E. SMITH.

Heating-Stove.

No. 168,534. Patented Oct. 5, 1875.

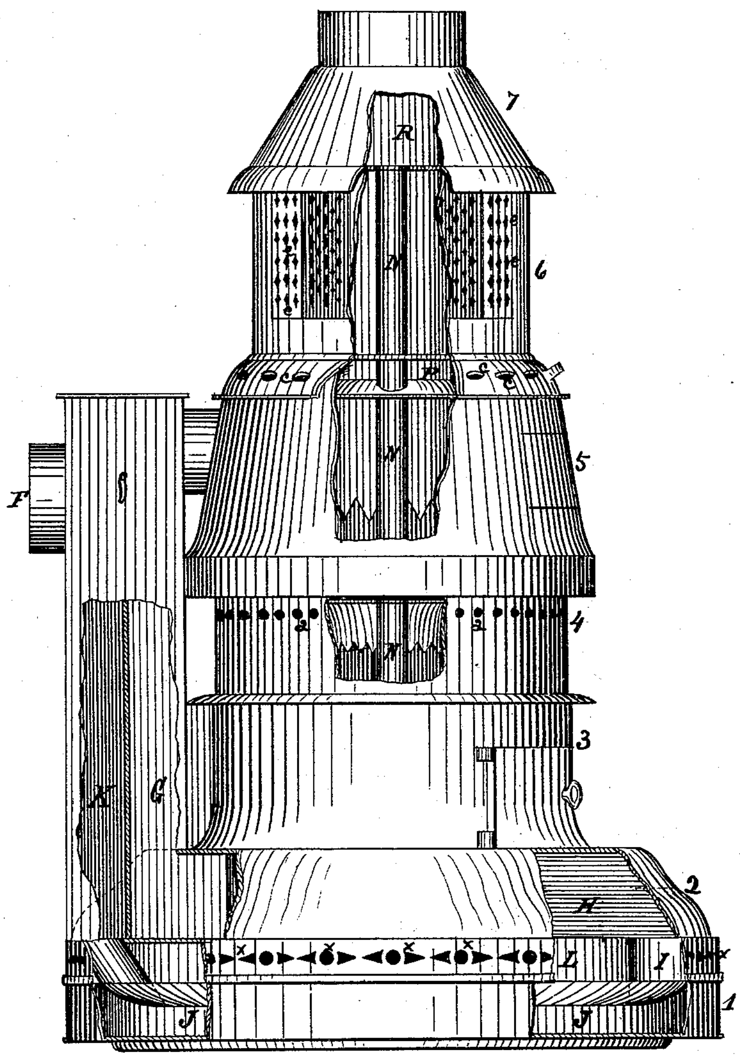

Fig. 1.

Witnesses. Alex. Selkirk. Henry W. Smith

Elihu Smith
Inventor.

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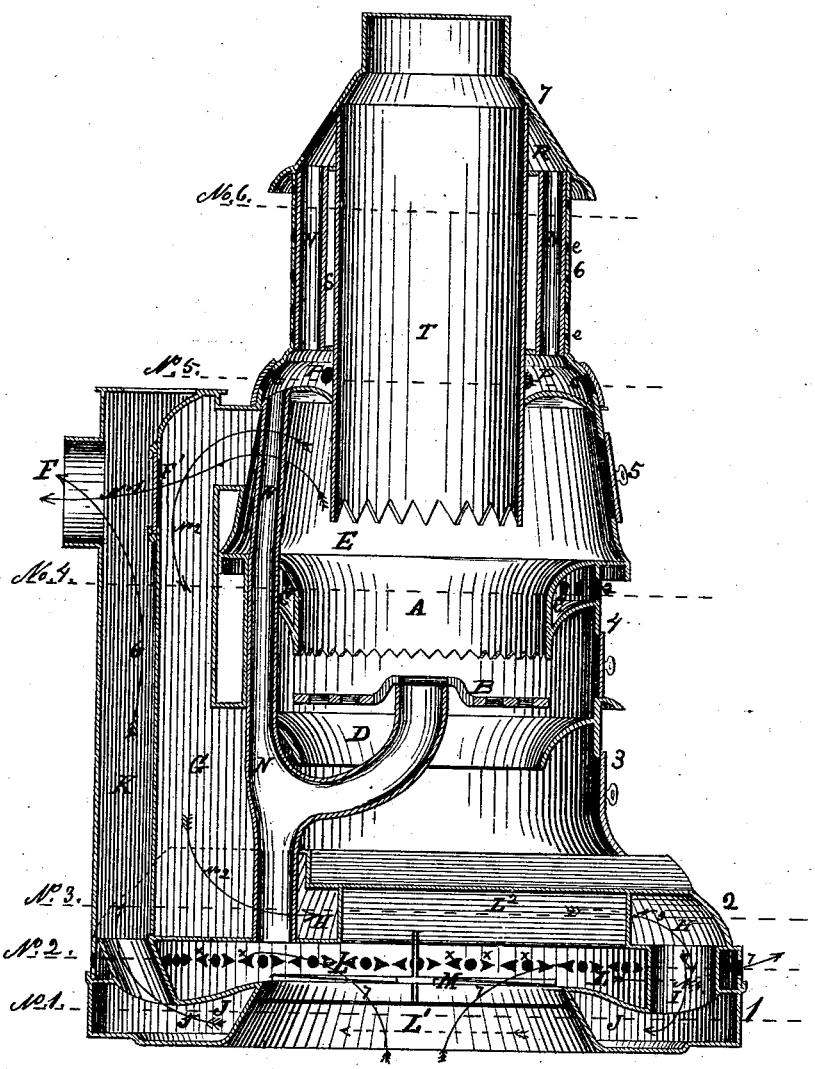

