

Feb. 23, 1937.

T. M. RUST ET AL  
HEATING AND COOLING SYSTEM

2,071,801

Filed March 5, 1936

2 Sheets-Sheet 1

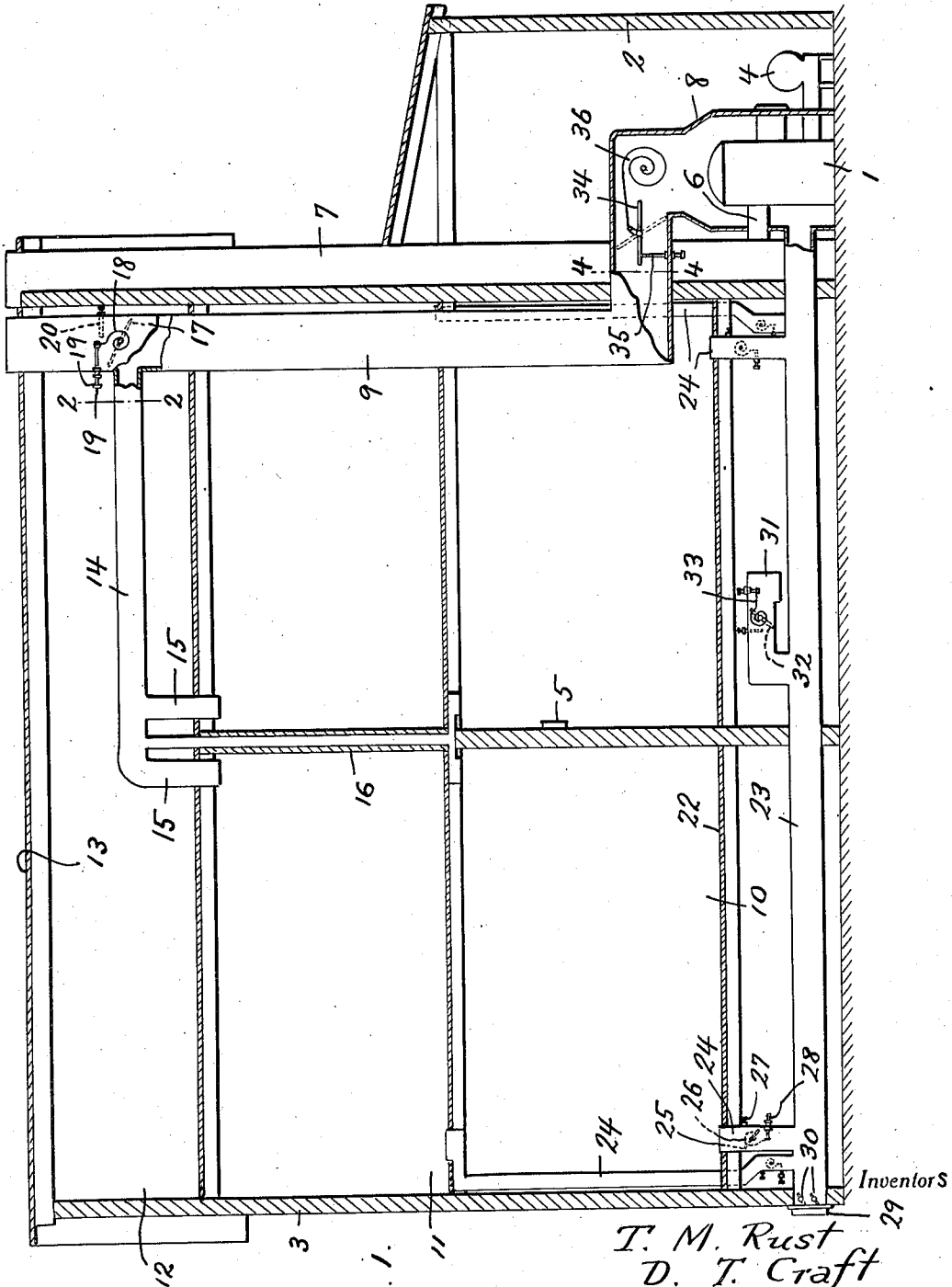


Fig. 1.

