No. 810,255. PATENTED JAN. 16, 1906.

S. W. BOUGHTON.

EXPANSION CONTROLLED APPARATUS.

APPLICATION FILED MAR. 20, 1905.

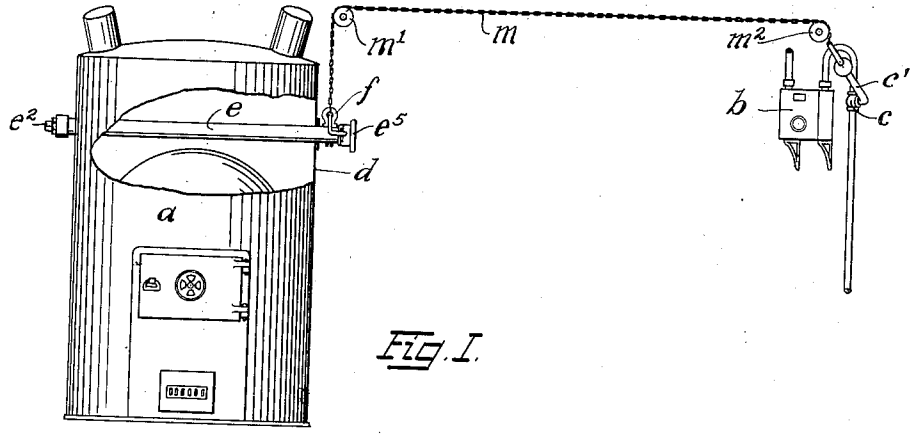


Fig. I.

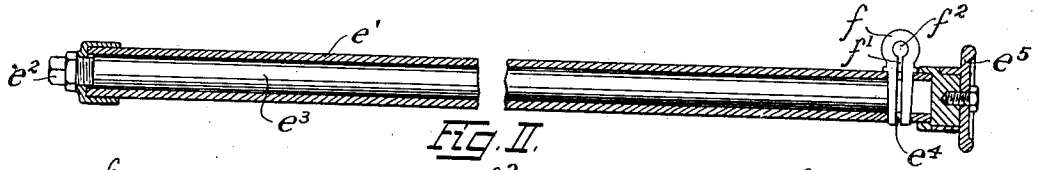


Fig. II.

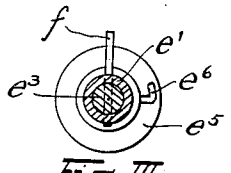


Fig. III.

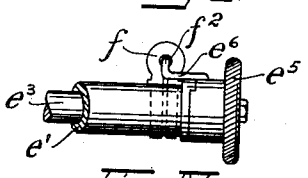


Fig. IV.

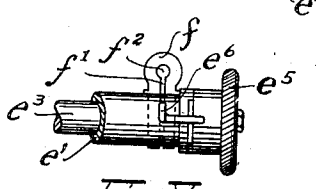


Fig. V.

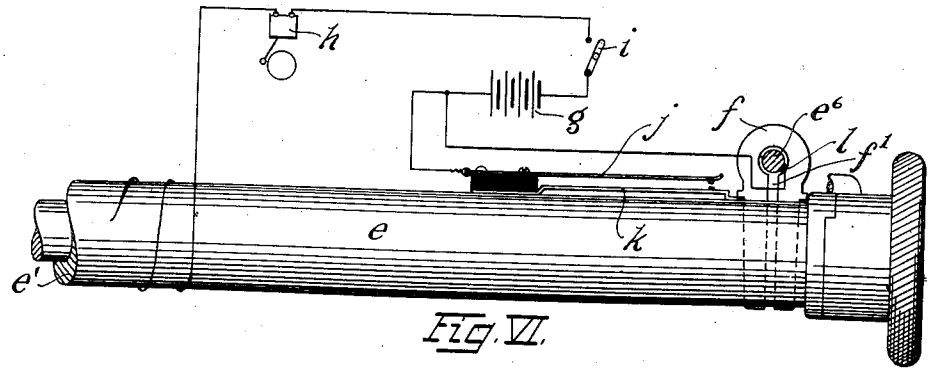


Fig. VI.

WITNESSES:

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EXPANSION-CONTROLLED APPARATUS.

No. 810,255. Specification of Letters Patent. Patented Jan. 16, 1906.

Application filed March 20, 1905. Serial No. 250,926.

To all whom it may concern:

Be it known that I, SEYMOUR W. BOUGHTON, a citizen of the United States of America, and a resident of Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Expansion-Controlled Apparatus, of which the following is a specification.

My invention relates to improvements in expansion-controlled apparatus, the same being particularly employed for the purposes of a gas cut-off.

