

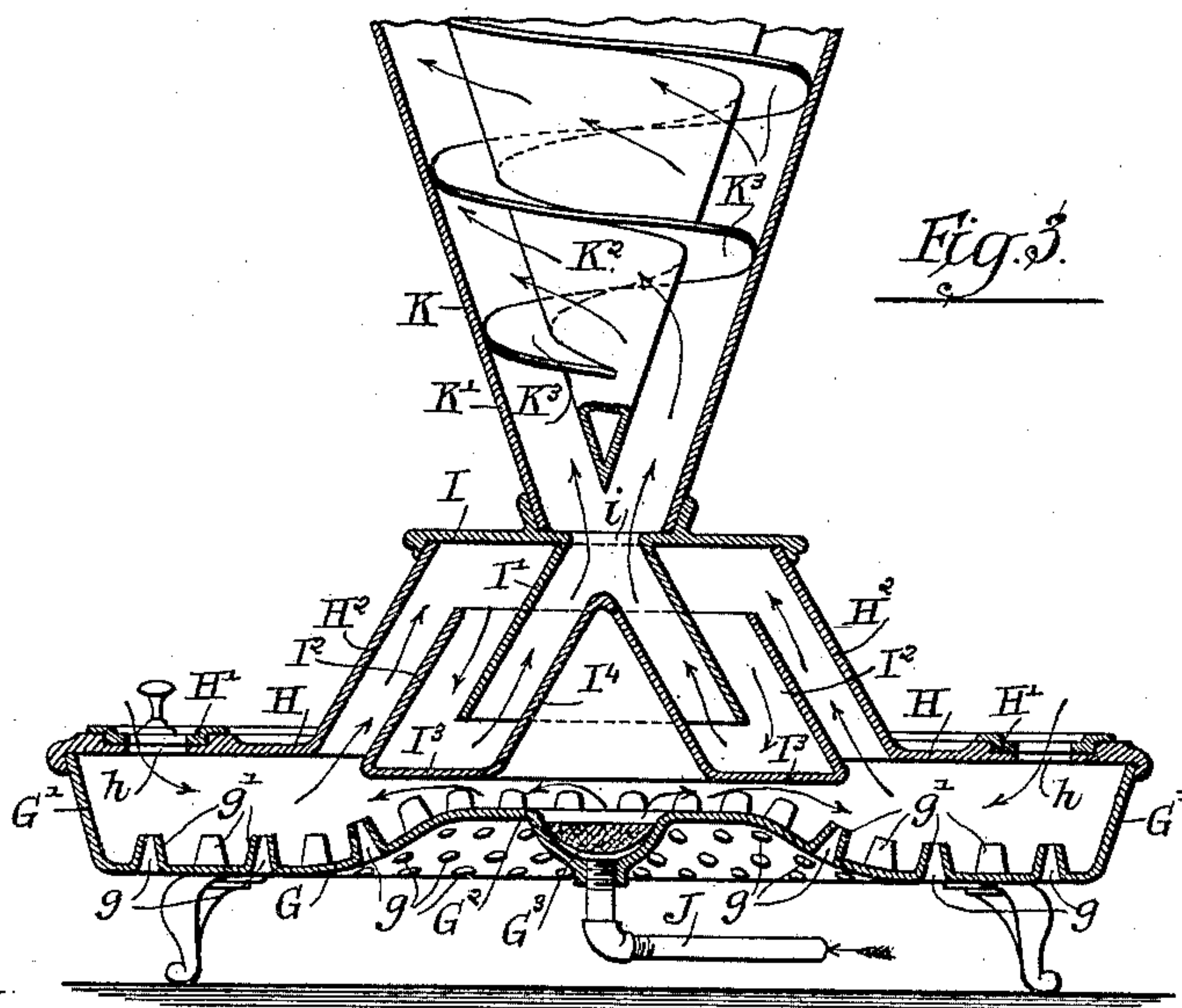
