March 8, 1927. 1,620,315

W. E. BAKER

VALVE

Filed Nov. 21, 1925

Fig. 1

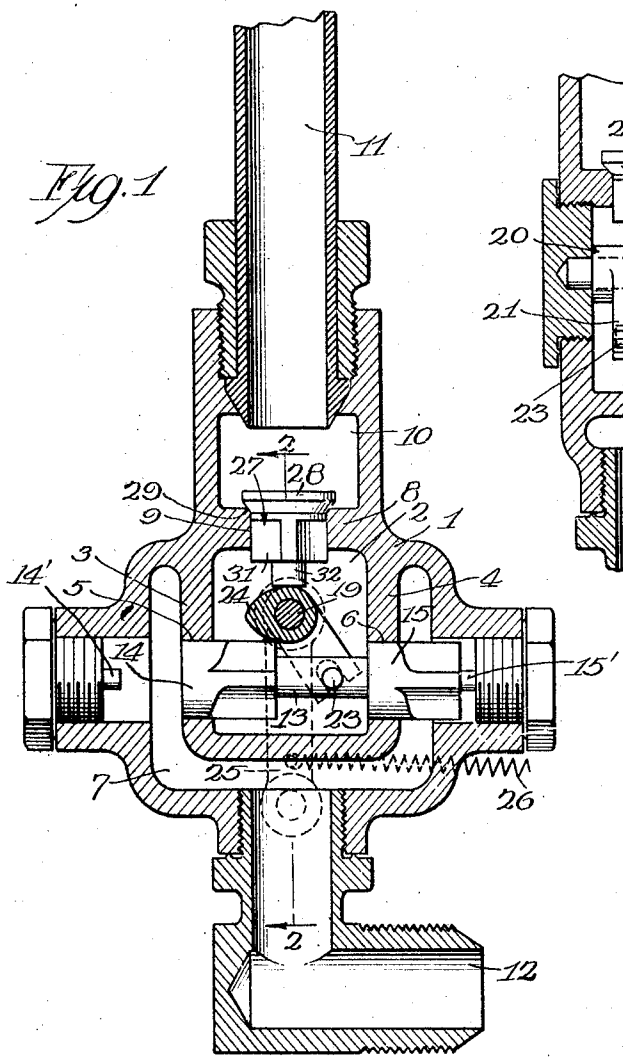


Fig. 2

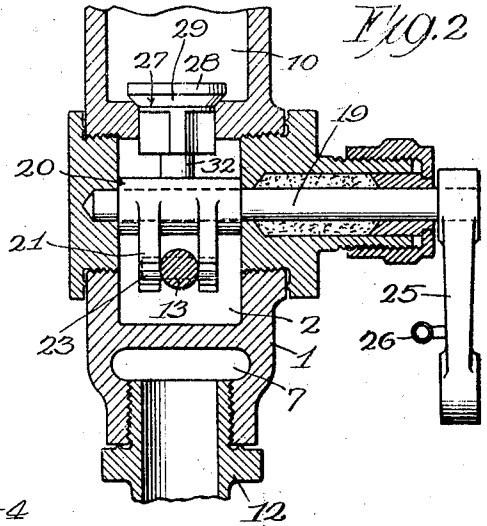


Fig. 5

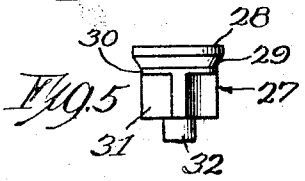


Fig. 6

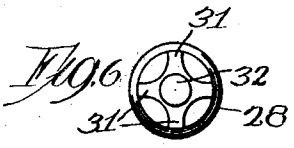


Fig. 7

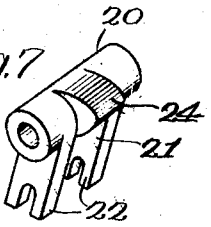


Fig. 3

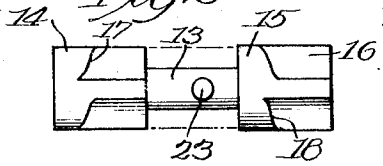
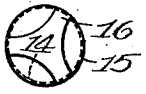


Fig. 4



Inventor
William E. Baker
By [illegible] Atty.

