

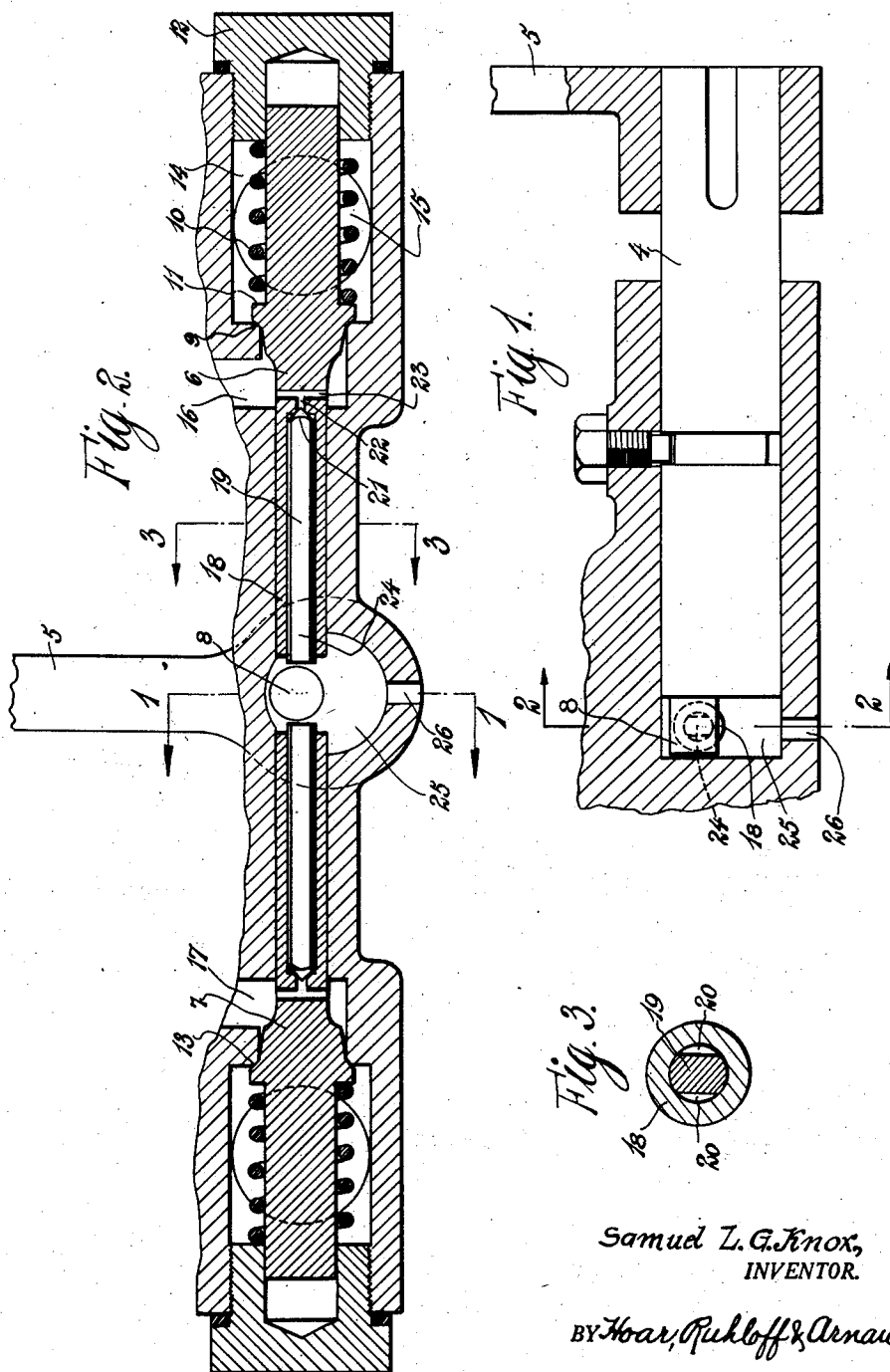
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COMBINED THROTTLE VALVE AND RELIEF VALVE

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COMBINED THROTTLE VALVE AND RELIEF VALVE

Original application filed August 3, 1927, Serial No. 210,261. Divided and this application filed June 25, 1928. Serial No. 288,151.

This application is a division of my co-pending application, Serial No. 210,261, filed August 3, 1927.

My invention relates to new and useful improvements in combined throttle and relief valves, particularly in double throttle valves adapted to introduce fluid pressure selectively into one of two fluid pressure chests.

In connection with the invention shown and described in the co-pending application, it is important that when steam is admitted to one steam chest, there should be substantially no pressure in the other steam chest, and vice versa. Doubtless a similar need often occurs in other types of fluid pressure engine. It is the principal object of my present invention to attain this end by the special construction of throttle valves shown and described herein.

Further objects and advantages of my invention will be readily evident, as the description progresses.

The invention consists in the novel parts, and in the combinations and arrangements thereof, which are defined in the appended claims, and of which one embodiment is exemplified in the accompanying drawings, which are hereinafter particularly described and explained.

Throughout the description, the same reference number is applied to the same member or to similar members.

