July 2, 1929. J. POSEY 1,719,080

COMBINED HEATING AND COOLING APPARATUS

Filed Aug. 1, 1928 3 Sheets-Sheet 1

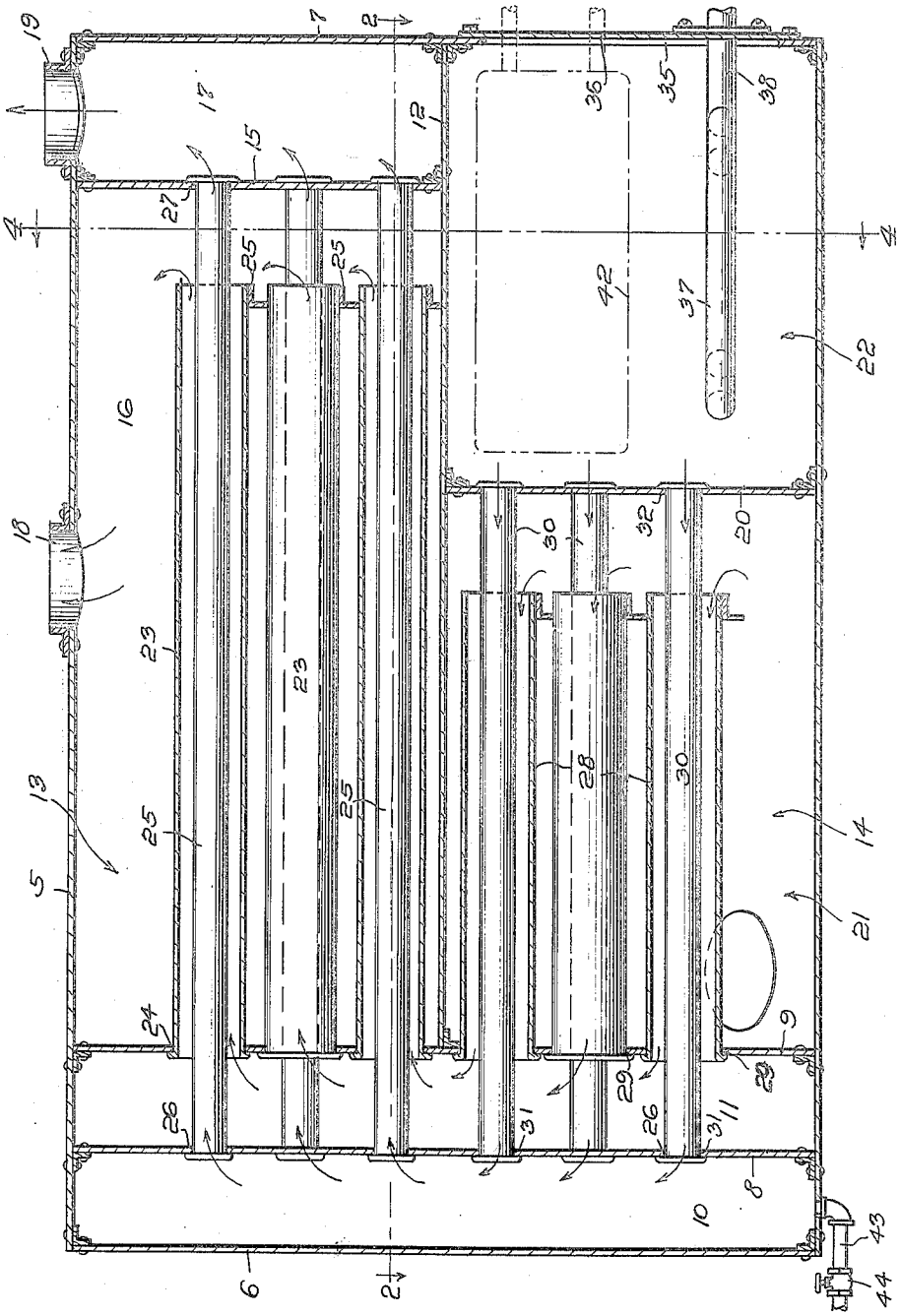


Fig. 1.

