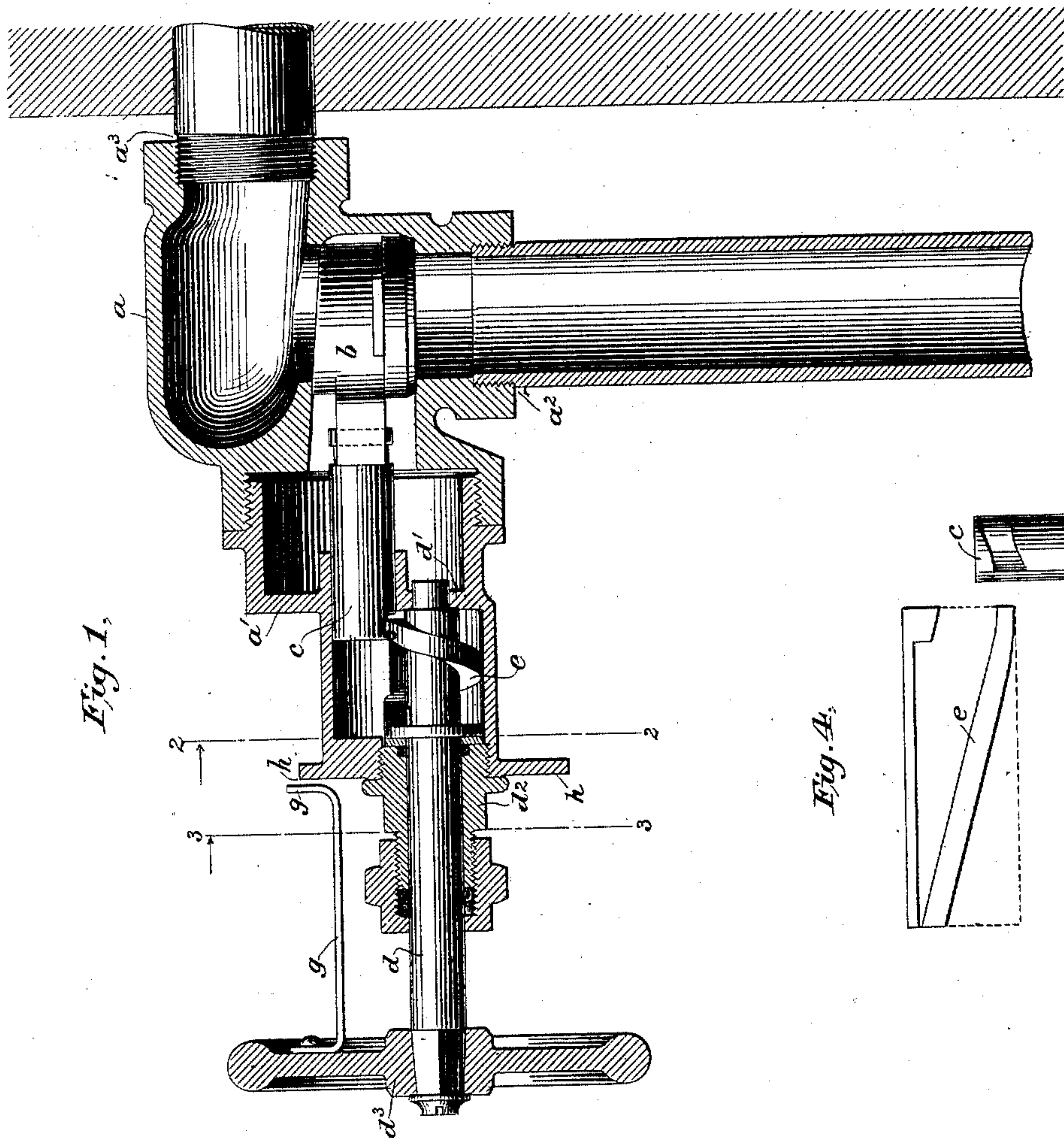


Fig. 1.

