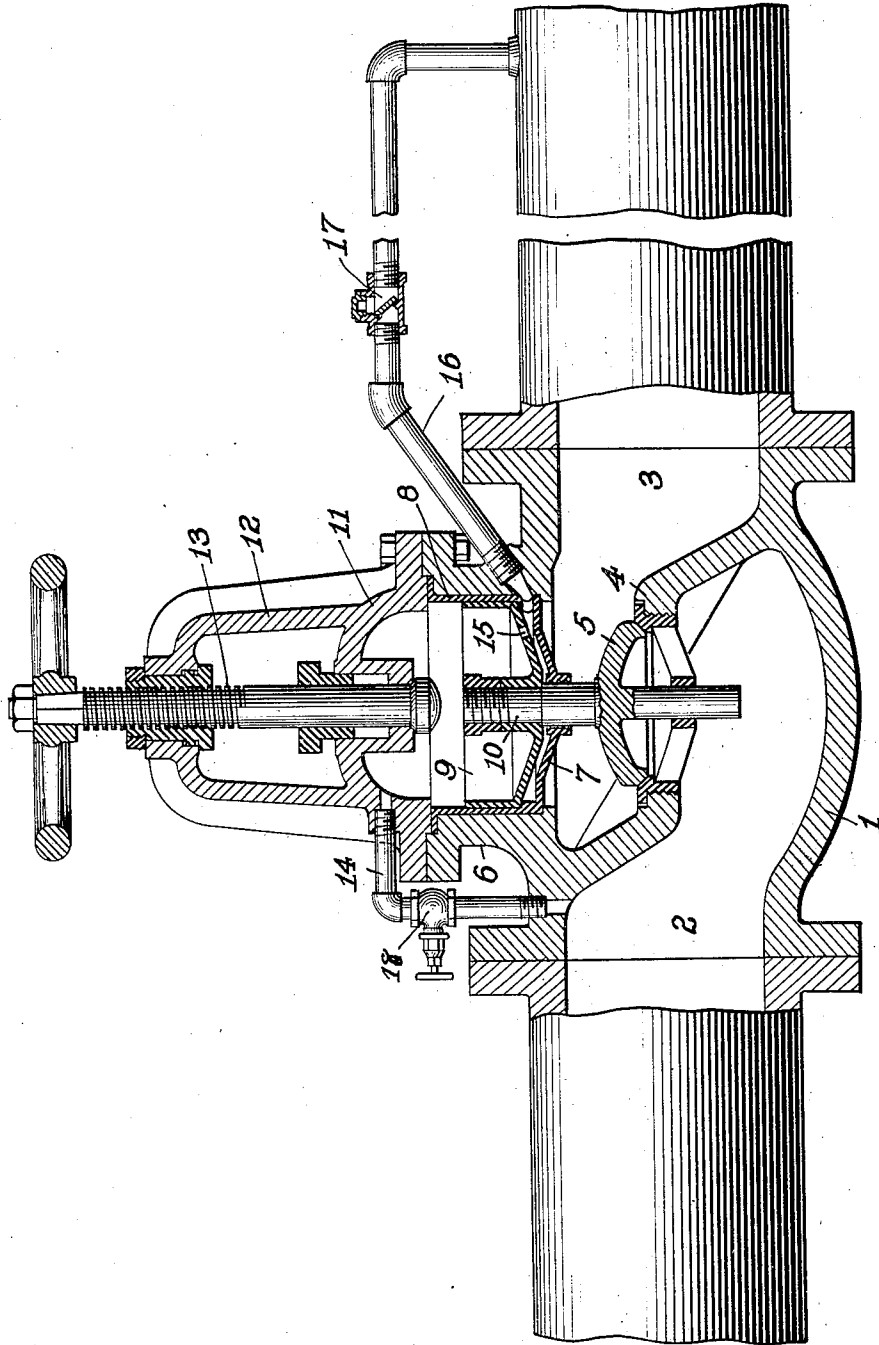


C. E. GOLDEN.
 NON-RETURN VALVE MECHANISM.
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NON-RETURN-VALVE MECHANISM.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, CHARLES E. GOLDEN, residing at Crafton, in the county of Allegheny and State of Pennsylvania, a citizen of the United States, have invented or discovered certain new and useful Improvements in Non-Return-Valve Mechanism, of which improvements the following is a specification.

The invention described herein relates to certain improvements in valve mechanism, generally known as "non-return" valves, and adapted to automatically close in case of the breakage of a steam pipe to prevent the escape of steam from the boiler or battery of boilers.

The invention is hereinafter more fully described and claimed.

In the accompanying drawing forming a part of this specification is shown a sectional elevation of my improved valve mechanism, and the manner of connecting the same to a boiler system.

