

No. 683,273.

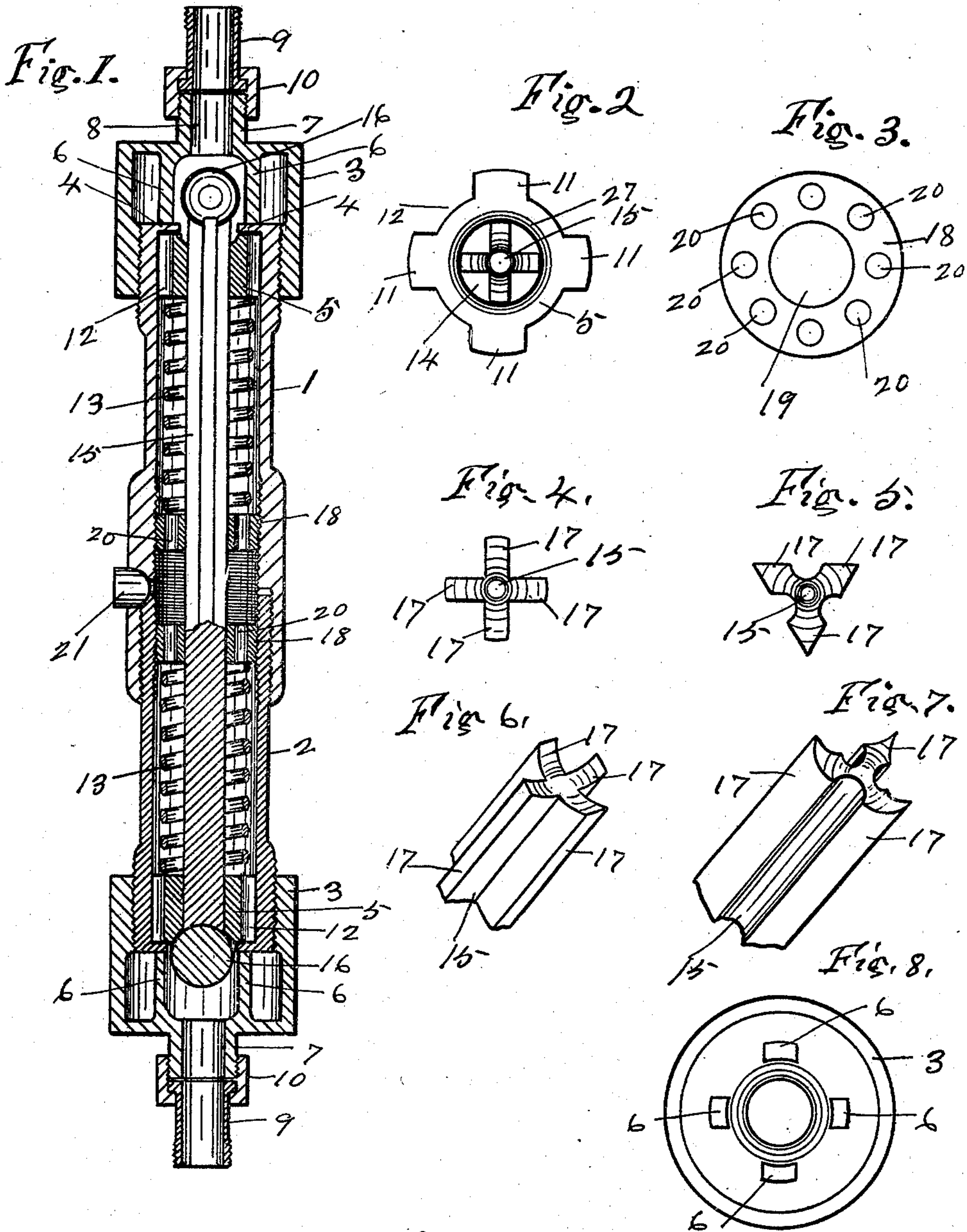
Patented Sept. 24, 1901.

S. P. GREY.  
AUTOMATIC CYLINDER COCK.

(Application filed Feb. 11, 1901.)

(No Model.)

