

No. 619,709.

Patented Feb. 21, 1899.

A. BAIR.

MAGAZINE OR RETORT FOR STOVES OR FURNACES.

(Application filed Mar. 31, 1897.)

(No Model.)

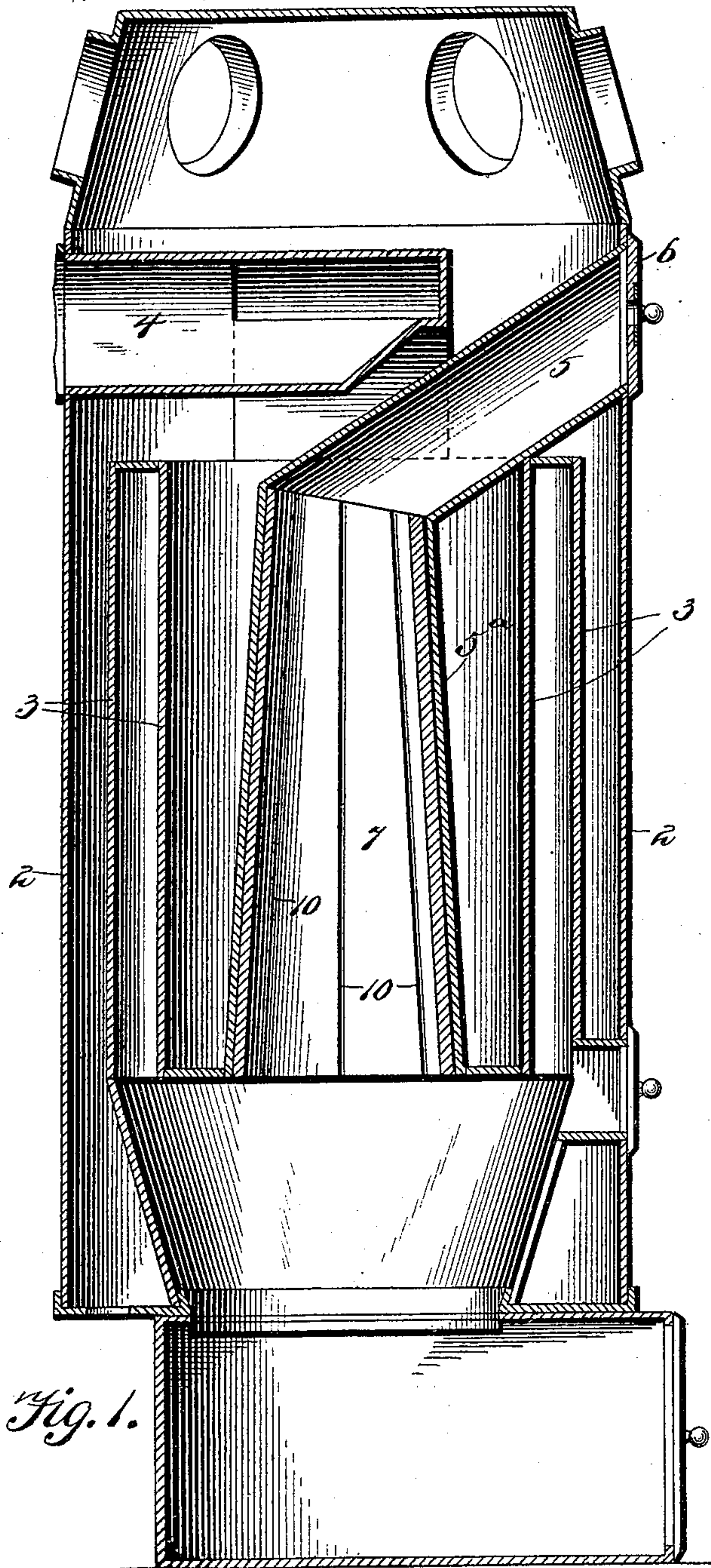


Fig. 1.