Patented Mar. 8, 1927. 1,620,315

UNITED STATES PATENT OFFICE.

WILLIAM E. BAKER, OF CLEVELAND, OHIO, ASSIGNOR TO WILLIAM EDGAR BAKER AND GEORGE ALTON FRANTZ, TRUSTEES OF THE WEB ENGINEERING COMPANY, OF CLEVELAND, OHIO.

VALVE.

Application filed November 21, 1925. Serial No. 70,472.

My invention relates to a novel and improved throttle valve and more particularly to one designed for use to control the passage of steam from a generator to an engine. It is, of course, understood that my invention may be employed in any other situation where it is found to be applicable, and while I shall, for brevity, use the term steam throughout the specification, it is understood that steam is merely used as exemplary of any fluid under pressure.

It is the principal object of my invention to provide a throttle valve which shall permit perfect control of the flow of steam therethrough and without the objectionable friction which is normally present in valves. This friction is usually caused because of the fact that the valve must be operated in one direction against the pressure of the steam. I have devised a throttle valve wherein the pressure of the steam is overcome through a cam action which takes very little pressure on the operating lever and is held closed by steam pressure when it is once closed.

A further object of my invention is to provide an arrangement whereby the flow of steam may be easily and accurately regulated and yet without the danger of leakage, and whereby the steam shall be automatically shut off upon breakage of the valve operating means.

Further objects of my invention will become apparent to those skilled in the art during the progress of the description, when read in connection with the accompanying drawing in which;

Fig. 1 is a longitudinal section taken through a selected embodiment of my invention.

Fig. 2 is a section on the line 2—2 of Fig. 1.

Fig. 3 is a view of the throttle valve detached from the casing.

Fig. 4 is an end view of the throttle valve taken from the right of Fig. 3.

Fig. 5 is an elevation of the auxiliary valve detached from the casing.

Fig. 6 is a bottom view of the valve shown in Fig. 5.

Fig. 7 is a perspective view of the operating member by which the two valves are moved in unison.

Referring now to the drawings in detail I have shown my invention as embodied in a casing 1 provided with a chamber 2 of general rectangular form and having the two oppositely disposed walls 3 and 4. These walls are apertured at 5 and 6 respectively, these apertures forming communicating passageways with the outside chamber 7. One of the other four walls 8 is apertured at 9 to form a communicating passageway between the chamber 2 and the chamber 10. The chamber 10 is adapted to receive steam which may pass thereto through a suitable pipe 11 connected with any suitable means to the valve casing. Steam is adapted to pass from the chamber 7 through the connection 12 to an engine or other device.

The throttle valve is disposed in the apertures 5 and 6 which form a double outlet for the steam from the chamber 2. The valve is what is known as the balanced type and comprises a member which is shown in Figs. 1 and 3 as consisting of a central reduced portion 13 terminating in heads 14 and 15, these heads being received within the apertures 5 and 6 respectively. Each head is provided with a cylindrical portion adapted to fit tightly within the aperture in which it reciprocates in order to close the aperture, and at one side of the cylindrical portion each head is provided with a portion of special construction comprising radially disposed ribs 16, the outer surface of each rib forming a continuation of the surface of the cylindrical portion. The ribs are joined to the cylindrical portion by oppositely disposed spiral surfaces 17 and 18. By this means the pressure of steam on the valve is balanced or neutralized. That is, the pressure is exercised in both directions instead of in one direction only as in most valves. This type of balanced valve is broadly old, but its use in the application to which I have put it I believe to be new. I prefer to modify the usual type of balanced valve by making one head slightly larger than the other, and by referring to Figs. 3 and 4 it will be seen that the head 15 is made of slightly greater diameter than the head 14. That is, the valve is not exactly balanced, but there is always a tendency for the pressure of steam in the chamber 2 to move the valve towards the right, as viewed in Fig. 1. This will result in closing of the valve and therefore this arrangement provides a safety device which will insure closing of the valve upon breakage of any of the operating parts which may be used to open the valve.