Fig. 2.

Witnesses. Alex. Selkirk, Henry W. Smith

Elihu Smith
Inventor.

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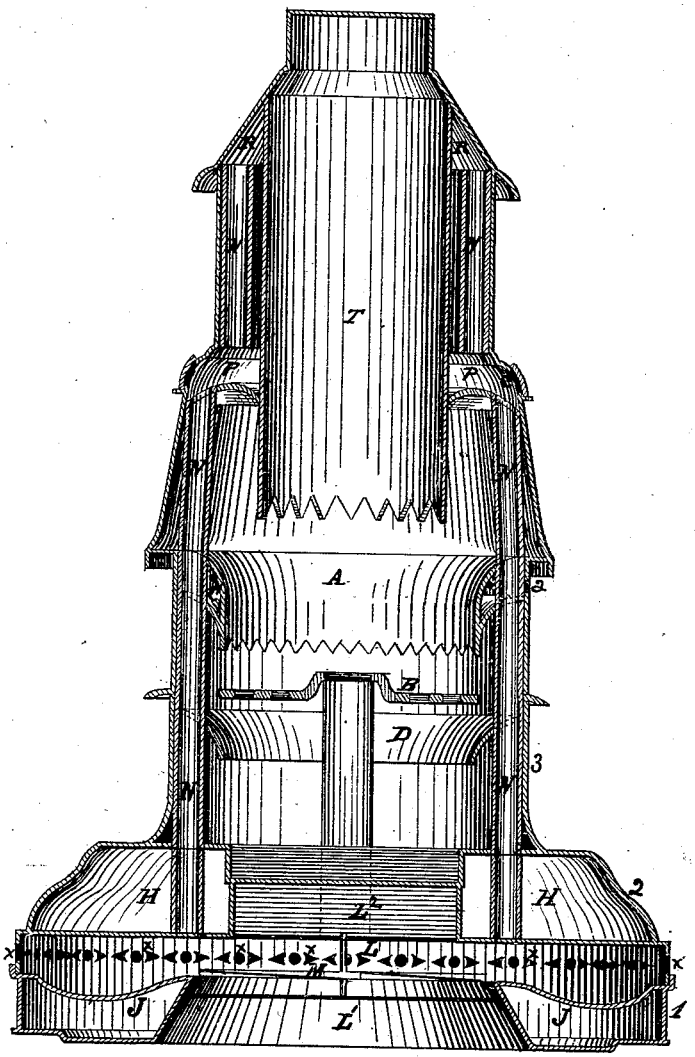

Fig. 3.

Witnesses. Alex. Selkirk
Henry W Smith

Elihu Smith
Inventor.

5 Sheets--Sheet 4.

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Fig. 4.

