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HEAT EXTRACTOR

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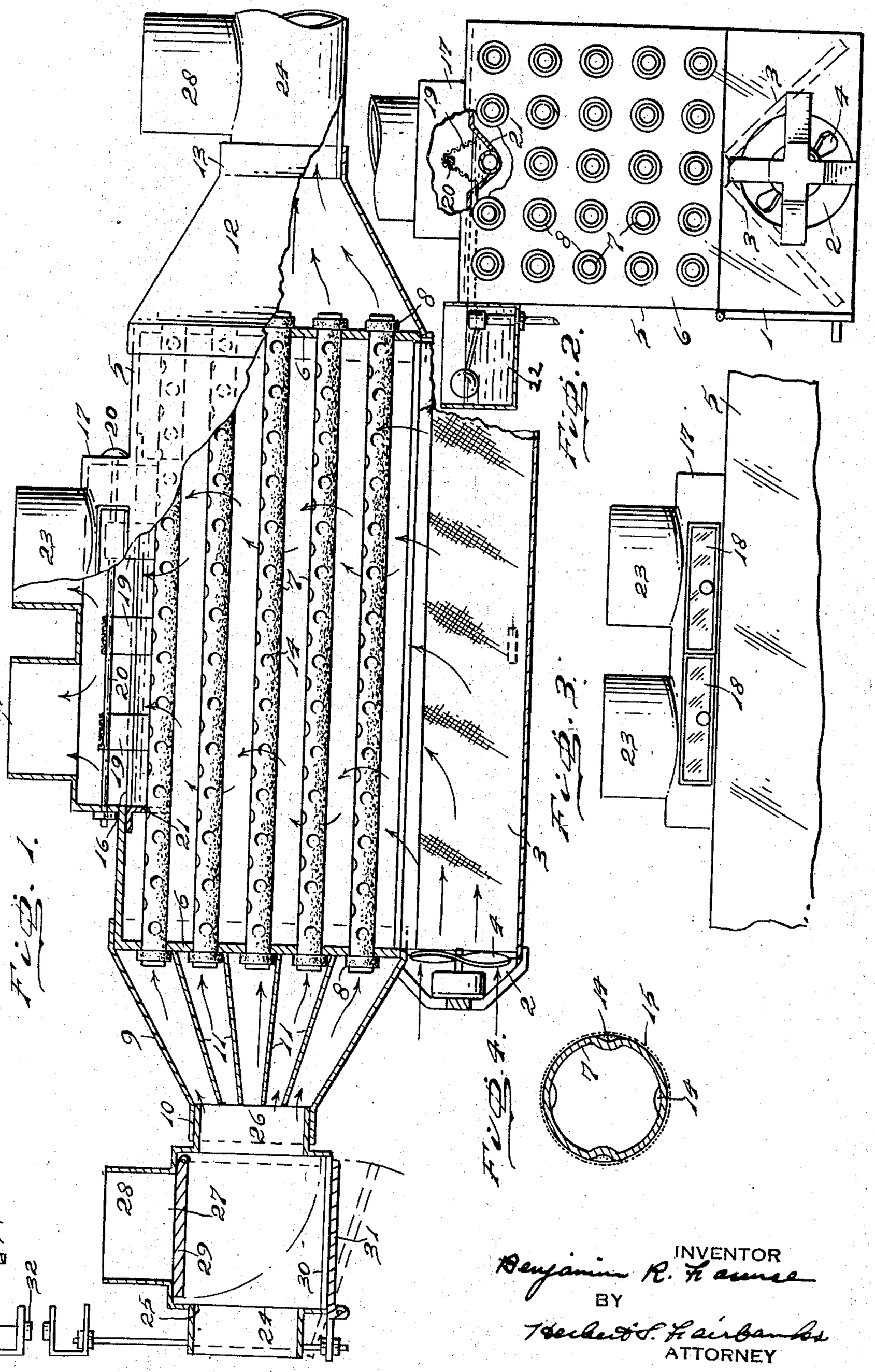

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

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HEAT EXTRACTOR

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3 Claims. (Cl. 257—165)

In my prior patent, No. 2,070,427, of February 9, 1937, I have described and broadly claimed a novel construction and arrangement of a heat extractor which was found in practice to be efficient in the recovery of heat in the products of combustion passing from a furnace.

The object of my present invention is to devise a novel heat extractor for the same general purposes as that of my prior patent, and to construct the device in a novel manner to provide for increased efficiency over the devices of the prior art, to decrease the cost of manufacture and upkeep, to provide for the easy removal of dust and foreign material from the tubes, to provide for the desired humidity of the heated air, and to provide for the automatic control of the source of heat for the furnace in case of abnormal conditions arising in the furnace, or heating system.

With the above and other objects in view as will hereinafter clearly appear, my invention comprehends a novel construction and arrangement of a heat extractor adapted for connection in the pipe line from a heating system.

