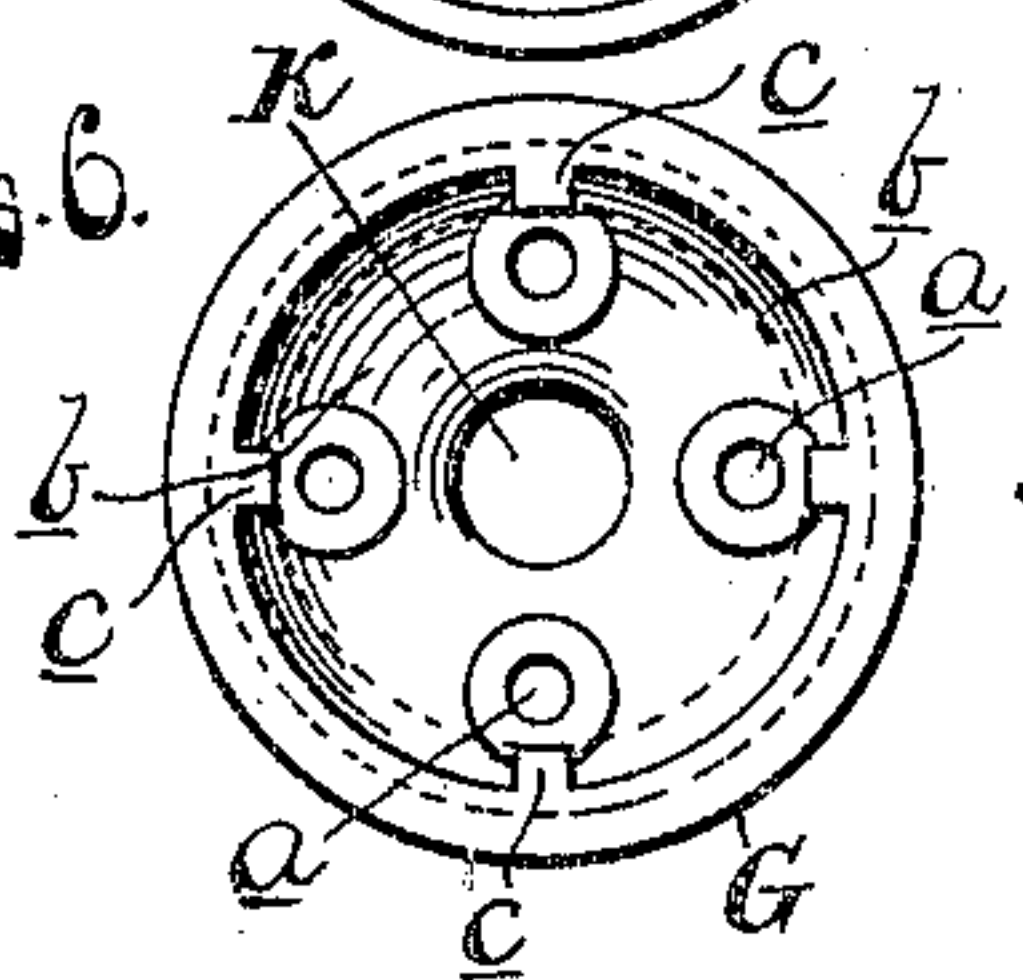