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2 Sheets-Sheet 2

Fig. 2.

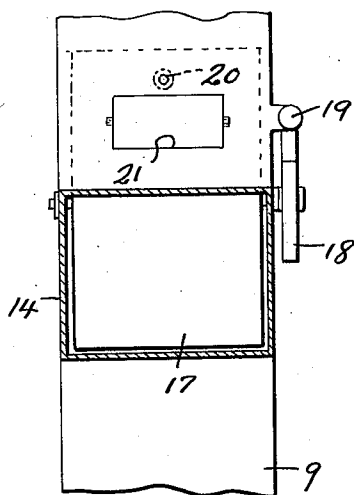


Fig. 3.

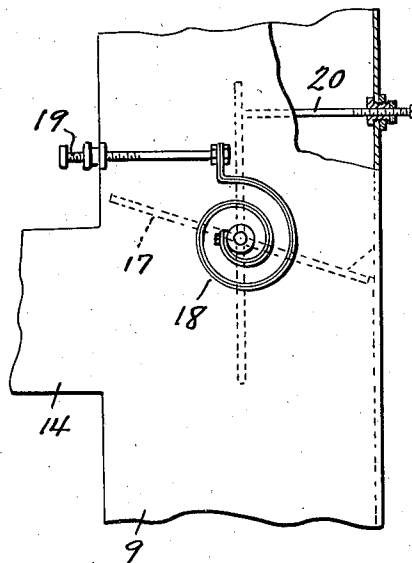
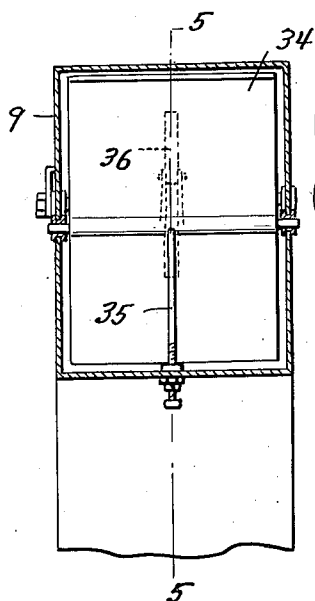


Fig. 4.

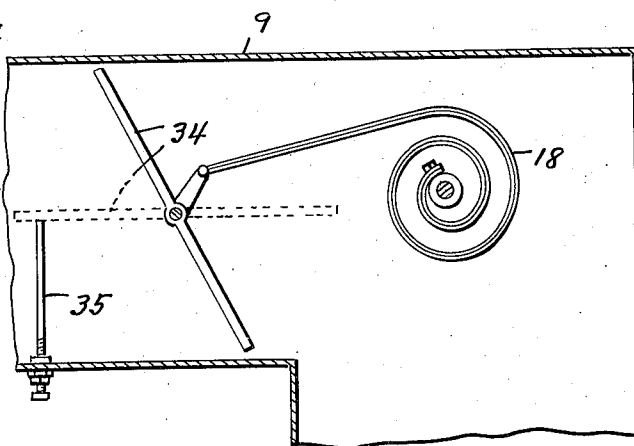


Fig. 5. Inventors

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## UNITED STATES PATENT OFFICE

2,071,801

## HEATING AND COOLING SYSTEM

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3 Claims. (Cl. 237—48)

The present invention relates to new and useful improvements in heating and cooling systems particularly for residential buildings, although it will be understood that an apparatus in accordance with the present invention may be installed for use in any other types of buildings for which it may be found adapted and desirable.

The primary object of the invention is to provide, in a manner as hereinafter set forth, a system of the aforementioned character embodying a novel construction, combination and arrangement of parts through the medium of which an even, predetermined temperature will be automatically maintained in all of the rooms of the building.