The throttle valve is operated by means of a shaft 19 disposed transversely of the chamber 2 and above the valve. Secured to the shaft in any suitable manner is the operating member 20 comprising a pair of depending arms 21 terminating in forked ends 22 which receive the transverse pin 23 on the reduced portion 13 of the valve. The operating member also comprises a cam 24 for a purpose which will presently appear. Secured to the outer end of the shaft 19 is the lever 25 by which the shaft and consequently the throttle valve may be operated. This lever may be operated through any suitable connection, depending upon the type of device in which it is used. For example, if used in a vehicle, the lever 25 may be connected to a foot pedal. Movement of the valve is limited by suitable stops 14′ and 15′.

The throttle valve is shown closed in Fig. 1 and obviously in order to open the same the lever 25 would be rotated in a clockwise direction as viewed in that figure. This rotation would cause movement of the throttle valve to the left, during which movement whatever pressure of steam there may be in the chamber 2 will not offer much resistance. The valve 27 is lifted thereby equalizing pressure in the chamber 2 with chamber 10 and permitting the throttle valve to control the flow of steam. Therefore, the movement can be made without exerting a great deal of force and without friction, such as is bound to occur when the valve must be moved against a high pressure. In order to normally maintain the valve closed, it may be found desirable to employ resilient means tending to rotate the lever 25 in a counter-clockwise direction, this means being exemplified by the spring 26, which may be secured to the lever and also to any fixed part of the device upon which the valve is employed. If either the lever 25 or spring 26 should break, the valve will automatically close because of the slightly greater pressure which is exerted upon the head 15. This difference in pressure is so slight that the valve still retains substantially all the advantages of a balanced valve and I shall continue to refer to it as a substantially balanced valve and shall so claim it. The construction retains all the advantages of the balanced valve with the added advantage of the safety feature described above.

While my invention may be operated when constructed in the manner described above, I prefer to employ an auxiliary valve 27, which as shown in Figs. 1, 2, 5 and 6 comprises a combination poppet and piston valve. This valve comprises the head 28 provided with the conical surface 29 adapted to contact with a correspondingly shaped surface in the aperture 9, as plainly shown in Figs. 1 and 2. Beneath the surface 29 is a cylindrical surface 30 which has a close fit with a corresponding surface in the aperture 9. Beneath the surface 30 are a plurality of radially extending ribs 31 whereby when the valve is lifted sufficiently in the aperture 9 steam may pass between the chambers 2 and 10.

The valve 27 is usually held in position by means of the pressure of steam entering the chamber 10. In order to lift the valve from its seat I provide it with the stem 32 which is adapted to contact with the cam 24, whereby upon rotation of the shaft 19 in a clockwise direction, as viewed in Fig. 1, the cam will gradually lift the valve and ultimately permit steam to pass from the chamber 10 to the chamber 2. When the valve 27 is lifted to a sufficient extent to permit passage of steam through the aperture 9, it then becomes a floating valve because of the fact that the pressure of the steam is substantially the same on both sides of the valve. Of course, the valve will still rest against the cam 24 because of its weight, but this weight is negligible and not sufficient to in any way affect the operation of the throttle valve.

