F. E. CHATARD, Jr.

Draught-Regulator for Hot-Air Furnaces.

No. 126,377. Patented May 7, 1872.

Fig. 1.

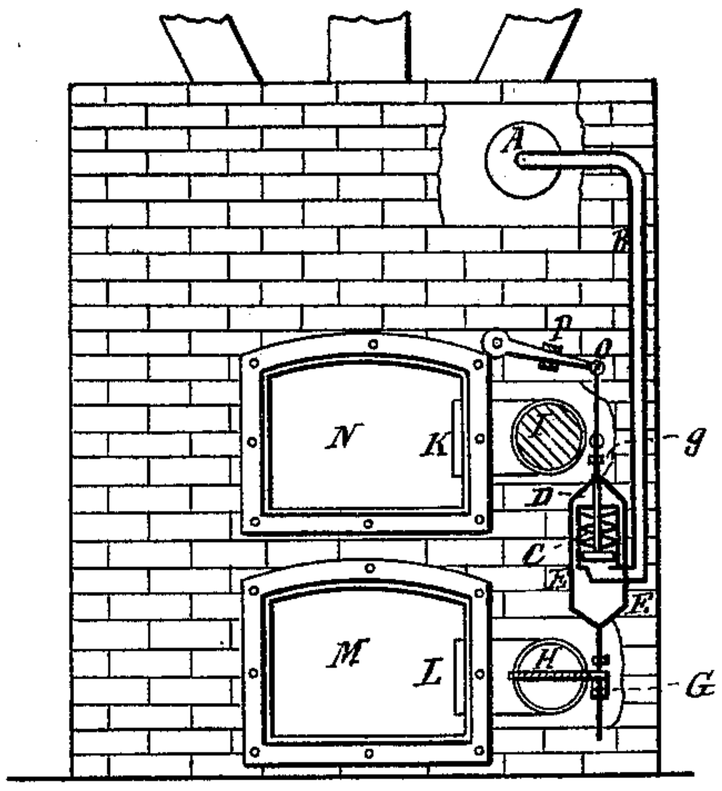


Fig. 2.

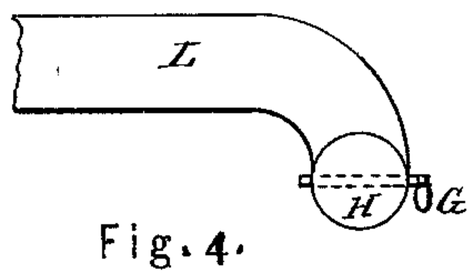


Fig. 3.

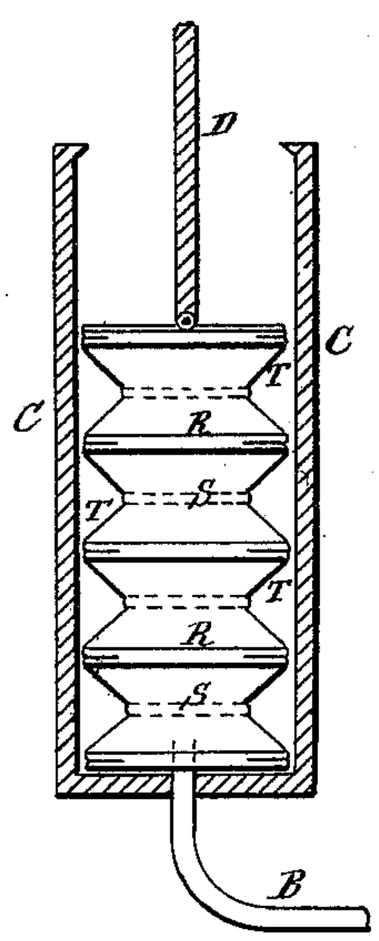


Fig. 4.

