(No Model.) 3 Sheets—Sheet 1.

# C. L. RIDGWAY.

## HEATING STOVE OR FURNACE.

No. 389,902. Patented Sept. 25, 1888.

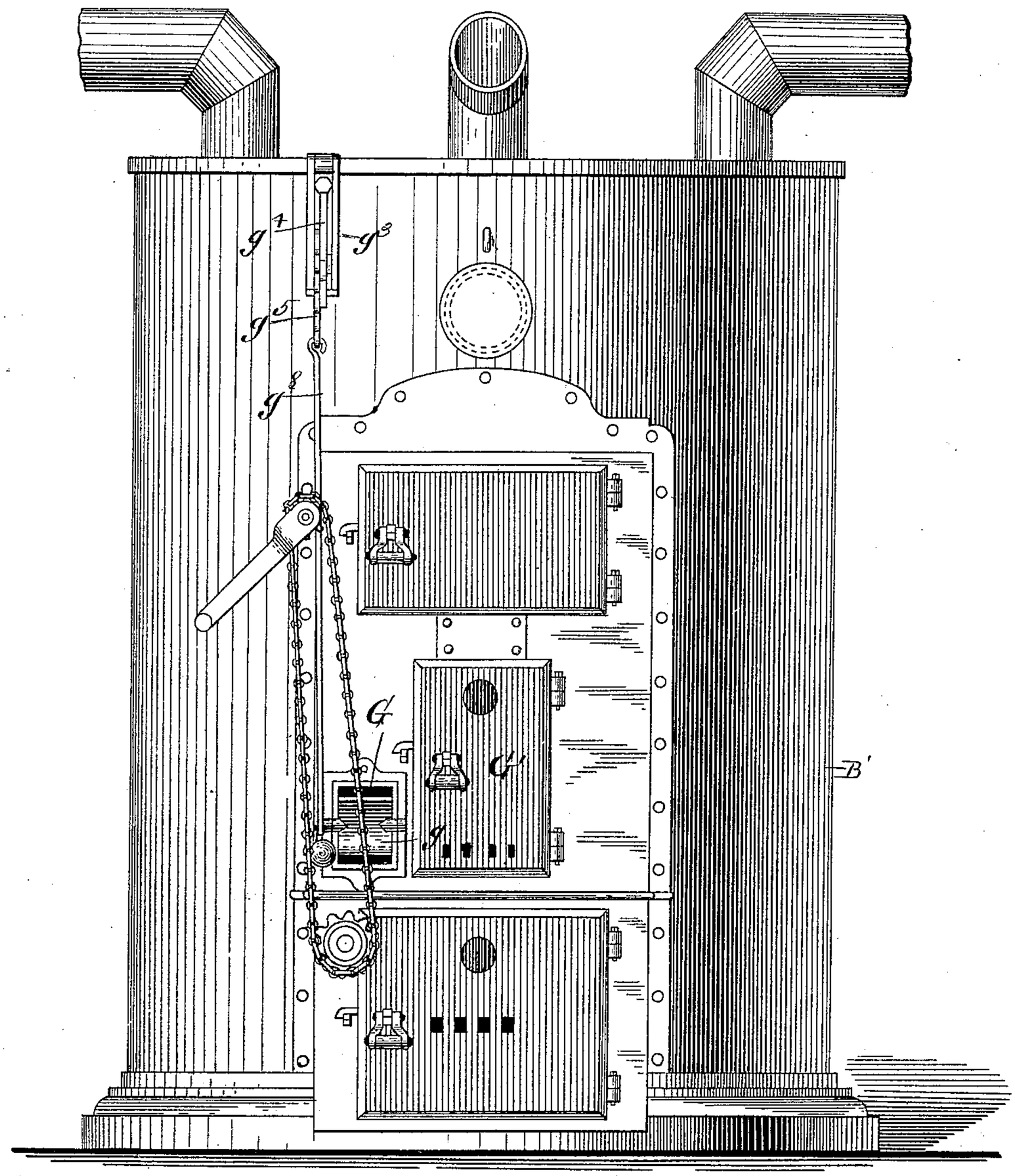


Fig. 1.

