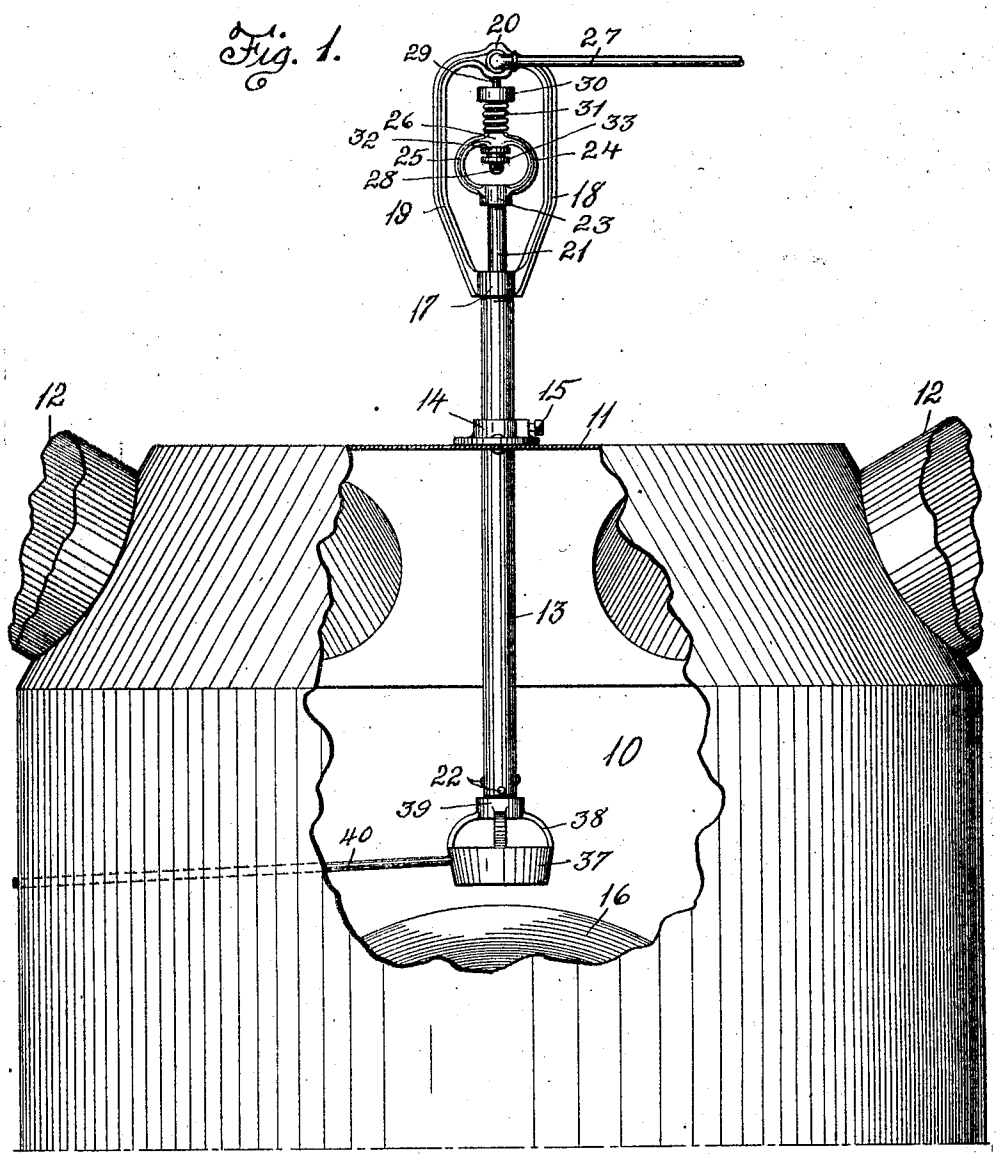
Aug. 2, 1927. 1,637,693

J. W. GALLOWAY

HUMIDIFIER

Filed Nov. 23, 1926 3 Sheets-Sheet 1

Fig. 1.



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HUMIDIFIER

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Fig. 2.