In operation the two valves work in unison. As the shaft 19 is rotated in a clockwise direction, as viewed in Fig. 1, the throttle valve will be gradually moved to an open position. Before it is opened at all, however, the valve 27 has been opened to permit steam to pass into the chamber 2. It is important that the auxiliary valve 27 should open first, because if the throttle valve were open first then when the auxiliary valve is opened the steam would go through the aperture 9 with such force as to injure the valve in the manner known in the art as "wire drawing". This action is minimized by the combination poppet and piston valve used for the auxiliary valve 27 and is still further minimized by the arrangement just described whereby the steam passes from the chamber 10 to the chamber 2 before the throttle valve is opened. Obviously the valve 27 is not opened until the cylindrical surface 30 is disengaged from the corresponding surface in the aperture 9. Then, as stated above, the pressure on the two sides of the valve is substantially equal so that there is very little tendency for the valve to close and therefore there is no pressure of steam to be overcome by rotation of the shaft 19. Continued rotation of the shaft 19 will obviously open the throttle valve and the amount of opening may be varied as desired. As stated above, the throttle valve is balanced for all practical purposes, but a slightly unbalanced condition is introduced by means of the difference in diameter of the heads in order to provide a safety arrangement.

From the above it will be apparent that I have achieved a novel and improved throttle

valve wherein the amount of steam passing therethrough may be controlled effectively. By the arrangement of throttle valve and auxiliary valve leakage is effectively prevented and wire drawing is reduced to a minimum. At the same time a valve is achieved which may be very readily operated as by the lever 25 and against a spring. This arrangement is a preferable one particularly when a throttle valve is designed for use in a vehicle where a foot pedal is desired to be used. At the same time the valve is automatically closed if the operative mechanism breaks.

I am aware that changes in the form, construction and arrangement of parts may be made without departing from the spirit and without sacrificing the advantages of the invention and I consider myself entitled to make all such changes as fairly fall within the scope of the following claims.

I claim:

1. In a device of the class described, a valve casing having a chamber therein, said chamber having passages forming an inlet and a double outlet, a substantially balanced valve controlling one of said passages and means acting in unison with said valve for controlling another of said passages.

2. In a device of the class described, a valve casing having a chamber therein, said chamber having passages forming an inlet and a double outlet, a substantially balanced valve controlling two of said passages, and an auxiliary valve operated by the first-named valve and controlling the other of said passages.

3. In a device of the class described, a valve casing having a chamber therein, said chamber having passages forming an inlet and a double outlet, a substantially balanced valve controlling two of said passages, an auxiliary valve controlling the other of said passages, and means to operate said valves in unison.

4. In a device of the class described, a valve casing having a chamber therein, said chamber having passages forming an inlet and an outlet, a substantially balanced valve controlling one of said passages, an auxiliary valve controlling the other of said passages, means to operate said valves in unison in one direction, and a spring normally holding said operating means in position wherein both of said valves are closed.

5. In a device of the class described, a casing having a chamber therein, said chamber having an inlet and a double outlet for the passage of steam thereinto and therefrom, a substantially balanced valve controlling said outlets, and an auxiliary valve controlling said inlet and normally retained in closed position by the pressure of steam.

6. In a device of the class described, a casing having a chamber therein, said chamber having an inlet and a double outlet for the passage of steam thereinto and therefrom, a substantially balanced valve controlling said outlets, an auxiliary valve controlling said inlet and normally retained in closed position by the pressure of steam, and means to operate said valves in unison.

7. In a device of the class described, a casing having a chamber therein, said chamber having an inlet and an outlet for the passage of steam thereinto and therefrom, a substantially balanced valve controlling said outlet, an auxiliary valve controlling said inlet and normally retained in closed position by the pressure of steam, means to operate said valves in unison in one direction, and a spring normally holding said operating means in position wherein both of said valves are closed.

8. In a device of the class described, a casing having a chamber therein, said chamber having an inlet for the passage of steam thereinto and having a double outlet for the passage of steam therefrom, a substantially balanced valve controlling the passage of steam through said double outlet and a valve acting in unison with said balanced valve to control said inlet.

9. In a device of the class described, a casing having a chamber therein, said chamber having an inlet for the passage of steam thereinto and having a double outlet for the passage of steam therefrom, a substantially balanced valve controlling the passage of steam through said double outlet, and an auxiliary valve operated by the first-named valve and controlling the passage of steam through said inlet.