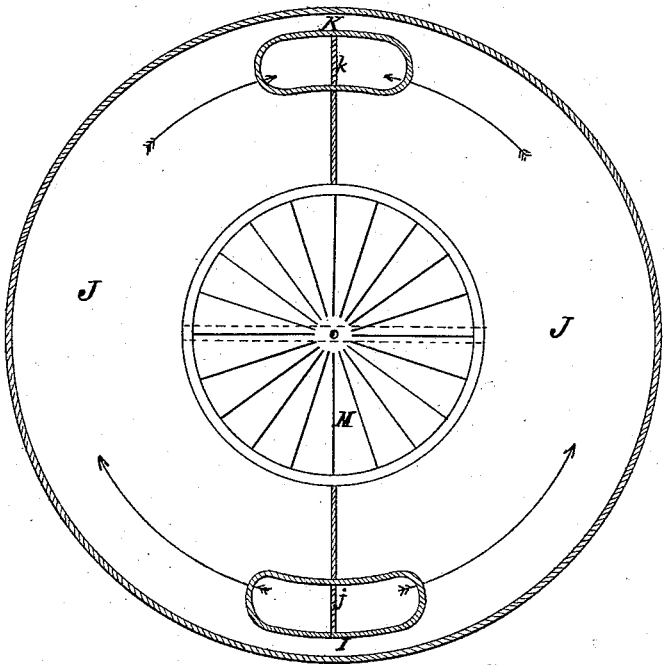
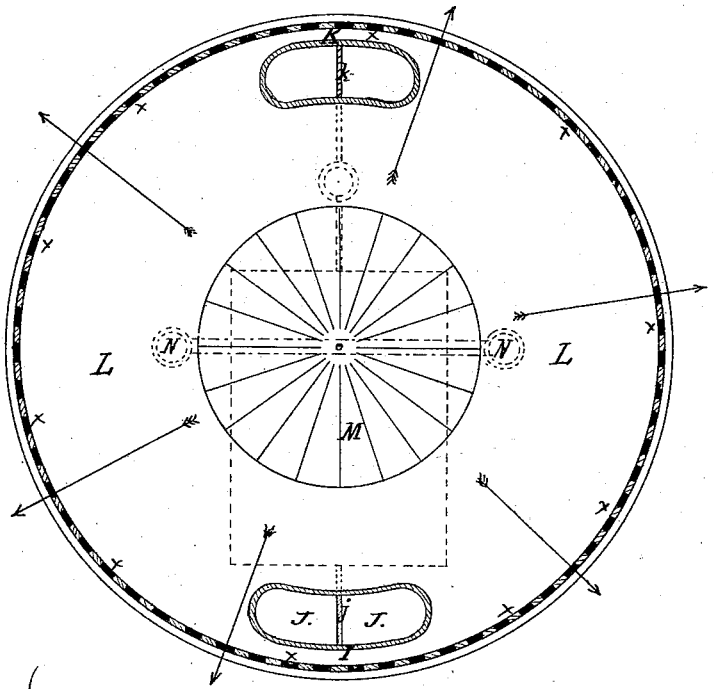


Fig. 5.



Witnesses. Alex. Selkirk. Henry W. Smith

Elisha Smith
Inventor.

5 Sheets--Sheet 5.

E. SMITH.

Heating-Stove.

No. 168,534. Patented Oct. 5, 1875.

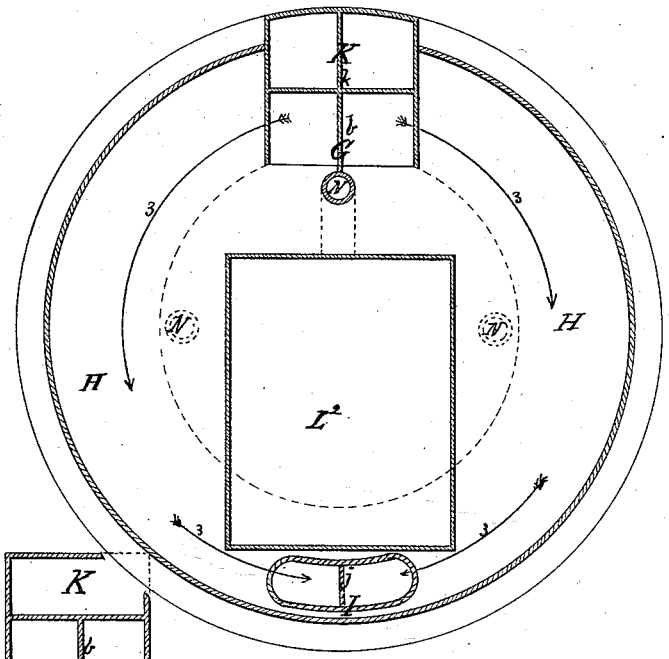


Fig. 6.