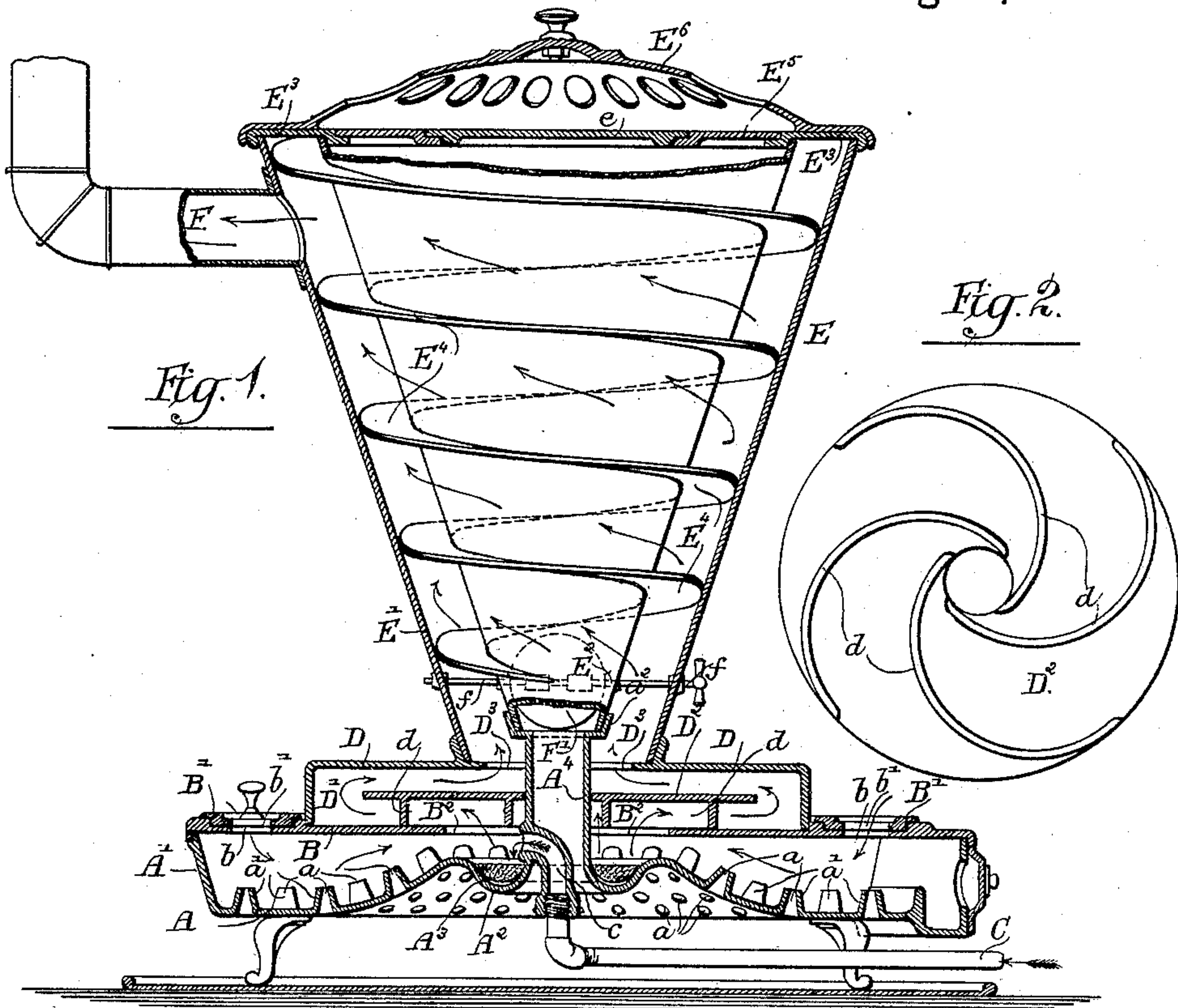
(No Model.)