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COMBINED HEATING AND COOLING APPARATUS

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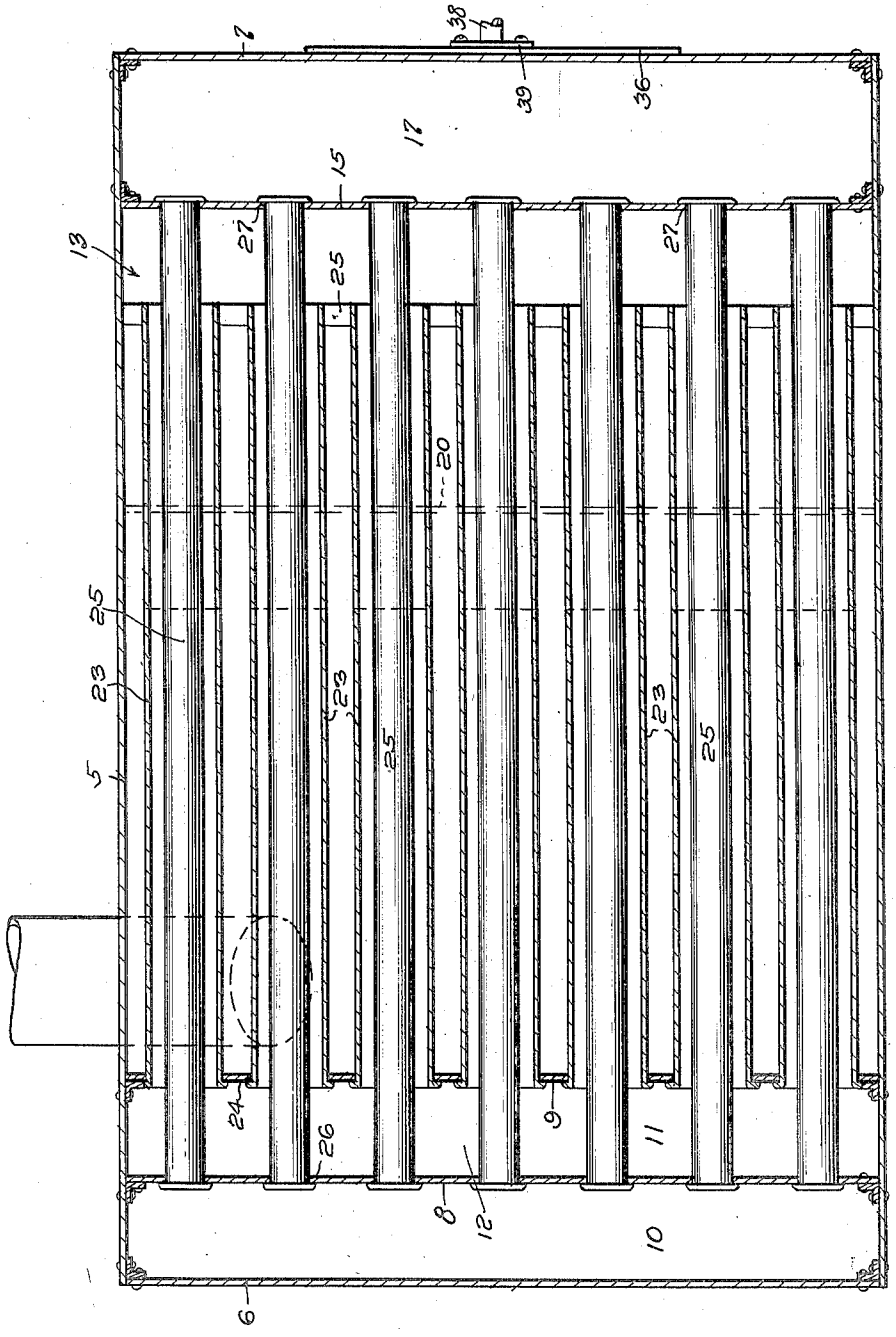


Fig. 2.

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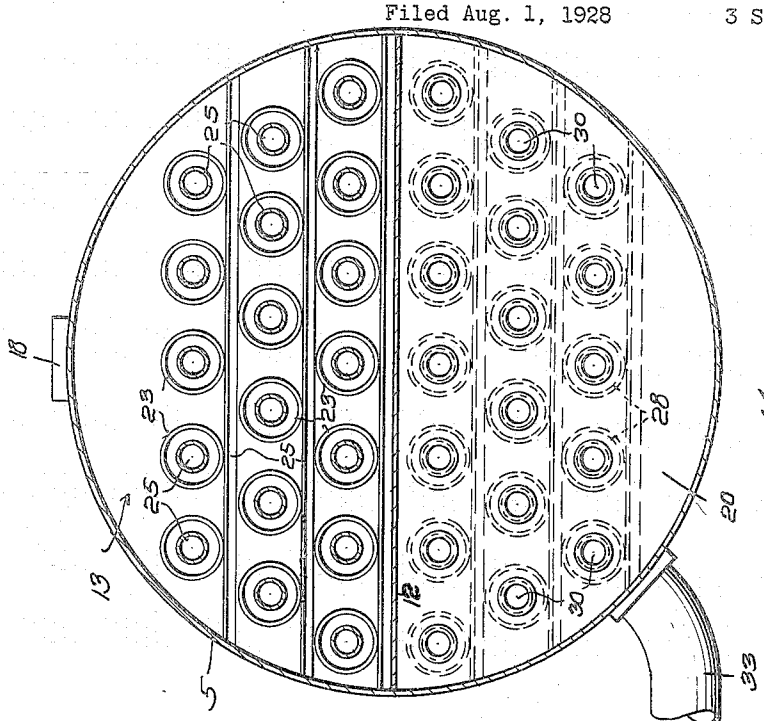


