

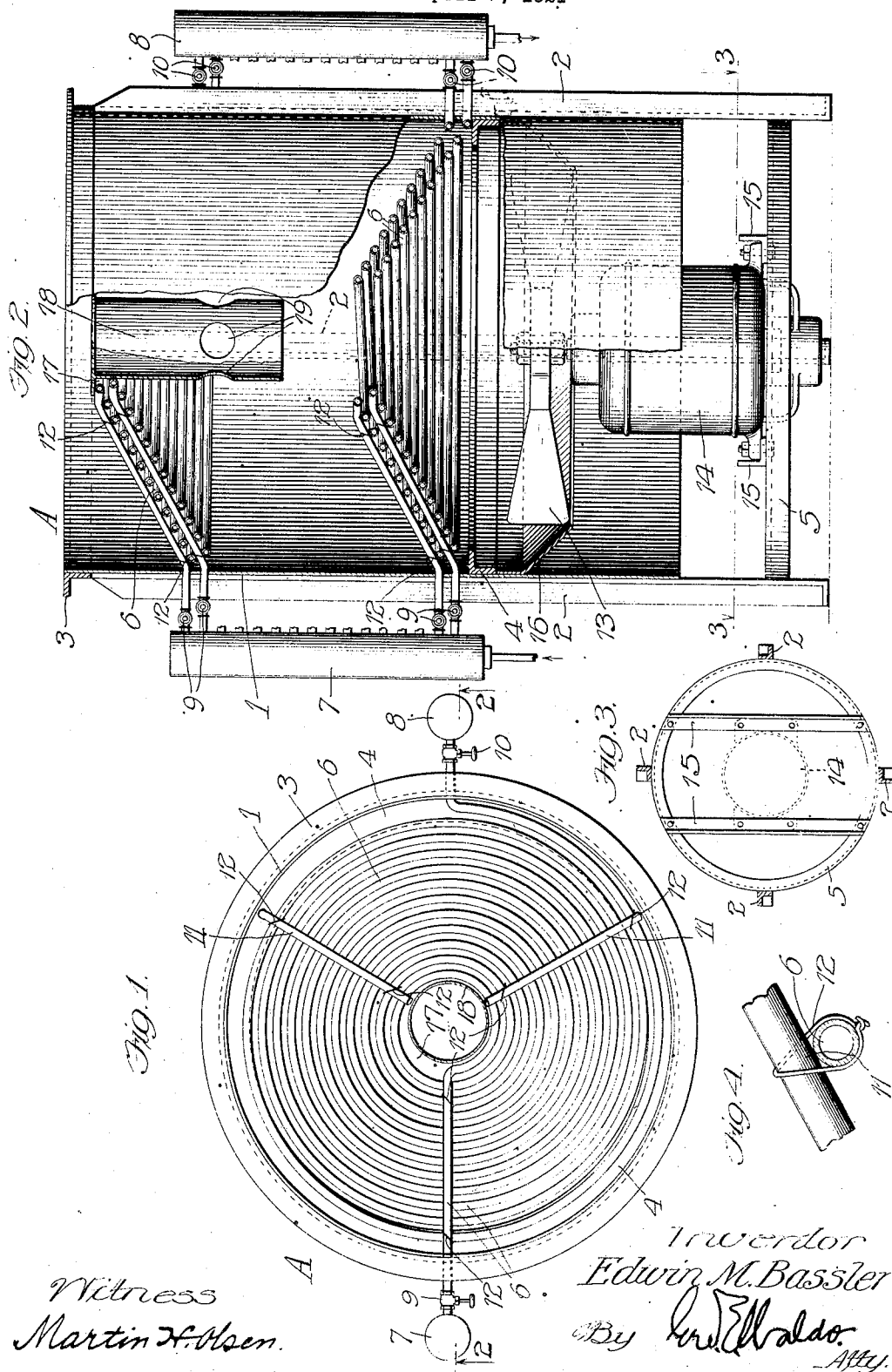
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HOT BLAST HEATER

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UNITED STATES PATENT OFFICE.

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HOT-BLAST HEATER.

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To all whom it may concern:

Be it known that I, EDWIN M. BASSLER, a citizen of the United States, and resident of Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented a new and useful Improvement in Hot-Blast Heaters, of which the following is a specification.

This invention relates to heating apparatus and relates particularly to the type of heating apparatus in which a current of air is caused to traverse a series of pipe coils through which a circulation of hot fluid—steam or water—is maintained, such heaters being commonly known as hot-blast heaters.