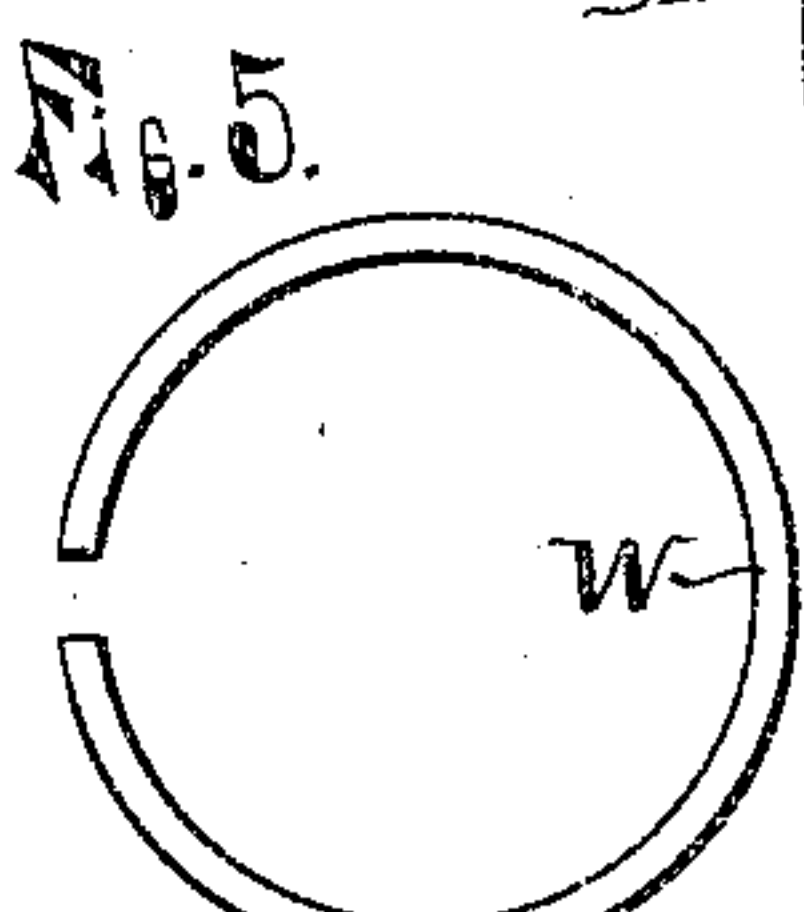
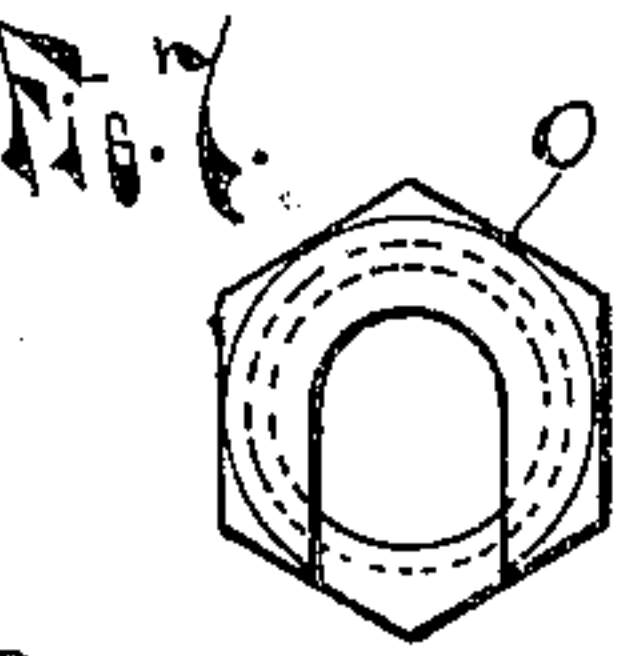