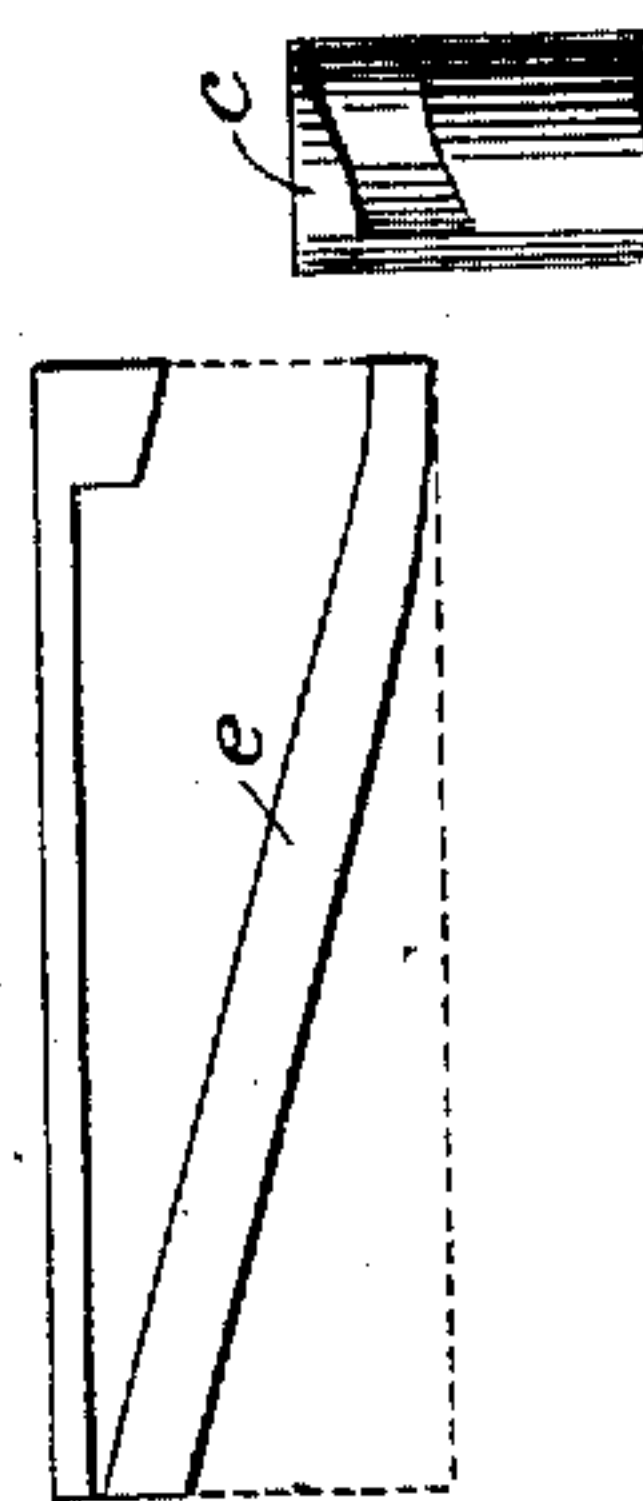


Fig. 4.

