

N. E. NASH.
HEAT REGULATING APPARATUS.
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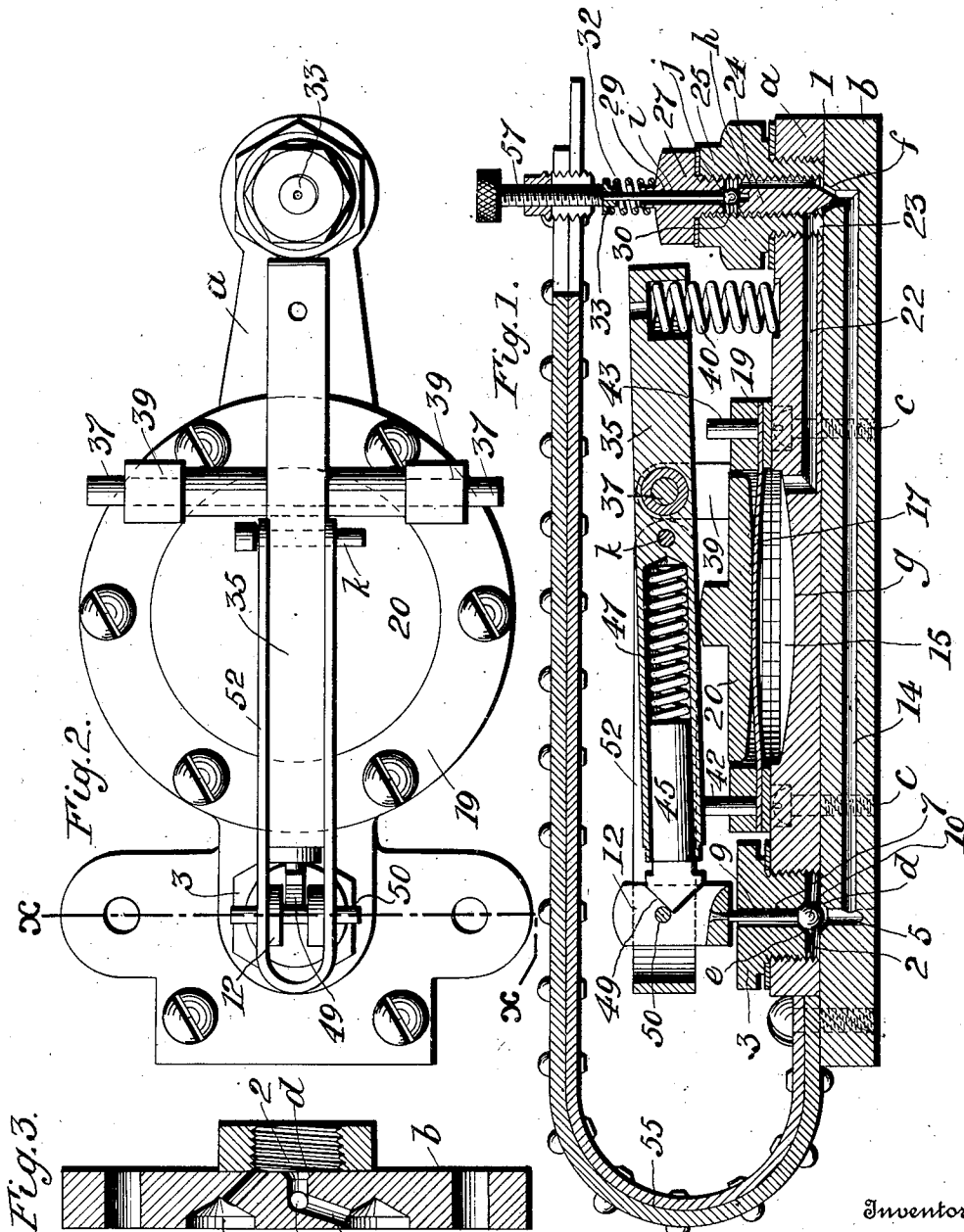


Fig. 3.

Witnesses
A. W. C. Blunkard
Alberta Richards.

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Inventor
Nathan E. Nash,
W. H. W. T. Howard
Attorney

UNITED STATES PATENT OFFICE.

NATHAN E. NASH, OF TORONTO, ONTARIO, CANADA.

HEAT-REGULATING APPARATUS.

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To all whom it may concern:

Be it known that I, NATHAN E. NASH, a citizen of the United States, and resident of the city of Toronto, in the Province of Ontario, Dominion of Canada, have invented certain Improvements in Heat-Regulating Apparatus, of which the following is a specification.

This invention relates to certain improvements in that class of heat-regulating apparatus in which the opening and closing of the radiator valve, or that valve which admits steam or hot water to a radiator, is effected, primarily, by a thermostat which in its movement consequent upon a change in temperature of the air surrounding the thermostat, controls the admission to and the discharge of air from a diaphragm adapted to either open or close the radiator-valve, as may be arranged, the reverse movement being effected by a spring.