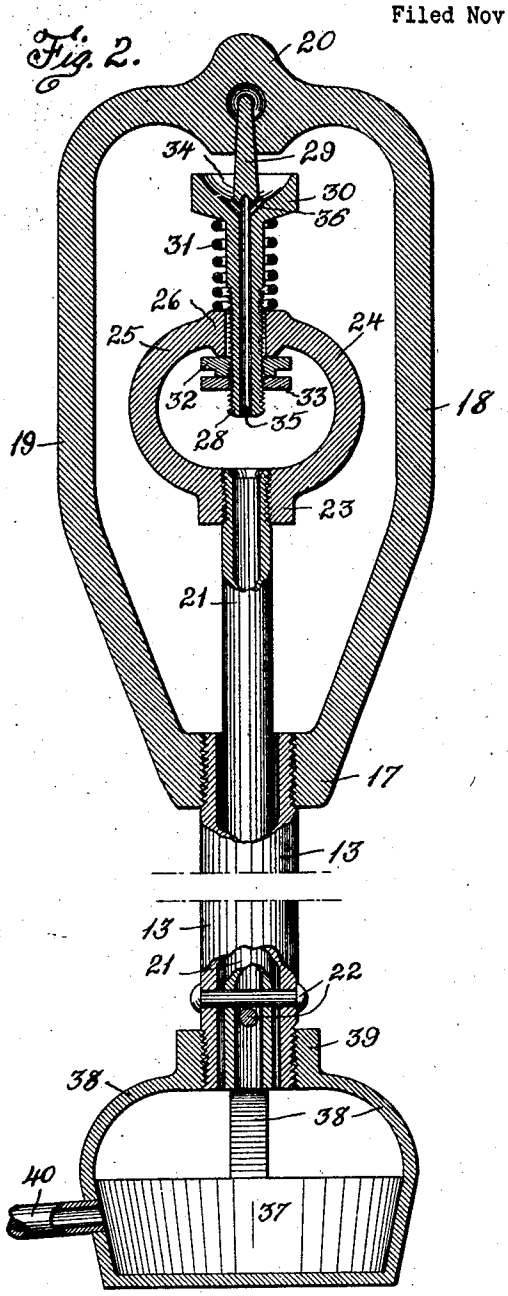


Fig. 3.

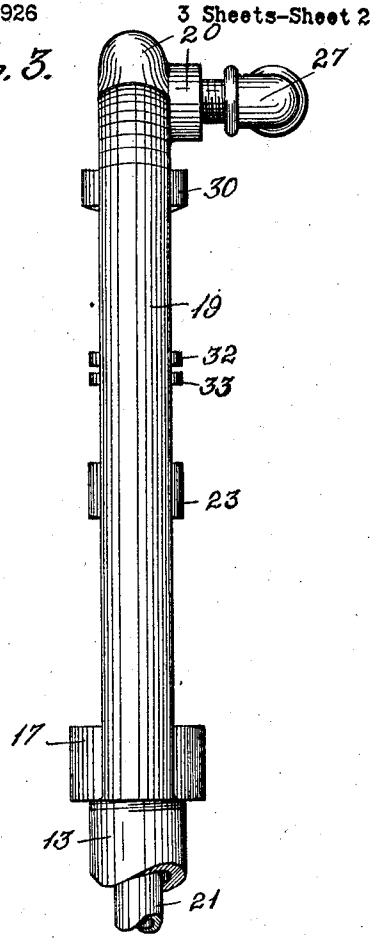
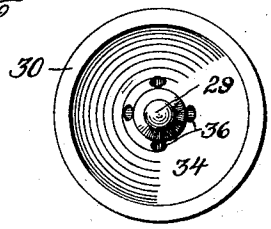


Fig. 4.



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Fig. 5.

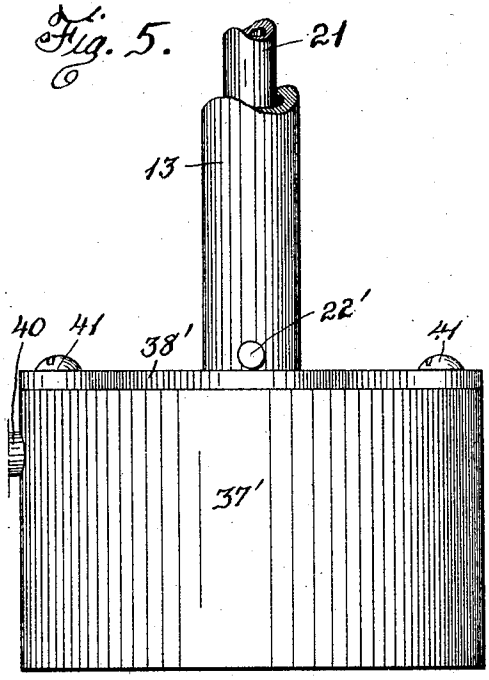


Fig. 6.