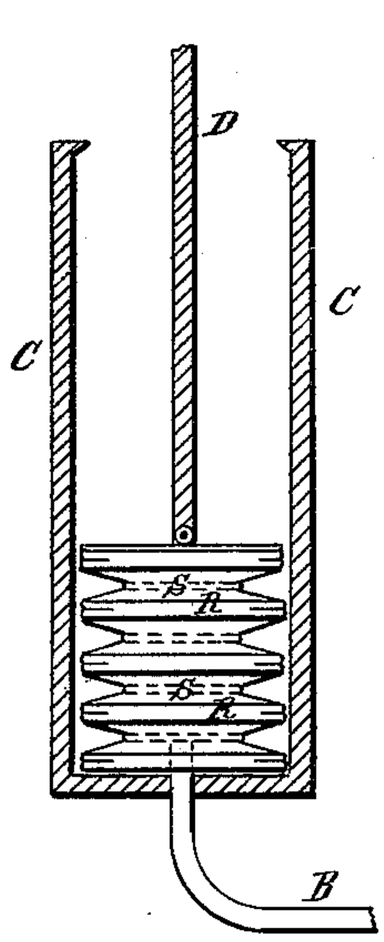
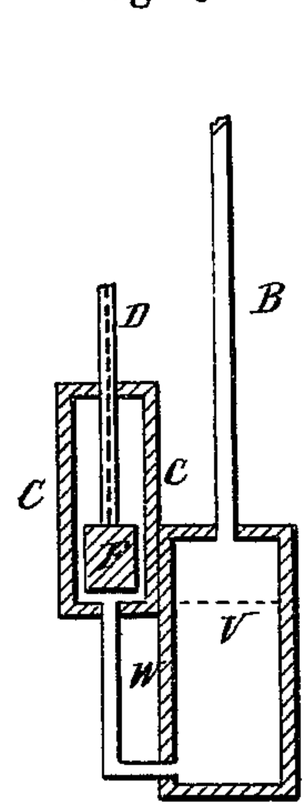


Fig. 5.



Witnesses:

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UNITED STATES PATENT OFFICE.

FERDINAND E. CHATARD, JR., OF BALTIMORE, MARYLAND.

IMPROVEMENT IN DRAUGHT-REGULATORS FOR HOT-AIR FURNACES.

Specification forming part of Letters Patent No. 126,377, dated May 7, 1872.

I, FERDINAND E. CHATARD, Jr., of Baltimore, in the county of Baltimore and State of Maryland, have invented certain Improvements in Regulating the Draught of Furnaces and Stoves, of which the following is a specification:

My invention relates to an arrangement of two draught-pipes or flues, of any convenient or suitable form and length, one opening into the ash-pit or below the fuel, the other above the level of the fuel, either directly into the dome of the furnace or stove, or into the smoke-pipe. These pipes or flues communicate with and receive air from the room or place in which the furnace or stove is placed. The upper as well as the lower pipe is provided with a damper or valve for closing the opening, which, by suitable connections of rods and levers or chain and levers, receive motion from a cylinder containing an air-tight tube or bag, which tube or bag expands or contracts in proportion as the air contracts or expands within the air-vessel situated within the hot-air chamber of a hot-air or other furnace, or above the fire-pot and dome of a stove, a small tube connecting the cylinder and air-vessel. The air-tight tube or bag contained within the cylinder is arranged after the manner of a bellows, and the construction is such that, while the air from the air-vessel has free access to every part, there can be no lateral expansion sufficient to cause much friction with the sides of the cylinder—a condition which necessarily results when a simple elastic bag is employed—but expansion tends almost entirely to elongate the bag or tube, and hence gives the required motion lengthwise.

