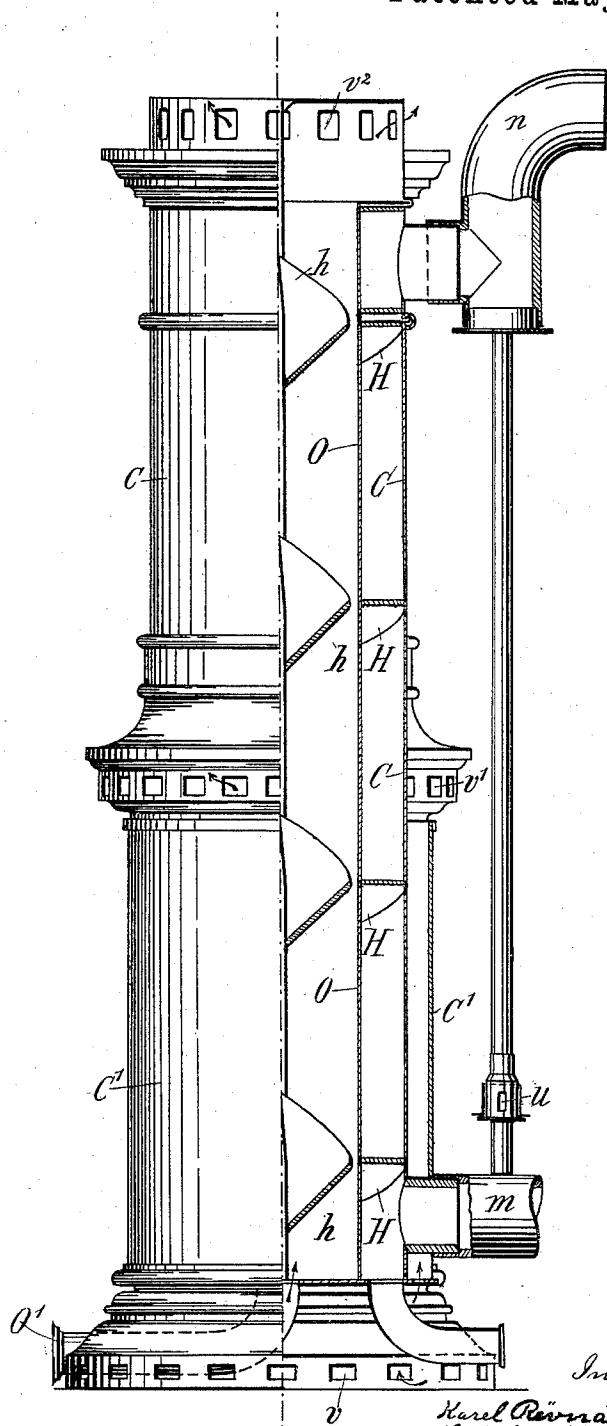


(No Model.)

K. RIVNÁČ & L. VOJÁČEK.
APPARATUS FOR HEATING, &c.

No. 474,694.

Patented May 10, 1892.



Witnesses:

E. H. Sturtevant.

H. Huster

Inventors.

Karel Rivnác &
Ludislav Vojáček.

by

Richardson
Attys.

UNITED STATES PATENT OFFICE.

KAREL RIVNÁČ AND LADISLAV VOJÁČEK, OF PRAGUE, AUSTRIA-HUNGARY,
ASSIGNORS TO K. RIVNÁČ & CO., OF SAME PLACE.

APPARATUS FOR HEATING, &c.

SPECIFICATION forming part of Letters Patent No. 474,694, dated May 10, 1892.

Application filed March 28, 1890, Serial No. 345,792. (No model.) Patented in Austria-Hungary October 30, 1888, No. 5,511 and No. 36,272, and June 14, 1890, No. 507 and No. 20,971; in England January 29, 1889, No. 1,569; in France May 28, 1889, No. 198,571; in Belgium May 28, 1889, No. 86,419, and in Switzerland June 25, 1889, No. 1,218.