2 Sheets—Sheet I.



WITNESSES:

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*Augusta Viberg.*

*Sylvester P. Grey* INVENTOR

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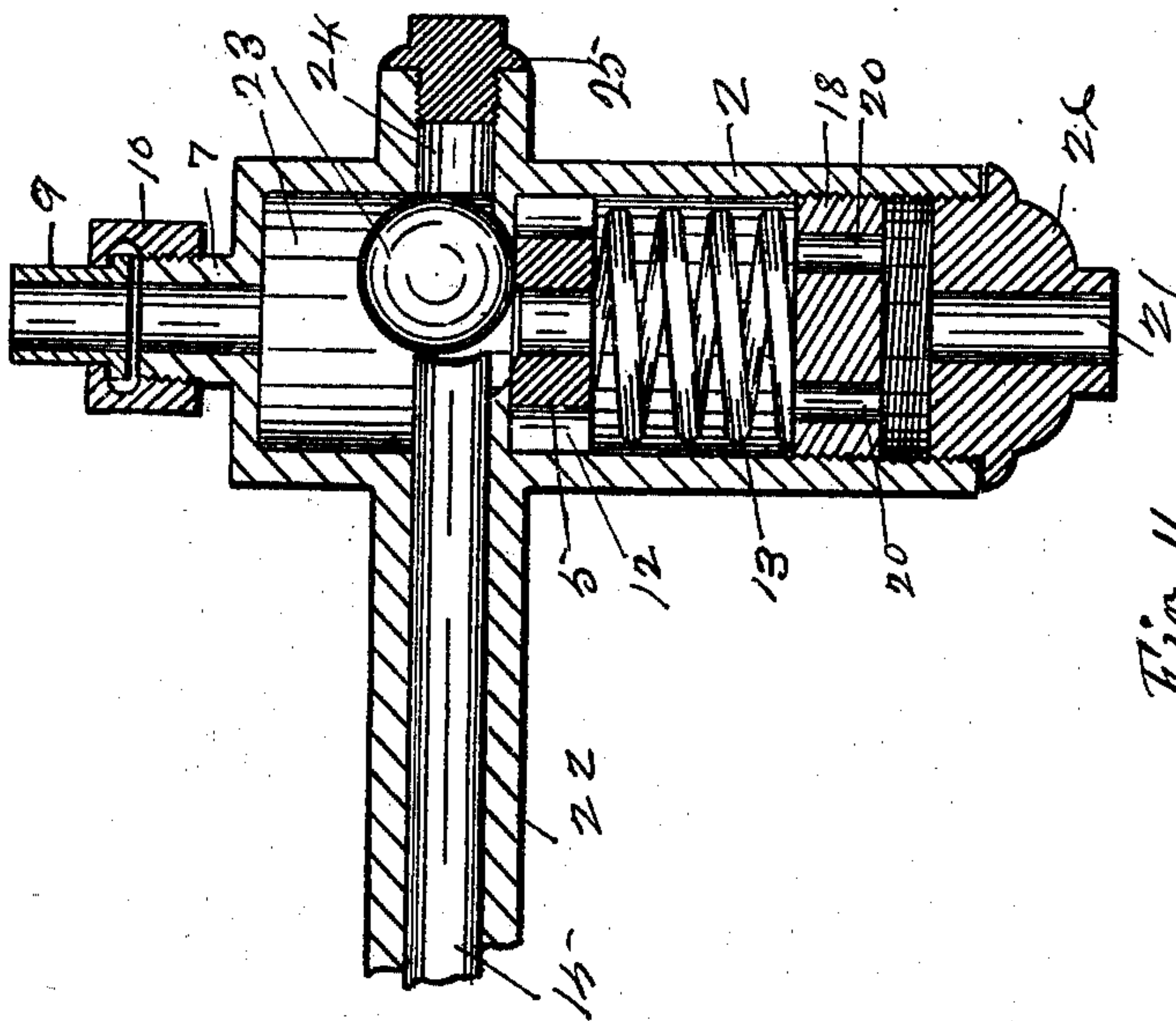


Fig. 9.