Another very important object of the invention is to provide, in a manner as hereinafter set forth, an apparatus of the character described which may be expeditiously converted for use as a cooling system in warm weather.

Other objects of the invention are to provide a heating and cooling system of the character set forth which will be comparatively simple in construction, strong, durable, highly efficient and reliable in operation, compact and which may be manufactured and installed at low cost.

All of the foregoing and still further objects and advantages of the invention will become apparent from a study of the following specification, taken in connection with the accompanying drawings wherein like characters of reference designate corresponding parts throughout the several views, and wherein:—

Figure 1 is a view in vertical section through a building, showing a system in accordance with the present invention installed therein, portions of said system being broken away in vertical section.

Figure 2 is a view in vertical section, taken substantially on the line 2—2 of Figure 1.

Figure 3 is a view partially in side elevation and partially in section of that portion of the invention shown in Figure 2.

Figure 4 is a vertical sectional view, taken substantially on the line 4—4 of Figure 1.

Figure 5 is a vertical sectional view, taken substantially on the line 5—5 of Figure 4.

Referring now to the drawings in detail, it will be seen that the reference numeral 1 designates a furnace which, in the arrangement illustrated, is installed at grade in a furnace room 2 which is constructed as an annex to the building 3. The furnace 1 is provided with an oil burner 4 which is automatically controlled by a thermostat 5

suitably located in the building 3. The furnace 1 is connected, as at 6, to a chimney 7.

The furnace 1 is enclosed in a spaced jacket 8 from the top of which a delivery pipe 9 extends upwardly through the first and second floor rooms 10 and 11, respectively, of the building 3, through the attic 12 and then through the roof 13 to the atmosphere. Connected to the delivery pipe 9 in the attic 12 is a manifold 14 the branches 15 of which communicate with the rooms 10 and 11 through the ceilings thereof. It will be observed that the branch 15 from the manifold 14 which communicates with the lower rooms 10 extends downwardly in the partition 16 between the upper rooms 11.

Mounted in the delivery pipe 9, above the manifold 14, is a damper 17 which is actuated or controlled by a thermostat 18 located on the outside of said delivery pipe 9. The thermostat 18 may be conveniently adjusted as desired to function at different temperatures through the medium of an adjusting screw 19 to which one end of said thermostat is connected. The reference numeral 20 designates an adjustable stop for the damper 17 which is mounted in the pipe 9. The reference numeral 21 designates a vent having a suitable closure or cover through the medium of which the pipe 9 communicates with the attic 12.

Extending beneath the lower or ground floor 22 of the building 3 is a return pipe 23 which communicates with the jacket 8 adjacent the bottom thereof. Branches 24 from the pipe 23 communicate with the rooms 10 and 11 through the floors thereof. The branches 24 are provided with dampers 25 which are operated by thermostats 26 located in said branches 24. Adjustable stops 27 are provided for the dampers 25. Adjusting screws 28 are provided for regulating the thermostats 26.

The end of the pipe 23 which is remote from the jacket 8 passes through the foundation of the building 3, as at 29, to the outside atmosphere and mounted in this end portion of said pipe 23 are dampers 30. The reference numeral 31 designates a cool air inlet for the pipe 23 which is located below the ground floor 22 of the building 3. The inlet 31 is controlled by a damper 32 which is actuated by an adjustable thermostat 33 located on the outside of said inlet 31.

Mounted in the inlet end portion of the pipe 9 is a damper 34 for which an adjustable stop 35 is provided. The damper 34 is actuated by a thermostat 36 which is located in the intake end

portion of the pipe 9 immediately above the jacket 8.