In place of this air-tight tube or bag we may employ, as a motor for closing the dampers or valves, a float of cork, wood, or other material, moving freely within the cylinder, motion being imparted to this float by a fluid—mercury, oil, or any other liquid—which is forced into the cylinder from the reservoir by the action of the air expanding in the air-vessel placed above the furnace or stove. In proportion as the air in the air-vessel expands, the fluid is forced from the reservoir into the cylinder and the float ascends; when, by the cooling of furnace, contraction ensues, the fluid returns to the reservoir, and the float falls. The motion of the float is, by means of connecting-rods or other modes of conveying motion, imparted to the upper and lower dampers. The lower sides of the dampers or valves are made heavier than the other, so that the tendency of both is to close the openings of the pipes or flues whenever free to act, or when the restraining force is removed. The lower damper is kept open by the weight of the connecting-rod, &c., and prevented from closing until the expansion within the air-cylinder is sufficient to overcome the downward pressure and raise the rod, &c.; then the damper closes by reason of the increased weight of the lower side. The upper damper usually remains closed. When, however, the connecting-rod is raised sufficiently, a movable nut on the rod engages the crank or lever of the damper and forces it open. At the upper end of the connecting-rod is a lever with a sliding or adjustable weight, by means of which the downward pressure of the rod is increased, and hence the movement upward and consequent motion of the dampers is retarded, and only takes place under increased temperature and more powerful expansion. Thus, it will be seen that by properly proportioning the air-vessel, the cylinder, the weight of the connecting-rods, and arranging the joints and connections, we will have no perceptible closing motion imparted to the lower damper until the heat of the furnace or stove is sufficient to expand the air within the air-vessel to a certain degree; then, if the heat continues to increase, the lower damper closes by the gradual rising of the connecting-rod and its movable nut. When all draught is cut off below the fuel and the heat still further increases, the continued upward movement of the rod will cause the upper movable nut to engage the lever or crank of the upper damper and gradually open it. If, therefore, we proportion all properly, and set the apparatus so that the lower damper will be closed when the heat of the air-vessel has reached a certain point, we can keep the temperature at or near the same point: if there be an increase, the upper damper will open; if it diminish, the upper damper remains closed and the lower opens.

Description of the Accompanying Drawing.

Figure 1 is a front view of the draught apparatus, showing dampers, pipes, cylinder,

connecting-rods, air-vessel, &c., the lower damper being open and upper closed. Fig. 2 is a plan of a draught flue or pipe, showing damper with slotted lever or handle. The connecting-rod passes through this slot.

Fig. 5 is a section of the cylinder and reservoir, connected by a tube. Within the cylinder is seen a section of the float.

A is an air-tight vessel, of metal, glass, or other material, placed within the hot-air chamber of a furnace, or above the fire-pot and dome of a stove. B is a small tube, forming communication between A and C, the air-cylinder. D is a rod, which communicates the motion from the air-tight tube or bag, Figs. 3 and 4, or from the float, Fig. 5, to the connecting-rod E. On the rod E are two movable nuts, *g g*, which serve to move or restrain the motion of the damper by acting on the lever or handle G. H and I are the lower and upper dampers closing the pipes K and L, opening, one above and the other below the fuel. M is the ash-door; N, the fuel-door; O, the lever, with sliding adjustable weight P, serving to increase or diminish the downward pressure of the connecting-rods on the damper.

In Figs. 3 and 4 is seen the bellows-shaped air-tight tube or bag T, with rings R, of metal or other material, properly attached, serving to prevent the tube or bag from collapsing at certain points, and at same time preventing undue expansion laterally. Between the rings R R are other smaller rings, of metal, or, preferably, some elastic material, S S, which serve to gather in and bring toward the center the folds of the bellows when contraction takes place, but not sufficiently to prevent the free entrance of the expanding air to every part. We thus have a perfectly air-tight packing without danger of leakage. This bellows moves easily within the cylinder C, as the rings R R are of a diameter sufficiently less than that of the cylinder as to admit of easy motion in the direction of the axis of the cylinder.

In Fig. 5 is shown a section of the reservoir V, communicating through the tube B with the air-vessel, and through a tube, W, or any other form of passage and mode of connection, with the cylinder C. Within the cylinder C is seen the float F. When V is filled with fluid as far as the dotted line no movement of float F takes place; but when, by pressure of expanding air in the air-vessel, the fluid is forced from V into C, the float moves upward, and with it the rod D, which, in turn, acts upon connecting-rod E and dampers H and I.

I claim as my invention—

1. The combination of upper and lower dampers or valves H and I with connecting-rod and appropriate connections, receiving motion from the expansion or contraction of an air-tight bellows or bag, T, within the cylinder C, the whole, when constructed and arranged, to operate substantially as shown.

2. The cylinder C, with its internal air-tight tube bag or bellows, T, having communication with the air-vessel A by a tube of small diameter, and responding to the expansion and contraction of the air within A, when constructed and operating substantially as shown.

3. The combination of the reservoir V and cylinder C, with communication by tube or otherwise, a float of proper size and shape moving freely within the cylinder C, and giving motion to the upper and lower dampers H and I by appropriate connections, the whole when constructed and operating substantially as described, and for the purpose hereinbefore set forth.

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Witnesses:

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