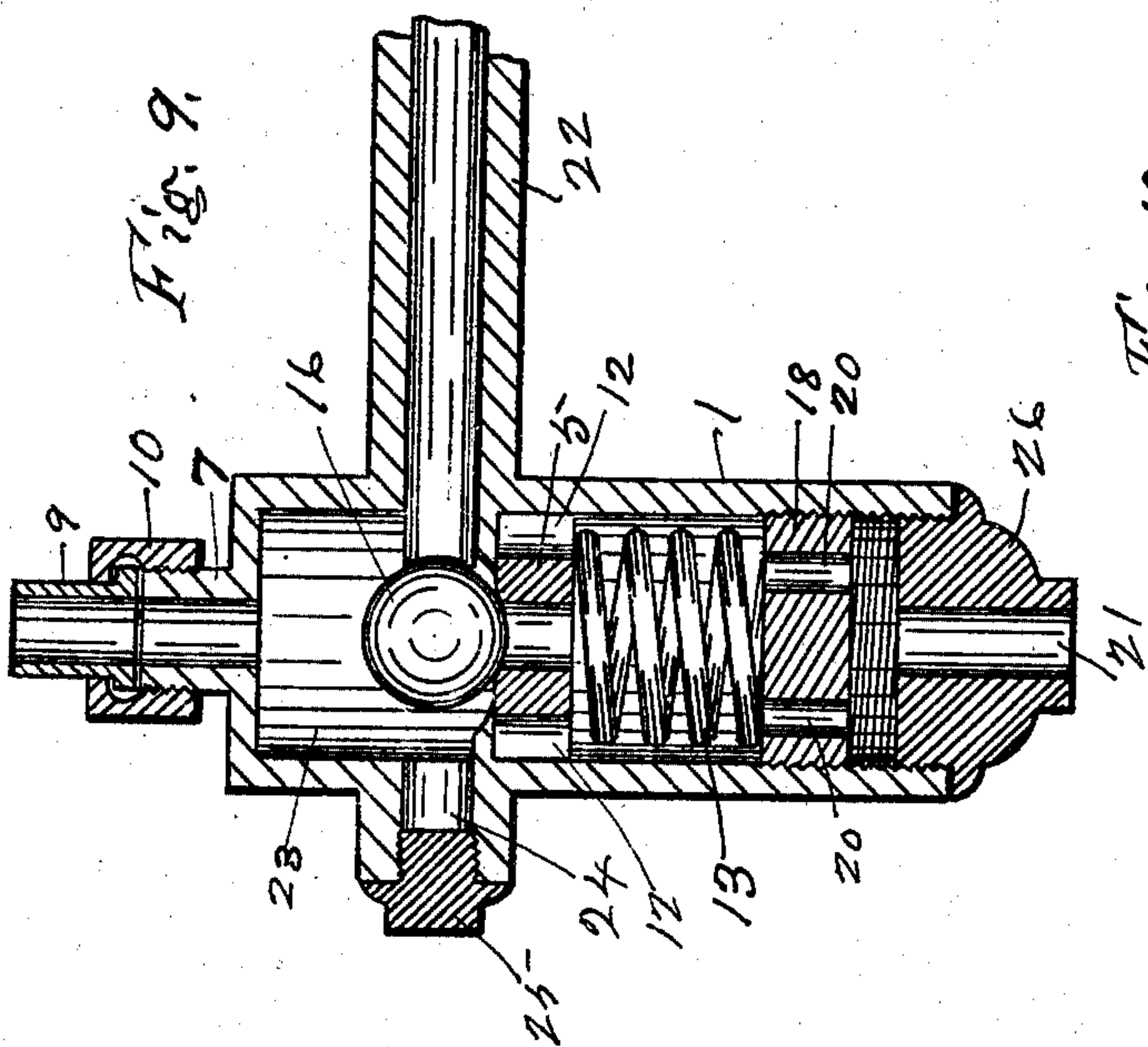
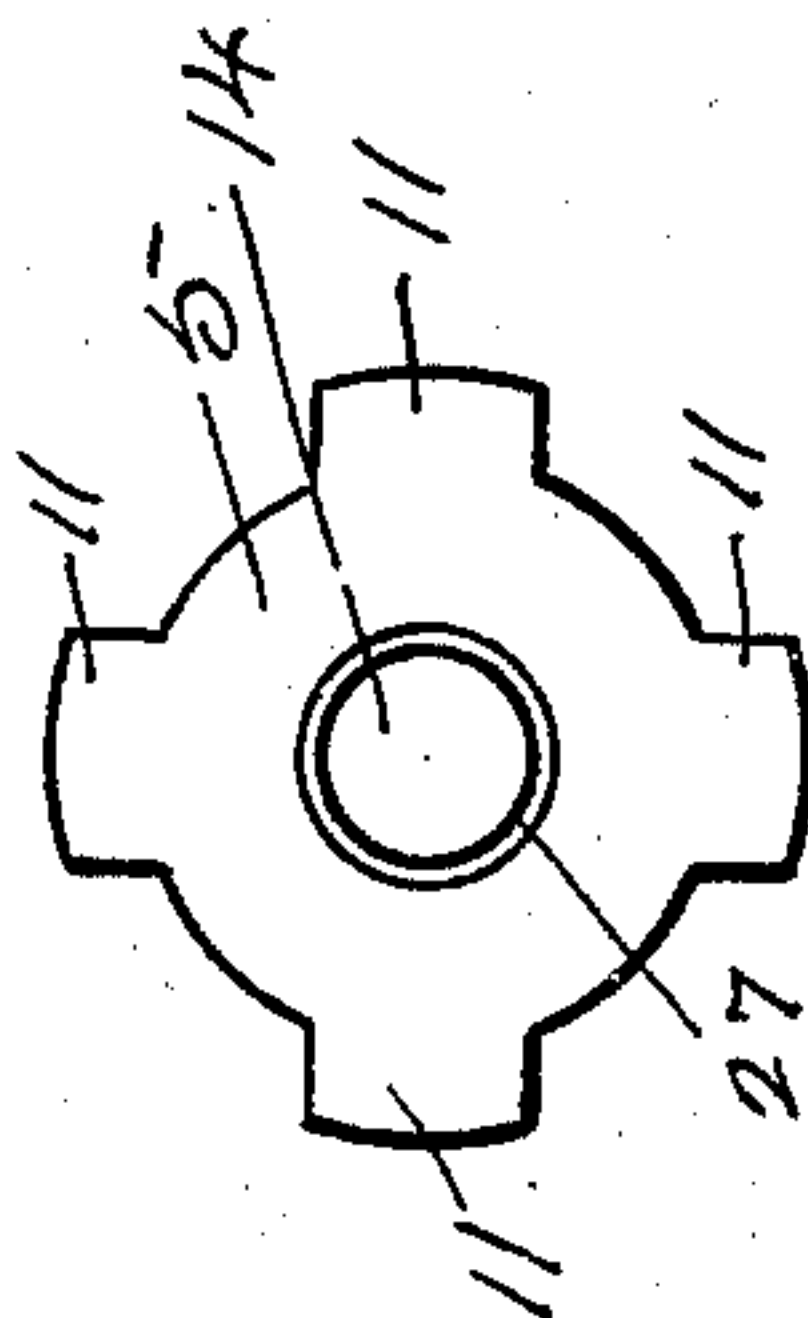
