G. H. KLUMPH & E. M. BASSLER.

HEATER.

APPLICATION FILED FEB. 14, 1905.

919,362.

Patented Apr. 27, 1909.

2 SHEETS—SHEET 1.

Fig. 1.

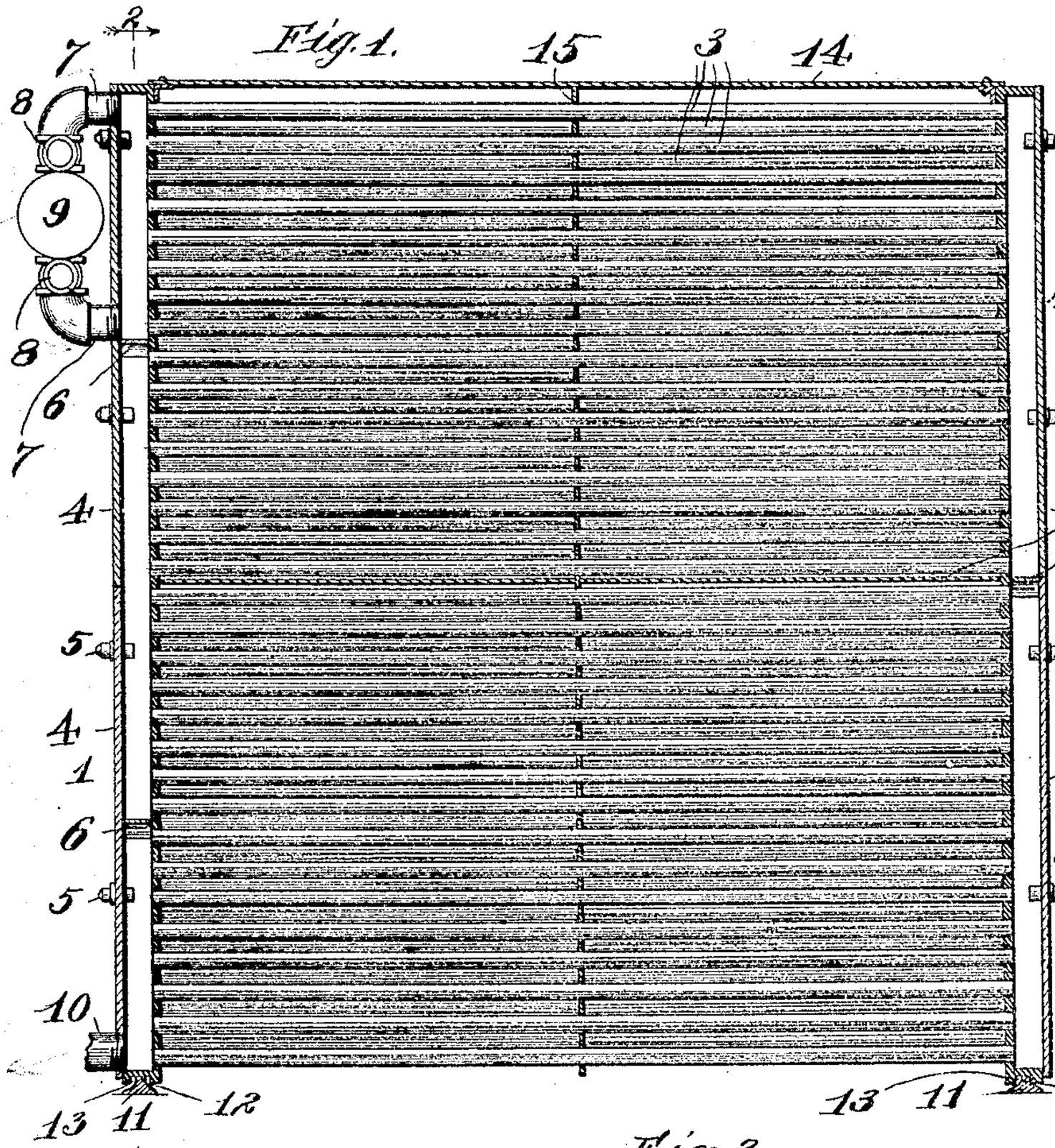


Fig. 2.