Fig. 4.

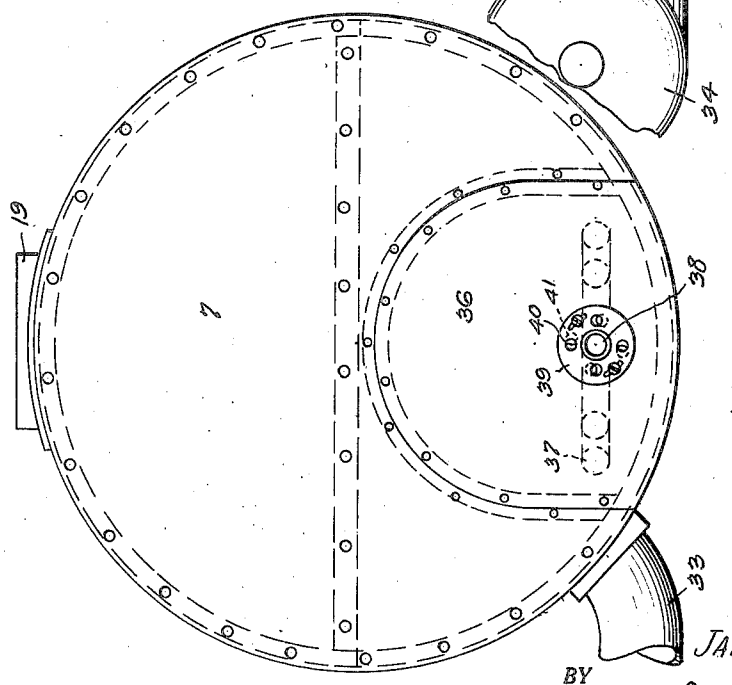


Fig. 3.

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Patented July 2, 1929. 1,719,080

UNITED STATES PATENT OFFICE.

JAMES POSEY, OF BALTIMORE, MARYLAND, ASSIGNOR TO THE TWO-SEASON PROCESS, INC., OF NORFOLK, VIRGINIA, A CORPORATION OF VIRGINIA.

COMBINED HEATING AND COOLING APPARATUS.

Application filed August 1, 1928. Serial No. 296,689.

My invention relates to apparatus for regulating the temperature within a building or the like, by introducing air therein, at a suitable temperature.

In accordance with my invention, air under suitable pressure is forced through air circulating tubes, through which extend inner tubes, for receiving the temperature regulating fluid. The apparatus is so constructed that an efficient heat exchange is effected between the temperature regulating fluid and the air, and a relatively large volume of air is adapted to be handled by the apparatus. The apparatus is of simplified construction, and is cheap to manufacture. The apparatus may be employed to heat the air or to cool the same.

In the accompanying drawings, forming a part of this specification, and in which like numerals are employed to designate like parts throughout the same,

Figure 1 is a central vertical longitudinal section through heat exchange apparatus embodying my invention,

Figure 2 is a horizontal section taken on line 2—2 of Figure 1,

Figure 3 is a front end elevation of the apparatus, and,

Figure 4 is a transverse section taken on line 4—4 of Figure 1.

In the drawings, wherein for the purpose of illustration, is shown a preferred embodiment of my invention, the numeral 5 designates a preferably cylindrical casing, which is preferably horizontally arranged. This casing has its rear end closed by a head 6 and its front end closed by a head 7, having gas-tight joints therewith. Arranged within the rear end portion of the casing 5 are spaced transverse heads or plates 8 and 9, providing rear and forward transverse drums 10 and 11, as shown. The heads 8 and 9 are rigidly connected with the casing 5, and form gas-tight joints therewith.