Briefly, the operation of the system is substantially as follows:—

5 With the damper 34 open and the damper 17 closed, as seen in Figure 1 of the drawings, warm air from the jacket 8 passes upwardly through the pipe 9, through the manifold 14 and is discharged from the branches 15 into the rooms 10 and 11 at the ceilings thereof. As the air cools it drops and passes into the branches 24 and then through the pipe 23 back to the jacket 8 to be reheated. It will thus be seen that a continuous circulation of the air is had. The thermostats 26 are set to close the dampers 25 when the air in the rooms 10 and 11 is at or above a predetermined temperature. By reason of this arrangement the circulation will take place only through those rooms in which the temperature has fallen below the desired point. It may also be well to here state that the registers or inlets of the branches 24 are located at the most advantageous points in the rooms 10 and 11 for receiving the coldest air in said rooms, such as adjacent the outside or exposed walls, below windows, etc. When the oil burner 4 is not functioning and the air in the jacket 8 falls below a predetermined temperature the thermostat 36 closes the damper 34 for preventing circulation of cold air through the rooms. Of course, when the oil burner 4, under the control of the thermostat 5 begins to function and the air in the jacket 8 is heated, the damper 34 is opened by the thermostat 36 thereby permitting passage of the heated air up the pipe 9. In warm weather the damper 34 is normally maintained in closed position and the damper 17 is opened by its thermostat 18 which is responsive to the temperature in the attic 12. The dampers 25 are now opened, also the dampers 30 or the damper 32, to permit the passage of cool air through the pipe 23, through the branches 24 and the rooms 10 and 11, then through the branches 15, the manifold 14 and the upper portion of the pipe 9 to the atmosphere above the roof 13 of the building 3. As the damper 32 is located in the comparatively cool air under the building 3 said damper will be kept open at all times in warm weather by its respective thermostat 33. The dampers 30 are manually operated while the damper 32 is, as hereinbefore described, thermally controlled. It may also be well to here state that in warm weather, with the burner 4 out of operation, the temperature in the lower end portion of the pipe 9 will not be sufficiently high to cause the thermostat 36 to open the damper 34 while the comparatively high temperature in the attic 12 of the building 3 will cause the thermostat 18 to open the damper 17.

It is believed that the many advantages of a heating and cooling system constructed in accordance with the present invention will be readily understood, and although a preferred em-

bodiment of the apparatus is as illustrated and described, it is to be understood that changes in the details of construction and in the combination and arrangement of parts may be resorted to which will fall within the scope of the invention as claimed.

What is claimed is:—

1. A heating and cooling system for buildings comprising, in combination, a heating plant, a conduit extending from said heating plant to the atmosphere, a manifold establishing communication between said conduit and the interior of the building, and a thermally controlled damper mounted in the conduit at a point between the manifold and the outlet end of said conduit to the atmosphere, said manifold extending horizontally from the conduit and having downwardly extending branches opening through the ceilings of the upper rooms of the building, one of said branches being enclosed in one of the partitions for the rooms and having a plurality of lateral branches opening through the ceilings of a lower group of rooms.

2. A heating and cooling system for buildings comprising, in combination, a heating plant including a furnace and a jacket enclosing said furnace, a conduit connected, at its lower end, to the top of the jacket and communicating, at its upper end, with the atmosphere, a manifold establishing communication between said conduit and the rooms of a building, a thermally controlled damper mounted in the conduit between said manifold and the atmosphere end of said conduit, a thermally controlled damper mounted in the jacket connected end portion of the conduit and in advance of the manifold, a return pipe connected to the jacket, branches connecting said return pipe to the rooms of the building, and thermally controlled dampers mounted in said branches.

3. A heating and cooling system for buildings comprising, in combination, a heating plant including a furnace and a jacket enclosing said furnace, a conduit connected, at its lower end, to the top of the jacket and communicating, at its upper end, with the atmosphere, a manifold establishing communication between said conduit and the rooms of a building, a thermally controlled damper mounted in the conduit between said manifold and the atmosphere end of said conduit, a thermally controlled damper mounted in the jacket connected end portion of the conduit and in advance of the manifold, a return pipe connected to the jacket, branches connecting said return pipe to the rooms of the building, and thermally controlled dampers mounted in said branches, said return pipe having communication with the atmosphere, and dampers for controlling the communication between said return pipe and the atmosphere.

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