

N. E. NASH.
HEAT REGULATING APPARATUS.
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2 SHEETS—SHEET 1.

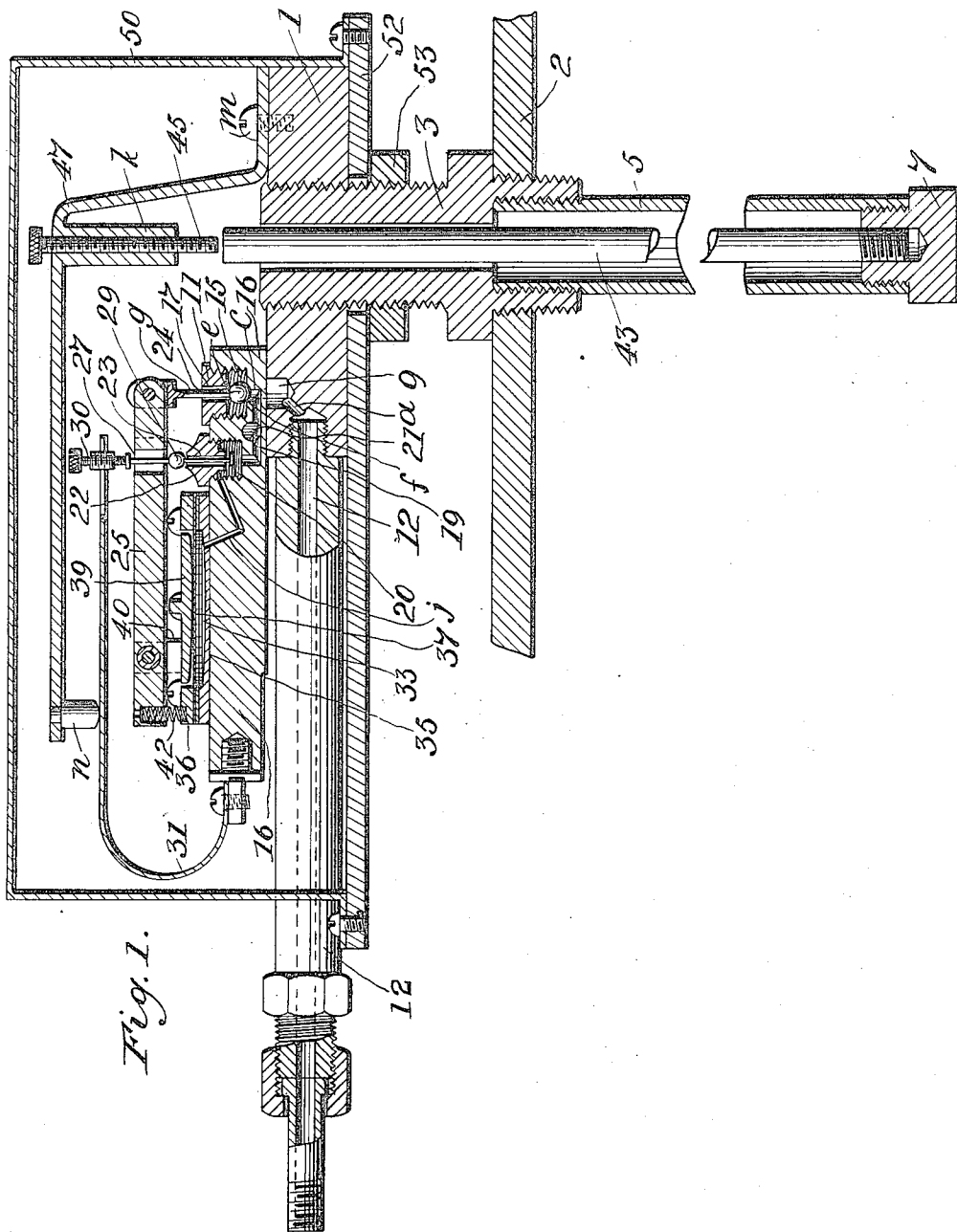


Fig. 1.