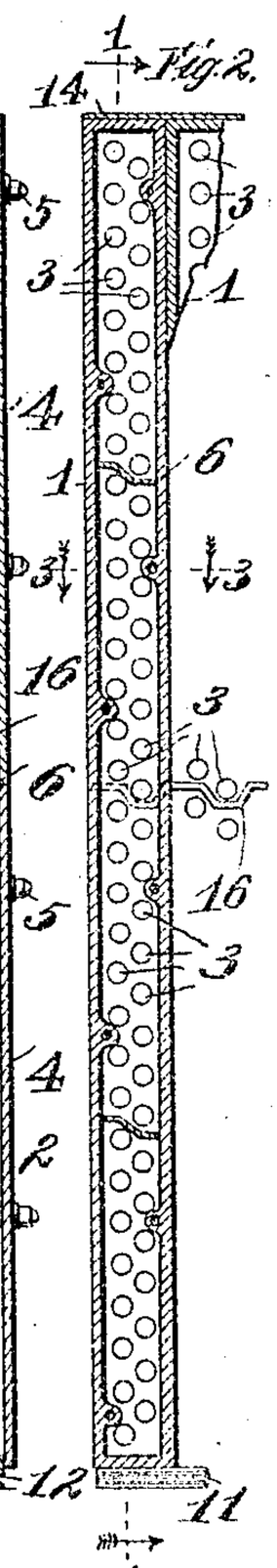
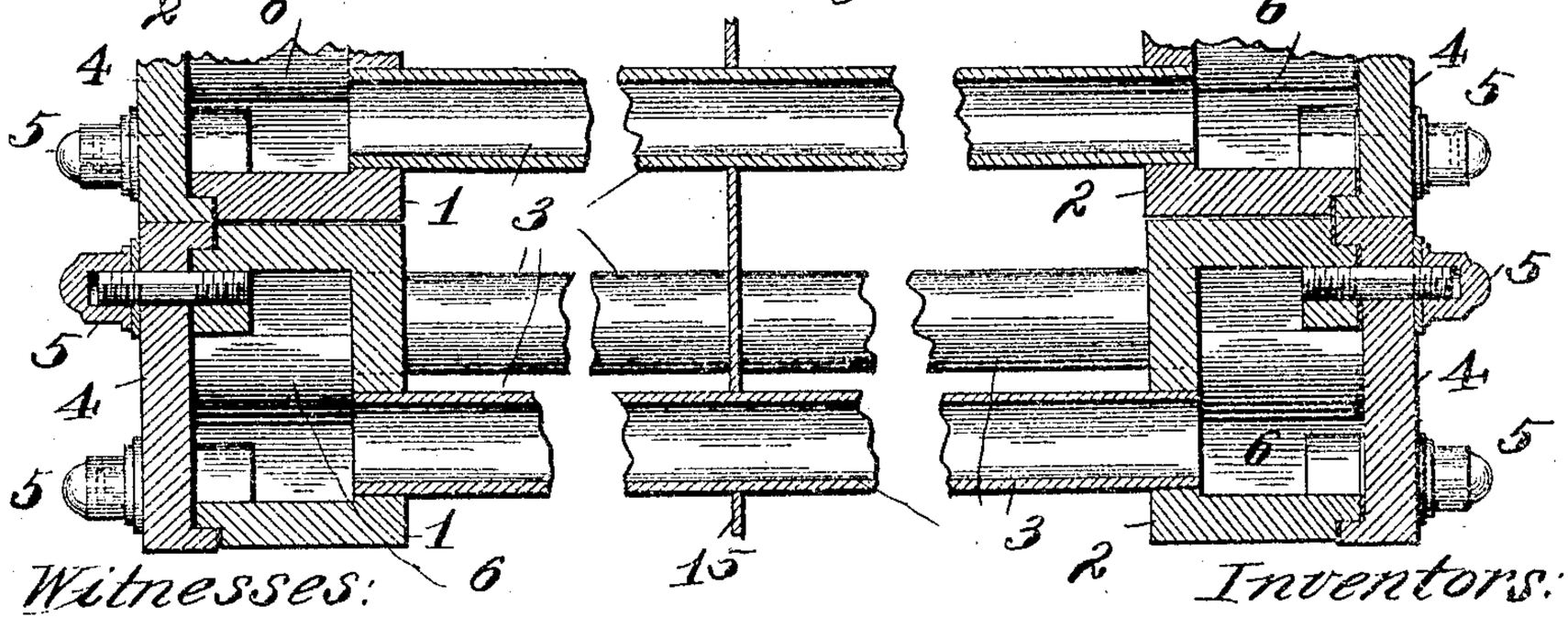


