O. NELSON.

FRESH AIR INJECTOR FOR FURNACE HEATING AND VENTILATING.

APPLICATION FILED JAN. 19, 1909.

954,989. Patented Apr. 12, 1910.

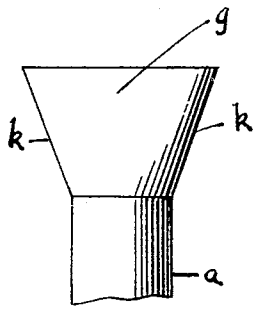

FIG. 3.

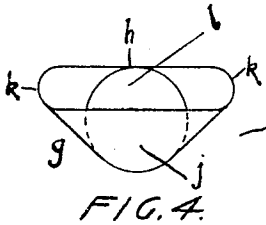

FIG. 4.

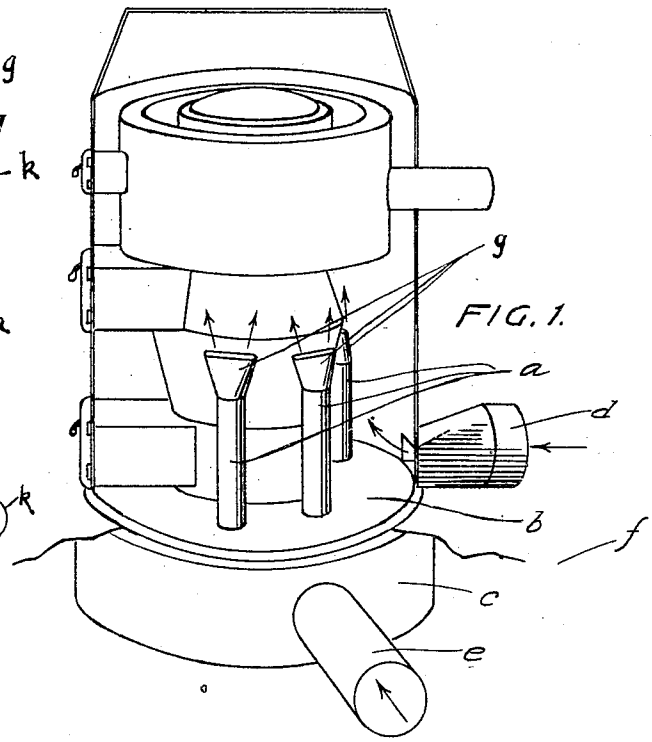

FIG. 1.

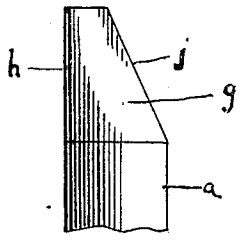

FIG. 5.

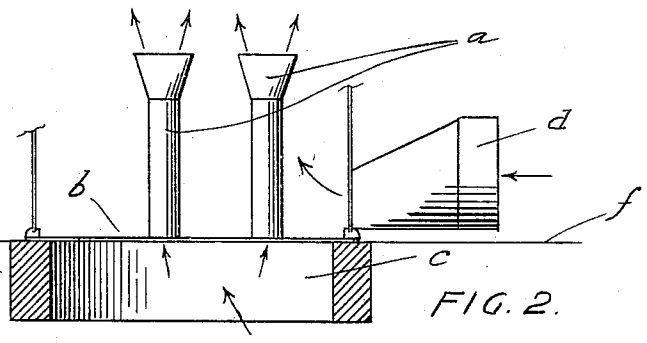

FIG. 2.

Witnesses

Jno. F. Coe

Rebecca Franke

Ole Nelson Inventor

UNITED STATES PATENT OFFICE.

OLE NELSON, OF MANKATO, MINNESOTA.

FRESH-AIR INJECTOR FOR FURNACE HEATING AND VENTILATING.

954,989. Specification of Letters Patent. Patented Apr. 12, 1910.

Application filed January 19, 1909. Serial No. 473,112.

To all whom it may concern:

Be it known that I, OLE NELSON, a citizen of the United States, residing at the city of Mankato, in the county of Blue Earth and State of Minnesota, have invented certain new and useful Improvements in Fresh-Air Injectors for Furnace Heating and Ventilating, of which the following is a specification.

My invention is intended to provide a means whereby the fresh outside air is supplied in connection with the inside return air to ventilate that type of furnaces known as warm air furnaces.

