H. F. WESTPHAL.

AUTOMATIC DRAFT REGULATOR FOR FURNACES.

APPLICATION FILED DEC. 30, 1908.

945,831.

Patented Jan. 11, 1910.

2 SHEETS—SHEET 1.

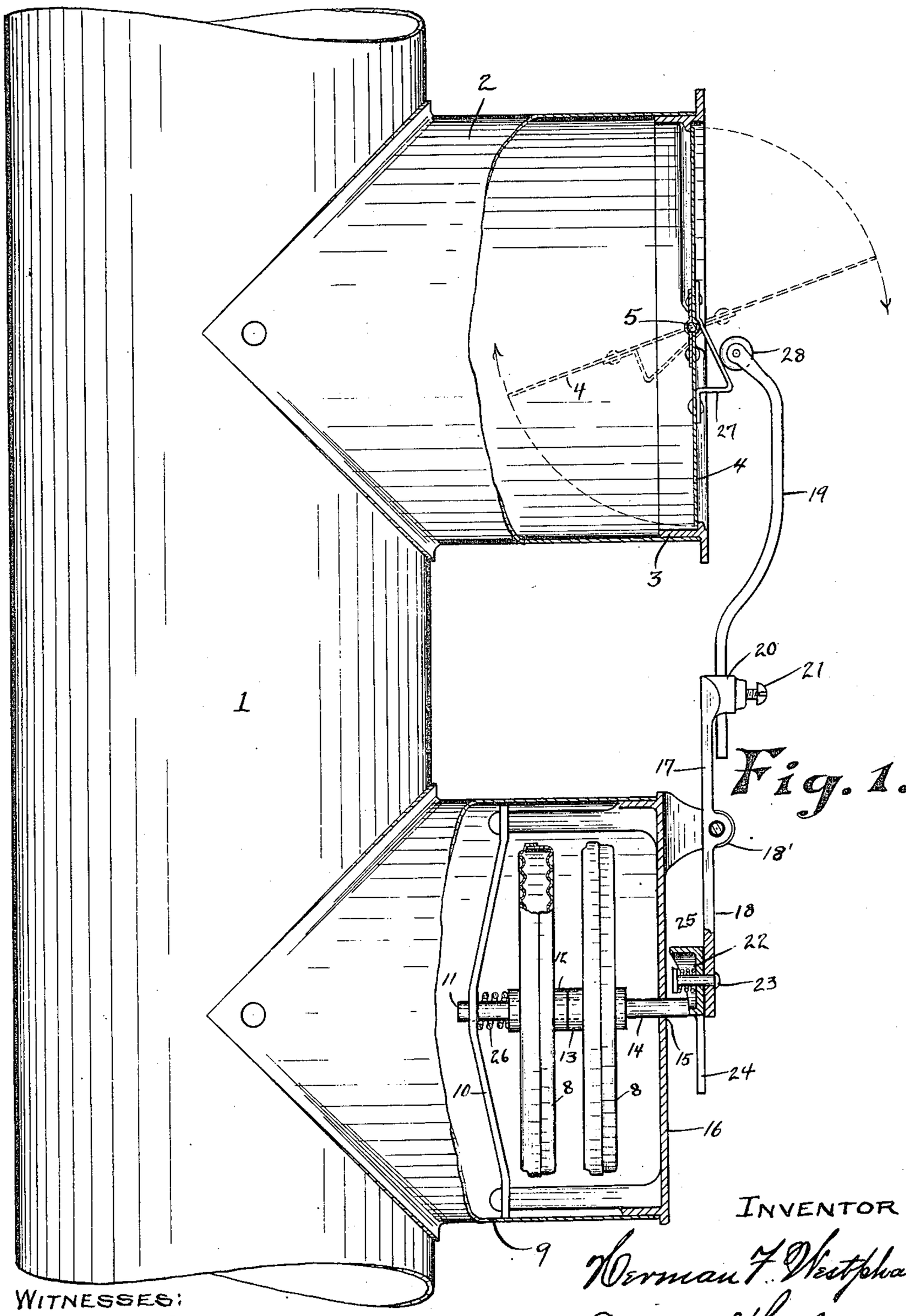

Fig. 1.