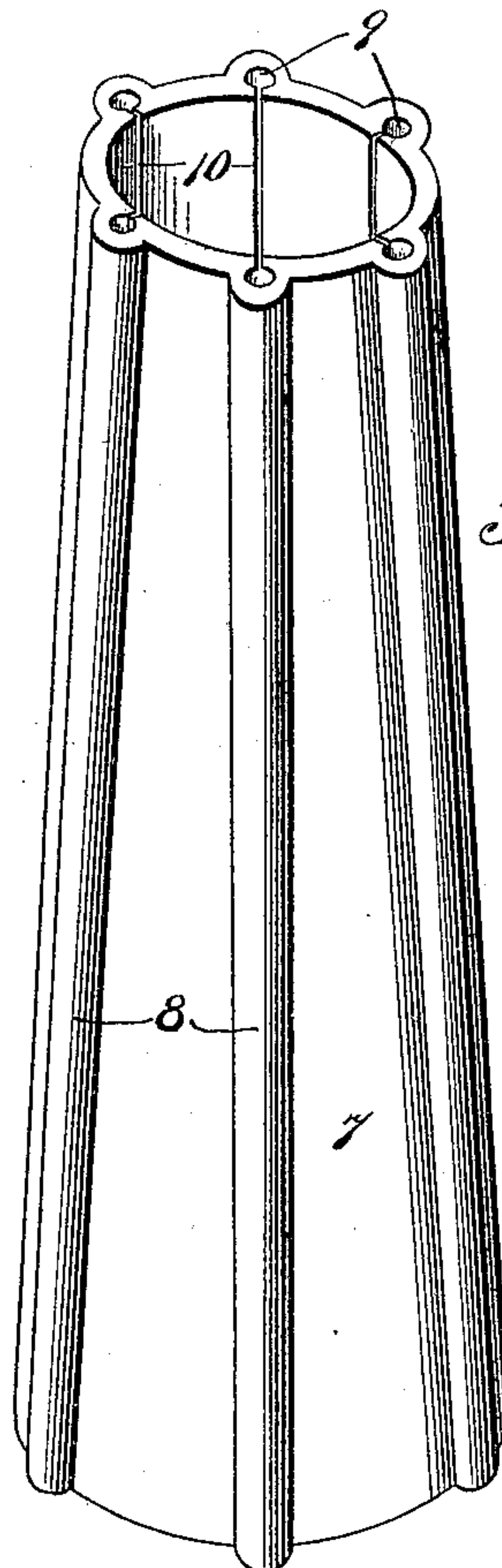
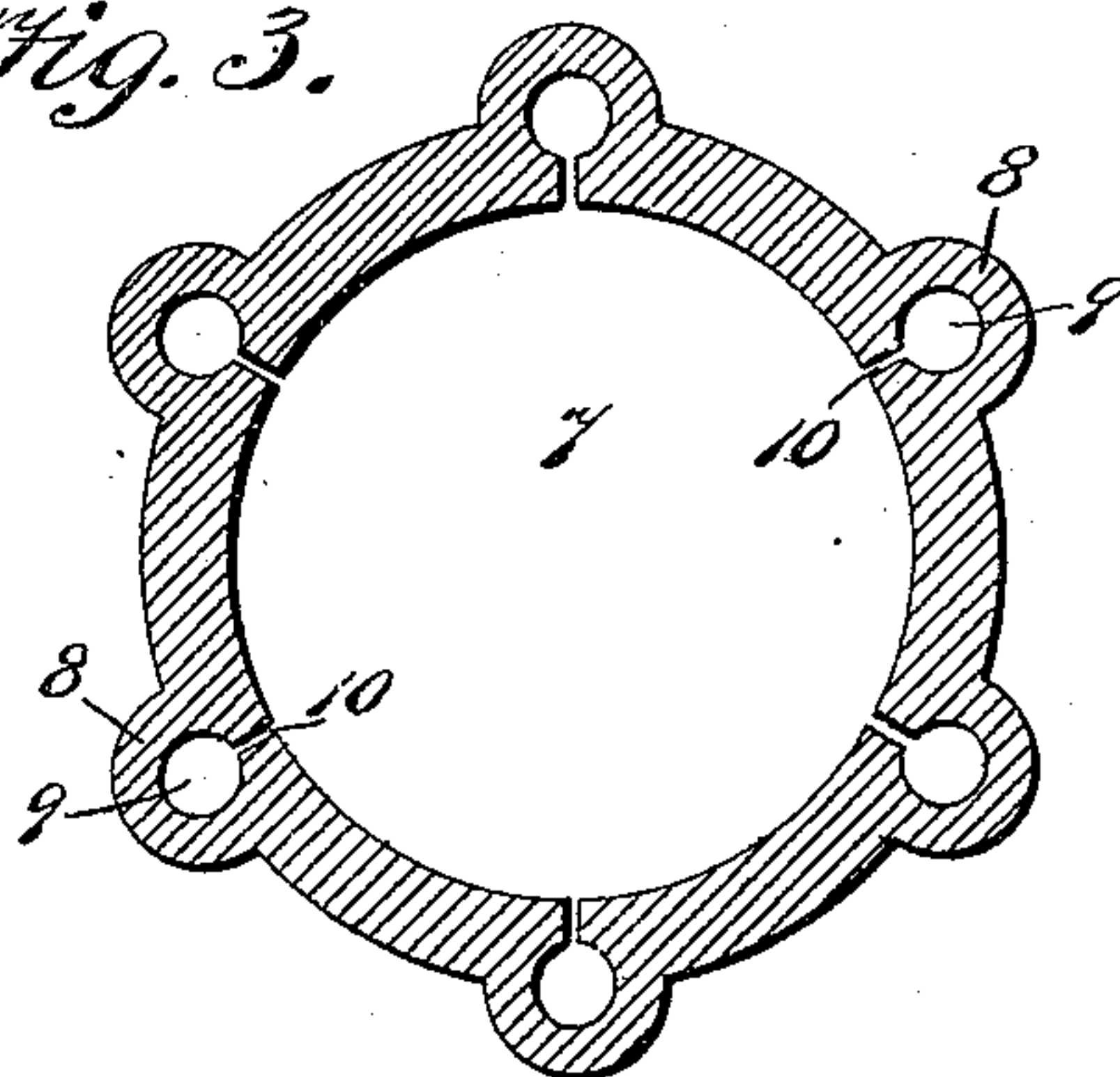