It is known that in the present construction of warm air furnaces the fresh outside air supplied to the hot air chamber which surrounds the fire box of the furnace is not sufficiently heated in order to insure a steady upward flow and therefore much of this air instead of accomplishing the desired result is directed by backward flow into the inside return air pipe. By my invention this difficulty is obviated and the fresh outside air is admitted in such a manner that it is sufficiently heated before it is actually delivered into the heated air of the furnace thereby producing constant flow upward and presents no opportunity to flow backwardly up the inside air pipe.

The construction briefly stated provides for an air pit under the furnace beneath the ash pit, a covering over the air pit, an air pipe communicating with the air pit and outside atmosphere, a plurality of pipes leading from the air pit into a hot air chamber to a point in a plane near the top of the fire box, with their openings projecting upward so that the cold or fresh air entering the air pit is carried upward through the pipes and delivered at such a position that it is warmed during its travel and insures a constant flow upward as desired, with no possibility of descending and flowing up the pipe communicating with the inside air.

Another important point is to so construct the injector pipes, that is the pipes carrying the outside air into the furnace, that the total cross-sectional area of these pipes is no greater than the total cross-sectional area of the outside air pipe. This insures a perfect and equal flow with no effect of back pressure nor allows the air to travel so rapidly up the injector pipes that it is not sufficiently heated.

The specific structure illustrating one means of accomplishing the object of my invention is clearly shown and described in connection with the annexed drawings and following specification.

Figure 1 sets forth my invention applied to a furnace. Fig. 2 is a detailed view partly in section and elevation of the invention. Figs. 3, 4 and 5 illustrate respectively front elevation, plan and side elevation on an enlarged scale, of the head of the injector tube.

The furnace illustrated in Fig. 1 to which my invention is applied is constructed along the usual general type, including fire box, ash pit, etc. Located under the ash pit and beneath the floor *f* is an air pit *c* to which communicates from the outside atmosphere a pipe *e*. Covering the air pit *c* is a metallic plate *b* having a plurality of openings therethrough into which are secured the vertical injector tubes or pipes *a*, which extend upward to a height nearly to the top of the fire box, and located around its outer surface. The upper extremity of each of the injector pipes is formed into a head *g* integral with the main body of the pipe, and so constructed as to diverge the circular form of the pipe into a contracted mouth with an elongated elliptical opening *l* as clearly illustrated in Figs. 3, 4 and 5, the head structure *g* being preferably made by continuing the cylindrical wall of the tube or pipe *a* adjacent the fire box upwardly in a tangential line to its main body as at *h* and the diametrically opposite wall converged inwardly and upwardly toward the fire box as at *j*. This thereby forces the metal of the side walls *k* upward and outward from the body of the tube or pipe *a* and conclusionally forms the desired elongated elliptical exit opening *l*. (See Figs. 3, 4 and 5.) This thereby gives the incoming air a spraying or scattering motion and mingles it with the previously warmed air from the inside air pipe *d*, and giving a constant upward motion. Not only does this head construction accomplish the spraying motion of the admitted air, but directs the said admitted air against the hot outer walls of the fire box by reason of the converging wall *j*, and thereby insures a more ready heating of the admitted air than otherwise would be the result if the head structure was straight or cylindrical. The admitted air is ejected in a wide relative thin stream against the hot outer walls of the fire box, thus making it

therefore possible to heat all of the ejected air and not only partial quantities of it. Therefore, by my invention I obtain a practically perfect construction and warm the desired places to be heated in the building without any remote possibility of chilling the said desired places. Any number of these pipes *a* may be placed around the body of the furnace, but their total cross-sectional area must not be greater than the total cross-sectional area of pipe *e*. By this means a sure and positive flow of fresh air is insured.

The above description cites the specific details of construction, but a more complete understanding of my invention can be obtained by noting the operation which is as follows:—The furnace assumed to be in operation and the several parts in position, the fresh outside air is admitted into the air pit *c* through the medium of the pipe *e* and flows upward into the various injector pipes *a* which owing to their height are heated by the fire in the furnace and impart a corresponding heat to the pipes *a* which thereby heat the incoming outside air and cause it to proceed upward to be sprayed into the heated air of the furnace and carried off through suitable pipes and flues into the building for its desired function. The inside air which enters the furnace enters through the pipe *d* (from the atmosphere within the room, or cellar in which the furnace is situated) which is positioned above the air pit and covering *b* and allows the inside air to be mingled with the incoming fresh air and carried upward to be used in heating the building.