Fig. 3



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G. H. KLUMPH & E. M. BASSLER.

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2 SHEETS—SHEET 2.

Fig. 4.

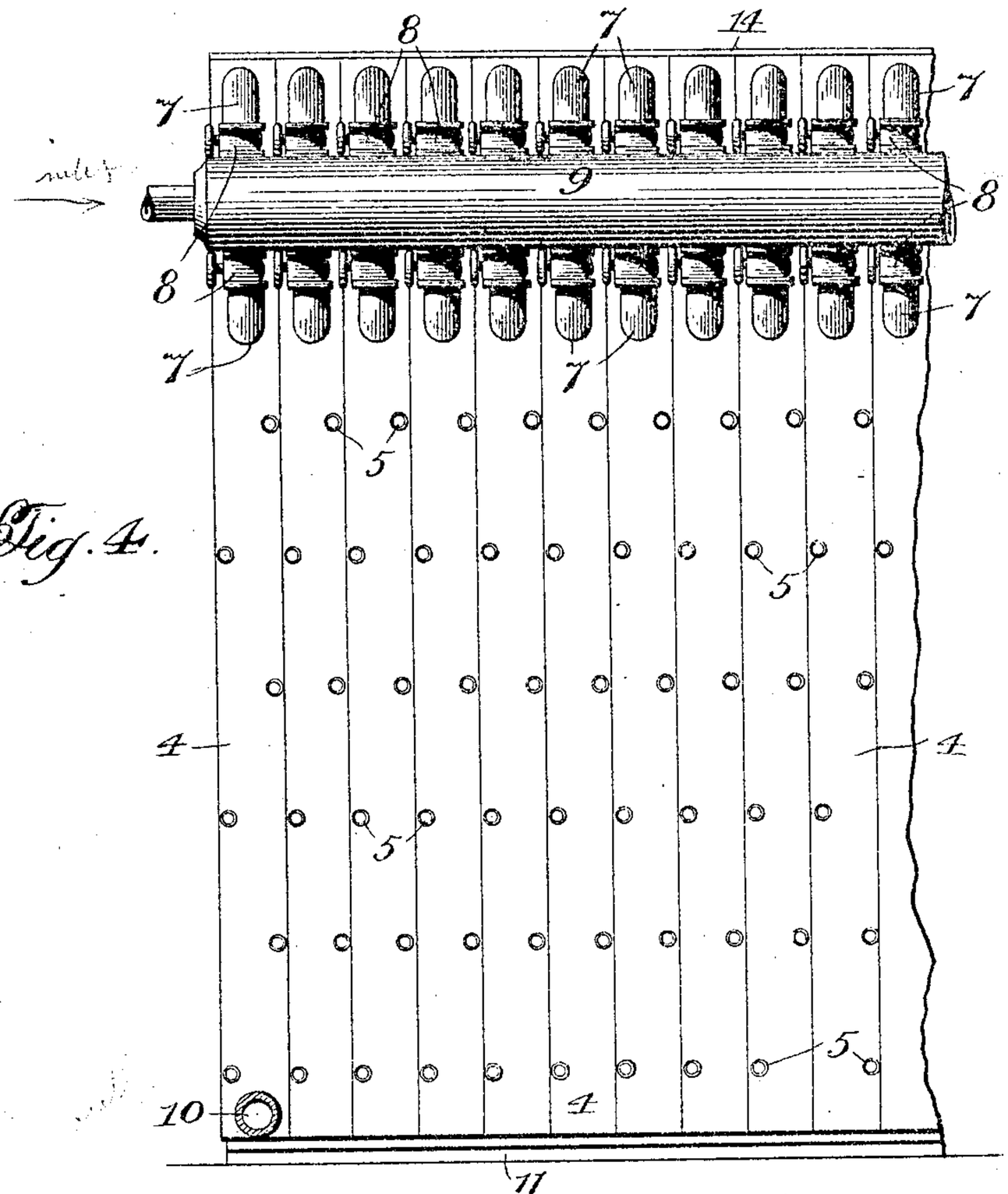
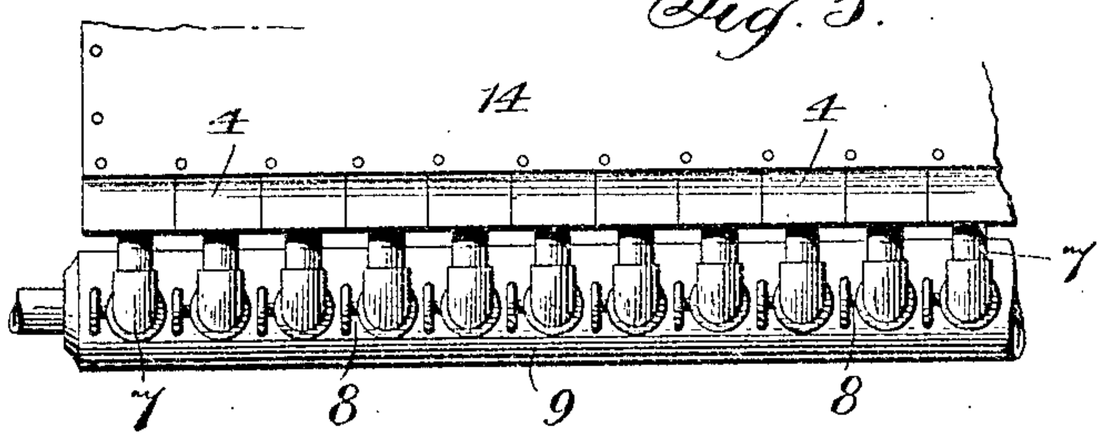