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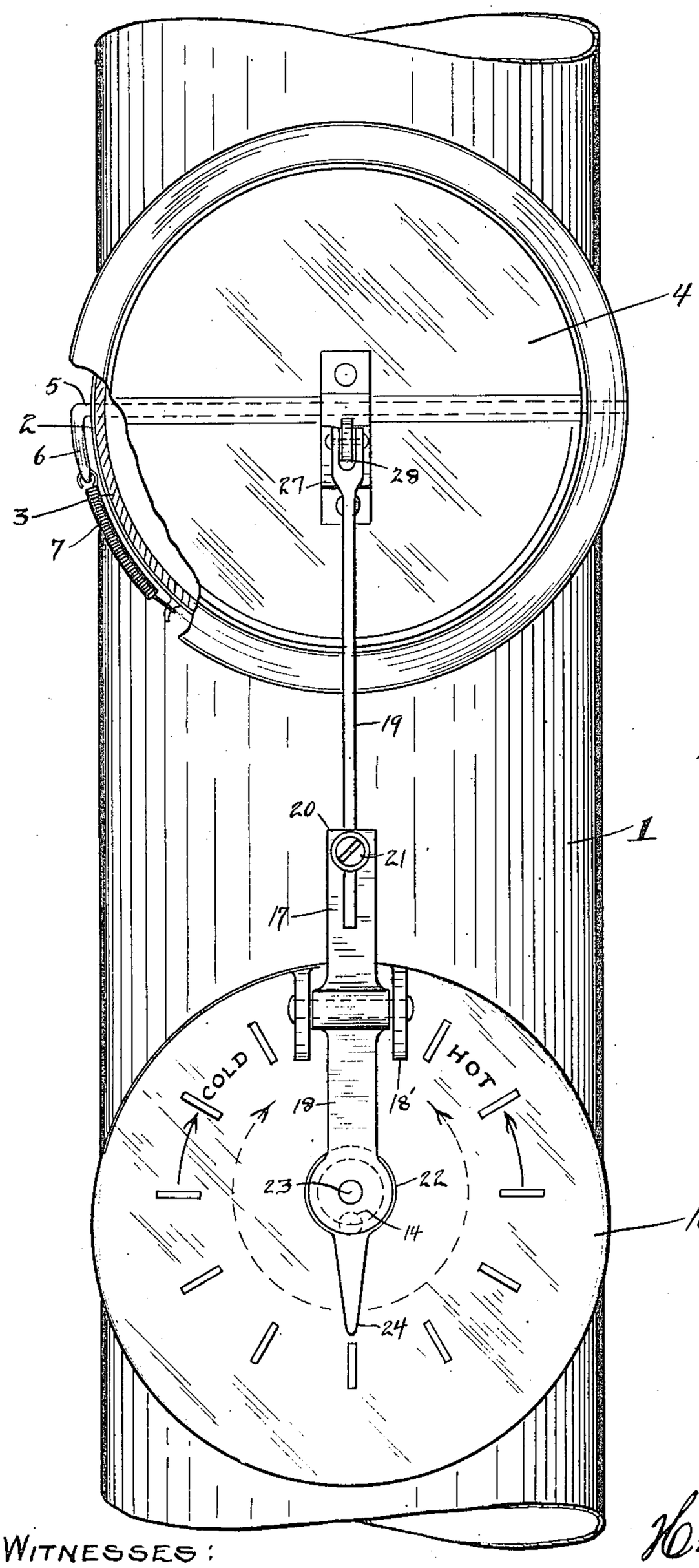

Fig. 2.

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AUTOMATIC DRAFT-REGULATOR FOR FURNACES.

945,831. Specification of Letters Patent. Patented Jan. 11, 1910.

Application filed December 30, 1908. Serial No. 470,015.

To all whom it may concern:

Be it known that I, HERMAN F. WESTPHAL, a citizen of the United States, residing at Milwaukee, county of Milwaukee, and State of Wisconsin, have invented new and useful Improvements in Automatic Draft-Regulators for Furnaces, of which the following is a specification.

My invention relates to improvements in automatic draft regulators for furnaces, stoves and the like, and the same is explained by reference to the accompanying drawings, in which—

Figure 1 represents a side view thereof, part in section; Fig. 2 is a front view.

Like parts are identified by the same reference characters in both views.

1 represents a length of ordinary furnace or stove pipe, which is adapted to connect a furnace or stove with the chimney or smoke flue, and which is provided near one end with an inlet air duct 2.

3 is a damper supporting sleeve.