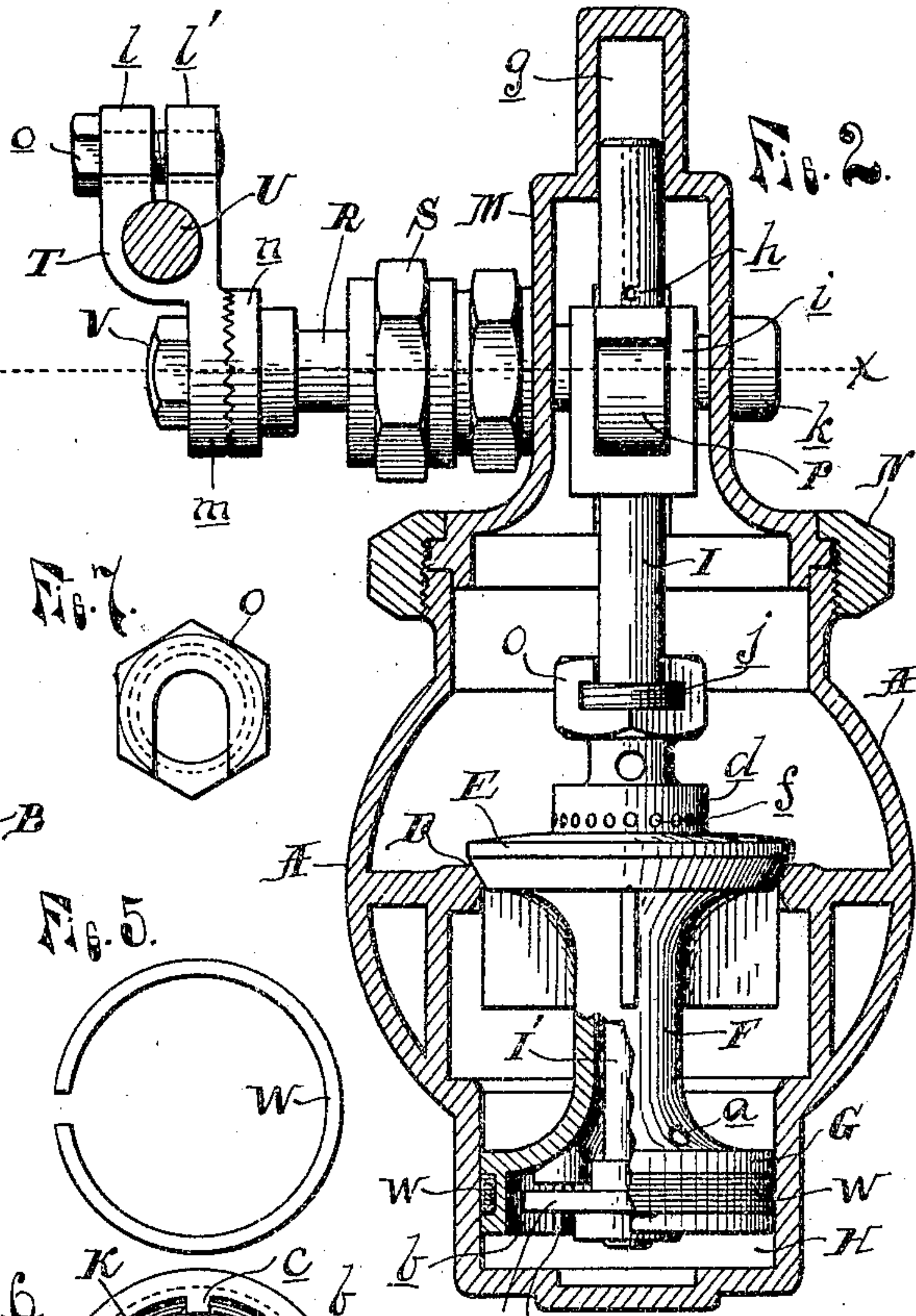