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(No Model.) 3 Sheets—Sheet 2.

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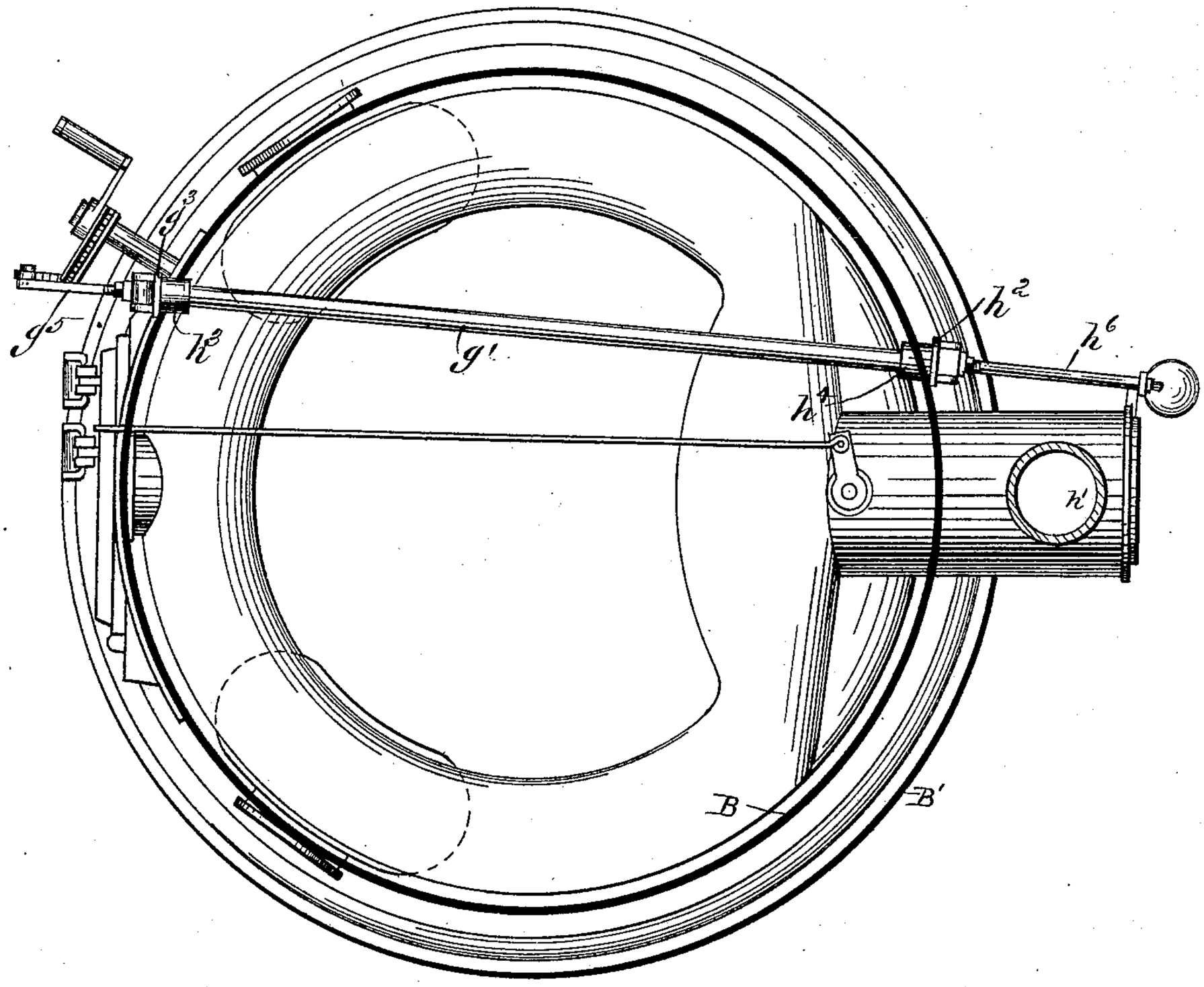


Fig. 2.