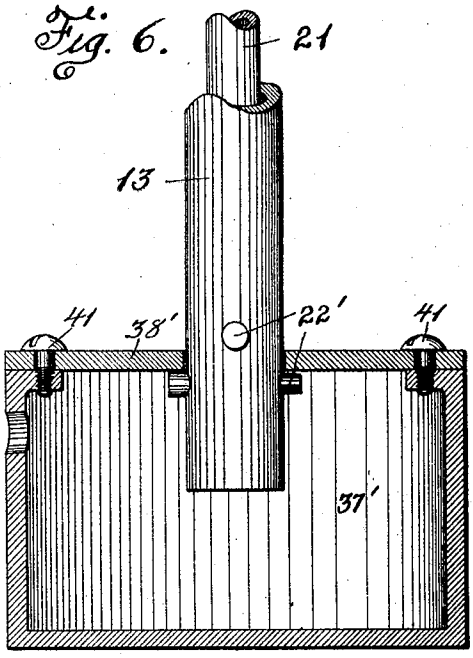
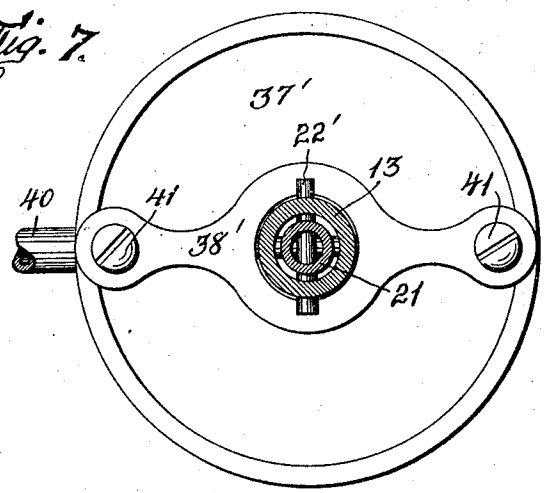


Fig. 7.



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UNITED STATES PATENT OFFICE.

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HUMIDIFIER.

Application filed November 23, 1926. Serial No. 150,216.

An object of this invention is to provide improved automatic means for supplying water vapor to the warm air circulated for heating purposes from a hot air heater.

A further object of the invention is to provide improved automatic means whereby the water vapor content of the warm air circulated from a hot air heater may be proportioned to the temperature of the heater.

A further object of the invention is to provide improved means whereby the water vapor content of the warm air circulated from a hot air heater may be automatically controlled by the temperature of the heater.

A further object of the invention is to provide adjustable, automatic means whereby water flow between a source of supply and an evaporating pan may be regulated and controlled by temperature changes.

A further object of the invention is to provide an improved construction for a humidifier adapted for simple and ready installation in and on hot air heaters already in use.

My invention consists in the construction, arrangement and combination of elements hereinafter set forth, pointed out in my claims and illustrated by the accompanying drawing, in which—

Figure 1 is a side elevation of my improved humidifier as mounted in and on a hot air heater for practical use, a portion of a conventional hot air heater being shown with parts broken away in order to better illustrate the device. Figure 2 is a vertical section of the device shown in Figure 1, on an enlarged scale, a section of the thermostatic element being omitted. Figure 3 is a side elevation of the operating head of my device and its connections, on the same scale as Figure 2. Figure 4 is a top plan view of the valve member and drip cup employed in my device. Figures 5, 6 and 7 are detail views of a modification.