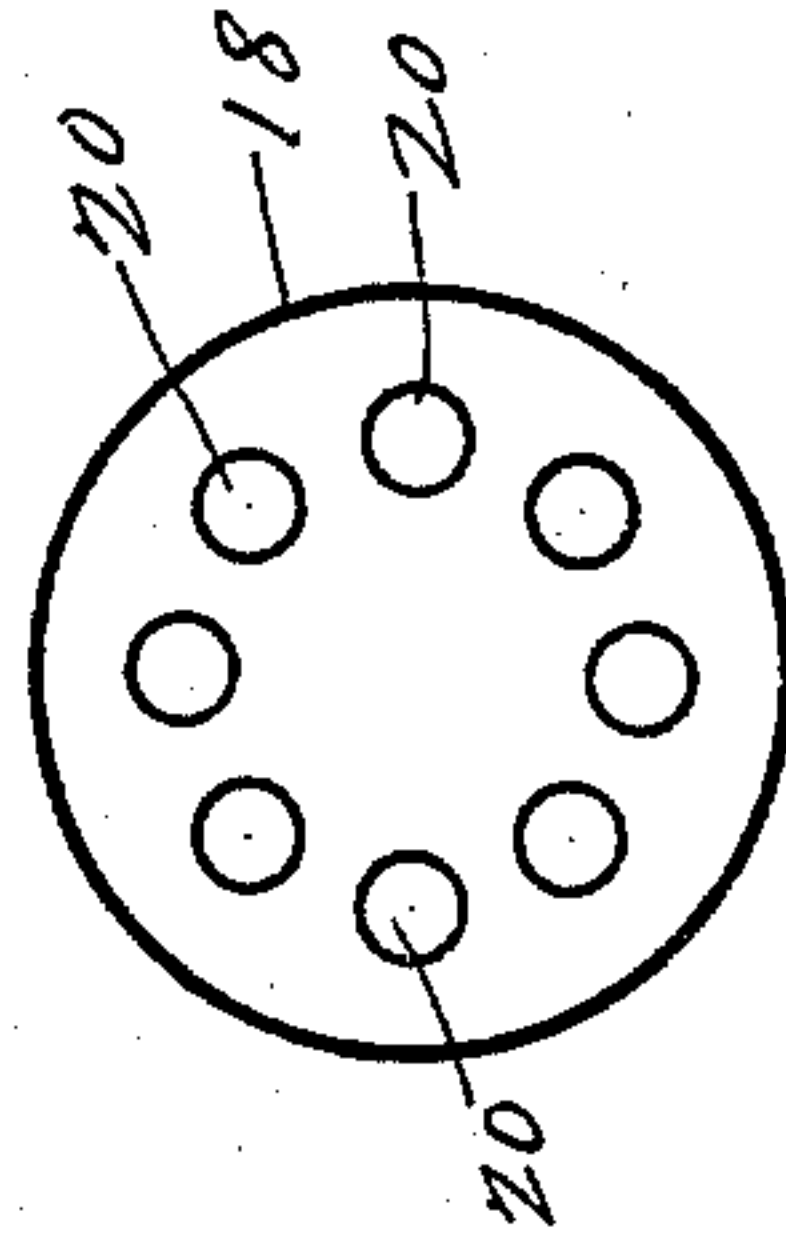