10. In a device of the class described, a casing having a chamber therein, said chamber having an inlet for the passage of steam thereinto and having a double outlet for the passage of steam therefrom, a substantially balanced valve controlling the passage of steam through said double outlet, an auxiliary valve controlling the passage of steam through said inlet, and means to operate said valves in unison.

11. In a device of the class described, a casing having a chamber therein, said chamber having an inlet for the passage of steam thereinto and having a double outlet for the passage of steam therefrom, a substantially balanced valve controlling the passage of steam through said double outlet, an auxiliary valve controlling the passage of steam through said inlet, means to operate said valves in unison in one direction, and a spring normally holding said operating means in position wherein both of said valves are closed.

12. In a device of the class described, a casing having a chamber therein, said chamber being of general rectangular shape, opposite walls of said chamber having aligned

apertures therein forming a double outlet from said chamber, an inlet in another of said walls for the passage of steam into said chamber, an auxiliary valve controlling said inlet, a substantially balanced valve controlling the passage of steam through said outlet, a shaft disposed transversely of said chamber, and means on said shaft to operate said latter valve.

13. In a device of the class described, a casing having a chamber therein, said chamber being of general rectangular shape, opposite walls of said chamber having aligned apertures therein forming a double outlet from said chamber, an inlet in another of said walls for the passage of steam into said chamber, a substantially balanced valve controlling, the passage of steam through said outlet, a shaft disposed transversely of said chamber, an auxiliary valve disposed in said inlet, and means on said shaft to operate both of said valves in unison.

14. In a device of the class described, a casing having a chamber therein, said chamber being of general rectangular shape, opposite walls of said chamber having aligned apertures therein forming a double outlet from said chamber, an inlet in another of said walls for the passage of steam into said chamber, a substantially balanced valve controlling the passage of steam through said outlet, a shaft disposed transversely of said chamber, an auxiliary valve disposed in said inlet, means on said shaft to operate both of said valves in unison in one direction, and a spring normally holding said operating means in position wherein both of said valves are closed.

15. In a device of the class described, a casing having a chamber therein, said chamber being of general rectangular shape, opposite walls of said chamber having aligned apertures therein forming a double outlet from said chamber, an inlet in another of said walls for the passage of steam into said chamber, a substantially balanced valve controlling the passage of steam through said outlet, a shaft disposed transversely of said chamber, an operating member on said shaft and comprising a cam adapted to operate said auxiliary valve, a transverse pin on said balanced valve, and means on said operating member loosely engaging said pin, for the purpose set forth.

16. In a device of the class described, a valve casing having a chamber therein, said chamber having passages forming an inlet and a double outlet, a substantially balanced valve controlling one of said passages, and an auxiliary valve for closing the inlet, said auxiliary valve being connected with and actuated by said balanced valve.

17. In a device of the class described, a valve casing having a chamber therein, said chamber having passages forming an inlet and an outlet, a substantially balanced valve controlling one of said passages, an auxiliary valve controlling the outer of said passages, means actuated by movement of said balanced valve to operate said valves in unison, and means for automatically closing said valves.

18. In a device of the class described, a casing having a chamber therein, said chamber having an inlet for the passage of steam thereinto and having a double outlet for the passage of steam therefrom, an auxiliary valve controlling said inlet, a substantially balanced valve controlling the passage of steam through said double outlet, said auxiliary valve being controlled by said balanced valve, said balanced valve being so arranged that the pressure of steam will normally close the same.

19. In a device of the class described, a casing having a chamber therein, said chamber being of general rectangular shape, opposite walls of said chamber having aligned apertures therein forming a doublet outlet from said chamber, an inlet in another of said walls for the passage of steam into said chamber, an auxiliary valve controlling said inlet, a substantially balanced valve controlling the passage of steam through said outlet and having heads received in said aligned apertures, said auxiliary valve being controlled by said balanced valve, one of said heads being slightly larger than the other whereby the pressure of steam in said chamber normally tends to close said valve.

WILLIAM E. BAKER.