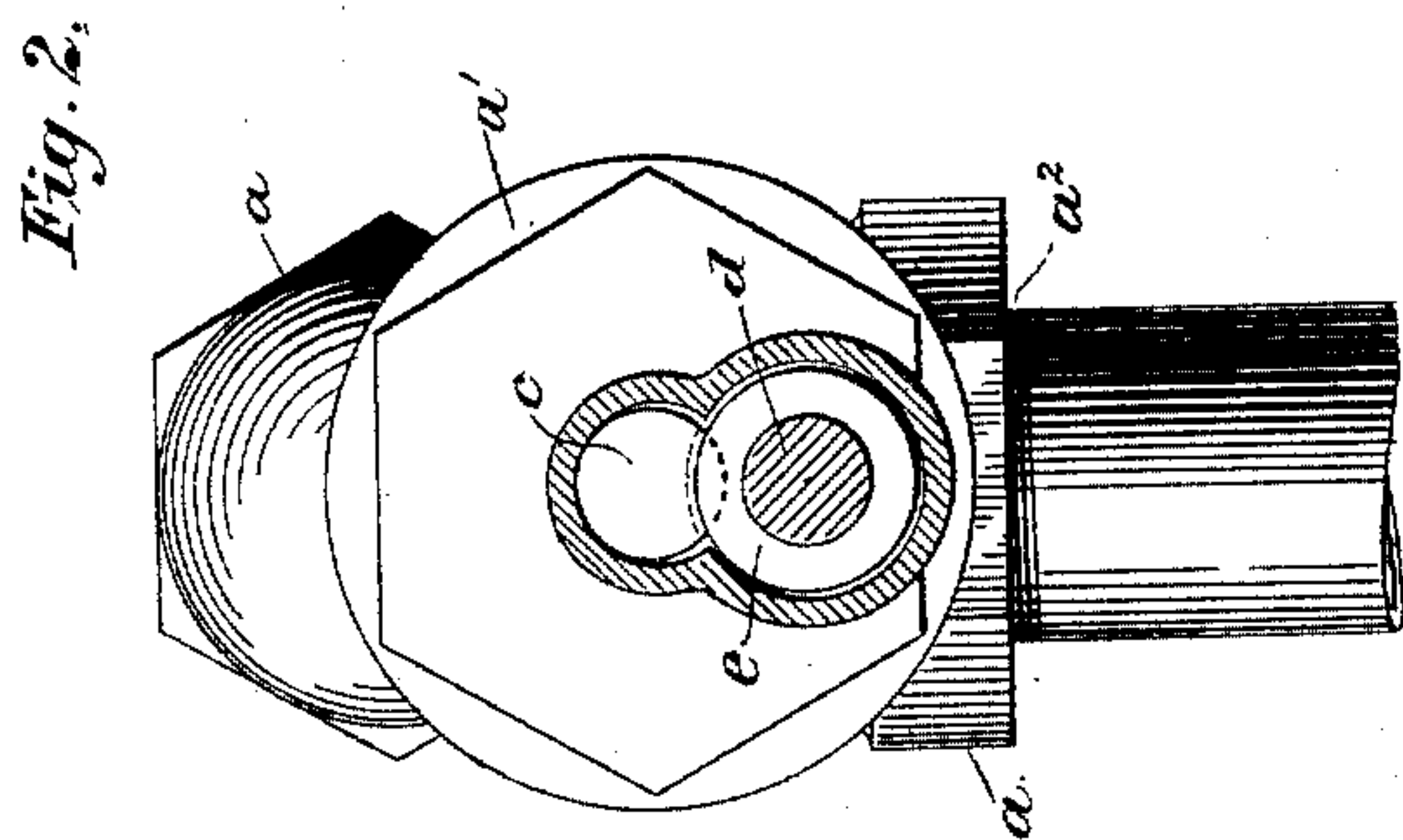


Fig. 2.