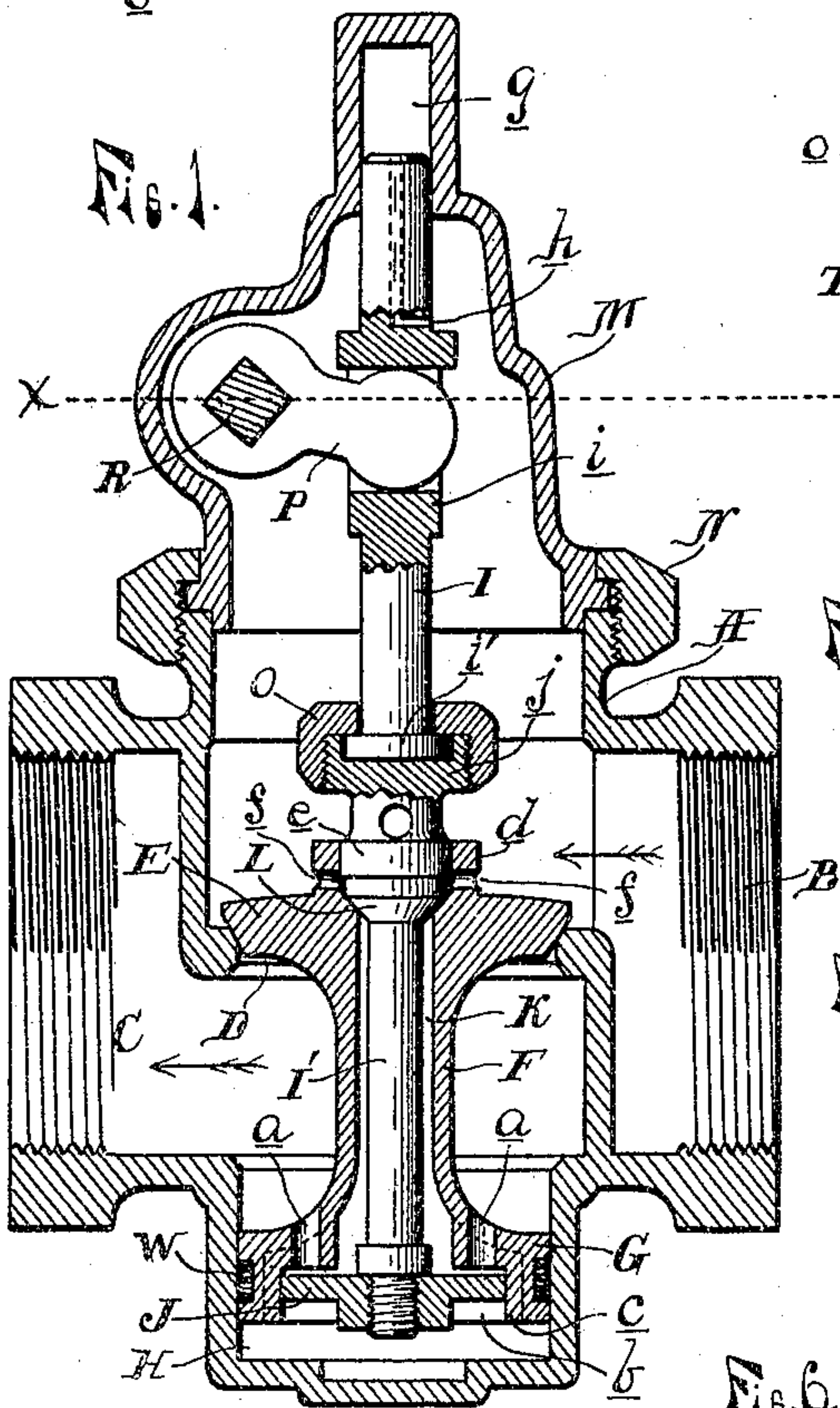
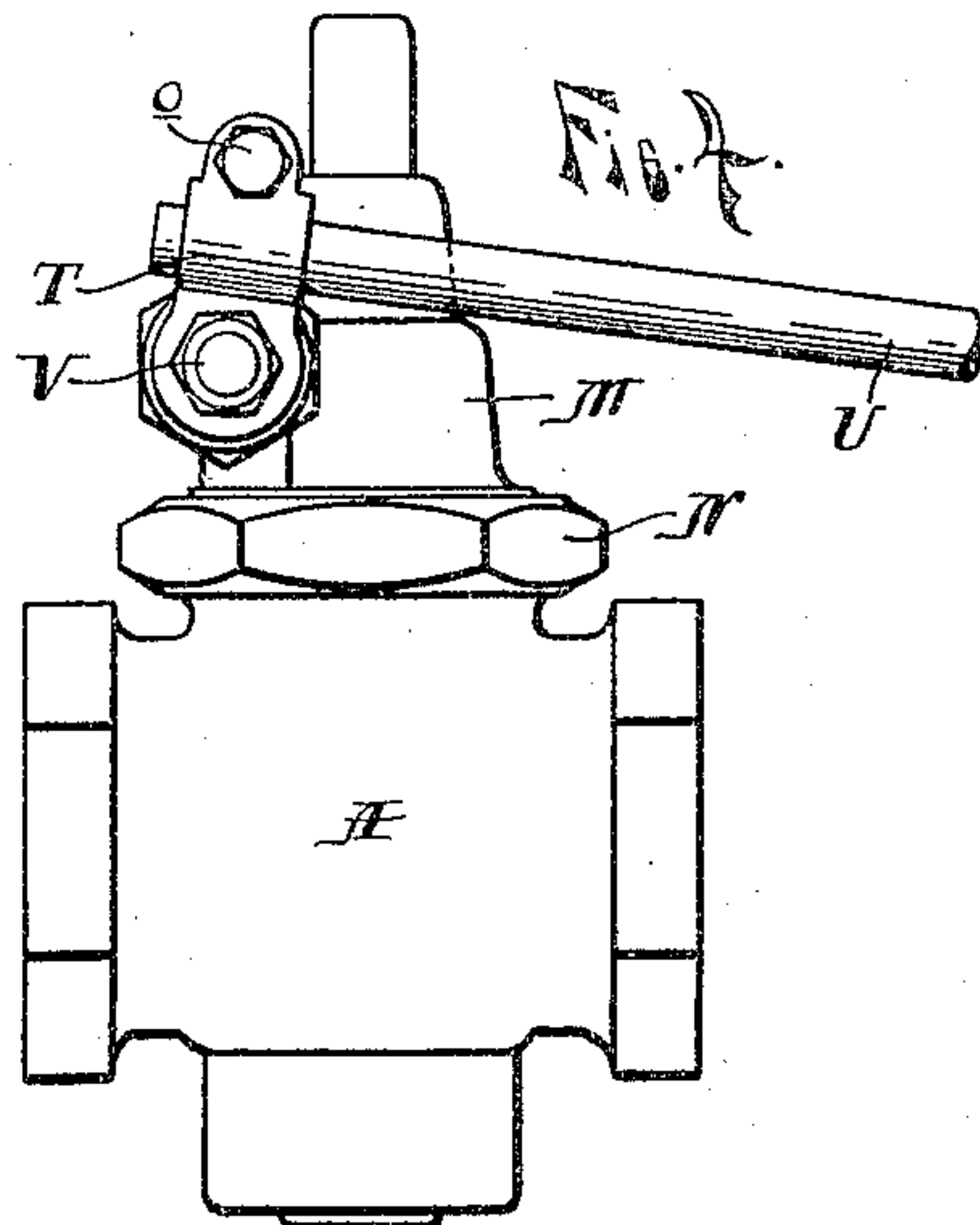