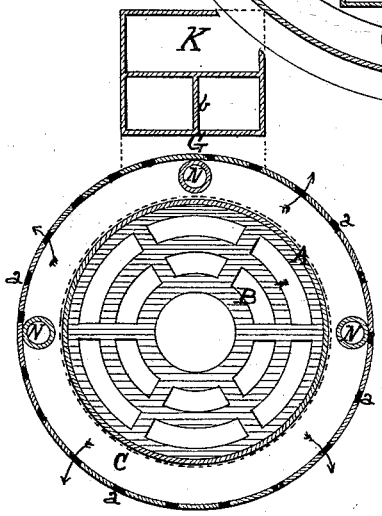


Fig. 7.

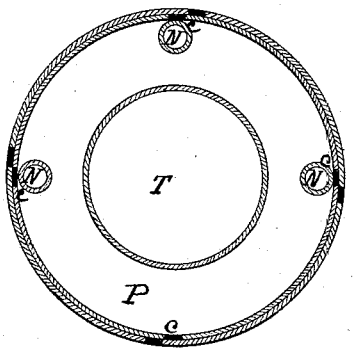
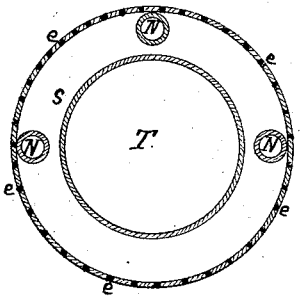


Fig. 8.

Fig. 9.



Witnesses.

Alex. Kelkirk

Henry W. Smith

Elihu Smith

Inventor.

UNITED STATES PATENT OFFICE.

ELIHU SMITH, OF ALBANY, NEW YORK.

IMPROVEMENT IN HEATING-STOVES.

Specification forming part of Letters Patent No. **168,534**, dated October 5, 1875; application filed March 4, 1875.

To all whom it may concern:

Be it known that I, ELIHU SMITH, of the city and county of Albany, State of New York, have invented certain new and useful Improvements in Heating-Stoves; and I do hereby declare that the following is a description thereof, reference being had to the accompanying drawings, in five sheets, forming a part of this specification, in which—

Figure 1 represents a side view of the exterior of the stove, having the improvements in this invention. Fig. 2 is a sectional elevation from front to rear, illustrating the same. Fig. 3 is a sectional elevation from side to side, illustrating the same. Fig. 4 is a sectional view taken at horizontal line No. 1 in Fig. 2. Fig. 5 is a sectional view taken at horizontal line No. 2 in Fig. 2. Fig. 6 is a sectional view taken at horizontal line No. 3 in Fig. 2. Fig. 7 is a sectional view taken at horizontal line No. 4 in Fig. 2. Fig. 8 is a sectional view taken at horizontal line No. 5 in Fig. 2. Fig. 9 is a sectional view taken at horizontal line No. 6 in Fig. 2.

My invention relates to revertible-flue stoves; and consists in certain improvements in the descending and ascending and base flues, and their combinations, and in hot-air flues and chambers used in combination with the base-flues and other heating parts of the stove, all of which I will proceed to describe.

The object of this invention is to cause the hot gaseous products of combustion to be drawn in their full volume in two equal currents, separated from each other, in their entire distance of passage to the exit-flue, from the combustion-chamber, in which their distance of passage will be materially increased, and the direction of the two currents reversed in their passage, that a greater amount of heat-radiating surface may be brought in contact with the two equal currents of hot gases passing through them to the exit, when the revertible draft is used, and the stove be thereby made to operate more powerfully as a heater, while the air-flues and air-chambers may be made to heat air for discharge into the room, or into another room, and a better circulation of atmosphere for heating be secured.

To enable others skilled in the art to make and use my invention, I will proceed to describe the same, reference being had to the accompanying drawings, and the letters of reference marked thereon, the same letters indicating like parts.

In the drawings, 1 represents the sub-base of the stove. 2 is the base proper. 3 is the ash-pan section. 4 is the fire-pot section. 5 is the combustion-chamber section. 6 is the fuel-reservoir section. 7 is the top section. The said sections are made in the usual manner, of cast-iron, and joined together in any of the modes practiced by the trade.

A is the fire-pot, made of cast-iron, and supported at its upper margin from the outer casing of the stove. B is the grate, supported below the lower end of the fire-pot.

In this invention I support the said fire-pot from its center, in a manner substantially as in the patent issued to myself August 25, 1874, in which an air tube or conduit, leading from an opening in the base, is employed for supporting the grate, and at the same time admit air to the center of the fuel massed in the fire-pot.