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(No Model.) 3 Sheets—Sheet 3.

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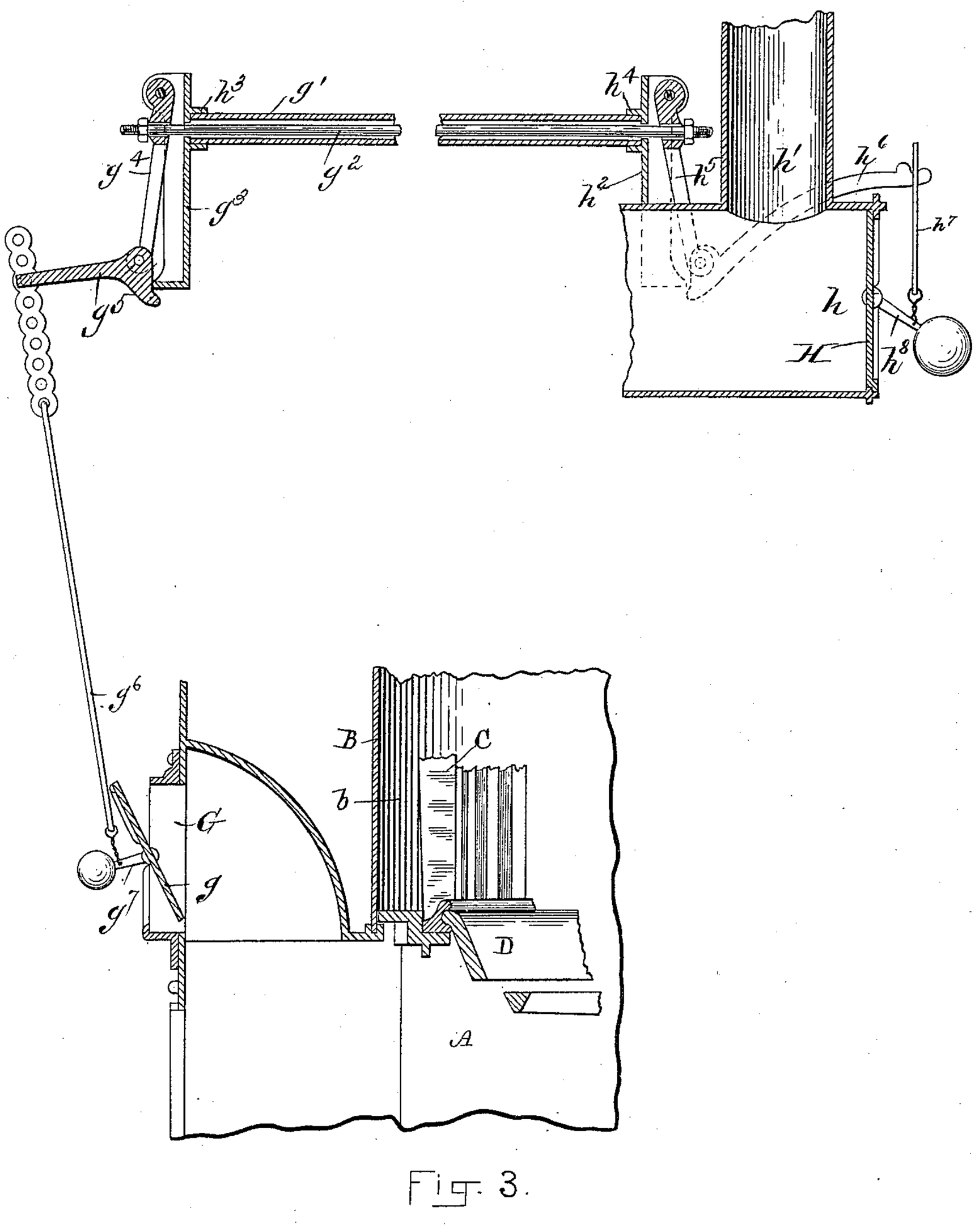


Fig. 3.