My invention has for its object the provision of means which are simple, certain, and efficient and avoiding as far as possible the chances for accident and for the apparatus to get out of order. Accordingly I have endeavored to make the said controlling apparatus embodying my invention as simple and efficient as possible in order to adapt it to the described purpose and to other uses to which it may be put.

I am aware that many types of apparatus for automatically actuating gas cut-offs have previously been devised; but I have avoided the disadvantages inherent in many of these by reason of the use therein of destructible parts and the presence of more or less complicated mechanism, which reduces the certainty that such devices will act in an emergency.

My improvement is based upon the principle of unequal expansion of indestructible coacting parts formed of different metals, and the apparatus herein shown as embodying my invention comprises such an expansion device, which is associated with and normally holds a detent, controlling in turn a weighted lever adapted to actuate and close the controlled gas-valve.

I shall be able to make my invention much more readily understood by making reference to the accompanying drawings, illustrating a preferred form of apparatus embodying my improvements, wherein—

Figure 1 is a view in elevation, although somewhat diagrammatic in character, illustrating a particular application of my improvements. Fig. 2 is a transverse sectional view, partially broken away, depicting the expansion device. Figs. 3, 4, and 5 are details of the detent and retaining-hook in association with the expansion device, and Fig. 6 is an enlarged detail illustrating the parts a little more clearly and showing as well in diagram the application of an electrical alarm apparatus to the expansion device.

Throughout each of the several figures of the drawings I have employed the same characters of reference to indicate similar parts.

Referring first to the general features shown in Fig. 1, *a* will be readily recognized as a hot-air furnace, and *b* as a meter which, it will be understood, registers the amount of gas burned by the furnace or other apparatus connected with the same system of piping. A cut-off valve *c*, equipped with a long weighted lever-arm *c'*, is provided to check the flow of gas through the service-pipes when the said lever-arm is permitted to fall to a substantially horizontal position. Extending through the casing *d* of the furnace is an expansion device *e*, which preferably is positioned a short distance above the dome of said furnace and accordingly is subjected to the radiation of heat therefrom whenever the fuel-gas is ignited in the fire-pot. Said expansion device comprises an outer iron pipe e', having a screw-threaded adjusting-plug e^2, and its lock-nut upon one end. A contained brass rod e^3 is provided therein, abutting against the adjustable plug, and extending to the rear wall of a slot e^4, cut through the pipe to receive and hold a detent or key *f*. Upon the adjacent end of said expansion device is provided a rotatable thumb-piece e^5, carrying a retaining-hook e^6, adapted to enter the eye of the detent or wedge *f* and temporarily retain it in position. The said key or detent *f* may take the form of a solid wedge or pin adapted to fit readily within the slot or opening in the pipe; but preferably I employ the bifurcated spring-like key shown in the drawings, which is formed of a relatively heavy gage of brass or sheet-steel, having a central slot f' and an eye or opening f^2 in order to provide for a considerable variance in the relative expansion of the two members of said expansion device. These members I may here observe, of course, may be formed of other metals or suitable materials having different coefficients of expansion; but I prefer to employ brass and iron, as stated, deeming them best adapted for my present purposes.

In Fig. 6 I have indicated diagrammatically an alarm device comprising a source of current *g*, an alarm-bell *h*, a manual switch *i*, and circuit-closing springs *j k*, respectively, mounted upon, in electrical connection with,

and insulated from the iron pipe e' of the expansion device. The free end of spring k is extended, so that when the key or detent is in position said spring will be maintained out of contact and the alarm-circuits will be opened. A multiple branch of this circuit extends to a separate insulated contact l, which may be mounted upon the rotatable hook e^6 and which will close the alarm-circuit while said hook remains within the eye or opening of the detent for temporarily holding it in place within the expansion device.

I may now describe in a manner making perfectly clear the function and operation of the several parts of the apparatus herein shown. It will be readily appreciated that the expansion device should be so adjusted that at ordinary temperatures the detent or key f may be easily inserted in and removed from its slot or receptacle cut therein, this being accomplished by the screw-adjustment provided at the left end thereof. Secured in a furnace or other heat-producing apparatus, however, said expansion device very shortly becomes heated, and the brass rod, which is in line with the rear wall of the slot, expands in proportion to the degree of heat and grips or securely holds the key in position, so that it may not be removed therefrom by ordinary means. A chain m, running over pulleys m' m^2, connects the key and the weighted lever of the cut-off valve, and under these conditions the latter is held in a raised position and maintains the valve open; but upon a decrease in the heat of the furnace below a predetermined point the contraction of the brass rod results in the release and withdrawal of the key and the weighted lever falls, thereby closing the gas-valve. This would most commonly occur upon the reduction or cessation in the flow of gas. Under these circumstances the contact-springs j k would immediately be closed together and energize the alarm-circuit and ring the bell connected therein.