Of course other forms may be suggested to the average mechanic constructing this device and I do not limit myself to the specific structure described and shown.

What I claim and desire to secure by Letters Patent is as follows:—

1. In combination with a hot air furnace, comprising a heater with a fire-pot, and a combustion chamber, a casing surrounding and spaced from the same to form a hot air chamber, an air pit located beneath said heater, and having a cold air pipe leading thereinto, a plurality of injector tubes or pipes substantially cylindrical terminating into contracted mouths having elongated exit openings so as to give the air a spraying action, said injector tubes or pipes leading from the air pit into the hot air chamber.

2. In combination with a hot air furnace, comprising a heater with a fire-pot, and a combustion chamber, a casing surrounding and spaced from the same to form a hot-air chamber, an air pit located beneath said heater, and having a cold air pipe leading thereinto, a plurality of injector tubes or pipes associated with the air pit and terminating in the hot air chamber, said injector tubes or pipes having contracted mouths with elongated exit openings so as to spray the air.

3. In combination with a hot air furnace, comprising a heater with a fire-pot, and a combustion chamber, a casing surrounding and spaced from the same to form a hot air chamber, an air pit located beneath said heater, and having a cold air pipe leading thereinto, a plurality of injector tubes or pipes substantially cylindrical and terminating into contracted mouths having elongated exit openings so as to spray the air, said injector tubes or pipes leading from the air pit and terminating in the hot air chamber in a plane coinciding with the top of the fire-pot.

4. In combination with a hot air furnace, comprising a heater with a fire-pot, and a combustion chamber, a casing surrounding and spaced from the same to form a hot air chamber, an air pit located beneath said heater, and having a cold air pipe leading thereinto, a plurality of injector tubes or pipes terminating into heads with contracted mouths having elongated exit openings, said heads having a plurality of walls one of which is so formed as to direct the admitted air against the walls of said fire box, and said injector tubes or pipes leading from the air pit into the hot air chamber.

5. In combination with a hot air furnace, comprising a heater with a fire-pot, and a combustion chamber, a casing surrounding and spaced from the same to form a hot air chamber, an air pit located beneath said heater, and having a cold air pipe leading thereinto, a plurality of injector tubes or pipes substantially cylindrical terminating into integral heads with contracted mouths having elongated exit openings, said heads having a plurality of walls, one of which is so formed as to direct the admitted air against the walls of said fire box, and said injector tubes or pipes leading from the air pit into the hot air chamber.

6. In combination with a hot air furnace, comprising a heater with a fire-pot, and a combustion chamber, a casing surrounding and spaced from the same to form a hot air chamber, an air pit located beneath said heater, and having a cold air pipe leading thereinto, a plurality of injector tubes or pipes terminating into heads with contracted mouths having elongated exit openings, said heads having a plurality of walls one of which is in line with said tube or pipe and another converging toward the in line wall, and said injector tubes or pipes leading from the air pit into the hot air chamber.

7. In combination with a hot air furnace, comprising a heater with a fire-pot, and a combustion chamber, a casing surrounding and spaced from the same to form a hot air chamber, an air pit located beneath said heater, and having a cold air pipe leading

thereinto, a plurality of injector tubes or pipes substantially cylindrical terminating into integral heads with contracted mouths having elongated exit openings, said heads having a plurality of walls one of which is in line with said tube or pipe and another converging toward the in line wall, and said injector tubes or pipes leading from the air pit into the hot air chamber.

8. In combination with a hot air furnace, comprising a heater with a fire-pot, and a combustion chamber, a casing surrounding and spaced from the same to form a hot air chamber, an air pit located beneath said heater, and having a cold air pipe leading thereinto, a plurality of injector tubes or pipes substantially cylindrical terminating into integral heads with contracted mouths having elongated exit openings, said heads having a plurality of walls one of which is tangential with the said tube or pipe and another converging inwardly and upwardly toward the tangential wall, and said injector tubes or pipes leading from the air pit into the hot air chamber.

OLE NELSON

Witnesses:
JNO. C. NOE,
REBECCA FUNK.