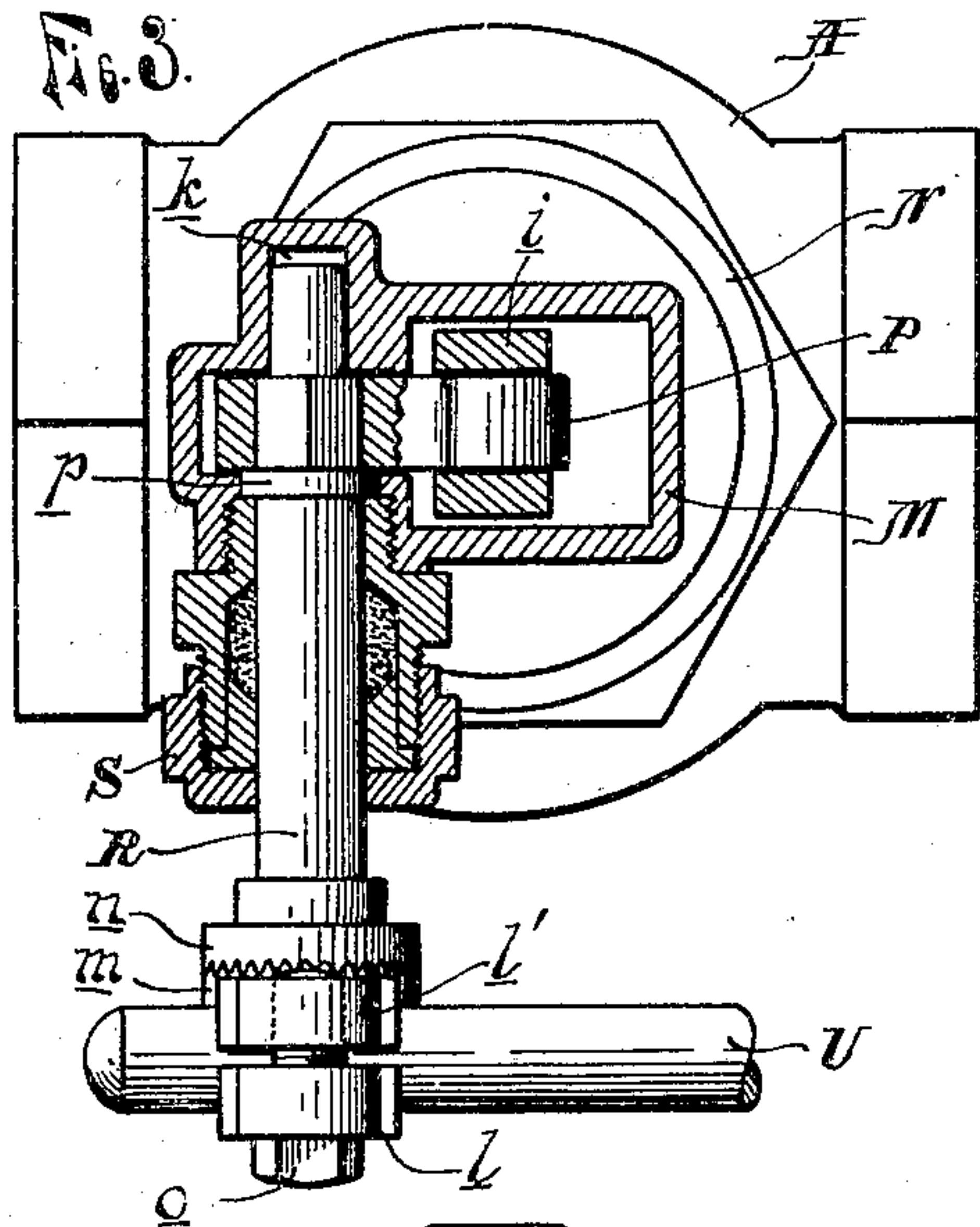


