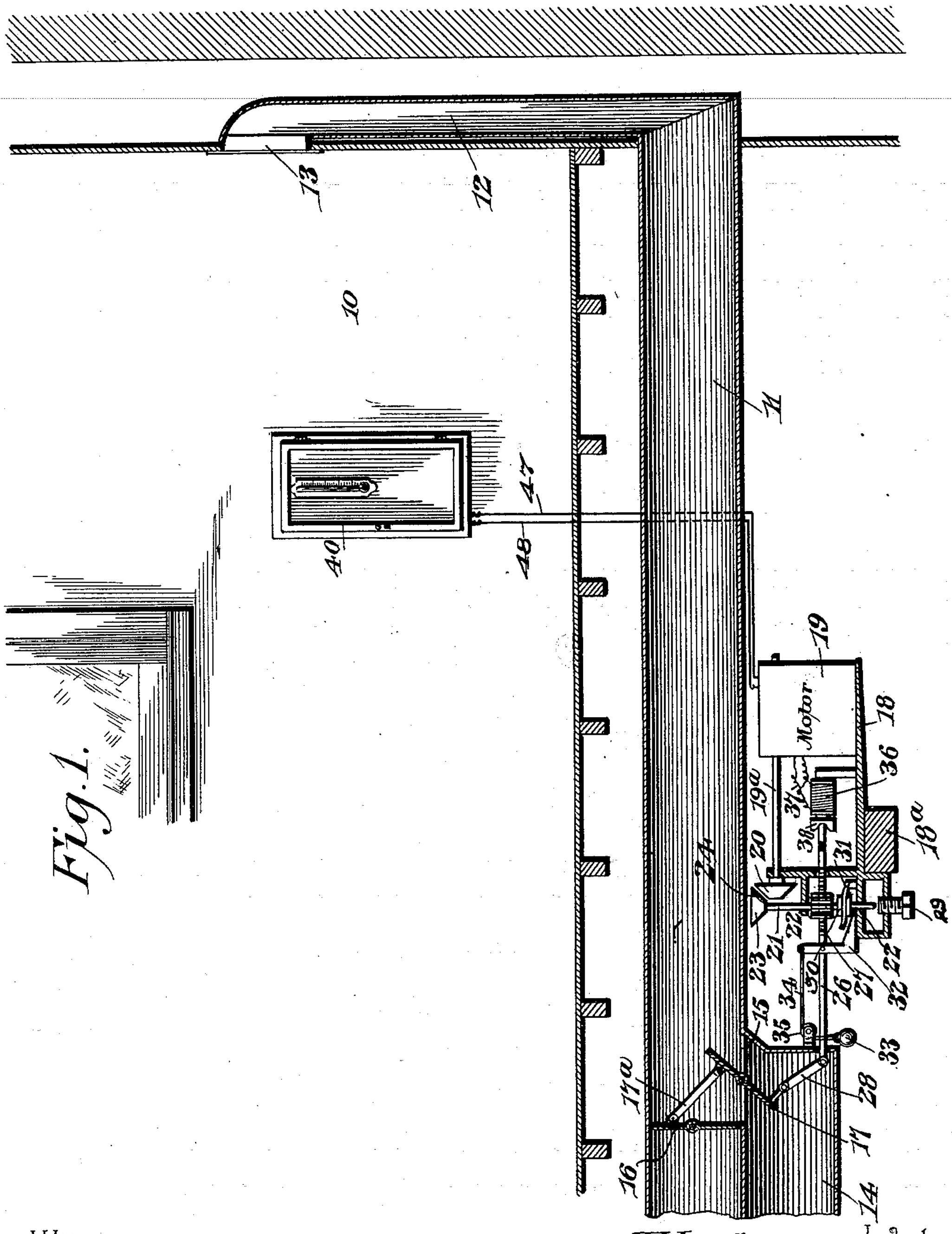
No. 647,723. Patented Apr. 17, 1900.

J. T. LUTON.

AUTOMATIC DAMPER REGULATOR.