Fig. 2.

Fig. 3.



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UNITED STATES PATENT OFFICE.

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MAGAZINE OR RETORT FOR STOVES OR FURNACES.

SPECIFICATION forming part of Letters Patent No. 619,709, dated February 21, 1899.

Application filed March 31, 1897. Serial No. 630,122. (No model.)

To all whom it may concern:

Be it known that I, ALVIN BAIR, a citizen of the United States, residing at Tiffin, in the county of Seneca and State of Ohio, have invented a new and useful Magazine or Retort for Stoves or Furnaces, of which the following is a specification.

This invention relates to stoves and furnaces; and it has for its object to provide a new and useful construction of coking-retort adapted for use in connection with a hot-air furnace or stove and coöperating with suitably-arranged draft-passages to provide for a thorough consumption of the fuel, as well as providing means for consuming the gases and other products of combustion without their escaping into the room or through any of the hot-air-conducting flues of the furnace or stove.

To this end the invention contemplates a novel form of coking-retort which not only serves in the capacity of a magazine or feeder above the fire-pot for containing a reserve supply of fuel, but also acts in the capacity of a combustion-chamber, so that as the major portion of the combustion actually takes place within the said retort the same by reason of its longitudinal draft-passages and lateral vents or slits will provide for supplying the fuel with the requisite draft and also provide for carrying off the gases and other products liberated from the fuel.

Other objects and advantages of the invention will appear in the following description; but the preferred embodiment of the invention is shown in the accompanying drawings, in which—

Figure 1 is a central vertical sectional view of a hot-air furnace embodying the improvements contemplated by the present invention. Fig. 2 is a detail in perspective of the coking-retort. Fig. 3 is a horizontal sectional view of the retort.

In carrying out the present invention the peculiarly-constructed coking-retort could be adapted for use in connection with any type of hot-air furnace or stove providing for the requisite downdraft of air through the longitudinal passages of the retort and into the fire-pot; but in order that the application of the invention may be understood a hot-air furnace or retort is illustrated in the drawings.