No. 794,267.

PATENTED JULY 11, 1905.

J. C. WILLS.  
VALVE.

APPLICATION FILED SEPT. 8, 1904.



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## UNITED STATES PATENT OFFICE.

JOHN C. WILLS, OF DETROIT, MICHIGAN.

## VALVE.

SPECIFICATION forming part of Letters Patent No. 794,267, dated July 11, 1905.

Application filed September 8, 1904. Serial No. 223,699.

*To all whom it may concern:*

Be it known that I, JOHN C. WILLS, a citizen of the United States of America, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Valves, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates more particularly to an improved balanced valve; and the invention consists in the novel construction, arrangement, and combination of different parts, all as more fully hereinafter specified, and more particularly set forth in the claims.

In the drawings which form a part of the specification, Figure 1 is a vertical central section of my improved balanced valve. Fig. 2 is a side elevation with the casing and part of the valve in vertical central section at right angles to Fig. 1. Fig. 3 is a horizontal section on line *xx*, Figs. 1 and 2. Fig. 4 is an elevation of the valve on a smaller scale. Fig. 5 is a detached plan of one of the packing-rings. Fig. 6 is a detached bottom plan of the piston. Fig. 7 is a detached plan of the screw-cap O.

A is a globular valve-body formed with diametrically opposite inlet and outlet openings B C, communicating with each other through a seat-opening D, upon the inlet side of which the main valve E is adapted to be seated. This valve has a hollow stem F projecting through the seat-opening and terminating in a piston G of about the same diameter as the valve E (respectively its seat-opening) and working in a cylindrical enlargement of the valve-body below the seat-opening. The valve is carried upon a valve-stem composed of two detachably-connected sections I I', the lower one of which passes loosely through the valve and carries on its end a valve-disk J, adapted to control a series of ports *a* through the piston connecting the outlet side of the valve with the chamber H below the piston. This chamber also communicates with the inlet side of the valve through the passage K, formed around the section I', and the admission of the fluid into this passage is controlled by a valve L, formed on the sec-

tion I', the seat of this valve being formed on the top of the passage. The section I' of the valve-stem has a limited vertical motion relative to the valve E, so that when the controlling-valve L is seated the other controlling-valve J is unseated, and vice versa. The section I' of the valve-stem is vertically guided in its movement at the lower end by the valve-disk J, moving within a recess *b*, formed on the under side of the valve-stem and provided with inwardly-projecting lugs *c*, (see Figs. 1 and 6,) which guide the valve-disk J within the vertical walls of the recess and permit at all times a free and unobstructed communication between the chamber H and passage K, since the valve-disk cannot seat against the bottom of the recess by reason of the ports *a* being formed with raised edges upon the under side. The section I' of the valve-stem is also vertically guided upon its upper end by means of a standing guide-flange *d*, formed on top of the valve, in which the thickened portion *e* of the valve-stem is guided, a series of holes being formed in the guide-flange *d* to permit access of the fluid to the controlling-valve L. The upper section I of the valve-stem extends within a cap M, detachably secured upon the body portion A by the coupling-ring N and provided on its top with a chamber *g*, which forms a guide-bearing for the upper end of the valve-stem. The chamber *g* is in open communication with the inlet side of the valve through a passage *h*, bored through the upper end of the valve-stem. The middle portion of the section I of the valve-stem is formed into a yoke *i*, and the lower end is formed with an enlargement *i'*, which projects into a corresponding recess in the enlarged head *j*, formed on the upper end of the lower section of the valve-stem and which is retained therein by a screw-cap O, secured upon the exteriorly-threaded head *j* and formed with a lateral passage for the purpose of detachably engaging it with the section I of the valve-stem. The valve-stem is actuated by means of a crank P, which engages into the yoke *i* of the valve-stem and is carried by the rocking shaft R, the inner end of which is stepped into an interior bearing *k*, formed in one side



of the cap, and the outer end of which is supported in a stuffing-box S, secured in the opposite side of the cap, the crank P being detachably secured upon a squared portion of the shaft. Adjacent to this squared portion I secure a collar *p* upon the shaft, which seats against the inner end of the stuffing-box, and thereby insures a tight steam-joint independently of the stuffing-box.