Witnesses

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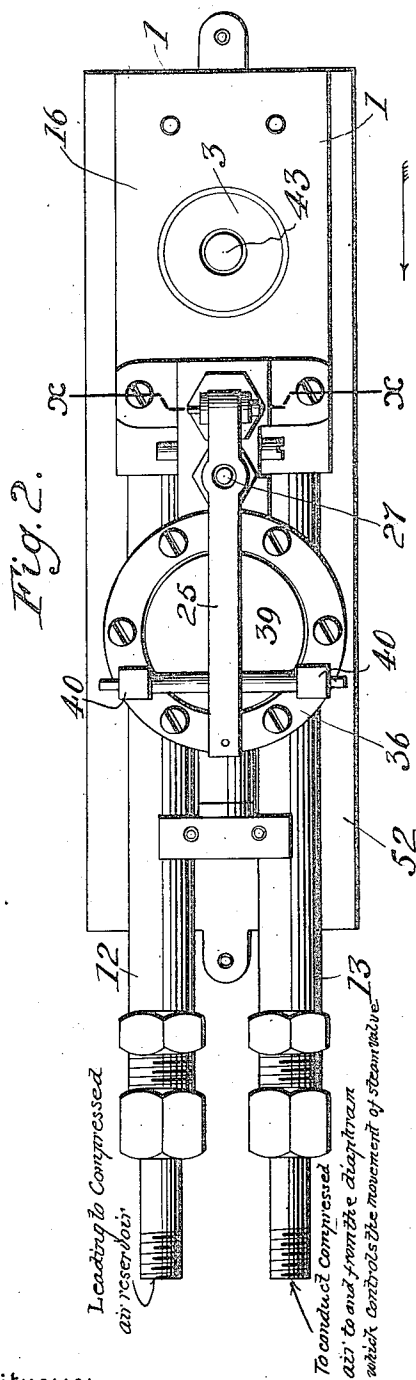
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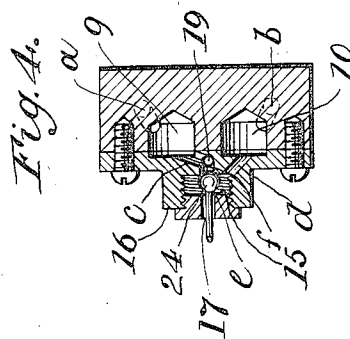
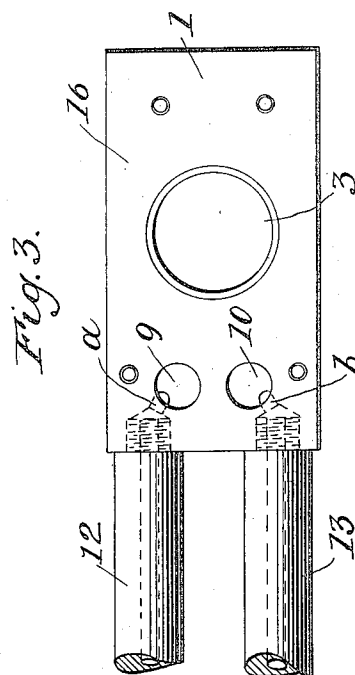
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2 SHEETS—SHEET 2.



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HEAT-REGULATING APPARATUS.

1,060,780.

Specification of Letters Patent.

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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 means to maintain the water in a tank adapted to supply a radiator, at a regular and predetermined temperature; and it consists in an improved apparatus whereby air under pressure is used to control the opening and closing of a valve in the steam pipe whereby the water in the tank is heated, the operation of the said apparatus being effected by a change of temperature of the water, as will hereinafter fully appear.

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

Figure 1 is a partly sectional side view of the improved apparatus. Fig. 2 is a plan of the same with certain parts thereof removed. Fig. 3 is a plan of a part of Fig. 1. Fig. 4 is a section taken on the dotted line *x-x* in Fig. 2.