I am aware that it has heretofore been proposed to construct heaters of this general type in small units, but, as heretofore constructed they have been objectionable on account of their relatively low efficiency and their high cost of manufacture, which has rendered their use impractical and almost prohibitive.

Broadly stated, the object of the present invention is to overcome the foregoing objectionable features and to provide a heater of the type specified in small units, which shall be highly efficient in operation and which may be manufactured at such small cost as to render the use of same not only entirely practical but highly advantageous.

A further object of my invention is to provide a heater of this general type in which the heating area may be varied to meet different temperature conditions and requirements.

To effect the objects of the invention, my improved heater comprises a casing, heating coils mounted therein, each of said coils preferably forming a separate section having independent connection with a source of supply of heating fluid, a valve which controls the supply connection to each coil or section, whereby the effective area of heating surface may be varied within a wide range, and a fan adapted for causing a current of air to traverse said heating coils.

As the invention relates to increasing the efficiency of the heater, I attain the object of the invention by using pipes of relatively small diameter; one inch or smaller, so that the air traversing said coils, by eddying around the pipes, will come into contact with a relatively large fractional part of the heating surface of said pipes, as compared with pipes of larger diameter, thereby in-

creasing the effective area of heating surface.

The invention also comprises the various other features, combinations of features and details of construction hereinafter described and claimed.

In the accompanying drawings, in which my invention is fully illustrated,

Figure 1 is a top plan view of a heater embodying my invention.

Figure 2 is a side view thereof partly in elevation and partly in section on the line 2—2 of Fig. 1.

Figure 3 is a sectional plan view on a reduced scale on the line 3—3 of Fig. 2, showing the means for supporting the fan motor, indicated in dotted lines; and

Figure 4 is a fragmentary detail view, illustrating simple means for supporting the heating coils in spaced relation.

Referring to the drawings, A designates as a whole, the body portion of my improved heater, comprising a casing 1 made of suitable sheet metal, supported on legs formed by angle-irons 2 secured to said casing, which preferably extend from top to bottom thereof, and the lower ends of which extend a sufficient distance below said casing to provide desired clearance between the lower end of the casing and the floor on which the heater stands.

The body portion A of the heater is reinforced and strengthened by means of flanged rings 3, 4 and 5, of which the ring 3 is secured to the outside of the casing 1 at its upper end, the ring 4 to the inner side of said casing at about the center of the overall height of the heater, and the ring 5 to the legs 2 a short distance above the lower ends thereof. As shown, said rings 3, 4 and 5 are made of angle-bars, flanges of which extend substantially at right angles to the sides of the casing 1, said rings being riveted to the angle-bars 2 forming the legs of the heater where said rings and angle-bars cross, thereby rendering the entire framework of the heater very strong and rigid.

The upper and lower ends of the casing 1 are open, thus providing for free circulation of air through the same.

Supported in the upper end of the casing 1 are a plurality of heating coils 6, each preferably forming a separate section one end of which is connected to a manifold 7 adapted to be connected with a source of supply of steam or hot water, not shown,

and the opposite ends of which, respectively, are connected to a return manifold 8 adapted to be connected with a condenser, steam trap or the like, also not shown.

5 Communication of the coils 6 with the supply and return manifolds 7 and 8, is controlled by valves 9 and 10 in the ends thereof connected to the supply and return manifolds 7 and 8, respectively.

10 Said heating coils 6 are made of suitable metal pipe or tubing, preferably copper, of relatively small diameter, not exceeding one inch, and are preferably made in the form of conical helices, the upper ends thereof
15 being connected to the supply manifold 7 and their lower ends to the return manifold 8, as previously described.

Said coils are supported in the following manner:—the lowermost coil rests upon the
20 inwardly projecting flange of the ring 4 and each succeeding upper coil is spaced from the coil next below it and is supported thereupon by means of spacer bars or pipes 11 secured to said coils and which extend
25 substantially radially, from the outer to the inner edges thereof, said spacer rods or pipes may be secured to the different coils in any suitable manner, simple means for the purpose consisting of wire ties indicated
30 at 12 secured around said spacer rods and the pipes of said coils where they cross each other. The number of said spacer rods or pipes may be varied as desired, three or four thereof, spaced equal angular distances
35 apart, being usually employed. Also, for convenience and economy, the ends of the coils which communicate with the supply manifold 7 may be utilized as spacer pipes.

In the preferable construction shown,
40 also, the coils 6 comprise coils wound on slightly different radii, said coils being arranged alternately with the spirals thereof in staggered relation, that is, upper spirals being arranged directly above the spaces
45 between lower spirals.