The shaft R carries upon its outer end a bracket-arm T, the outer end of which is formed with two clamping-jaws *l l'*, adapted to clamp between them the round handle-bar U, and the inner end of which is formed with serrated disk *m*, adapted to engage with a correspondingly-serrated disk *n*, secured adjacent thereto upon the shaft R, all so arranged that by means of the clamping-nut V upon the outer end of the shaft the bracket T may be adjusted to any position around the shaft, and the handle-bar U, which is a round bar of suitable length, may be adjusted within the clamping-jaws at any points of its length, a suitable clamping-screw *o* being provided to clamp it fast in any position.

A further provision in the construction of my valve consists in providing the piston G with a friction device consisting of several rings W, of spring metal, confined in an annular recess formed in the piston. These rings are cut open, as shown in Fig. 5, and have a tendency to expand when confined in the recess of the piston, and thereby create friction against the movement of the piston.

In practice my valve is especially designed and adapted as a throttle-valve for steam-engines, and in operating it will be seen that when steam is admitted by the inlet B the valve when in closed position, as in Fig. 1, is held to its seat by the pressure of the steam, and in the act of opening the valve the valve-stem will therefore first lift the valve L from its seat, and thereby admit the steam through the ports *f* and passage K into the chamber H and also through the ports *a* as long as the latter remain open into the exit side of the valve. As the valve-stem has but a very limited movement independent of the valve E, the disk J will quickly close the ports *a* and prevent the steam from blowing through into the exit side of the valve. Nevertheless sufficient steam will pass to clear all the passages of air and fill them with live steam, and thus when the ports *a* are closed the chamber H is filled with live steam, and the valve E is now in a balanced condition and will be readily lifted up from its seat and remain balanced in any position into which it may be moved, and it is held in such position by the friction of the friction-rings W on the walls of the chamber H.

My valve is constructed with a special attention to its economical manufacture upon a large commercial scale, and it is composed of

few and simple parts which can be readily assembled.

What I claim as my invention is—

1. The combination with the valve-casing and the seat-opening therein, of a main valve held to the seat-opening by pressure from the inlet side, a balance-piston on said main valve working in a chamber formed in the outlet side of the casing and opening into the same, a port or ports through said piston through which the chamber below the piston is adapted to communicate with the space above the same, a passage leading through the main valve and piston into the chamber below the same, a valve-stem wholly contained within the valve-casing and passing loosely through said passage and two controlling-valves on said valve-stem, one above the main valve and controlling the passage and the other in the chamber below the piston and controlling the port or ports, said valves adapted to carry the main valve in raising and lowering the valve-stem after a limited movement operating said controlling-valves together in the manner described to balance the main valve in advance of its opening and in its open positions, said main valve and piston adapted to maintain itself in any position into which it may be moved independently of its connection with the valve-stem or the positions of the controlling-valves.

2. The combination with the valve-casing and seat-opening therein, of a main valve held to the seat-opening by the pressure of the fluid, a balance-piston on said main valve working in a chamber in the outlet side of the valve-casing and provided with a port or ports through which the fluid is adapted to enter from the outlet side of the valve into the chamber below the piston when the main valve is open, a passage through the piston and main valve through which the chamber below the piston is adapted to communicate with the inlet side of the valve-casing in the open or closed position of the main valve, a valve-stem passing loosely through said passage and adapted to raise and lower the main valve and have a limited movement therein and two controlling-valves on said valve-stem operated by the limited movement of the valve-stem in the manner described to balance the main valve in advance of its opening and in its open positions, said controlling-valves and valve-stem being wholly inclosed within the valve-casing and independently balanced by the pressure of the fluid when the main valve is opened.