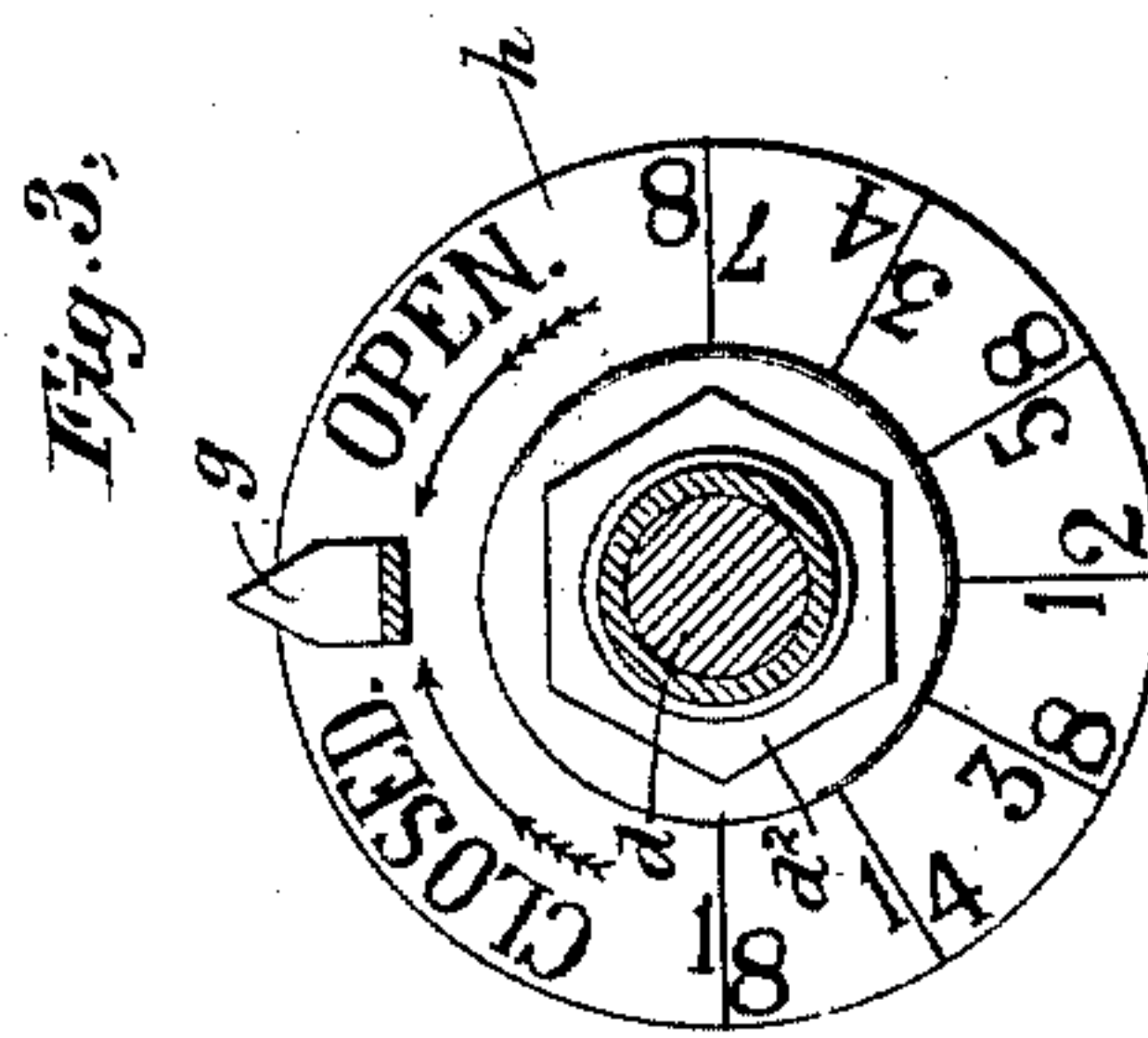


Fig. 3.

Witnesses  
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# UNITED STATES PATENT OFFICE.

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## VALVE, GATE, OR SIMILAR DEVICE.

SPECIFICATION forming part of Letters Patent No. 468,334, dated February 9, 1892.

Application filed September 8, 1890. Serial No. 364,230. (No model.)

*To all whom it may concern:*

Be it known that I, FRANK J. FERRELL, a citizen of the United States, residing at New York, county and State of New York, have  
5 invented certain new and useful Improvements in Valves, Gates, or Similar Devices, of which the following is a specification, reference being had to the accompanying drawings, forming part hereof.

10 My invention relates to valves, gates, and similar devices for closing orifices, and has for its object to improve the construction of such devices.

15 My invention consists of the improvements in the construction of such devices hereinafter particularly set forth and claimed.

In the accompanying drawings, Figure 1 is a vertical central section of a sliding gate-valve embodying my invention. Fig. 2 is a section of the same on the line 2 2, Fig. 1. Fig. 3  
20 is a section of the same on the line 3 3, Fig. 1. Fig. 4 shows a development of the operating-worm and an elevation of part of the valve-stem.

25 The valve shown in the drawings is attached to a pipe projecting from a vertical surface, as in fire-hydrants on vertical walls. The casing is formed in two parts  $a$  and  $a'$ , the part  $a$  containing the valve-openings and valve-seat, and the part  $a'$  supporting the operating-stem and containing the operating mechanism. The valve  $b$  is shown in closed position. The valveway is straight, while the casing is an angle-casing having openings at an angle to  
35 each other, preferably a right angle, as shown. One opening  $a^2$ —the vertical one in the drawings—is in line with the valveway. The other opening  $a^3$ —the horizontal one in the drawings—is at an angle thereto, the passage within the casing bending at a point above the valveway and seat. These openings  $a^2$  and  $a^3$   
40 are suitably threaded for the insertion of pipes and connections. The opening  $a^3$  and its passage contains the valve-ports formed by an enlargement of the passage, and the valveway is formed in the casing between these ports. The passage of the opening  $a^3$  is considerably enlarged, forming a large chamber, and the passage from the opening  $a^2$  penetrates the side of this chamber. The passage  
50 of the opening  $a^2$  can be readily finished and

the valveways and ports accurately shaped, while the enlarged chamber requires no finishing or fitting and is left in the rough condition produced in the casting, except as to the threaded portion at the opening  $a^3$ . The enlarged chamber permits ready access to the passage containing the valveways and permits free use of tools in finishing the latter passage. This form of valve is especially  
60 adapted for use in fire-hydrants for fire-hose, as shown, and in blow-off valves for steam-boilers.