An important object of the present invention is to reduce the expenditure of compressed air used as the motive force to actuate the diaphragm of the radiator valve; and the invention consists in a peculiar arrangement of certain air-passages in the heat-regulating apparatus and the construction of certain controlling valves and their attachments used in connection with the said air-passages, whereby direct communication between the tank in which the compressed air is stored and the atmosphere is only momentary, or during the period of time required by the said valves to pass from one extreme position to another,—a period so minute as to be hardly appreciable.

In the description of the improved apparatus which follows reference is made to the accompanying drawing, forming a part hereof, and in which,—

Figure 1 is a central side section of the heat regulating apparatus, and Fig. 2 a top view of the same, except that a certain thermal blade forming a part of the apparatus is omitted. Fig. 3 is a section taken on the dotted line *x—x* in Fig. 2.

Referring now to the drawing, 1 is the shell of the apparatus which for the sake of convenience in manufacture, is formed of two parts *a* and *b* fastened together by the screws *c* shown in dotted lines in Fig. 1.

2 is the main valve chamber of the apparatus the bottom of which is in horizontal alignment with the upper surface of the part *b* of the shell. The top of the chamber 2 is

formed by the plug 3 which is screwed into the part *a* of the shell.

In the part *b* of the shell 1 are two passages 4 and 5 which lead from the bottom thereof to the valve chamber 2, and the passage 4 is in communication with the diaphragm chamber of an ordinary radiator valve not shown, to either open or close the valve as may be arranged. The passage 5 leads to a reservoir, not shown, of air under pressure. At the inner end of the passage 5 is formed a valve seat *d* and at the bottom of the channel 7 which extends through the plug 3 is a similar seat *e*. In the channel 7 is a loosely fitting stem 9 having a spherical valve 10 at its lower end, adapted to come into contact with either of the valve seats *e* and *d* and thereby close the passage 5 leading to the valve chamber 2, or the annular space in the channel 7 around the valve stem 9. The upper end of the valve stem 9 has a slotted head 12 for a purpose hereinafter described.

14 is a branch passage leading from the main passage 5, and extending longitudinally of the part *b* of the shell to near its end where it is turned up to the surface of the said part and counter-bored to produce the valve seat *f* adapted to receive a needle valve hereinafter described. In the part *a* of the shell 1 is a concave surface *g* which constitutes the bottom of the diaphragm chamber 15 in which is adapted to vibrate the diaphragm 17 formed of some flexible material, which is held in place by the ring 19 and screws shown in Fig. 2. A suitable annular joint-forming gasket is interposed between the diaphragm 17 and the surface of part *a* of the shell 1; and 20 is a disk having a convex under surface which is placed loosely in the diaphragm chamber 15 and rests upon the diaphragm 17.

22 is a duct in the part *a* of the shell 1 extending from the portion of the diaphragm chamber which is beneath the diaphragm therein, in a direction parallel with the branch passage 14 and terminating at the space 23.

24 is an adjustable needle valve before referred to which is screwed through the plug 25 which in turn is screwed into the part *a* of the shell 1, and directly over the valve seat *f* which performs a function hereinafter described. At one side thereof, the needle valve is provided with a groove *h* which constitutes a by-pass for the exit of air

from under the diaphragm 17 in the diaphragm chamber 15 to the atmosphere during one part of the operation of the apparatus, as will hereinafter appear.

27 is a cap screwed into the plug 25, having a central aperture *i* through which the stem 29 passes loosely so as to give an annular space around it. At the lower end of the stem 29 is a valve 30 which is held yieldingly in contact with the valve seat *j* formed at the lower end of the aperture *i* in the cap 27 by means of a spring 32 which is coiled around the stem 29 and confined end-wise between the top of the cap 27 and a collar 33 which is tight on the stem.

35 is a rocker having trunnions 37 which are journaled in the columns 39 erected on the ring 19 and best shown in Fig. 2. The rocker 35 is always under an upward tension at one end thereof effected by means of the compressed spiral spring 40, the upper end of which rests in a cavity in the rocker, and its lower end in a similar cavity in the surface of the part *a* in the shell 1. 42 is a stop upon which the other or free end of the rocker 35 rests, with a pressure due to the strength of the spring 40. 43 is another and similar stop to limit the upward movement of the free end of the rocker caused by the action of the disk 20 through the medium of the diaphragm underneath it, when the diaphragm chamber 15 is supplied with air under pressure. The rocker 35 is longitudinally bored at its free end, and in the hole thus produced, is placed a loosely fitting plunger 45 which is backed by the compressed spiral spring 47. At its outer end the plunger 45 is fitted with a head having a chisel point or edge 49 which is at all times in the slot in the head of the valve stem 9, and with one of the angular faces of the chisel edge bearing against the pin 50 which passes through the said head and also through the yoke 52 which is pivoted to the rocker 35 at *k*. The function of the yoke 52 is to prevent the valve stem 9 being pushed over or from a vertical position, by the pressure of the chisel pointed plunger against the pin 50.