Fig. 10.



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# UNITED STATES PATENT OFFICE.

SYLVESTER P. GREY, OF FORT WAYNE, INDIANA.

## AUTOMATIC CYLINDER-COCK.

SPECIFICATION forming part of Letters Patent No. 683,273, dated September 24, 1901.

Application filed February 11, 1901. Serial No. 46,792. (No model.)

*To all whom it may concern:*

Be it known that I, SYLVESTER P. GREY, a citizen of the United States, residing at Fort Wayne, in the county of Allen, in the State of Indiana, have invented certain new and useful Improvements in Automatic Cylinder-Cocks; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, which form part of this specification.

My invention relates to improvements in automatic cylinder-cocks for steam-engines.

The object of my present invention is to provide an improved automatic cylinder-cock for steam-engines adapted to permit the water of condensation to freely escape at each stroke of the piston without any waste of steam in effecting the drainage of the cylinder.

My invention consists of a two-part casing or barrel united at its inner ends by a screw-threaded connection and provided upon its opposite ends with a detachable valve-chamber containing a ball-valve adapted to be seated by the normal steam-pressure upon a spring-pressed auxiliary relief-valve which resists the boiler-pressure, but yields to the excessive pressure of the water in the cylinder.

The novel feature of my improvement resides in the relative arrangement and coöperation of the main and auxiliary valves for securing a perfect automatic drainage of the cylinder.