A current of air is adapted to be maintained upwardly through the casing 1 so that it will traverse the coils 6 by a fan 13
50 mounted in the lower end of the body portion A of the heater. As shown, said fan is motor driven, being secured directly to the upper end of the armature shaft of an electric motor 14 mounted on cross bars 15
55 secured to the ring 5 connected to the lower ends of the angle-bars 2 forming the legs of the heater.

Secured to the inner wall of the casing 1 and extending in close proximity to the outer ends of the blades of the fan 13 is a
60 sheet metal ring 16 conical in shape and upwardly flared, which will permit the current of air entering the lower end of the casing to distribute itself substantially uniformly over the area of the heating coils 6.

65 For convenience and economy of manu-

facture, the small spirals adjacent to the centers of the coils 6 are formed on such long radii, that an axial passageway 17 will be formed at the centers of said coils, extending from top to bottom of the same, and
70 to prevent air from blowing through said passageway, deflectors or baffles are preferably secured therein, which will direct air from said passageway outwardly among the spirals of the coils 6. While my invention
75 contemplates the use of any desired form of baffle for this purpose, I prefer the form shown, which consists of a thimble 18, the upper end of which is closed and the lower end open. Said thimble 18 is preferably
80 somewhat shorter than the length of the passageway 17, extending from the upper end of said passageway to a point a desired distance above its lower end, say one third
85 of the length of said passageway. Formed in the side walls of said thimble are holes 19 through which air entering the lower end of said thimble will be discharged outwardly among the spirals of the coils 6. The aggregate area of the holes 19 will preferably
90 be appreciably larger than the cross-sectional area of said thimble, whereby the velocity of the air discharged from said thimble will be correspondingly less than the velocity of the current of air when it
95 enters said thimble.

With the described construction and operation of my improved heater, it is obvious that all air passing through the casing 1 will traverse the heating coils 6, thus
100 insuring maximum efficiency of the heater.

While I have herein shown the casing 1 as disposed vertically with the coils 6 in its upper end and the fan 13 and motor 14 in its lower end, I do not desire to limit
105 myself to this or to any particular arrangement, as my invention contemplates disposing the heater casing in any desired position and any desired arrangement of the coils 6 and of the fan 13.

Advantages of my improved construction are:—

1. As compared with the usual form of heaters consisting of manifolds in which
115 separate sections of pipe are secured in substantially parallel positions, the number of screw threaded pipe connections in my improved heater are comparatively so few that a great economy in labor, amounting to at least 50% is effected in the construction of
120 my improved heater.

2. My improved heater may be finished complete and ready for installation at the factory.

3. By making the heating coils in separate independently controlled sections, the effective area of heating surface of the heater may be varied to meet different temperature conditions and requirements; and

4. By making said heating coils of pipe
130

of small diameter, the eddying action of the air in traversing said pipes will bring it, into contact with a relatively larger fractional area of said pipes than would be the case if larger pipes were used.

I claim:

1. In a hot blast heater, the combination of a casing provided with air admission and discharge openings, a series of pipe coils supported therein, said coils consisting of separate lengths of pipe bent to form conical helices, separate supply and return connections thereto, respectively, and a fan adapted to cause a current of air to traverse said coil, substantially as described.

2. In a hot blast heater, the combination of a casing provided with air admission and discharge openings, a series of pipe coils supported therein, said coils consisting of separate lengths of pipe bent to form conical helices, independent supply and return connections to each of said coils, valves whereby said coils may be turned on and off separately to vary the effective area of heating surface of the heater, and a fan adapted to cause a current of air to traverse said heating coils, substantially as described.

3. In a hot blast heater, the combination

of a casing provided with air admission and discharge openings, a series of pipe coils supported therein, said coils consisting of separate lengths of pipe bent to form conical helices, supply and return manifolds, independent connections from each of said coils to said supply and return manifolds, valves whereby said coils may be separately turned on and off to vary the effective area of heating surface of the heater, and a fan adapted to cause a current of air to traverse said coils, substantially as described.

4. In a hot blast heater, the combination of a casing provided with air admission and discharge openings, a series of pipe coils supported therein, said coils consisting of separate lengths of pipe bent to form conical helices, said series of pipe coils being provided with an axial passageway, supply and return connections to said coils, respectively, a fan adapted to cause a current of air to traverse said coils, and a baffle positioned in said passageway, substantially as described.

In testimony that I claim the foregoing as my invention, I affix my signature.

EDWIN M. BASSLER.