(Application filed Oct. 10, 1899.)

(No Model.) 2 Sheets—Sheet 1.



Witnesses

Jas. K. McCathran

H. F. Bernhard

John T. Luton Inventor

By his Attorneys,

C. A. Snow & Co.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 647,723. Patented Apr. 17, 1900.

J. T. LUTON.

AUTOMATIC DAMPER REGULATOR.

(Application filed Oct. 10, 1899.)

(No Model.) 2 Sheets—Sheet 2.

Fig. 3.

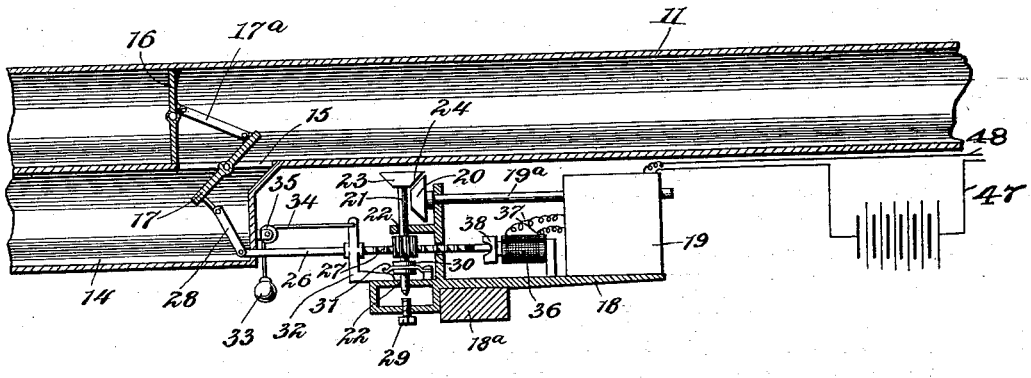
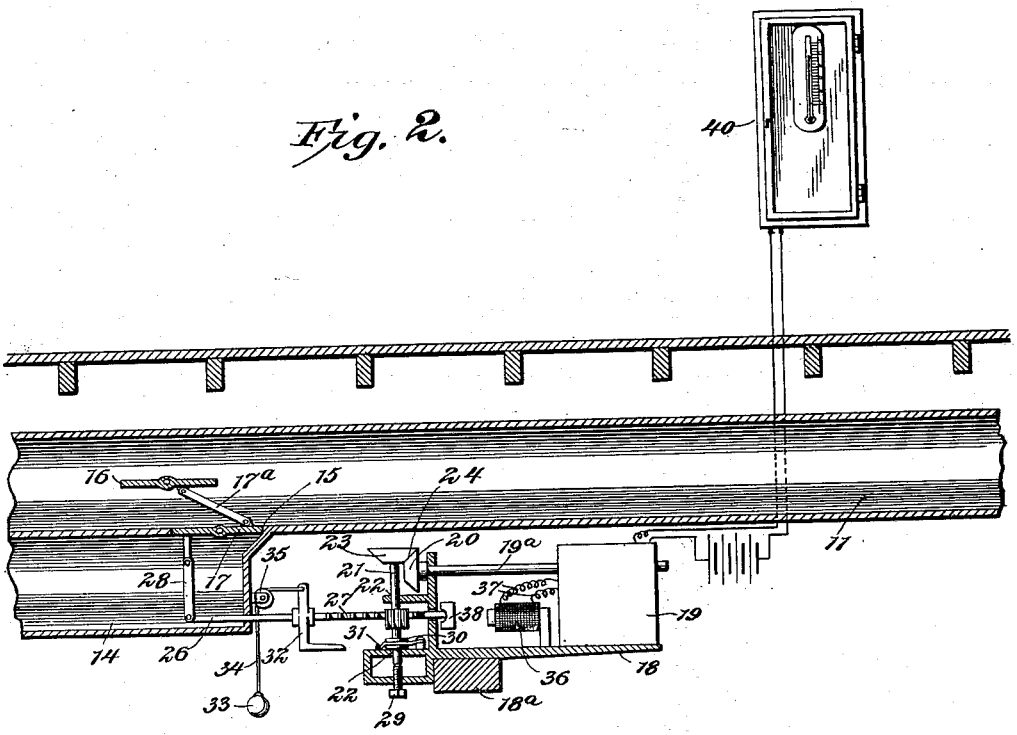


Fig. 2.