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# UNITED STATES PATENT OFFICE.

CHARLES L. RIDGWAY, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO THE RIDGWAY FURNACE AND STOVE COMPANY, OF NASHUA, NEW HAMPSHIRE.

## HEATING STOVE OR FURNACE.

SPECIFICATION forming part of Letters Patent No. 389,902, dated September 25, 1888.

Application filed July 27, 1885. Serial No. 172,749. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES L. RIDGWAY, of Boston, in the county of Suffolk and State of Massachusetts, a citizen of the United States, have invented a new and useful Improvement in Automatic Regulators for Heating-Stoves, Furnaces, &c., of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification, in explaining its nature.

The invention relates, especially, to an automatic regulator arranged to operate or regulate the feed or supply of air to the ash-pit or fire, and also the feed or supply of air to the direct escape-passage from the combustion-chamber to the chimney-flue.

It further relates to a furnace supplied or provided with an air-inlet to the ash-pit or other equivalent chamber, through which air for the combustion of fuel is supplied, which inlet is automatically opened and closed by the action of the fire, as hereinafter described.

It further relates to various details of construction, all of which will hereinafter be explained.

Referring to the drawings, Figure 1 is a front elevation of a furnace embodying my invention. Fig. 2 is a plan view of the furnace, the top plate being removed. Fig. 3 is a view illustrating the construction of the regulator and its connections with the damper or valve controlling the cold-air inlets to the ash-pit, and the damper or valve controlling the cold air inlet to the escape-passage.

A denotes the ash-pit; B, the inner casing of the furnace forming the chamber *b;* B′, the outer casing of the furnace; C, a portion of the fire-pot wall, and D a portion of a ring to assist in holding the sectional fire-pot wall in place. The furnace has, in addition to the ordinary cold-air passages or inlets to the ash-pit chamber through the ash-pit door or casing of the furnace or stove, preferably immediately above it, a cold-air passage or inlet, G, which opens into the ash-pit chamber. This inlet is represented in the drawings as at the left side of the door G′ to the full chamber. There is arranged at the entrance to the inlet a damper or valve, *g*, for closing and opening the same and for regulating the supply or quantity of air admitted to the ash-pit chamber and to the fire, which is automatically operated by an automatic regulator. This regulator comprises the tube $g'$, expansible longitudinally by heat, a rod, $g^2$, inclosed within the expansible tube, and adapted, in connection therewith and with the plate $g^3$, levers $g^4$ $g^5$, and rod $g^6$, to move the damper or valve *g*, the damper or valve having a weighted arm, $g^7$, which is connected with the lever $g^5$ by means of the said rod $g^6$.

It will be seen from this description that upon the extension of the tube the damper or valve *g* is closed, or at any rate its aperture diminished in size, whereby the quantity of air supplied the fire is either entirely cut off or lessened, and that this will of course immediately act to control the fire and reduce its intensity or force, and that such reduction will effect the cooling of the expansible tube sufficiently to cause it to again act to open sufficiently to provide the fire with more air.

It is also desirable that the same regulator shall act to operate the damper or valve H, governing the inlet *h*, to the direct escape-passage $h'$ from the furnace to the chimney-flue, and when it is used additionally for operating this damper I prefer the construction shown in Figs. 2 and 3—that is, the expansible tube is arranged across the heating-chamber of the furnace and its ends extend through the casing and bear against the inner surface of the plates $g^3$ $h^2$, which have sleeves $h^3$ $h^4$ to receive said ends, and holes through which the rod $g^2$ extends. Each of these plates bears or supports a lever. The plate $g^3$ and its connections with the valve or damper *g* are already described. The other levers, $h^5$ $h^6$, are similar in construction and operation, and are connected with the valve or damper H by means of the rod $h^7$ and the weighted arm $h^8$. The rod $g^2$ has at its ends nuts, which bear against the levers $g^4$ $h^5$.