Fig. 5.



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UNITED STATES PATENT OFFICE.

GEORGE H. KLUMPH AND EDWIN M. BASSLER, OF CHICAGO, ILLINOIS.

HEATER.

No. 919,362. Specification of Letters Patent. Patented April 27, 1909.

Application filed February 14, 1905. Serial No. 245,580.

To all whom it may concern:

Be it known that we, GEORGE H. KLUMPH and EDWIN M. BASSLER, citizens of the United States, and residents of Chicago, Cook county, Illinois, have invented certain new and useful Improvements in Heaters, of which the following is a specification.

This invention relates to heaters and relates particularly to heaters of the type consisting of a header or headers comprising closed compartments, one adapted for connection with a source of supply of steam, hot water or other heating agent, and the other provided with a discharge pipe or passage and pipes or tubes which connect the compartments of said header or headers, said heaters being specially designed and adapted for heating the air or other circulating medium delivered to dry kilns and other driers.

Primary objects of the invention are to provide a heater comprising straight tubes of equal length, all of which will offer the same resistance to the passage of the heating agent therethrough, thereby eliminating stagnation in the longer pipes or pipes of greater resistance and correspondingly increasing the efficiency of the heater; to provide a heater having the pipes disposed in such manner that, when steam is used as a heating agent, entrained water and water of condensation deposited along the pipes will be carried by the current of steam toward the discharge opening or drip chamber of the heater, instead of flowing by gravity against the current of steam back into the steam inlet; to provide a heater of such construction that pipes of minimum thickness may be used, thereby further increasing the efficiency of the heater; to provide a heater of such construction that the pipes thereof may be readily removed and replaced, when desired; and generally to simplify the construction and reduce the cost of heaters of this type.

To this end a heater of our invention consists of the various features, combinations of features and details of construction hereinafter described and claimed.

In the accompanying drawings in which a heater of our invention is fully illustrated:—Figure 1 is a sectional elevation of a heater of our invention on the line 1—1 of Fig. 2. Fig. 2 is a sectional elevation thereof on the line 2—2 of Fig. 1; and Fig. 3 is an enlarged horizontal section on the line 3—3 of Fig. 2. Fig. 4 is an elevation of our invention showing the feed tank for feeding the heating agent to the several units. Fig. 5 is a top plan view showing said feed tank in its relation to the units.

Referring now to the drawings, 1 and 2 designate the headers of our improved heater, and 3 the pipes connecting the same.

Instead of being screw threaded into the headers 1 and 2, in a manner heretofore common, the pipes 3 are preferably expanded into suitable holes or openings formed in said headers. There are several advantages due to this construction over the screw threaded connection. In the first place the tubes are not weakened by the cutting of the screw threads, thereby permitting the use of much lighter tubes and correspondingly increasing the efficiency of the heater and, in the second place, by the use of an expanded joint, instead of a screw threaded joint it is rendered possible to remove and replace the pipes as desired, whereas with screw threaded joints it is practically impossible to remove or replace a pipe without dismantling the entire heater.

To render the ends of the tubes accessible for the purpose of expanding the same, the outer walls 4 of the headers 1 and 2 are removable and are secured in position by means of suitable cap screws or bolts 5.

Where, as is commonly the case, a heater comprises several units, each consisting of headers 1 and 2 with connecting pipes 3, it is desirable that they be secured together with a practically air tight joint between them. To effect this end with a minimum of machine work, the removable side walls 4 of the headers are made slightly wider than the body portions so that, to form a tight joint it will only be necessary to dress or machine the edges of the removable side walls 4 of the headers.

The quantity of heat radiated by the heating agent, obviously depends upon the length of time to which it is exposed to the action of the current of air or other circulating medium passing through the heater. The time of exposure of said heating agent depends upon two factors, first, the length of the pipe through which it travels and, second, the speed or velocity at which it passes through the said pipes.

Heaters of this type are preferably made substantially square in cross section, and to provide a desired length of pipe, the inte-

riors of the headers 1 and 2 are divided into compartments by means of partitions 6, which practically convert the heater into a series of coils, and cause the steam to pass back and forth between the headers 1 and 2 several times, depending upon the number of partitions 6.

Steam is admitted to one of the headers, as shown the header 1, through an admission opening 7 and the rate of travel or velocity of the heating agent through the pipes 3 will obviously depend upon the size of the admission pipes 7, as compared with the aggregate size of the pipes 3 communicating therewith. Thus, if the aggregate area of the pipes 3 receiving steam from the admission pipe 7 is twice as large as the area of said admission pipe, it is obvious that the velocity of the heating agent through the pipes 3 will only be one-half as great as its velocity through the pipe 7, whereas if the pipe 7 is twice as great as the aggregate size of the pipes 3 which receive the heating agent therefrom, the velocity of the heating agent through the pipes 3 will be twice its velocity through the pipe 7 and thus by providing means to regulate the size of the admission opening 7, it is obvious that the velocity of the heating agent through the pipes 3 may be controlled as desired. To effect this end, the admission pipes 7 are preferably made of such size that they will supply the heating agent to the heater in such quantities as will create a desired maximum velocity through the pipes 3, and are provided with controlling valves 8 whereby the passage therethrough may be reduced as desired to produce any desired minimum velocity of the heating agent through the pipes 3.