In the accompanying drawings similar reference-numerals indicate like parts throughout the several views, in which—

Figure 1 is a longitudinal central section showing the relative arrangement of the operative parts with one of the ball-valves and a portion of the plunger in section. Fig. 2 is an end view of the auxiliary valve with the plunger mounted therein. Fig. 3 is a plan view of the nut by which the tension of the coil-spring supporting the auxiliary valve is regulated, showing the outlet-openings therein. Fig. 4 is an end view of the plunger. Fig. 5 is a similar view of a modified form of plunger. Fig. 6 is a perspective end view of that form of plunger shown in Fig. 4. Fig. 7 is a similar view of that form of plunger shown in

Fig. 5. Fig. 8 is a plan view of the inner end of the valve-casing, showing the studs or lugs for limiting its movement when placing it in position on the barrel. Fig. 9 is a modified form of my invention in which the barrel-sections are placed in parallel arrangement and united by an integral tubular connection, the auxiliary valves being in right-angular relation with the plunger. Fig. 10 is a plan view of the relief-valve, showing the valve-seat thereon. Fig. 11 is a plan view of the adjusting-nut for regulating the tension of the coil-springs which supports the auxiliary valves.

Referring now particularly to Fig. 1, the cylindrical casing or barrel containing the auxiliary valves consists of two parts 1 and 2, which are united at their adjacent ends by a screw-threaded connection or other proper manner. Each of said parts 1 and 2 has its outer end externally screw-threaded to receive an internally-screw-threaded valve-casing 3 and is also provided with an inturned annular flange 4, adapted to form a seat for the auxiliary valve 5, hereinafter described, and also adapted to limit the adjustment of the said valve-casing by contact with the studs or lugs 6, as shown. The said valve-casing 3 is also provided with an inlet steam-opening 8 and an externally-screw-threaded boss 7, which may be connected to the drain-cock at the ends of the cylinder (not shown) by means of a suitable elbow-pipe and any proper coupling—as, for example the pipe-joint 9 and the coupling-nut 10. Adjacent to the inner face of said flange 4 is arranged the said auxiliary valve 5, Fig. 2, having peripheral lugs 11, by means of which the said valve snugly fits within the said barrel and yet leaves a series of peripheral outlet-openings 12, which freely admits the water when the valve 5 is forced from its seat against the tension of the coil-spring 13, upon which the said valve is supported in position. The said valve 5 also has a central opening 14 to admit and snugly contain the corresponding end of the plunger 15 of any desired contour, and also has its upper face provided with an annular concave seat 27 about the said opening 14, adapted to receive the ball-valve 16, of rubber, metal, or other suitable material. The said plunger 15 may be constructed in an infinite variety of ways, but preferably has



a series of radial wings 17, as shown in Figs. 4 and 5, and has both ends made slightly concave, as shown in Figs. 6 and 7, to holdingly receive the said ball-valve 16 in forcing it from its seat on the said auxiliary valve 5.

The inner ends of the barrel portions 1 and 2 are internally screw-threaded and are each provided with an externally-threaded nut 18, having a central opening 19 to loosely contain the said plunger 15 and having a series of small circular openings 20, Figs. 1 and 3, adapted to freely admit the water to the central portion of the barrel, from whence it is discharged by gravity through the outlet 21 therein. Between the said nuts 18 and the said valves 5 are arranged the said respective coil-springs 13 of proper tension, which are coiled about the said plunger without touching the same and firmly support the said valves 5 upon their seats, respectively.

A modified form of my invention is shown in Fig. 9, in which the spring-pressed auxiliary valves are arranged at right angles to the plunger instead of in alinement therewith, though their operation and coöperation is the same as in the form shown in Fig. 1. In the said modified form the barrel-sections 1 and 2 are made identical in form and are placed in parallel arrangement and rigidly united by a horizontal tubular connecting-piece 22, in which the plunger 5 is snugly fitted. This plunger is preferably cylindrical and has its opposite concave ends extended into the valve-chamber 23 in coöperative relation with the said ball-valve 16. The chambers 23 have a lateral opening 24 in alinement with the opening in which the said plunger is mounted to permit the boring out thereof when the said connecting-piece 22 is cast integral with the said barrel-sections. These openings 24 are closed by a proper screw-plug 25. In this modified form the water-discharge opening 21 is arranged in the screw-plug 26, which closes the lower end of the said barrel-sections. This modified form is preferable when it is desirable to arrange the overflow directly beneath the ends of the cylinder.