4 is a damper, which is pivotally supported from the sleeve 3 upon the transversely arranged rod 5. The rod 5 is supported at its respective ends in suitable apertures formed in the opposing sides of the sleeve. To one end of the rod 5 is attached an operating arm 6, through which motion is communicated to said rod and damper from a spring 7. The spring 7 is connected at one end to the wall of the sleeve and at its opposite end to the outer end of said arm, the tension of said spring being such as to yieldingly retain said damper in its closed position, while the resiliency of the spring will permit said damper to be readily thrown open with slight inward pressure upon one side of said damper supporting rod. The damper and its supporting mechanism thus far described is substantially of ordinary construction.

My heat actuating means for automatically opening said damper comprises one or more expansible chambers 8, which are preferably formed of thin flexible sheet metal, in which chambers a small quantity of volatile liquid is stored. The chambers 8 are located in a separate heating chamber 9 from the pipe 1, from the walls of which they are supported by the open bracket 10. Each chamber is provided on its respective sides with a separate central bearing member, which bearing members are respectively indicated by the reference numerals 11, 12, 13 and 14, whereby as the respective sides of said chamber are moved outward by the expansive force of their contents, they will all coöperate to force the central bearing 14 forward through the central aperture 15 of the inclosing cover 16. It will be understood that as the chambers 8 are expanded and contracted under the influence of varying temperature in the pipe 1, the central member 14 will be caused to protrude a greater or less length from the chamber 9.

Motion is communicated from the protruding end of the member 14 to the damper 4 through the lever 17. The lever 17 is pivotally supported from the bracket 18′ and said bracket 18′ is in turn rigidly supported from, or in close proximity to, the cover 16 in any suitable manner, whereby as the short arm 18 of said lever is moved outward or away from said pipe 1 by the expansive action of said chambers 8, the long arm 19 of said lever is moved inward or in the opposite direction against one side of said damper 4, whereby said damper is turned from the closed position shown to the open position indicated by dotted lines, thereby permitting the exterior air to enter the pipe 1, whereby the draft in the stove or furnace is checked and the combustion of fuel is retarded. As the draft is thus checked in the furnace, the expansion chambers 8 will be proportionately cooled, whereby their contents is contracted when said chambers will be caused by their own resiliency to contract to their normal size, thus relieving the pressure upon the short arm of said lever, whereby the pressure of the long arm against said damper will be withdrawn. When the pressure of the arm 19 is thus withdrawn from the damper 4, said damper will be brought back to its normal closed position by the recoil of the spring 7. Thus it will be obvious that the damper is automatically opened as the temperature in the system rises through the expansion of the chambers 8 and is closed as the temperature falls by the recoil of said spring. For convenience of adjustment, the lever 17 is preferably formed in two parts, 18 and 19, which are adjustably connected together, the arm 18 being provided with a projecting lug 20 through which an aperture is formed for the recep-

tion of the arm 19, which is slidably fitted therein and said arm is secured at any desired point of adjustment in said aperture by the set screw 21, which has screw threaded bearings in said lug 20.

To make the damper actuating mechanism more or less sensitive to the changes of temperature, I have provided the short arm 18 with an angular cam 22, which is revolubly connected with the underside of said lever by the pin 23, and said cam is provided with an operating handle 24, by which said cam is turned upon its supporting pin. Thus it will be understood that when the cam is adjusted with its widest end 25 above the central projection of the expansion chamber, said lever will be actuated more promptly by the expansion of said chambers 8. When however said cam 22 is reversed so as to bring its narrow end above the central projection, said lever will be acted upon less promptly and consequently a higher temperature will be required in the furnace and furnace pipe to actuate said lever and draft controlling damper. From this fact, it will be understood that when the weather is exceedingly cold, a higher temperature may be maintained in the furnace. When however the weather is mild, the heat regulating device may be adjusted, by reversing the movement of the cam, so that the damper will be opened and closed with but slight variation of temperature around the expansion chambers.