In the construction of furnace or heater shown in the drawings the numeral 1 designates the flaring fire-pot arranged above the plane of the grate and enclosed within the exterior shell or casing 2, forming the main hot-air drum through which the air to be heated is circulated before finding escape into the hot-air-conducting flues connected with the said shell or casing at the top thereof. Arranged within the exterior shell or casing 2 and supported by the flaring fire-pot 1 is an upright annular smoke-chamber confined between the concentric walls 3, spaced apart and united at their upper ends to form a closed top for the smoke-chamber, while the lower ends of said concentric walls are disconnected to provide a direct communication between the upright annular smoke-chamber and the fire-pot 1 above the grate. At its closed top end the upright annular smoke-chamber between the concentric walls 3 has connected therewith the smoke-flue 4, to which is coupled the usual smoke-pipe, and completes the connections necessary to provide for the circulation of the smoke and other products of combustion up through the annular smoke-chamber, and thence into the flue 4 and chimney.

The inner wall 3 of the upright annular smoke-chamber is flanged inwardly at its lower edge to close the top of the fire-pot 1, except at its center, where there is formed an opening from which arises a centrally-arranged upright magazine-casing 5^a. This centrally-arranged upright magazine-casing 5^a flares in a downward direction and has the lower end thereof open directly into the fire-pot 1, at the top of the latter, while the upper end of the magazine-casing 5^a connects with a combined feed and draft chute 5. In the construction illustrated this combined feed and draft chute 5 inclines upwardly and forwardly from the top of the magazine-casing 5^a and has the outer end thereof fitted in the exterior shell or casing 2 and provided with a damper-door 6, which is constructed for the admission of draft-air into the upper end of the magazine-casing, said door being also mounted conveniently to facilitate the opening thereof for the introduction of fuel into the said chute 5.

In the present invention the magazine-cas-

ing 5^a is adapted to snugly receive therein a coking-retort 7. This coking-retort is preferably made in one piece and is of a conico-cylindrical shape, so as to have a registering fit within the correspondingly-shaped magazine-casing 5^a of the furnace or stove, and the said retort 7 is provided in its circular wall and exterior of its interior diameter or bore with a plurality of continuous air-passages 9, extending longitudinally from end to end thereof and open at both ends. The upper open ends of the said air-passages 9 communicate with the interior of the combined feed and draft chute 5 and the lower open ends of said air-passages 9 opening directly into and communicating with the fire-pot, it being observed at this point that the retort 7 is coextensive in length with the casing 5^a, so that its lower end will lie directly at the top of the fire-pot 1, while its upper end will lie at the inner extremity of the chute 5. It will therefore be seen that by reason of the relative length and location of the retort 7 and the fact that the continuous longitudinal air-passages 9 thereof are open at both ends there will be a direct and unobstructed line of draft from the air-inlet in the door 6 through the chute 5, the passages 9 of the retort 7, the fire-pot 1, and from thence through the upright annular smoke-chamber between the walls 3 into the smoke-flue 4. The air which has this circulation provides the necessary draft for supplying the fuel within the fire-pot and the coking-retort.

After the fire has been started in the furnace or stove the ordinary or bottom drafts of the same are closed and the air necessary to support combustion is admitted through the dampered door 6 and takes the course already described. It will therefore be seen that the main supply of air to the fuel passes through the air ducts or passages 9 of the coking-retort, and at this point it may be explained that in practice I prefer to construct the passages 9 in the thickness of the wall or retort, so in order to insure the proper thickness of the material around the passages without unnecessarily increasing the weight and cross-sectional area of the walls said passages are formed in the enlargements or ribs 8, disposed longitudinally of the retort upon the exterior surface thereof, as plainly shown in Figs. 2 and 3 of the drawings.

The communication of downdraft to the fuel through air-passages formed in and parallel with the wall of the coking retort or magazine secures an important advantage in the fact that the air when it reaches the fuel within the fire-pot has become heated, and hence does not chill the incandescent contents of the combustion-chamber, and in addition to this the carrying of draft-air through the passages in the walls of the retort serves to maintain the retort at a lower temperature than under other circumstances, and thus to a certain extent prevent the burning out of