Witnesses
Howard D. Orr.
Geo. H. Chandlee.

John T. Luton, Inventor.
By his Attorneys.
C. A. Snow & Co.

UNITED STATES PATENT OFFICE.

JOHN THOMAS LUTON, OF EVANSVILLE, INDIANA.

AUTOMATIC DAMPER-REGULATOR.

SPECIFICATION forming part of Letters Patent No. 647,723, dated April 17, 1900.

Application filed October 10, 1899. Serial No. 733,185. (No model.)

To all whom it may concern:

Be it known that I, JOHN THOMAS LUTON, a citizen of the United States, residing at Evansville, in the county of Vanderburg and State of Indiana, have invented a new and useful Automatic Damper-Regulator, of which the following is a specification.

My invention relates to improvements in automatic damper-regulators employed in ventilating and heating buildings, houses, and the like, wherein are employed a valved hot-air flue, a valved cold-air flue, a thermostat, and devices actuated by said thermostat to move the valve in the hot-air flue to a closed position and at the same time open the valve in the cold-air flue on an increase of the temperature in the apartment to a certain limit.

One object of this invention is to simplify the construction of the devices which constitute the operative elements of a mechanism of the class above specified with a view to making the parts quite cheap in construction and noiseless in operation, so that the system may be installed in a building at a comparatively-small cost.

A further object is to provide an improved damper-operating mechanism by which the dampers in the two flues may be simultaneously and automatically operated by the energy of an electric motor which and its related parts are practically noiseless in service, and with this motor is combined means which break the train of mechanical connections from the motor to the damper-actuating device, so that the motor may continue in service after the dampers shall have been shifted until the motor-circuit is broken.

With these ends in view the invention consists in the construction and arrangement of parts, which will be hereinafter fully described and claimed.

To enable others to understand the invention, I have illustrated the same in the accompanying drawings, forming a part of this specification, and in which—

Figure 1 is a sectional elevation illustrating my improved heating and ventilating system in connection with one room of a building. Fig. 2 is an enlarged view partially in section and partially in elevation and showing the complete mechanism with the parts in position to close the warm-air flue and open the cold-air flue as the motor is rotated. Fig. 3 is an enlarged view partially in section and partially in elevation and showing the positions of the parts when the hot-air flue is closed and the cold-air flue is opened.

The same numerals of reference are used to indicate like and corresponding parts in each of the several figures of the drawings.

The room or apartment to be heated and ventilated by my improved system is indicated by the numeral 10, and beneath the floor of this apartment is the hot-air flue 11, having an upright branch 12, which discharges through a suitable register 13, which may be provided in one of the walls of the room. A cold-air flue 14 is arranged parallel to the flue 11, preferably beneath the same, and communication between the two flues is established by means of a port 15, the latter being formed at a point between the branch 12 and the damper in the hot-air flue, whereby cold air from the flue 14 may flow into a part of the flue 11 and be admitted to the room by the branch flue and the register.

A damper 16 is pivoted or hung in the hot-air flue at a point contiguous to the port 15, and another damper 17 is hung at a point to close the port 15 in one position of said damper. The two dampers are connected operatively by a link 17^a, which is so arranged as to open the damper in one flue and to close the damper in the other flue, whereby the link serves to simultaneously move the two dampers.