It further comprehends a novel heat extractor having a novel construction of a casing, novel means for sealing the heating tubes in the ends of the casing, novel means for directing the products of combustion uniformly to superimposed rows of tubes, novel means for filtering the air, and novel means to provide the proper humidity for the heated air.

Other novel features of construction and advantage will hereinafter appear in the detailed description and the appended claims.

For the purpose of illustrating the invention, I have shown in the accompanying drawing a typical embodiment thereof which I have found in practice to give satisfactory and reliable results. It is, however, to be understood that this embodiment is typical only, and that the various instrumentalities of which the invention consists can be variously arranged and organized and the invention is not limited to the exact arrangement and organization of these instrumentalities as herein shown.

Figure 1 is a sectional elevation, partly in full lines, of a heat extractor embodying my invention.

Figure 2 is an end elevation with certain of the parts removed, and partly broken away.

Figure 3 is a side elevation of a portion of the device.

Figure 4 is a cross section of one of the tubes.

Similar numerals of reference indicate corresponding parts.

Referring to the drawing:

1 designates a lower casing having at one end an air intake 2, the bottom sides and the other end of the casing being closed, and the top being open. A desired number of air filters 3, of spun glass or other suitable material, are disposed within the lower casing, and preferably arranged to provide an inverted V formation through which the air is forced by an impeller 4. 5 is an upper casing secured in any desired manner to the lower casing, and having its bottom open to be in free and unobstructed communication with the chamber of the lower casing. The casings may have any desired contour in cross section, but are preferably rectangular. The upper casing 5 has closed ends 6 which are apertured to receive tubes 7 which extend through and outwardly beyond the ends and are sealed with the ends by asbestos rings or washers 8, fixed in position by suitable adhesive. I have found that silicate of soda is efficient in securing the asbestos rings in sealed condition with the tubes and the ends of the upper casing.

The intake end for the products of combustion has a tapered hood 9, terminating in a collar 10 adapted to be connected with the exit or pipe line from a heating system. Partitions 11 at the inner end of the upper casing and within the hood 9 cause the products of combustion to pass to the tubes at different levels to provide a more uniform distribution of products of combustion to the pipes or tubes which are arranged in superimposed rows. The tubes discharge into a tapered hood 12, terminating in a collar 13 adapted to be connected to the exit pipe line leading to the chimney. The tubes 7 are preferably of copper and at different angular positions along their lengths they are pressed inwardly as at 14, thus tending to reduce the speed of travel of the hot gases through the pipes or tubes. I have found that the heat absorbed by the air passing around the tubes is materially increased if the exterior surfaces of the tubes have silicate of soda applied to them as a binder, and then have finely divided sand sifted over them to uniformly coat the tubes as shown at 15.

Means are preferably provided to obtain the desired humidity for the heated air. The upper casing 5 has an elongated opening 16 closed by a casing 17 having door controlled openings 18 to provide for the insertion or removal of wicks 19, carried by a supporting rod 20 and extending into water in a water pan 21, partially surrounding one of the tubes. The water is fed to the pan from a supply tank 22, provided with a conven-

tional float valve to maintain the water in the pan at a desired level. 23 are exit pipes from the casing 17 to conduct heated air to a desired place of utilization.

The heat extractor is connected in a pipe line 24, forming the exit from a furnace of any conventional construction. As illustrated, I provide at the intake end of the extractor a valve casing 25 having an outlet 26 leading to the intake end of the extractor and having an outlet 27 leading to a by-pass 28. A manually actuated valve 29 controls the outlets so that when the wicks are to be changed or cleaned the gases can be by-passed through the by-pass. The bottom of the valve casing has an opening 30, controlled by a counterweighted safety valve 31, which, in case of an explosion in the furnace, will close the circuit through a contact 32 of a solenoid circuit 33 to cause the solenoid to open a switch controlling the fuel and air supply to the oil burner or other type of source of heat for the furnace. The possibility of fire from the gases is reduced by passing the products of combustion through a number of tubes. When the oil burner is shut off, air will still pass into the furnace, and be heated by the hot walls of the furnace for some time. If the heating system is not in use, the impeller can be operated during such period to circulate conditioned air, and such operation is advantageous during warm weather.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a heat extractor for connection in a pipe line leading from a heating system, a lower casing having its sides, bottom and one end closed and its top open, an upper casing on the lower casing having its ends, sides and top closed and its bottom in free communication with the open top of the lower casing, tubes extending through and sealed with the ends of the upper casing, a tapered hood connecting the intake end of the upper casing with an exit from a furnace, a tapered hood connecting the exit end of the upper casing with a pipe line leading to the chimney, and pipe connections for delivery of heated air from the upper casing.

2. In a heat extractor as set forth in claim 1, having an addition means to bypass the products of combustion from the intake pipe from the furnace to the pipe leading to the furnace.

3. A heat extractor as set forth in claim 1, having a fan at the intake end of the lower casing.

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