To all whom it may concern:

Be it known that we, KAREL RIVNÁČ and LADISLAV VOJÁČEK, subjects of the Emperor of Austria-Hungary, and residents of Prague, Bohemia, Austria-Hungary, have invented certain new and useful Improvements in Heating Apparatus, (patented in Austria-Hungary October 30, 1888, No. 5,511 and No. 36,272, and June 14, 1890, No. 507 and No. 20,971; in France May 28, 1889, No. 198,571; in Belgium May 28, 1889, No. 86,419; in Switzerland June 25, 1889, No. 1,218, and in England January 29, 1889, No. 1,569,) of which the following is a full, clear, and exact description.

The object of our invention is to utilize in a secondary stove or heater the heat of the smoke and the various gases which escape from other stoves or heaters.

We are aware that many stoves and similar apparatus have been invented and patented for this purpose; but most of them are meant principally for ventilating purposes and none of them is a sufficient heater. The characteristic feature of our stove is to bring the heated smoke or gases and heated air into a very close and thorough contact with the heating-surface.

Smoke-stoves with one or several air-circulating tubes inside are known. The waste hot smoke circulates between the outer and inner tubes and cold air circulates through the inner tubes upward. This kind of smoke-stove is not efficacious enough, as a great part of the smoke escapes without being brought into sufficiently close contact with the heating-surface, while the smoke which comes into such contact cools out more than enough. The cold air passes through the inner circulating-tubes too quickly and only a small part of it is really heated, the central portion not being heated, but is uselessly drawn up with the rest. To avoid these losses, we force the smoke and hot gases to take a helical course inside the stove, so as to come into thorough contact with the heating-surface of the smoke-stove. The air-circulating tube is provided with another helix which does not touch its surface. By this helix the cold air is induced to circulate through the air-tube, so as to come into thorough contact with the heating-sur-

face of the tube, and no air can pass through without being heated.

The accompanying drawing illustrates our invention. It is partly in elevation from the front and partly in vertical central section.

The stove is composed of three concentric tubes. The smoke and the gases of combustion pass between the tubes C and O. The air to be heated passes between the tubes C and C' and through the central tube O. The space between the tubes C and C' is open beneath and on its top and so is the central tube O; or the upper ends of the air-heating spaces may communicate with the apartment through the side openings v' and v'' . The central tube O can be fed by the outward fresh air through a tube O', in which case its bottom must be closed. In this case the cold air which passes between the tubes C and C' will be provided by the openings v at the lower end. The hot smoke or burning gases are introduced by one of the tubes m and n into the chimney. U is a ventilator, which can be regulated as one likes. The hot smoke and burning gases are forced to circulate between the tubes C and O by the helix H, and in this way all their warm particles come into close connection with the surface of the tubes O and C. A similar effect is produced upon the air by means of the helix h in the air-tube O. We prefer that the helix h should be arranged as shown in the drawing—that is, with its outer edge situated a short distance away from or inside of the tube O. This arrangement leaves a certain space between the helix and the tube through which may pass a thin film of air, which is found to facilitate the circulation through the tube O. This narrow space being, however, adjacent to the passage-way for the hot products of combustion between the tubes O and C insures that the air which shall pass through it shall be thoroughly heated. No air can pass through this tube without being heated upon the wall O.

Our stoves can be made of every material fit for stoves and can assume every possible shape. The drawing shows only one example of such stoves.

In many cases our stoves receive the direct

fire from their primary heater or stove, and from them it is led back into the upper flues of said primary heat-producer or, as it may be convenient, to the chimney.

5 What we claim is—

The combination, with the two concentric cylinders O and C, of the helix arranged within the inner cylinder, the helicoidal partition in the space between the two cylinders, the outer
10 wall or casing C', with openings at the top, the fresh-air tube at the lower end of the cylinder

O, the tubes *m* and *n*, leading into the chimney, and a connection, said tubes and a ventilator in said connection, substantially as described.

In witness whereof we have hereunto set our hands in presence of two witnesses.

KAREL RIVNÁČ.

LADISLAV VOJÁČEK.

Witnesses:

ADOLF FISCHER,

JAN HORÁK.