A supporting-beam 18^a is fixed below the hot-air flue and spaced from the closed end of the cold-air flue, said beam carrying a suitable metallic frame 18, which serves to support an electric motor 19, as well as the several operative parts which are associated with the motor and the dampers. The armature-shaft 19^a of this motor is provided with a cone-pulley 20, the latter adapted to have frictional engagement with a corresponding pulley 23 upon a vertical shaft 21 under some conditions in the adjustment of the latter. Said vertical shaft is revolubly and slidably mounted in suitable bearings 22 of the metallic frame, the cone-pulley 23, carried by the upper end of said shaft, being provided with a facing of some good friction material 24, such as leather, rubber fabric, or any

other substance adapted for the purpose. This vertical shaft is mounted in its bearings to rotate freely therein and to be capable of a limited sliding motion, so that its cone-pulley may engage frictionally with the pulley on the armature-shaft and motor in order that the vertical shaft may be driven by the motor for actuating the damper-operating devices. The vertical shaft is furthermore provided with an elongated gear-pinion 25, the latter adapted to mesh with a series of gear-teeth forming a rack 27 on a horizontally-slidable bar 26. Said bar is guided in suitable openings provided in the metallic frame and in the closed end of the cold-air flue 14, so that one end of this bar extends into the flue, and a link 28 has one end thereof pivoted to the inner end of the slidable bar, the opposite end of said link being pivoted to the damper 17, so that the slidable bar is operatively connected by the links 28 17^a to the two pivoted dampers in the hot-air and cold-air flues. The movement of the vertical shaft 21 in a downward direction under the influence of an impelling-spring 31 is limited or regulated by an adjustable screw 29, which has a threaded bearing in the metallic frame 18, so that the screw is in alinement vertically with the shaft 21. The depressing-spring 31 is shown as having one end secured firmly to the metallic frame, said spring engaging with the vertical shaft between a pair of spaced collars 30, which are fixed or integral with the shaft, the free end of said depressing-spring being extended beyond the collars in order that a lifting-shoe 32 may fit beneath said spring. This lifting-shoe is fast with the slidable bar 26, but normally the shoe is free from engagement with the depression-spring, because the slidable bar is pulled in a backward direction by the employment of a drop-weight 33. This drop-weight is attached to a cable 34, which passes over a suitable guide-sheave 35, the opposite end of said cable being secured to a projecting arm of the shoe or to the slidable bar itself. An electromagnet 36 is supported on and insulated from the metallic frame 18 in any suitable way, said magnet being arranged in alinement with the slidable bar 26. This electromagnet has suitable connections 37, by which it is included in the motor-circuit, and, as is usual in the art, the magnet has a hole-piece 38, which faces one end of the slidable bar 26, a section of said bar being insulated electrically from the rack-formed portion of the bar and the metallic frame to serve as an armature to the electromagnet.

The motor-circuit includes wires 47 and 48, which lead to the contacts of a thermostat 40, of any suitable construction and adapted under the influence of an excessive rise in temperature to close the motor-circuit and under the influence of a drop in temperature to break the motor-circuit.

The drop-weight 33 normally draws the slidable bar 26 in a direction to move the damper 17 to a closed position across the port 15 and the damper 16 to an open position in the hot-air flue 11, thus cutting off the ingress of cold air from one flue and permitting warm air to pass to the room or apartment. In this position of the slidable bar 26 its armature end is withdrawn from the pole-piece of the electromagnet and the lifting-shoe 32 is free from engagement from the depressing-spring 31, although I have shown the parts in their reversed positions by Fig. 1 of the drawings. Said slidable bar and the parts related thereto occupy the described position when the motor-circuit is open or broken; but when the thermostat is actuated to close the motor-circuit the armature thereof is rotated in order to drive the cone-pulley 20, which in turn propels the cone-pulley 22 and the shaft 21, whereby the gear 25 is driven to move the bar 26 in a direction toward the motor. The endwise movement of the bar 26 is effected against the action of the drop-weight to move the dampers to the positions indicated by Fig. 1, thereby opening the damper in the cold-air flue and closing the damper in the hot-air flue positively by the energy of the motor. The movement of the slidable bar toward the motor causes the shoe 32 to engage with and lift the depressing-spring 31, and at the same time the armature of the slidable bar is attracted by the electromagnet, so that the bar will be held in the position indicated by Fig. 1 by the magnet, which is energized by the motor or the motor-circuit. During the operation of moving the bar 26 in the direction indicated the shoe lifts the spring and the shaft 21 for the cone-pulley 23 to be free from frictional engagement with the pulley on the armature-shaft, and thus the valve-actuating devices are permitted to be held in their locked positions by the electromagnet, while the motor is free to rotate, because its circuit is closed by the thermostat. Cold air may be supplied to the room until its temperature is lowered sufficiently to actuate the thermostat to break the motor-circuit. At the same time the electromagnet is deënergized, whereupon the drop-weight 33 moves the slidable bar 26 in an opposite direction, so as to close the valve 17 in the cold-air flue and open the valve 16 in the hot-air flue. The motor-circuit being broken, the rotation of the armature is arrested and the spring 31 lowers the vertical shaft and its cone-pulley to restore the parts to the position for operation.