While I have shown two expansion chambers supported from the bracket 10, for some purposes a single chamber may be substituted therefor, or the number of said chambers may be increased as circumstances may require. To prevent the liability of the expansion chambers or coöperating parts from being injured by too great expansion, said expansion chambers are preferably yieldingly supported from the bracket 10 by a spiral spring 26, which is interposed between the central member of the bracket 10 and the opposing side of the expansion chamber, the tension of spring 26 being such as to permit said chambers under excessive expansion to move downward or toward the central member of said supporting bracket 10. While the long arm 19 of the lever 17 may, if desired, be used in direct contact with the damper 4, I preferably interpose a bracket 27, which is rigidly affixed to said damper and I also preferably provide the end of said arm 19 with a friction bearing roller 28, whereby as said arm 19 is moved downwardly or toward the damper 4, the frictional contact will not only be reduced, but the pressure of said arm 19 will be more effectively applied to said damper, as the same is turned from the closed position shown to the open position indicated by dotted lines.

While my device is equally adapted to be used with stoves, furnaces and the draft flues of various kinds of power and heating systems, I have for brevity of description referred to the same as used in connection with a furnace pipe. While I preferably use a volatile liquid for producing the required expansion in said expansion chambers, air or other fluid may be substituted therefor, and while a plurality of expansion chambers are preferably employed for actuating the damper, a single chamber of sufficient size may be substituted therefor.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination of a furnace pipe provided with an inlet air duct, a damper pivotally supported in said duct and adapted to control the passage of exterior air through the same, a heating chamber formed in connection with said furnace pipe, an expansion chamber located in said heating chamber, an expansible fluid located in said expansion chamber, a central member bearing at one end against said expansion chamber and extending through an aperture provided therefor in the walls of said heating chamber, a lever pivotally supported in close proximity to said heating chamber, one arm of which is adapted to contact with the protruding end of said central bearing member, while its opposite end is adapted to contact with an integral part of said damper, whereby as said expansion chamber is expanded or contracted by the fluid contained therein, motion will be communicated therefrom through said central member and lever to said pivotally supported damper, and where by the movement of said damper is controlled through the action of said expansion chambers.

2. The combination of a furnace pipe provided with an inlet air duct, a damper pivotally supported in said duct and adapted to control the passage of exterior air through the same, a spring for closing and retaining said damper in its normal position, a heating chamber formed in connection with said furnace pipe, one or more expansion chambers located in said heating chamber, an expansible fluid located in said expansion chamber or chambers, a lever pivotally supported with one end in close proximity to said expansion chamber and adapted to bear at its opposite end against said damper, whereby as one end of said lever is actuated by the expansive force of the fluid in said expansion chambers, the opposite end of said lever will be caused to contact with and open said damper and whereby when said lever is moved in the opposite direction, the damper is closed by said spring.

3. The combination of a furnace pipe provided with an inlet air duct, a damper piv-

otally supported in said duct and adapted to control the passage of exterior air through the same, means for retaining said damper in its normal position, a heating chamber formed in connection with said furnace pipe, one or more expansion chambers located in said heating chamber, an expansible fluid located in said expansion chamber or chambers, a lever pivotally supported with one end in close proximity to said expansion chamber and adapted to bear at its opposite end against said damper, an adjustable contact bearing interposed between said lever and expansion chamber adapted to be manually changed to accelerate or retard the action of the damper.

4. The combination of a furnace pipe provided with an inlet air duct, a damper pivotally supported in said duct and adapted to control the passage of exterior air through the same, a contact bearing plate formed at an angle to the front of said damper, means for retaining said damper in its normal position, a heating chamber formed in connection with said furnace pipe, one or more expansion chambers located in said heating chamber, an expansible fluid located in said expansion chamber or chambers, an adjustable lever pivotally supported with one end in close proximity to said expansion chamber and adapted to bear at its opposite end against said angular contact bearing.

5. The combination of a furnace pipe provided with an inlet air duct, a damper pivotally supported in said duct and adapted to control the passage of exterior air through the same, a spring for closing and retaining said damper in its normal position, a heating chamber formed in direct connection with said furnace pipe, a plurality of expansion chambers located in said heating chamber, an expansible fluid located in said expansion chamber or chambers, an adjustable lever pivotally supported with one end in close proximity to said expansion chamber and provided at its opposite end with an anti-friction roller bearing, adapted to bear against said damper, whereby as one end of said lever is actuated by the expansive force of the fluid in said expansion chambers, the opposite end of said lever will be caused to open said damper and whereby as said lever is moved in the opposite direction, the damper will be closed by said spring.

In testimony whereof I affix my signature in the presence of two witnesses.

HERMAN F. WESTPHAL.

Witnesses:

JAS. B. ERWIN,

O. R. ERWIN.