The regulation of the velocity of the steam through the pipes 3 is preferably effected by means of two or more pipes 7 communicating with the first set of compartments of the different heater units, all of said pipes being controlled independently by means of separate valves 8. It is found, in practice, that the steam supply can be controlled much more effectively and accurately by means of a plurality of independently controlled pipes than by the use of a single pipe which is throttled in order to produce the desired size of admission opening.

Where the heater comprises several units, the heating agent is supplied thereto from a suitable tank or reservoir 9, which extends along the side of said heater and is connected to each unit of the heater by the controlled admission pipes 7 and to which the heating agent is supplied from any suitable source, not shown.

The heater is provided with a suitable discharge opening, as shown a discharge pipe 10, through which the heating agent, including water of condensation, escapes after it has traversed the pipes 3.

In order to provide for expansion and contraction of the tubes 3 in use, the headers 1 and 2 are supported upon bars or plates 11 which extend beneath said headers transversely to the pipes 3. Said bars or plates 11 are preferably provided on their upper sides with beads or flanges 12 which engage grooves 13 formed in the lower ends of the headers 1 and 2, said grooves 13 being enough wider than the width of the flanges 12 to provide for movement of the headers 1 and 2 as the tubes 3 expand and contract.

The top of the heater is closed in the usual manner by means of a plate 14 secured to the upper ends of the headers 1 and 2, which extends the entire length of the heater. Said plate operates in the usual manner to confine the current of air passing through the heater and also to connect the different units of which the heater is made up.

The space within the heater inclosed by the headers 1 and 2, the top plate 14, and the floor of the building or other surface upon which the heater rests, which space is traversed by the pipes 2 and which forms a conduit for the passage of air, is preferably divided into separate passages or flues, preferably of substantially the same size, by means of a vertical plate 15, and horizontal plates 16 which extend longitudinally through said heater. These plates operate to cause a practically uniform distribution of the air current through all parts of the heater, whereas without such plates the tendency would be for the greater portion of the air to pass through the upper part of the heater, thus reducing the efficiency thereof, as a considerable portion of the heat from the lower part of the heater would be wasted. The ends of the heater are open to permit the passage therethrough of the air to be heated, in the usual manner.

We claim as our invention:—

1. A heater comprising a plurality of sections arranged side by side, each including upright headers spaced apart and transverse tubes extending between the same and putting them in open communication with each other, each of said headers having a separable outer wall wider than its body, the edges of said walls being finished and abutting against the corresponding edges of the walls of the adjacent headers.

2. A heater including a plurality of sections, each comprising two upright headers spaced a distance apart and a plurality of transversely extending tubes connecting the headers to each other, said sections being arranged side by side with their walls abutting against one another, a top plate covering the space between the headers, a vertically arranged partition depending from said top plate and a horizontally disposed

partition extending between the headers and located at a point intermediate the upper and lower ends of the header, said partitions separating the space between the header and cover plate into a plurality of compartments.

3. A heater comprising upright headers provided with supply and discharge openings and pipes which connect said headers and a support for said heater comprising bars arranged beneath said headers transversely to the pipes connecting the headers, said bars being provided with flanges and the lower ends of the headers being provided with grooves to receive the flanges of relatively greater width than the same.

4. A heater comprising a plurality of sections arranged side by side, each including two headers spaced apart and transverse tubes extending between the same, the walls of the headers forming the side walls of an air heating conduit, a top plate supported upon the headers forming the top of such conduit, and horizontal and vertical division plates providing a plurality of flues in the conduit.

In testimony, that we claim the foregoing as our invention, we affix our signatures in presence of two subscribing witnesses this 9th day of February, A. D. 1905.

GEO. H. KLUMPH.
EDWIN M. BASSLER.

Witnesses:
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