Referring now to the drawings, 1 is the body of the apparatus adapted to be placed over a tank containing hot water to be supplied to a radiator for heating purposes. A portion of the upper wall of the said tank is represented by 2 in Fig. 1, as is also a hollow supporting stud 3 which at one end is screwed into the body 1, and at the other end screwed into the wall of the tank. The lower end of the stud 3 is interiorly threaded, and into it is screwed a thermostatic tube 5 which extends into the water in the tank, and is closed at its lower end by a cap 7. At its upper end, the thermostatic tube is in communication with the outer air by means of the central aperture in the stud 3, as shown in Fig. 1.

9 and 10 are chambers situated side by side in the body 1 as shown in Figs. 1, 3 and 4; and 12 and 13 are nozzles screwed into the body, and in communication with the said chambers, by means of the passages *a* and *b* respectively. The nozzles 12 and 13 lead

respectively to a source of supply of air under pressure, and to suitable valve controlling mechanism whereby steam is admitted to a pipe within the tank 2 to heat the water therein, as hereinafter more fully described. The chambers 9 and 10 intercommunicate by means of the channels *c* and *d* and they are in communication with a third chamber 15 (see Figs. 3 and 4) formed in a block 16 which is fastened by means of screws shown in Figs. 2, 3 and 4, to the body 1. Into the upper end of the chamber 15 is screwed a plug 11 having a central air-escape aperture 17; and at the lower end of the aperture, 17, and at the upper end of the channel *c* are formed the valve seats *e* and *f*, respectively.

19 is a continuously open duct leading from the channel *c* at a point which is below the valve face *f*, to a valve chest 20 formed in the block 16, which is fitted with a screw plug 22 having a central aperture 23 leading to the outer air.

21 is a plug which extends transversely through the block 16 and across the duct 19; and at the point where it intersects the said duct, it is flattened to produce a device similar to a cock key which can be turned to reduce the transverse area of the duct at that place. Within the chamber 15 is a spherical valve 24 adapted to seat on either of the valve faces *e* or *f*; and its stem *g* extends loosely through the aperture 17 and is pivoted at its upper end to a rocker 25 hereinafter described. Placed loosely in the aperture 23 in the screw plug 22, is a stem 27 having at its lower end a collar which is inoperative except that it serves to prevent withdrawal of the stem entirely from the plug; and upon this stem and directly over the said plug, is a valve 29 adapted to close the annular aperture 23 around the stem 27 under circumstances hereinafter described. The upper end of the stem 27 is provided with a head upon which rests the adjusting screw 30 at the end of the curved spring blade 31 which is attached to the block 16 and under tension in such direction as to normally hold the valve 29 away from the plug 22 and so disclose the central annular aperture 23 therein.

33 is a diaphragm chamber formed in

circular plate 35 mounted on the block 16, over which is secured by means of a ring 36, a flexible diaphragm 37. The interior of the diaphragm chamber is in communication
 5 with the valve chest 20 by means of the angular channel *j*; and supported by the diaphragm 37, is a disk 39 having a boss on its upper side which is in contact with the rocket 25 before referred to and which is
 10 pivoted to the columns 40 forming parts of the ring 36. The long arm of the rocker 25 is pivoted to the head of the valve stem *g* as before stated, and its short arm is yieldingly held in an upward position by a spring
 15 42 the upper end of which rests in a recess in the rocker, and its lower end in a similar recess in the ring 36.