55 is a thermal blade, the butt end of which is fastened to one end of the part *b* of the shell 1 by means of screws. The free end of the thermal blade 55 extends over the stem 29 of the valve 30, and is provided with an adjusting screw 57 the point of which at times is nearly in contact with the spring-supported said stem, and at other times, bearing upon the same to press it down and force the valve 30 from its seat *j* as will hereinafter fully appear.

In the drawing, the diaphragm 17 is shown in its lowest position, or as it appears when the diaphragm chamber underneath it is in communication with the outer air by means of the duct 22; the grooved valve 24,

and the annular space around the valve stem 29. In the fall of the disk 20 and the diaphragm 17, all pressure against the rocker, except that exerted by the spiral spring 40 is removed.

To fully understand the operation of the apparatus, it must be understood that at this time, the air in the room in which the radiator and its controlling valve are placed, has reached the maximum temperature, and by a previous operation the various parts of the apparatus have been placed in the relative positions shown in the drawing, the operation of the apparatus to close the radiator valve and shut off steam from the radiator, will therefore be as follows:—By reference to the drawing it will be seen that the pressure of the screw 57 at the end of the thermal blade 55 has pushed down the stem 29, and opened the valve 30 which allows of the escape of air from beneath the diaphragm 17, which had before supported it, the escape being by way of the aperture *i*. The rocker 35 is thereby allowed to fall and take the position shown, with its chisel edge underneath the pin 50 and holding the valve 10 tightly to its seat *e*, and the escape of compressed air is thus prevented. The spherical valve 10 being raised from its seat *d*, compressed air now passes from the passage 5 through the valve chamber 2 to the passage 4, and thence to the diaphragm of the radiator valve which is thereby closed; and steam is not again admitted to the radiator until the temperature in the room falls below the minimum allowed, when on the upward motion of the end of the thermal blade, the valve 30 is pressed to its seat, by the spiral spring 32 which stops all communication between the diaphragm chamber and the atmosphere, and by the rise of the rocker through the medium of the diaphragm and the disk 20, the chisel edge of the plunger 45 passes the center of the pin 50 and its lower inclined surface forces the said pin down, thereby bringing the spherical valve 10 to its face *d*. By this operation, the admission of the compressed air to the apparatus is stopped and the air from the radiator valve allowed to escape through the channel 7; and there is therefore no drain on the air reservoir until in the return of the various parts of the apparatus to the positions which they occupy in the drawing.

From the foregoing description, it will be understood that the movement of the valve 10 to either of its seats *d* and *e* is positively effected, and at no time and under no circumstances can the valve remain unseated which would cause a continuous escape of compressed air from its reservoir by way of the channel 7.

I claim as my invention,—

1. In a heat regulating apparatus, a shell having therein a valve chamber with a pas-

sage leading therefrom to a source of air under pressure, a second passage leading to where the compressed air is to be utilized, and a channel in longitudinal alinement with the first passage, which channel is open to the outer air, a double-faced valve in the said chamber, adapted to vibrate between the first passage and the channel, and thereby control the admission of compressed air to, and the escape of air from the valve chamber, and a stem extending from the double-faced valve through the said channel, having a head carrying a transversely-extending exposed pin; combined with a trunnioned rocker supported at one end by a spring, and at the other end provided with a spring-backed plunger having a chisel point which bears against the said transverse pin, and temperature-controlled means to produce a vibration of the rocker and the reciprocation of the double-faced valve, substantially as specified.

2. In a heat regulating apparatus, a shell having therein a valve chamber with a passage leading therefrom to a source of air under pressure, a second passage leading to

where the compressed air is to be utilized, and a channel in longitudinal alinement with the first passage, which channel is open to the outer air, a double-faced valve in the said chamber, adapted to vibrate between the first passage and the channel and thereby control the admission of compressed air to, and the escape of air from the valve chamber, and a stem extending from the double-faced valve through the said channel, having a head carrying a transversely-extending exposed pin; combined with a trunnioned rocker supported at one end by a spring, and at the other end provided with a spring-backed plunger having a chisel point which bears against the said transverse pin, a yoke carried by the rocker and attached to the transverse pin to prevent lateral deflection of the valve stem, and temperature-controlled means to produce a vibration of the rocker and the reciprocation of the double-faced valve, substantially as specified.

NATHAN E. NASH.

Witnesses:

WM. T. HOWARD,
ALBERTA RICHARDS.