Around the upper portion of the fire-pot, and between its walls and the wall of the outer casing, is formed an annular hot-air flue or chamber, C, the outer wall of which is provided with perforations *a a*, to permit the escape of the heated air into the room. Starting from the outer wall of the stove, at a short distance below the grate, and above the space occupied by the ash-pan, is placed the ash ring D, intended to conduct the ashes and clinkers discharged over the periphery of the grate into the ash-pan. The hot gaseous products of combustion are led from the combustion-chamber E to the exit F in either a direct manner, as indicated by arrows 1 in Fig. 2, when the damper F′ is opened, or in a circuitous direction when the said damper is closed. The descending flue G is divided about equally by a vertical plate, *b*, Figs. 6 and 7, and form what I denominate a bisected or duplex flue, through which the hot gases are drawn, in the revertible draft, in two equal currents, each separated from the other, and both leading into the base proper, as indicated by arrow No. 2.

The base proper is provided with the two flues H H, each leading from the duplex flue G, and around the opposite sides of the stove from the rear to the front, and together form what I denominate the "duplex base-flues," through which the hot gases pass from the duplex descending flue G to the front of the stove, as indicated by arrows No. 3 in Figs. 2 and 6. I is a short descending flue located in the front portion of the base, and leading from the flues H H into the sub-flues J J, as indicated by arrow 4 in Fig. 2. The said flue is also divided by a plate, *j*, into about equal parts, each of which part is to receive the hot gases from a flue, H, above, and discharge into a flue, J, in the sub-base. The sub-base flues J J lead the hot gases from the flue I in two separate currents to the ascending flue K, as indicated by arrows 5, each of which currents passes through a flue, J, on opposite sides of the said sub-base, and in a reverse direction from those passing through the base-flues H H. The ascending flue is also divided by a plate, *k*, in its lower portion at least, and leads to the exit F, as indicated by arrows 6, Fig. 2.

In the reverted draft, by the improvements in this invention, the hot gaseous products of combustion are made to pass in two equal and separated currents from the combustion-chamber to the exit in a circuitous manner, without either current interfering or crowding with the other in the least at any point in their passage, and each current is caused to heat a side of the base and sub-base from rear to front by reason of the contact, in part, of the hot gases with the outer sides of the flues in the base and sub-base, as they are drawn from the combustion-chamber to the exit, and the sides of the said base and sub-base are equally heated thereby by the full and equal action of the hot gases in their passage, which is an improvement over that manner of construction of flues employed by me in my reissued patent of April, 1869, in which the hot gases moved in a single current from the combustion-chamber to the exit, and made a passage in the base-flues from the rear to the front, and thence back in the opposite side to the rear to the ascending flue.

A great advantage is also secured by the employment of the two flues in the sub-base over my improvements patented August 25, 1874, in which the hot gases moved in a single current. As in this invention, there is secured an equal heating of the sides of the sub-base, which cannot be had when a single continuous flue is employed.

The advantages of employing a sub-base with the base proper are apparent, as the hot gases are made to come in contact with a greater area of surface of metal for the absorption of the caloric by the parts of the base and sub-base brought in contact with the hot gases passing through their flues in their passage to the exit or chimney, while at the same time the base of the stove is more evenly heated, and made to radiate a greater amount of heat for warming purposes from a low point.

Between the sub-base and the base proper I form an air-chamber, L, the outer walls of which are provided with perforations *x x* for the passage of the heated air from the said chamber into the room. The said chamber is supplied with air through the central opening L^1, made in the sub-base, and communicating with the room immediately above the floor. The sides of the said central opening are heated by the hot gases passing through the duplex sub-base flues J J, and tend to rarefy the air rising in the said opening, and cause it to move toward the chamber above, while the chamber L above is heated by the heated gases passing in contact with the upper shell of the sub-base flues, and also by the hot gases contacting with the lower shell or bottom of the flues in the base proper, and the air entering into the said chamber will be raised to a high temperature, and, seeking to escape, will move in a radial manner in all directions from the central opening to the periphery of the said air-chamber to escape through the perforations *x x*, as indicated by arrows No. 7 in Figs. 2 and 5, into the room at a low point near the floor.

The great advantage secured by thus taking air from an extreme low point, heating and discharging it also at a low point, yet at a short distance above the point of entrance and from an extended circumference, are these: the air of the room is made to circulate with greater uniformity, and the colder strata of air at the floor may be drawn toward the stove to be heated, and discharged also at a low point, where the air is the coldest, so as to mingle with such cooler air as it rises upward.