Arranged between the inner head 9 and the forward head 7 is a horizontal partition 12, rigidly secured thereto and with the casing 5, and forming a gas-tight joint therewith. The partition 12 with the associated elements, divides the casing 5 into an upper horizontal longitudinal compartment 13 and a lower horizontal longitudinal compartment 14, and these compartments are semi-cylindrical.

Disposed within the upper longitudinal compartment 13, near the forward head 7, is a transverse head or plate 15, which is semi-cylindrical, and is rigidly attached to the partition 12, and the casing 5 to form a gas-tight joint therewith. The transverse partition 15 with the associated elements, provides within the upper longitudinal compartment 13, an air discharging chamber 16, and a products of combustion discharge chamber 17. The chamber 16 is provided with an outlet connection 18, adapted to have communication with an outlet pipe which will lead to the registers or the like in the room. The products of combustion discharge chamber 17 has an outlet connection 19, adapted for communication with a suitable stack or pipe.

Arranged within the lower longitudinal compartment 14 is a semi-cylindrical transverse vertical partition 20, rigidly attached to the partition 12 and to the casing 5 and forming therewith a gas-tight joint. This partition, with the associated elements, provides a rear air intake chamber 21 and a forward temperature regulating chamber 22, as shown.

Extending longitudinally within the air discharge chamber 16, are air circulating tubes 23, the rear ends of which are held within openings 24, formed in the head 9. The tubes 23 have their rear ends in communication with the interior of the drum 11. The forward ends of the tubes 23 are spaced from the head 15, and discharge directly into the forward portion of the chamber 16. The forward ends of the tubes 23 are supported by transverse angle irons 25 rigidly attached to the casing 15. Extending longitudinally through the air circulating tubes 23 in spaced concentric relation thereto, are temperature regulating or heating tubes 25, the rear ends of which are held within openings 26, formed in the head 8, and these rear ends are in communication with the drum 10. The forward ends of the heating or temperature regulating tubes 25 are held within openings 27, formed in the head 15, and discharge into the drum 17.

Extending longitudinally within the air inlet chamber 21 are air circulating tubes 28, the rear ends of which are held within openings 29, formed in the head 9, and these rear ends are accordingly in communication with the drum 11. The forward ends of the tubes 18 are spaced from the head 20, and are, therefore, in free communication with the chamber 21. Extending longitudinally

through air circulating tubes 28 are heating or temperature regulating tubes 30, the rear ends of which are held within openings 31 formed in the head 8 and lead into the drum 10. The forward ends of the tubes 30 are held within openings 32, formed in the head 20, and are, therefore, in communication with the chamber 22.

The air intake chamber 21 has communication with an air supply pipe 33, receiving air under suitable pressure, from a rotary blower 34.

The head 7 is provided with an opening 35, adapted to be covered by a removable door 36, which is bolted or otherwise attached to the same, for producing a gas-tight joint. The opening 35 is provided so that a burner 37, which may be a gas burner, or any other source of heat, may be introduced into the chamber 22. The burner 37 receives gas through a pipe 38, passing through an opening in the cover 36, and in a pivoted valve plate 39. The cover 36 may also be provided with air feeding openings 40, adapted to be moved into and out of registration with openings 41 in the valve plate 39. It is obvious that by turning the valve plate 39, the openings 40 may be wholly or partly covered or uncovered.

Instead of employing a source of heat 37, I may employ a refrigerating unit 42. When this is done, the burner is removed, and an imperforate plate similar to the plate 39, is substituted for the plate 39.

The numeral 43 designates a brine pipe, leading into the drum 10, and equipped with a valve 44.

The operation of the apparatus is as follows:

The burner 37 being set in operation, heated gases and products of combustion pass through the inner tubes 30, traveling rearwardly, and discharging into the rear drum 10 and then passing upwardly and discharging into the tubes 25. The heated gases pass forwardly through these tubes and enter the drum 17, and then discharge to the stack. The rotary blower or fan 34 being now in operation, air under suitable pressure is fed into the air intake chamber 21 and enters the air circulating tubes 28 to travel rearwardly therein and enter the drum 11. The air then passes upwardly in the drum 11, and enters the rear ends of the air circulating tubes 23 traveling forwardly therein and discharging into the forward end of the air outlet chamber 16, from which it passes through the connection 18 to the desired register or registers.

While passing through the air circulating tubes, the air is made to travel in close relation to the heating tubes, and surrounds these tubes. In this way an efficient heat exchange is effected between the products of combustion and the air. The volume of air which may be passed through the apparatus is relatively large.