It will be noted that I have provided a valve-actuating mechanism which is exceedingly simple in construction and which is practically noiseless in operation, so that the attention of pupils in a school-room, when the system is installed in a school building, will not be attracted by the operation of the thermostat or the valve mechanism, although it will be understood that the system may be used in dwellings and in buildings.

The parts of my improved system being

simple in construction enables the apparatus to be manufactured at a minimum of cost and to be installed in a building without involving any considerable outlay of money. The apparatus is efficient in operation and requires practically no attention to keep the parts in working condition.

Changes may be made in the form and proportion of some of the parts while their essential features are retained and the spirit of the invention embodied. Hence I do not desire to be limited to the precise form of all the parts as shown, reserving the right to vary therefrom.

Although I have shown and described my valve-controlling mechanism in connection with pivoted dampers and the flues of a ventilating system, it is evident that the valve-controlling mechanism embodying the essential features of my invention may be used in connection with other types of valves than the dampers herein disclosed, and, furthermore, that said valve-controlling mechanism may be used to control the valves or dampers in different styles of flues adapted for the purpose either of ventilating a room or for warming the same.

Having thus described the invention, what I claim is—

1. In an automatic damper-regulator, the combination with a valved hot-air flue, a valved cold-air flue, and a motor included in a normally-open motor-circuit having a thermostat, of a slidable bar connected operatively with said valves in the flues, an electromagnet arranged to hold the slidable bar in one position, a shaft geared to said slidable bar and adapted to be propelled from the motor through suitable gearing, and means actuated by the bar to disconnect said shaft from the motor-shaft, substantially as described.

2. In an automatic damper-regulator, the combination with a valved hot-air flue, a valved cold-air flue, and an open motor-circuit including a thermostat and an electric motor, of a slidable bar connected operatively with said valves, a vertically-slidable shaft geared to the slidable bar, means between the motor-shaft and the vertically-slidable shaft to rotate the latter, a retractor tending to move the slidable shaft into gear with the motor-shaft, a lifting-shoe carried by the slidable bar and adapted to lift the slidable shaft against the action of its retractor, and means for holding the slidable bar in place when the shoe is in operative relation to the slidable shaft, substantially as described.

3. In an automatic damper-regulator, the combination with a hot-air flue, a cold-air flue, and an open electric circuit including a thermostat and an electric motor, of dampers pivoted respectively in the hot-air and cold-air flues and linked together for simultaneous operation, a slidable bar having one end thereof linked to one of the dampers, a drop-weight connected with said slidable bar, an electromagnet included in circuit with the motor and in operative relation to the slidable bar, a vertically-slidable shaft geared to the slidable bar and having frictional gearing with the motor-shaft, a spring to move the slidable shaft in one direction, and a shoe carried by the slidable bar and adapted to move the slidable shaft in the opposite direction, substantially as described.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

JOHN THOMAS LUTON.

Witnesses:
MICHAL ZARHERES,
HERMAN HEITMAN.