In the practice of my invention the shell or case 1 of the valve is divided into inlet and outlet chambers 2 and 3 by a diaphragm 4 through which is formed an opening controlled by a valve 5 preferably arranged to seat in opposition to the direction of flow of steam from the boiler or heater. In the upper portion of the case or shell is formed a cylinder 6, the lower head of the cylinder being formed by the end wall 7 of a shell 8, fitting within the cylinder and forming the working chamber for the piston 9. This piston is secured as shown to the stem 10 of the valve. The head of the cylinder 6 is formed by a cap piece 11 bolted to the flange of the cylinder 6, and having formed integral therewith a yoke 12, through which passes a threaded stem 13 extending down into the cylinder and adapted to bear against the stem 10 and force the piston and valve downward until the former is tightly seated. This hand operated means for closing the valve is designed to be used to prevent an accidental opening of the valve when the latter has been closed automatically as hereinafter described. The cylinder 6 is connected at a point above the upper limit of movement of the piston, by a pipe 14 to the boiler or its connections, at a point between the boiler and the valve mechanism. Preferably the pipe is connected to the inlet chamber 2 of the valve case or shell. It will

be observed that the piston 9 is of greater area than the valve 5, so that when these two parts are subjected to the same pressure, *i. e.*, boiler pressure acting on top of the piston and on the under side of the valve, the latter will be forced to its seat. In order that the valve may be opened and remain open provision is made for establishing an equilibrium of pressure on both sides of the piston by any suitable means known in the art as by a small port 15 through the piston so that steam will flow to the underside of the piston. As soon as pressures on opposite sides of the piston have equalized, the pressure on the underside of the valve, will force the same to open position where it will be held as long as pressure on the opposite sides of the piston remain equal. The cylinder is connected at its lower end or at a point below the lower limit of travel of the piston, by a pipe 16 to the steam line at a point beyond the main valve mechanism. This pipe and the port leading from it into the cylinder should be considerably larger than the port 15 through the piston, so that in case of a breakage of the steam line beyond the main valve mechanism, there will be a drop of pressure below the piston that the steam pressure above the piston will force the latter and the valve 5 downward against the pressure exerted on the underside of the valve by the steam.

When the valve mechanism is placed between a boiler and the header to which a battery of boilers is connected, provision should be made to prevent the accidental opening of the valve 5 by pressure on the underside. This can be effected by the introduction of a check valve in the pipe 16 leading from the steam line. This valve is constructed to open with a flow of steam from the cylinder 6, but to prevent any flow in the opposite direction. So that no equilibrium of pressure could be established so long as the pressure above the piston remains greater than the pressure against the underside of the valve 5.

It will be understood that when the "non-return" valve mechanism is placed in the connection a boiler and the header to which a battery of boilers is connected, the valve 5 will close not only in case of a drop of pressure in the boiler or its connections to the valve mechanism, but also in case of a drop in pressure in the steam line. In the first

case the closure is effected by pressure from the header acting on top of the valve 5, and in the second instance by the pressure on the upper side of the piston exceeding that on the lower side thereof unless a check valve or other suitable means are employed, pressure from the steam line might flow back through the pipe 16, after valve 5 has closed by reason of a drop of pressure in the boiler, and acting on the underside of the piston, open the valve 5 allowing steam to flow into the boiler in which the break occurred. When the valve 5 has been closed by the stem 13, or otherwise, it will be held in such position by pressure on the piston 9, there being no pressure directly on the under side of the piston, the lower end of the cylinder being in free communication with the steam line. The valve 5 may be opened under such conditions by closing the valve 18 in the bypass 14, whereupon the pressure on the under side of the valve 5 will raise the latter. After the valve 5 has been opened the valve 18 should be again opened.

I claim herein as my invention:

1. In a non-return valve mechanism the combination of a valve movable to closed position against the normal direction of flow, a cylinder, a piston therein connected to said valve a connection from the supply side of the valve mechanism to the upper end of the cylinder, a direct connection from the lower end of the cylinder to the line of pipe extending from the outlet side of the valve mechanism and normally open to permit a free flow of pressure from the lower end of the cylinder to the steam line, and means within the cylinder adapted to per-

mit an equalization of pressure on opposite sides of the piston.

2. In a non-return valve mechanism the combination of a valve movable to closed position against the normal direction of flow, a cylinder, a piston therein connected to said valve a connection from the supply side of the valve mechanism to the upper end of the cylinder, a direct connection from the lower end of the cylinder to the line of pipe extending from the outlet side of the valve mechanism, a check valve in such connection adapted to prevent a back flow of fluid pressure into the lower end of the cylinder, and means within the cylinder adapted to permit an equalization of pressure on opposite sides of the piston.

3. In a non-return valve mechanism the combination of a valve movable to closed position against the normal directions of flow, a cylinder, a piston therein connected to said valve a connection from the supply side of the valve mechanism to the upper end of the cylinder a valve in such connection, a direct connection from the lower end of the cylinder to the line of pipe extending from the outlet side of the valve mechanism, a port or passage materially smaller than the outlet from the lower end of the cylinder for the equalization of pressure on both sides of the piston.

In testimony whereof, I have hereunto set my hand.

CHARLES E. GOLDEN.

Witnesses:

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CHARLES BARNETT.