The operation of my improvement thus described is obvious and, briefly stated, is as follows: When the steam is admitted to the valve-chamber 23 from one end of the piston-cylinder, it will force the corresponding ball-valve 16 to its seat, thereby forcing the other end of the plunger 15 forward and lifting the other ball-valve from its seat, whereby any water in the corresponding end of the cylinder can freely pass through the said opening 14 of the valve 5 between the wings of the plunger, Fig. 2, and thence to the discharge-opening 21. The operation of the ball-valve is indefinitely repeated, whereby a free drainage of each end of the piston-cylinder is alternately afforded. Should the cylinder from any cause become overcharged with water, the excessive pressure of the water at each stroke of the piston might injure the machinery un-

less it had a larger escape-opening. For this purpose I have provided the auxiliary or emergency valves 5, which are so adjusted by means of the nuts 18 and the springs 13 as to resist the normal pressure of the steam, but readily yield to the additional pressure of the water, thereby affording the additional openings 12 for the escape of the water when the said auxiliary valve is forced from its seat.

My improved cylinder-cock is thus reliably automatic in any emergency, is entirely independent of any interference by the engineer, and does not in its operation permit any appreciable waste of steam.

Obviously my improvement may be indefinitely varied in numerous details of construction without departing from the spirit of my invention, which consists of the described coöperative relation of the main and auxiliary or relief valves.

Having thus described my invention and the manner of employing the same, what I desire to secure by Letters Patent is—

1. A two-part valve casing or barrel provided at its opposite ends with a valve-chamber having inlet and outlet openings; a ball-valve mounted in said chamber and adapted to normally close said outlet-opening; an operating-plunger loosely mounted in said casing and adapted to open said valves as described; auxiliary valves seated as shown on the said valve-chamber in coöperative relation with the said ball-valves; and means for so supporting the said auxiliary valves upon their seat against the normal steam-pressure that they will open by the increased water-pressure thereon.

2. In an automatic cylinder-cock, a two-part barrel-casing; a pair of main ball-valves mounted in said casing and operated by the boiler-pressure; a pair of auxiliary or emergency valves in coöperative relation with the said main valves respectively and adapted to resist the normal steam-pressure, but adapted to be opened by the additional fluid-pressure from condensation; and means for yieldingly supporting the said auxiliary valves in position.

3. The combination in an automatic cylinder-cock of a two-part valve barrel or casing having at its opposite ends a valve-chamber for a ball-valve, and provided with a seat for the auxiliary valves; a pair of ball-valves operated by the steam-pressure; a pair of spring-pressed auxiliary valves seated on said valve-chamber in coöperative relation with the said ball-valves respectively, and adapted to be operated by the emergency fluid-pressure against the tension of said springs.

4. An automatic compound cylinder-cock having opposite relief-valves operated by the boiler-pressure in such a relation to each other that the closing of one will open the other, and only one of said valves can be closed at the same time, and provided with a pair of spring-pressed safety-valves nor-



mally closed, arranged in coöperative relation with the said relief-valves, and adapted to be opened by additional fluid-pressure.

5 An automatic cylinder-cock having a pair of oppositely-arranged relief-valves alternately opened by a single coacting plunger under boiler-pressure as shown, and a pair of safety-valves normally closed and in coöperative relation with the said respective  
10 relief-valves, and adapted to be opened by excessive fluid-pressure.

6. The combination in an automatic cylinder-cock of a two-part valve barrel or casing provided upon its opposite ends with main-  
15 valve chambers having inlet and outlet openings; ball-valves mounted in said chambers

and adapted to be alternately operated by an actuating-plunger under boiler-pressure; auxiliary valves mounted in said barrel in coöperative relation with said main valves 20 and adapted to be actuated only by the additional water-pressure; and means for normally supporting the said auxiliary valves in position against the boiler-pressure.

Signed by me at Fort Wayne, county of 25 Allen, State of Indiana, this 6th day of February, A. D. 1901.

SYLVESTER P. GREY.

Witnesses:

ADELAIDE KEARNS,  
AUGUSTA VIBERG.