In the construction of my device as shown, the numeral 10 designates the warm air chamber casing of a conventional hot air heater, said casing being provided with a top plate 11 and circulating ducts 12, in a common and well known manner. A hollow tube or pipe 13, of relatively large diameter and formed of a metal having a relatively high coefficient of expansion, externally threaded at either end, is mounted through the top plate 11 in sliding relation to a flanged collar 14 secured to said top plate and is positioned vertically therethrough by means of a set screw 15, the lower end of the pipe 13 extending downwardly within the casing 10 to a point above and spaced from the crown of the fire-box 16. A yoked frame is formed by molding or casting and comprises an apertured, internally threaded boss 17, arms 18 and 19 diverging upwardly from said boss for a portion of their length, then extending parallel for a distance and finally converging to a common meeting in an enlarged portion or boss 20. The frame thus formed is secured to the upper end of the pipe 13 by means of the external threads on said pipe engaging with the internal threads within the boss 17 and is positioned and supported on said pipe with its longer axis vertical and rising above the upper end of said pipe. A tube or pipe 21, of relatively small diameter and formed of a metal having a relatively low coefficient of expansion, is mounted within the pipe 13, loosely, is secured to said latter pipe at its lower end by means of rivets or pins 22 and projects above the pipe 13 at its upper end into the space within the yoke between the arms 18 and 19. The upwardly projecting end of the pipe 21 is externally threaded and is received in the internally threaded aperture of a boss 23 from whence rise upwardly-extending, diametrically-opposed, diverging arms 24 and 25, which arms converge after a space to form a common boss 26, axially of and spaced axially from the boss 23, said boss 26 being apertured in alinement with the aperture of the boss 23. Thus is a second yoked frame formed within and spaced from the yoked frame supported by the pipe 13. The boss 20 of the exterior frame is formed with an internally threaded bore at right angles to the plane of said frame and extending past the axis thereof and a tapered bore is formed in said boss, axially thereof and intersecting said first bore and having its larger end opening downwardly toward and in alinement with the axis of the pipe 21. A water supply connection, as indicated at 27, is threaded into the threaded bore of the boss 20 and leads to a source of water supply, not shown. A plunger type valve is formed with an externally threaded stem 28, a tapered end portion 29 and an annular flange 30 between said stem and tapered end portion. Said

plunger valve is mounted vertically through the aperture in the boss 26 with its tapered end portion 29 seated in the tapered bore of the boss 20 and is retained in such position by means of an expansive coil spring 31 surrounding the stem 28 and confined between the lower face of the annular flange 30 and the upper face of the boss 26. An adjusting nut 32 is threaded on the lower end of the stem 28 and bears against the lower face of the boss 26, whereby said stem may be adjusted vertically against the pressure of the spring 31 and relative to the boss 26. A lock nut 33 is also threaded on the stem 28 to guard the nut 32 against accidental displacement. The upper face of the annular flange 30 is formed with a cup 34 about the base of the tapered end portion 29, and the stem 28 has an axial bore 35 opening to the end of said stem and extending beyond the bottom of the cup 34 to which said bore 35 is connected by means of a plurality of inclined passages 36. Thus is provision made, when the valve 29 is unseated, for flow of water from the supply connection 27, through the intersecting bores in the boss 20, the cup 34, passages 36 and bore 35, to and through the pipe 21. A relatively shallow evaporating pan 37 is formed with a plurality of upwardly-extending, converging arms 38 which unite to form a boss 39 having an internally-threaded aperture by means of which said pan is secured to the threaded lower end of the pipe 13 and thereby supported beneath the open lower end of the pipe 21 immediately above the crown of the fire-box 16. An aperture is formed in one of the side walls of the pan 37 and a pipe 40 is received in said aperture and leads through the side wall of the casing 10 to guard against overflow of said pan.

In the operation of my device as mounted as shown in Figure 1, the intersecting bores of the boss 20 are connected to a pressure water supply and the valve 29 is seated in the tapered bore in said boss by the pressure of the spring 31, the adjusting nut 32 being in contact with the lower face of the boss 26, when the temperature of the heater is low. As the temperature within the heater increases, the pipe 13 expands longitudinally and more rapidly than the pipe 21, thus drawing the said pipe 21 downwardly and unseating the valve 29, thereby permitting water to flow through said valve, the cup 34, passages 36, bore 35 and pipe 21 into the evaporating pan 37 where the heat from the fire-box 16 generates water vapor which is circulated with the warm air from the casing 10. It is obvious that as the temperature of the heater increases the valve 29 will be further opened and more water will be conducted to the pan 37, and conversely, as the temperature decreases the valve opening will will be likewise decreased. A constant flow at low temperatures may be had by opening the valve to the desired degree through manual adjustment of the nut 32.