Figure 1 is an elevation, partly in section taken on line 1—1 of Figure 2, of a part of the casting containing the steam chests of a steam engine, which part contains the rocking shaft whereby the motion of the throttle handle is conveyed to the throttle valves.

Figure 2 is a vertical section of a pair of throttle valves. It is taken at right angles to Figure 1, on the line 2—2.

Figure 3 is a vertical section, on an enlarged scale, taken on line 3—3 of Figure 2.

Referring to the drawings, it will be seen that 4 is a shaft, rotatable by throttle handle 5. This shaft and handle control the alternative opening of either valve 6 or valve 7, by the motion of crank pin 8 situated on the end of shaft 4. Valve 6 is normally biased to seat in valve seat 9 by the pressure

of spring 10 exerted against shoulder 11 of valve 6. Nut 12 is provided for the purpose of affording access to the mechanism. Spring 11 bears against this nut. An identically similar arrangement normally biases valve 7 against its seat 13.

Steam from a source (not shown) enters the space 14 through the pipe 15. When valve 6 is opened this steam then passes into passage 16 and thence to one of the two steam chests (not shown) of the engine in question. This passage and its steam chest will be referred to as "a chamber" in the claims.

Similarly the opening of valve 7 admits steam through passage 17 to the other steam chest of the engine.

The valve stem 18 of throttle valve 6 has a longitudinal cylindrical bore adapted to receive the needle 19. This needle is a rod of cylindrical shape, flattened at its sides to allow the passage of steam through the spaces 20. One end 21 of the needle is conical, and is adapted to close a small opening 22 in the valve stem. Opening 22 connects with an aperture 23, which pierces that part of the valve stem lying in passage 16. The other end 24 of the needle 19 projects beyond the end of the valve stem 18, so that the crank pin 8, when rotated toward the valve 6 will come in contact only with this end 24 of the needle 19.

A similar needle and its associated parts are provided in the stem of valve 7. The crank pin 8 moves in an open space 25 which communicates with the open air through opening 26, and thereby serves as a pressure sink.

Passage 22 serves as a relief valve to passage 16, as any pressure in passage 16 will tend to escape through passage 22 at all times except when passage 22 is forcibly closed by the conical end 21 of needle 19.

When handle 5 is rotated to the right in Figure 2, crank pin 8 will bear on the end 24 of needle 19, thus closing passage 22; and then forcing the whole valve stem to the right, thus opening throttle valve 6. When the handle 5 is rotated to the left a similar opening of valve 7 and closing of its relief valve is effected. As soon as the pressure of

crank pin 8 on needle 19 is removed, spring 10 closes throttle valve 6, and any accumulated pressure and condensation in passage 16 automatically forces the needle 19 to the left thus permitting the escape of such pressure and condensation through the aperture 23, the passage 22, the spaces 20, space 25 and opening 26.

As the handle 5 is moved from the right to the left the order of these operations is, the closing of the right hand throttle valve, the opening of the right hand relief valve, the closing of the left hand relief valve and the opening of the left hand throttle valve; the reverse order of operation takes place when the handle is moved from the left to the right.

This arrangement permits any steam and condensation in passage 16 and 17 to escape to the atmosphere whenever their respective throttle valves 6 and 7 are closed, and therefore prevents any building up of pressure in that steam chest which is not being operated.

Having now particularly described and illustrated one form of my improved valve, I wish to be understood as not limiting myself to the particular form exemplified, but rather as availing myself of all equivalents.

I claim:

1. In a fluid-pressure engine; fluid chambers; throttle valves for controlling admission of fluid to said chambers; relief valves, contained within the throttle valves for relieving the pressure from said chambers; and means for opening only one of said throttle valves at a time and for closing the relief valve contained within that throttle valve which is being opened.

2. In a fluid-pressure engine: fluid chambers; two spring-biased throttle valves for controlling the admission of fluid to said fluid chambers; a valve stem for each throttle valve; a needle valve associated with each valve stem for relieving fluid pressure in the corresponding fluid chamber, the stems for said needle valves projecting beyond the ends of the valve stems; a seat for each needle valve within the corresponding valvestem; a control member disposed in operative relation to the valve stems, and, when moved in either direction, coacting with the stem of one of the needle valves to force the same against its seat and to move the throttle valve against its spring, thereby first closing the needle valve and then opening the throttle valve.

3. In a fluid-pressure engine: fluid chambers; throttle valves opening in opposite directions for controlling admission of fluid to said fluid chambers, said throttle valves having valve stems, projecting towards each other, and means reciprocable between the ends of said valve stems, for actuating said valve stems so that only one of the throttle valves is opened at a time.

4. In a fluid-pressure engine: fluid chambers; throttle valves opening in opposite directions for controlling admission of fluid to said fluid chambers, said throttle valves having valve stems projecting towards each other; relief valves contained within the throttle valves for relieving the pressure from said chambers; and means reciprocable between the ends of said valve stems, for opening only one of said throttle valves at a time and for closing the relief valve contained within that throttle valve which is being opened.

In testimony whereof I affix my signature.

SAMUEL L. G. KNOX.