In order that the key may readily be held in place initially until the expansion device has acted under the influence of the necessary degree of heat to grip or securely hold said detent or key in place, I have provided a rotatable hook e^6, which may be turned into position to engage the key and bodily hold it against the opposing influence of the weighted lever within its receptacle or slot. It may be desirable, however, to provide an alarm which will tend to prevent the permanent engagement of the hook with the key, thereby nullifying the effect of my improved safety device, and accordingly I have equipped said hook with an insulated electrical contact l, brought into engagement with the key at such time as the same may be rotated within the eye of the latter, which serves to close a multiple circuit connected with the alarm and sound the bell until the expansion device has sufficiently acted to hold the key and its retaining-hook is withdrawn. Figs. 3, 4, and 5 will give an adequate idea of said hook.

Various modifications in the precise apparatus shown and in its application to this and other purposes will readily occur to those skilled in the art, as will the omission of certain details set forth, and I accordingly claim my improvements and their application, together with such modifications as may be suggested by mere skill, reserving to myself the following:

1. In apparatus of the class described, the combination with two expansion members formed of materials having different coefficients of expansion, the same being adapted to be subjected to heat, of a retained part or detent associated therewith and held in place thereby, self-actuating mechanism, and connecting means operatively coupling said mechanism and detent, normally withholding the mechanism from actuation, substantially as described.

2. In a heat-controlled appliance, the combination with variably-expanding members, of a detent or retaining part normally gripped or held in place thereby, an opposing part associated with and tending to release said detent, means for connecting said parts, and mechanism adapted to be actuated by the opposing part upon the altered condition of the expanding members, substantially as set forth.

3. The combination with a gas-burning device, of an expansion device associated therewith comprising two members having different coefficients of expansion, a detent normally held securely by said expansion device during the prevalence of a predetermined temperature, a valve controlling the gas-supply to the aforesaid device, mechanism associated therewith normally tending to close the said valve, and connecting means operatively coupling said mechanism and detent, substantially as set forth.

4. The combination with a gas-burning stove or furnace, of an expansion device comprising metal parts unequally affected by heat, a detent or key firmly gripped or held by said device during the prevalence of a predetermined temperature, a valve or cut-off and mechanism associated therewith tending to close the same, and means connecting the detent and the valve; whereby the latter is normally held in an open position during the continuance of a predetermined temperature in said stove or furnace, substantially as set forth.

5. In an expansion device, the combination with the brass and iron expansion members, the same affording a receptacle for a key or detent, a bifurcated or spring-like detent readily inserted in the appropriate recess afforded by the expansion members under con-

ditions of relatively low temperature, an opposing part sustained but normally tending to withdraw said detent from the expansion device, and means for operatively coupling said part and the detent, substantially as set forth.

6. In an expansion-controlled appliance, the combination with a tubular part and a coacting part formed of metals having a different coefficient of expansion, a suitable gripping-recess being provided therebetween, of a detent or wedge inserted in said recess and normally gripped by the expansion members while subject to a predetermined temperature, self-actuating mechanism normally withheld from operation while the detent is held in place, and means for operatively coupling said mechanism and the detent, substantially as set forth.

7. In an expansion-controlled appliance, the combination with a tubular part and a coacting part formed of metals having a different coefficient of expansion, a suitable gripping-recess being provided therebetween, of a detent or wedge inserted in said recess and normally gripped by the expansion members while subject to a predetermined temperature, self-actuating mechanism normally withheld from operation while the detent is held in place, and means for operatively coupling said mechanism and the detent, and electrically-actuated alarm apparatus brought into operation upon the release of the detent, substantially as set forth.

8. In an expansion-controlled appliance, the combination with a tubular iron member, of its coacting brass member contained therein, a slot or recess being provided in the said tubular member, means for adjusting the relative positions of the expansion members, a spring-like detent or key inserted in said slot or recess adapted to conform to varying degrees of expansion of the gripping parts, and a retaining part for temporarily holding the key in place, substantially as set forth.

9. In an expansion device, the combination with the brass and iron expansion members, the same affording a receptacle for a key or detent, a bifurcated or spring-like detent readily inserted in the appropriate recess afforded by the expansion members under conditions of relatively low temperature, an opposing part sustained but normally tending to withdraw said detent from the expansion device, and a retaining member for temporarily holding the key or detent within its receptacle, substantially as set forth.

Signed at Cleveland, this 18th day of March, 1905, in the presence of two subscribing witnesses.

SEYMOUR W. BOUGHTON.

Witnesses:

ROBT. M. MORGAN,

ALBERT LYNN LAWRENCE.