It is obvious that upon the expansion or longitudinal movement of the tube the blocks or plates $g^3$ $h^2$ are moved from each other, and that the levers are held by the nuts upon the

rod, so that this outward or separate movement of the plates causes the levers to be drawn inward, so that their operating ends communicate movement to the levers $g^4$ $h^5$. It is desirable, however, that the dampers or valves should not operate to close or open their respective inlets at the same time. In other words, the cold-air inlet should be closed while the direct air-supply passage is open, and the direct air-supply passage should be closed when the cold-air inlet is open. To accomplish this result I provide the damper or valve H with a heavier weight than is provided the damper or valve $g$, so that the pressure or force of the expansion of the tube is first directed against or upon the lever operating the valve or damper $g$, or, in other words, toward the work which is lightest, and it therefore follows that the lever $g^4$ must operate to close the damper or valve $g$ before the damper or valve H is opened.

Of course after the damper or valve $g$ is closed the expansion of the tube will be in the direction of the lever $h^5$, as the lever $g^4$ will then act as a stop; or, in other words, it cannot be further moved because the door $g$ is closed, and no other movement of the lever and connecting-rod is possible. The lever $h^5$ upon being moved then operates to open the valve or damper H. Of course there is no necessity for opening this valve or damper H until it becomes necessary to shut the cold-air inlet G. The reverse action of the regulator is the same—that is, the damper or valve H is closed as the tube contracts by its heavier weight before the lighter weight of the valve or damper $g$ serves to open it.

Of course the regulator can be arranged to open and close the inlet or passage through which air is supplied to the fire wherever that passage may exist.

I would here state that I do not confine myself to the exact details of construction herein described, but may use any mechanical equivalents capable of accomplishing the same results.

Having thus fully described my invention, I claim and desire to secure by Letters Patent of the United States—

1. The combination, with a heating-furnace provided with a passage or inlet for supplying the fire with air, of a valve or damper for regulating the admission of the air through the said passage or inlet, an expansible tube within the heating-chamber of the furnace, a movable plate, as $g^3$, to which the said tube is attached, a lever, as $g^4$, pivoted to the said plate, a rod within the said tube for operating the said lever, and connections between the said lever and the said valve or damper, substantially as set forth.

2. The combination, with a heating-furnace having a passage or inlet for supplying the fire with air, and also an outlet or escape passage for the products of combustion, of valves or dampers for the said passages, an expansible tube within the heating-chamber of the furnace, two movable plates to which the said tube is attached, two levers pivoted to the said plates, a rod within said tube to operate said levers, and connections for transmitting the movements of the latter to the said valves or dampers, substantially as set forth.

3. The combination, with a heating-furnace having a passage or inlet for supplying the fire with air, and also an outlet or escape passage for the products of combustion, valves or dampers for the said passages provided with weighted arms, the weighted arm for the escape-passage damper being heavier than the weighted arm for the inlet-passage damper, whereby, as the heat of the furnace is increased, the valve or damper for the inlet-passage will be closed before the valve or damper for the escape-passage is opened, and as the heat diminishes the latter valve will be closed before the former is opened, substantially as set forth.

4. The combination, with a heating-furnace having an inlet-passage, G, provided with a damper, $g$, and an escape-passage, $h'$, of a regulating-damper, H, for the latter passage, an expansible tube, $g'$, within the heating-chamber of the furnace, the movable plates $g^3$ and $h^2$, to which the said tube is attached, the levers $g^4$ and $h^5$, pivoted to the said plates, the levers $g^5$ and $h^6$, pivoted to the said levers $g^4$ and $h^5$, respectively, the connecting-rods $g^6$ and $h^7$, and the weighted arms of the dampers to which the said rods are attached, substantially as set forth.

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Witnesses:
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FRED. B. DOLAN.