3. The combination with the valve-casing and seat-opening therein, of a main valve held to the seat-opening by the pressure of the fluid in the inlet side of the valve-casing, a balance-piston on said main valve working in a chamber formed in the outlet side of the casing and subjected to the pressure of the fluid upon its upper side when the main valve is



open, a port or ports in the piston through which the chamber below the piston is adapted to communicate with the space above the same, a passage leading through the main valve and piston into the chamber below the piston, a valve-stem wholly inclosed within the valve-casing and passing loosely through the passage, two controlling-valves on said valve-stems, one above the main valve and controlling the passage and the other in the chamber below the piston and controlling the port or ports therein, said valves adapted to carry the main valve in raising and lowering the valve-stem after a limited movement of said valve-stem operating the controlling-valves in the manner described to balance the main valve in advance of its opening and in its open positions independently of its connection with the valve-stem, said valve-stem and controlling-valves being also balanced by the fluid when the main valve is open, independently of the positions of the controlling-valves.

4. The combination with the valve-casing and seat-opening therein, of a main valve held to the seat-opening by the pressure of the fluid in the inlet side of the valve-casing, a balance-piston on said main valve working in a chamber in the outlet side of the casing and subjected to the pressure of the fluid upon its upper side when the main valve is open, a port or ports in the piston through which the chamber below the piston is adapted to communicate with the space above the same, a passage leading through the main valve and piston into the chamber below the same, a valve-stem wholly contained within the valve-casing and passing loosely through the passage, means for manually raising and lowering the valve-stem within the casing, two controlling-valves on the valve-stem, one above the main valve and one in the chamber below the piston, and adapted to carry the main valve after a limited movement of the valve-stem said limited movement operating the controlling-valves in the manner described to balance the main valve by the pressure of the fluid on opening the main valve and in any position into which it may be moved, and a friction device applied to the piston and adapted to maintain the main valve in position against any inherent tendency of the valve-stem and its actuating devices to displace said main valve, thereby disposing with the necessity of a locking device.

5. The combination with the valve-casing formed with inlet and outlet openings communicating with each other through a seat-opening, of a main valve seated upon said seat-opening by pressure from the inlet side of the casing, a balance-piston on said main valve working in a chamber formed in the outlet side of the casing and provided with

ports through which the chamber below the piston is adapted to communicate with the outlet side of the casing, a passage through said main valve and piston, a valve-stem wholly inclosed within the valve-casing and passing loosely through said passage, two controlling-valves carried by said valve-stem, one above the main valve and the other in the chamber below the piston and adapted to operate the main valve after a limited movement of the valve-stem adapted to operate the controlling-valves together and control the passage and ports in the manner described to balance the main valve by the pressure of the fluid, a rock-shaft journaled in the valve-casing and having actuating connection with the valve-stem and a friction device applied to the piston to hold the main valve and the valve-stem and its actuating means in their adjusted position independently of any locking device, the valve-stem and controlling-valves being balanced by the fluid when the main valve is open.

6. The combination with the main valve seated upon the seat-opening in the casing by the pressure of the fluid from the inlet side of the casing, a piston on said main valve working in a chamber formed in the outlet side of the casing and provided with a port or ports forming a passage for the fluid from the chamber below the piston into the outlet side of the casing, a valve-stem passing loosely through the main valve and piston and adapted to positively operate the main valve after a limited movement, two controlling-valves on said valve-stem coöperating with the passage and ports in the main valve and piston to balance the main valve by the operating of the valve-stem before lifting the main valve, a cap upon the valve-casing having an interior guide-bearing for the valve-stem, a shaft transversely journaled in said casing, operating connection between said shaft and valve-stem, two serrated disks upon said shaft, one loose and one fast thereon, an arm on said loose disk, clamping-jaws formed at the free end of the arm and a handle-bar adjustably clamped in said jaws.

7. The combination with the valve-casing and seat-opening therein, a main valve seated by the pressure of the fluid upon said opening, a piston on said main valve frictionally engaging in a chamber formed in the outlet side of the casing, a passage through the main valve and piston and ports through the piston through which the chamber below the piston is adapted to communicate with the inlet side and with the outlet side of the casing respectively, a valve-stem composed of two detachably-connected sections, the lower one passing loosely through the passage and carrying two controlling-valves adapted to coöperate with said passage and ports to balance the main

valve by a limited movement of the valve-stem in advance of lifting the main valve, a cap on the valve-casing provided with an interior guide-bearing for the upper end of the  
5 valve-stem, a transverse shaft in said cap operatively engaging with the upper section of the valve-stem to positively raise and lower the same and a handle-bar rotatively and lon-

gitudinally adjustably secured to said transverse shaft. 10

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

JOHN C. WILLS.

Witnesses:

OTTO F. BARTHEL,  
ADOLPH BARTHEL.