the material constituting the retort. This arrangement, however, has a still more important advantage consisting in the relief of the retort or magazine from accumulations of gaseous products of the coking operation, and in order that this relief may be complete throughout the length of the retort the walls of the latter are provided with vents 10, extending radially from the bore or interior of the retort outwardly to the air-passages 9. In the construction illustrated these vents consist of continuous slits or slots extending throughout the length of the retort in communication with each passage 9. This construction of the vents is of special importance in connection with the burning of soft or bituminous coal from the fact of the waxy substances, such as pitch, which are contained in fuel of this kind. It is well known that soft coal when heated to a certain temperature discharges pitch and analogous substances, which serve to cake or lock the blocks of coal into masses, which will not feed readily, if at all, into a subjacent combustion-chamber or fire-box, and in addition to this disadvantage may be mentioned the further important one that these accumulations of pitchy substances prevent the passage of air through the mass, and hence interfere materially with the removal of the products of the coking operation. As a result these gases accumulate and are liable to cause explosions of greater or less intensity. By employing substantially continuous vents, however, extending throughout the length of the retort, the gases given off during the coking operation find their escape immediately into the air-passages, through which a downward draft of air is progressing, and hence gas-pockets of any considerable size cannot be formed in the contents of the retort. The continuous unobstructed downdraft of air through the passages 9 also produces a suction which serves to assist in relieving the retort of gaseous products, and said products becoming mixed with air are introduced into the fire-pot for contact with the incandescent contents thereof, where complete combustion ensues.

The self-feeding of soft or bituminous coal from the magazine into the subjacent fire-pot depends upon the completeness of the coking operation, and hence to the effective removal of the products of the coking operation as they are formed. When said operation has progressed to a certain extent under favorable circumstances, such as those possible with an apparatus constructed as above described, the sticky or glutinous properties will have been burned out, and thus the coke will be left loose and free to feed properly into the fire-pot without manual assistance.

It will be seen, furthermore, from the foregoing description that there is no communication whatever between the feed-chute, which constitutes a common fuel and air supply conductor, and any other portion of the interior of the furnace than the upper end of

the magazine or retort and the parallel air-passages, which are formed in the walls of said retort, and, furthermore, that the entire amount of air necessary to support combustion in the fire-pot when the lower drafts are closed must enter through the feed-chute and pass the entire length of the retort or magazine through the passages 9. The retort or magazine is in exclusive communication with the fire-pot, the joint between said parts being air-tight, whereby no combustion-supporting air can be admitted to the fire-pot through any other means of communication.

From the foregoing it will be understood that the retort 7 not only serves as a magazine for holding a reserve supply of fuel, but, in fact, acts in the capacity of a combustion-chamber, as the major portion of the combustion actually takes place within the retort. For this reason the lateral vents 10 are absolutely necessary to provide for a discharge of the liberated gases and other products of combustion into the draft-passages 9, through which the gaseous products, including the supply of air, pass directly into the fuel within the fire-pot 1, and the incandescent portions of the fuel within this fire-pot will necessarily provide for thoroughly consuming the gases and thereby rendering the combustion of the fuel as nearly perfect as possible.

It will also be seen from the foregoing that under no conditions can the gases from the fuel escape into the room, as even the opening of the door 6 will provide for the admission of an excessive amount of air, yet this will not cause the escape of gas for the reason that the admission of air is in a downward direction to the fire-pot and the capacity of the air-passages 9 is sufficient to carry off all of the gaseous products.

The preferred construction of the lateral vents 10 is in the form of slits running longi-

tudinally the full length of the retort and of less width than the air-passages, whereby the contents of the retort cannot possibly enter into the air-passages and obstruct the same.

Having thus described the invention, what is claimed as new, and desired to be secured by Letters Patent, is—

In a furnace or stove, the combination of the fire-pot, an upright smoke-chamber communicating at its lower end with the top portion of the fire-pot, a vertical coking-retort supported centrally above the fire-pot, and a combined feed and draft chute arranged at the top of said retort and provided with a draft passage or opening for the supply of cold air, said vertical coking-retort being of a conico-cylindrical shape and provided in its circular wall with a plurality of continuous air-passages extending longitudinally from end to end thereof, open at both their upper and lower ends, and with interior continuous lateral vents of a materially less width than the width of the air-passages and providing communication between such passages and the interior of the retort for the escape of the gaseous products of combustion into the passages, said retort also forming a combustion-chamber and being arranged with its lower end directly at the top and within the plane of the fire-pot, and its upper end within the plane of said combined feed and draft chute, whereby there is a direct downward draft of air from said chute through the longitudinal air-passages of the retort into the fire-pot and from thence through said smoke-chamber, substantially as set forth.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

ALVIN BAIR.

Witnesses:

JOHN RUDEL,
CLYDE C. BAIR.