When the apparatus is used to cool the air, the burner 37 is removed and the refrigerating unit 42 is introduced into the chamber 22. The valve 44 may now be opened and brine supplied thereto into the drum 10, such brine filling the tubes 25 and 30 and also filling the drums 10 and 17 up to the elevation of the top tube 25 and also filling chamber 22. The air is forced through the air circulating tubes in a similar manner, and is chilled by passing about the temperature regulating tubes.

It is to be understood that the form of my invention, herewith shown and described, is to be taken as a preferred example of the same, and that various changes in the shape, size and arrangement of parts, may be resorted to without departing from the spirit of my invention, or the scope of the subjoined claims.

Having thus described my invention, I claim:—

1. In a heat exchange apparatus, a casing, means providing inner and outer drums near one end of the casing, means providing a discharge drum near the opposite end of the casing, air circulating pipes having their ends leading into the inner drum and their opposite ends spaced from the discharge drum and leading directly into the casing, temperature regulating tubes passing through the air circulating tubes and leading into the outer drum and into the discharge drum, means for supplying a temperature regulating fluid to the outer drum, means for supplying air under suitable pressure to the inner drum, and air outlet means for the casing.

2. In a heat exchange apparatus, a casing, means providing end drums near one end of the casing, means providing a discharge drum near the opposite end of the casing, air circulating pipes having their ends leading into one end drum and their opposite ends discharging directly into the casing, temperature regulating tubes extending through the air circulating tubes and leading into one end drum and into the discharge drum, means for supplying a temperature regulating fluid to one end drum, means for supplying air under pressure to one end drum, and air outlet means for the casing.

3. In a heat exchange apparatus, a casing, means providing end drums near one end of the casing, means providing a discharge drum near the opposite end of the casing, air circulating pipes having their ends leading into one end drum and their opposite ends discharging directly into the casing, temperature regulating tubes extending through the air circulating tubes and leading into the other drum and into the discharge drum, means providing an air inlet chamber in the casing having communication with the end drum which is in communication with the air circulating tubes, means for supplying heated gases to the end drum having communication with the temperature regulating tubes, a blower con-

nected with the air intake chamber, and outlet means for the casing.

4. In heat exchange apparatus, a casing, means providing end drums near one end of the casing, means providing a discharge drum near the opposite end of the casing, means providing a longitudinal air outlet chamber within the casing and a longitudinal air intake chamber within the casing, air circulating tubes having their ends leading into the one end drum and their opposite ends discharging into the air outlet chamber, temperature regulating tubes having their ends leading into the other end drum and their opposite ends leading into the discharge drum, air circulating tubes arranged within the air inlet chamber and having their ends leading into the end drum in communication with the first named air circulating tube and their opposite ends in communication with the air inlet chamber, temperature regulating tubes extending through the air circulating tubes within the air inlet chamber and discharging into the drum which is in communication with the first named temperature regulating tubes, means for supplying heated gases through the last named temperature regulating tubes, an air blower discharging into the air inlet chamber, and outlet means for the air outlet chamber.

5. In heat exchange apparatus, a casing, means providing inner and outer drums at the end of the casing, a longitudinal partition within the casing and extending between the end drums and the opposite end of the casing for providing separate longitudinal compartments, a head arranged in one compartment and extending transversely thereof for providing an air outlet chamber and an end discharge drum, a transverse head arranged in the other longitudinal compartment and providing an air inlet chamber and a temperature regulating chamber, air circulating tubes extending longitudinally within the air outlet chamber and leading into the inner end drum and having their opposite ends discharging into the air outlet chamber, temperature regulating tubes extending through the air circulating tubes and having their ends leading into the outer end drum and their opposite ends leading into the discharge drum, air circulating tubes extending longitudinally within the air inlet chamber and having their ends leading into the inner end drum and their opposite ends in communication with the air inlet chamber, temperature regulating tubes extending through the last named air circulating tubes and having their ends leading into the outer end drum and their opposite ends in communication with the temperature regulating chamber, a temperature regulating unit arranged within the temperature regulating chamber, an air blower leading into the air inlet chamber, and outlet means for the air outlet chamber.

6. In heat exchange apparatus, an air receiving chamber having outlet means, a plurality of drums arranged near one end of the chamber, air circulating tubes extending longitudinally within the chamber and having their ends leading into one drum and their opposite ends discharging into the chamber, temperature regulating tubes extending through the air circulating tubes and through said chamber and leading into the other drum, means for supplying air under pressure to the drum in communication with the air circulating tubes, and means for supplying a temperature regulating fluid to the drum in communication with the temperature regulating tubes.

In testimony whereof I affix my signature.

JAMES POSEY.