By the operations of this part of my invention the room may be more uniformly and quickly warmed, and the air of the room will have a better circulation and be healthier for the breathing of the occupants of the room.

In the opening L^1 is placed an air-wheel, M, intended to be revolved by the passage of the air through the spaces in the said wheel, which wheel, when revolved, will cause the air to enter into the chamber L above more centrally than if no such wheel was used, as the air seeking to enter the said chamber will be directed upward more central, and not along the sides of the said opening. Made beneath the ash-pan chamber, and in the base proper, is a recess or cavity, L^2, which is also over the air-wheel M, and permits the air to rise up within before escaping outward through the chamber between the base and sub-base. Air-pipes N N, leading from the air-chamber L to the several sections of the stove above the grate, are placed at the outer casing, and supply air to the annular chamber C, made around the upper margin of the

fire-pot, to be discharged through the perforations *a a* into the room. An annular chamber, P, made immediately above the combustion-chamber F, is also supplied with air to be warmed and discharged through the openings *c*, made in the outer walls of the said chamber P. A register-ring is laid over the outer wall of the said chamber, to open or close the said openings, and thereby permit the escape of the heated air, or to prevent the same, as may be desired. Made in the upper portion of the stove, and around the top portion of the fuel-reservoir, is the air-chamber R, which is supplied by the pipes N N, continued past the chamber P, from which chamber R the heated air may be led by suitable pipes, to warm a room above, or be permitted to escape into the room occupied by the stove.

By thus receiving all the air to be warmed from a low point, and discharging the same when warmed at one or more points higher than the lower chamber L in the base of the stove, the heated air is more uniformly diffused throughout the room, and in a manner more comfortable to the persons in the same than can be had where the whole volume of heated air is discharged at a single point of height from the floor, while at the same time the several chambers are heated for warming the air by the action of heat, which would otherwise be almost entirely wasted for heating purposes.

The outer walls of the fuel-reservoir section 6 are made of sheet or cast metal, finished with baked lacquer, or enameled with plain or combined colors. A space, *s*, between the said walls and the wall of the reservoir T is also made. The outer walls are provided with perforations *e e*, made in any desired form, through which the air of the room may communicate with the space *s*.

By these improvements the hot gases drawn from the combustion-chamber are made to move in two separated and equal currents, in contact, in part, with a great area of heat-radiating surfaces, which will be heated in a thorough manner, and absorb most of the caloric from the gaseous products before their passage out of the exit to the chimney, while those portions of the heated metal surfaces which heretofore did not exert to any considerable degree a warming of the room are, by these improvements, made active to warm air to be discharged into the room, and also promote the circulation of the same, to render the warming more uniform and the atmosphere more healthy.

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

1. In a revertible-flue heating-stove, the combination of the combustion-chamber, two horizontal base-flues, and the flues G G, one of which is connected with each of said horizontal base-flues, substantially as and for the purposes set forth.

2. In a revertible-flue heating-stove, the combination of the direct horizontal base-flue, the ascending flue K, bisected in its lower portion, and the return base-flue, substantially as and for the purposes set forth.

3. The combination, with the base side flues H H, made in the base proper of the stove, leading the hot gases from the descending flue at the rear forward, and in contact, in part, with the sides of the said base, to the front, of the descending flue I and sub-flues J J, and ascending flue K, substantially as and for the purpose set forth.

4. In combination, in a heating-stove, ascending and descending flues, and base and sub-base flues, connected, arranged, and operating substantially as and for the purposes set forth.

5. In a heating-stove, a hot-air chamber, L, below the ash-pan section, receiving air from below, heating the same by means of flues at the sides and below, and discharging the same heated through openings in its periphery, substantially as set forth.

6. The combination, with the fire-pot A, flue G, and hot-air chamber L, of the annular air-flue C, having its outer walls perforated, and pipes N, substantially as and for the purpose set forth.

7. The combination, with the air-chamber L, heated by the base-flues, and flues G, heated by the heat from the fire-pot and the combustion-chamber, and pipes N N′, of the air-chamber P, substantially as and for the purpose set forth.

8. The combination, with the air-chamber L, heated by the base-flues, flues G, heated by the heat from the fire-pot and combustion-chamber, of the air-chamber R, made around the upper portion of the combustion-chamber, substantially as and for the purpose set forth.

9. The combination, with the hot-air chamber, located in the base of the stove, and heated by the heat of the base flue or flues therein, of the air-wheel M, substantially as and for the purpose set forth.

ELIHU SMITH.

Witnesses:

ALEX. SELKIRK,
HENRY W. SMITH.