The valve-stem  $c$  is detachably connected to the valve  $b$  by a lug extending from the valve and provided with projections engaging with a circumferential groove in the valve-stem. This valve-stem is fitted to slide in cylindrical bearings in the part  $a'$  of the casing. It is provided with an inclined slot,  
70 which meshes with a projecting worm on the operating-stem  $d$ , by which motion is imparted to the valve, as hereinafter described.

The operating-stem is fitted to rotate only in bearings in the part  $a'$  of the casing. The bearing  $d'$  of the inner end of the operating-stem is part of a partition extending across the casing. The bearing  $d^2$  of the outer end of the operating-stem is detachable to permit ready removal of the operating-stem. This  
80 outer bearing  $d^2$  receives the thrust in closing the valve, and is provided with suitable packing to insure a perfectly-tight joint. The bearings of the valve-stem  $c$  and operating-stem  $d$  are arranged side by side, and the partition containing the bearing  $d'$  of the operating-stem  $d$  also contains the bearing of the valve-stem, and the operating-worm and its meshing groove are thus located in a chamber separated from the valve and protected from  
90 the grit and sediment that often collects in such valves. The projecting worm  $e$ , which meshes with the inclined slot of the valve-stem, is formed or secured upon the operating-stem  $d$ . The operative face of this worm inclosing the valve corresponds to a uniform helix through the greater part of its length, but is, when my entire invention is used, gradually reduced in pitch near the end of its stroke, as clearly shown in the develop-  
95 ment, Fig. 4. The effect of this reduction of pitch is to decrease the working angle of the  
100



worm at this part of the stroke, and thus to cause the worm to tightly wedge the valve in closed position. This reduction of pitch may be such that at the end of the worm the operative face is practically at a right angle to the direction of movement of the valve, as shown, thus absolutely preventing accidental opening of the valve and making it impossible to open the valve, except by positively rotating the operating stem and worm. The uniformly-helical portion of the worm causes the valve when the operating stem and worm are rotated to move rapidly and uniformly. The pitch of the worm is preferably adjusted to cause one full stroke of the valve by one revolution or less of the worm, and an indicating plate and pointer are provided for indicating the exact amount of opening of the valve. The face of the worm *e*, which operates in opening the valve, is slightly reduced in pitch at the end of the stroke, as shown, so that the worm will be thinner and thus have considerable clearance at the closing end of the stroke. The outer end of the operating-stem *d* is provided with a hand-wheel *d*<sup>3</sup>, whereby the valve may be readily operated. An index *g* is attached to this hand-wheel and extends inward toward the casing and is arranged at its inner end adjacent to an indicating plate or dial *h*. This indicating plate or dial *h* is formed upon or attached to the casing and is provided with marks to indicate the amount of opening of

the valve, as clearly shown in Fig. 3. The valve is shown closed, and the index is in a correspondingly marked position over the dial. The large space between the closed and one-eighth-open position is due to the slow movement and clearance of the worm and groove at the closing end of the stroke. It is obvious that the number of worms may be increased, if desired, and that the pitch of the worm or worms may be altered to suit various conditions.

What I claim, and desire to secure by Letters Patent, is—

The combination of the valve-casing and the valve, the detachably-connected valve-stem *c* and the groove formed therein, the operating-stem *d* and the projecting worm *e* thereon, meshing in the groove in the valve-stem, such worm being gradually reduced in pitch at the closing end of its stroke, so as to tightly wedge the valve in closed position, and being thinner at the closing end of its stroke, and a partition in the casing, such partition being provided with the bearing of the valve-stem *c* and one of the bearings *d*' of the operating-stem *d* and dividing the casing, so as to form a separate chamber for the worm *e* and its meshing groove, substantially as set forth.

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Witnesses:

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