In the construction of the modified form of evaporating pan as shown in Figures 5, 6 and 7, a relatively deep cup 37′ is formed with diametrically-opposed, inwardly-extending ears adjacent its upper, open margin, said ears having internally-threaded holes adapted to receive screws 41 by means of which a centrally-apertured bar 38′ is positioned and secured diametrically of the open top of said cup. The central aperture in the bar 38′ is of a size to loosely receive the lower end of the pipe 13, which is preferably unthreaded when the modified form of evaporating pan is used, and spaced tapered pins 22′ connect the pipes 13 and 21 in the stead of the rivets 22, said pins 22′ being removable and replaceable and projecting at either end beyond the surface of the pipe 13, the bar 38′ being adapted to surround the pipe 13 and rest on the projections of the lower of the pins 22′ and thereby support the cup 37′ with the end of the pipe 13 extending within said cup. The overflow pipe 40 is received in an aperture in the side wall of the cup 37′ above the plane of the end of the pipe 13 to the end that the level of water within said cup will normally stand above the end of said pipe and thereby form a trap against the escape of heated air and moisture through the pipes 13 and 21.

Various structural modifications of my device as shown and described may be made without departing from the spirit of my invention, hence I wish to be understood as being limited only by the scope of the appended claims.

I claim as my invention—

1. A humidifier in combination with a hot air heater, comprising a thermostatic element formed of concentric tubes of unequal length interconnected at one end and mounted vertically through the top of said heater, a yoke carried on the upper end of the outer tube, a valve seat and water supply connections carried by said yoke, a second yoke carried by the upper end of the inner tube within said first named yoke, a spring-pressed plunger valve carried by said second yoke and adapted to register with said seat and an evaporating pan supported by and beneath said thermostatic element.

2. A humidifier in combination with a hot air heater, comprising a thermostatic element formed of concentric tubes of metals having different coefficients of expansion and of unequal length, said tubes being interconnected at one end and mounted vertically through the top plate of said heater, yokes carried by the upper ends of said tubes, water supply means connected with one of said yokes, a spring-pressed valve on the other of said yokes for controlling the flow

of water through said supply means and an evaporating pan supported by and beneath said thermostatic element.

3. A humidifier in combination with a hot air heater, comprising a thermostatic element formed of interconnected concentric tubes mounted vertically through the top of said heater, independent yokes carried by the upper end of each of said tubes, water supply means connected with one of said yokes, a spring-pressed plunger valve carried by the other of said yokes and adapted to control the flow of water through said supply means, an evaporating pan supported by and beneath said thermostatic element within said heater and water conducting means through said valve plunger and thermostatic element connecting said valve and evaporating pan.

4. In a device of the character described, a thermostatic element formed of concentric tubes of unequal length, yokes carried by the unequal ends of said tubes and water supply means connected with the outer of said yokes, water flow control means carried by the inner of said yokes and comprising a stem portion formed with an axial bore, an annular flange on one end of said stem and formed with a cup on its upper face, a tapered portion rising axially from said cup and adapted to seat in a tapered bore, passages between the bottom of said cup and the bore within said stem and a spring confined between the lower face of said flange and said yoke, together with adjusting and limiting means carried by said stem in normal contact with said yoke.

5. In a device of the character described, a thermostatic element, water supply and water flow control means carried by said element and water conducting means through said water flow control means and said element, an evaporating pan supported by and beneath said element comprising a relatively shallow pan and a plurality of arms rising from the side margins of said pan and converging to form a common apertured member whereby said pan is secured to said element.

6. In a device of the character described, a thermostatic element comprising concentric tubes inter-connected at their lower ends by projecting, spaced, removable and replaceable pins, an evaporating pan comprising a relatively deep cylindrical cup and a centrally-apertured bar transversely of the open end of said cup, said bar being adapted to surround said tubes between said pins and rest on and be supported by the projections of the lower of said pins, together with removable and replaceable connections between said bar and cup.

JAMES W. GALLOWAY.