43 is a bar with its lower end screwed into the cap 7, and its upper end extending above
 20 the hollow stud 3 where it is in contact with an adjusting screw 45 in a threaded sleeve *k* forming a part of an offset spring 47 which is held to the body 1 by the screws *m*. The outer or free end of the offset spring 47 is
 25 provided with a finger *n* which bears on the upper surface of the curved spring 31 with sufficient pressure to overcome the tendency of the curved spring to rise. The nozzles
 30 12 and 13 as before stated are respectively connected by means of pipes to a reservoir of compressed air, and to the upper side of a
 35 diaphragm forming a part of a valve mechanism which controls the passage of steam to a pipe (not shown) situated in the tank is closed by the pressure of compressed air
 40 on the diaphragm, and opened by means of a spring when the compressed air escapes. The construction of this valve mechanism is well known, and as it forms no part of the
 45 present invention, its illustration is omitted from the drawings; and for the purpose of perspicuity in the description of the operation of the apparatus, which follows, the
 50 said valve will be referred to as X.

50 is a casing which incloses the apparatus but does not insulate it from the outer air; and it is shown in Fig. 1 as erected on a
 55 plate 52 which is held to the body 1 by means of the nut 53 on the threaded stud 3.

The operation of the apparatus is as follows: In Fig. 1, the various elements of the apparatus are represented as they would appear should the valve X which controls the
 60 admission of steam to the steam pipes in the water tank be open due to the action of the spring beneath it, the compressed air being shut off from the diaphragm which is situated over the valve and serves to close it.
 65 Should the temperature of the water in the tank rise above that which has been prearranged as the maximum temperature, expansion of the thermostatic tube 5 will cause the upper end of the bar 43 to descend together with the adjusting screw 45; and in

view of the free end of the spring 47 having at all times a tendency to seek a lower level, the finger *n* bears on the curved spring 31 and after overcoming its resistance,
 70 forces it down, and the screw 30, through the agency of the stem 27, causes the valve 29 to seat on the screw plug 22 and close the aperture 23 therein. The escape of compressed air which reaches the said aperture
 75 by way of the constantly open channel 19 having the area-reducing key 21 therein, is now prevented, and the air accumulates under the diaphragm 36 which is thereby
 80 raised carrying with it the disk 39 which lifts the long arm of the rocker 25, and through the medium of the stem *g* transfers the spherical valve 29 from its seat *f* to the upper seat *e*. This movement of the
 85 valve 29 has the effect of closing the annular air escape aperture 17 around the stem *g*, and allows the compressed air to pass through the channel *c* into the valve chamber 20, and thence through the channel
 90 *d* to the chest 10 which is in communication with the nozzle 13 by means of the passage *b*, and thence to the space above the diaphragm of the steam valve X, which is closed and remains closed until the water
 95 in the tank falls below the predetermined minimum temperature. When this takes place, the thermostatic tube 5 will have contracted in length sufficiently to raise the bar 43, and cause the spring 47 and the various
 100 movable parts of the apparatus to assume their original positions, and so maintain them until the maximum temperature of the water in the tank is again exceeded, when the operation of the apparatus as described is repeated.

I claim as my invention,—

105 In combination with a water tank, a heat regulating apparatus which consists of a hollow stud which is inserted through the shell of the tank, a body fastened to the said stud having a pair of nozzles one of which
 110 leads to a source of air under pressure, and the other to a steam-valve-operating device adapted to govern the temperature of the water in the tank, the said body having a pair of intercommunicating chambers open
 115 to the said nozzles, a third chamber in communication with the others, a valve chest at all times open to intercommunicating chambers by means of a duct and provided with an aperture leading to the outer air,
 120 and a valve to control the said aperture, a valve in the third chamber to close or open communication between the said nozzles, and at times admit of the escape of air from the nozzle leading to the steam-valve-
 125 operating device, a flexible diaphragm with its under side constantly open to the valve chest, a trunnioned rocker actuated by the said diaphragm to open and close the valve
 130 in the third chamber, a thermostatic tube

closed at the bottom, and at the top screwed into the hollow stud and open to the air, a bar having its lower end fastened to the bottom of the thermostatic tube, and means
5 whereby the movement of the said bar produced by a change in the temperature of the water in the tank is transmitted to the valve in the valve chest to control the passage of air from below the diaphragm to the outer air, substantially as specified.

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