2 Sheets—Sheet 1.

A. H. CALKINS.
OIL STOVE.

No. 408,210.

Patented Aug. 6, 1889.



Witnesses:
Louis M. Whitehead
Mr. J. Hemming

Inventor:
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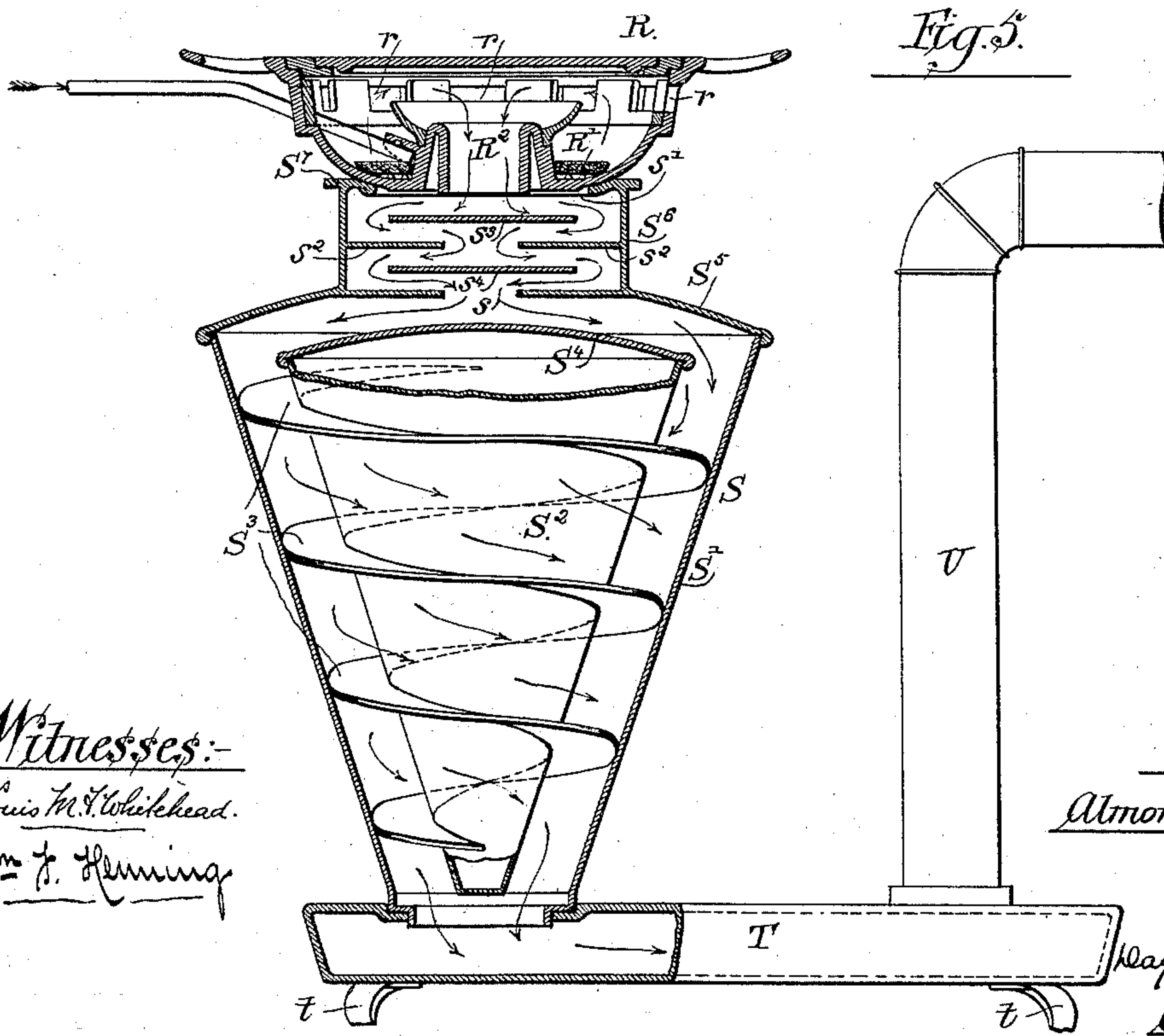
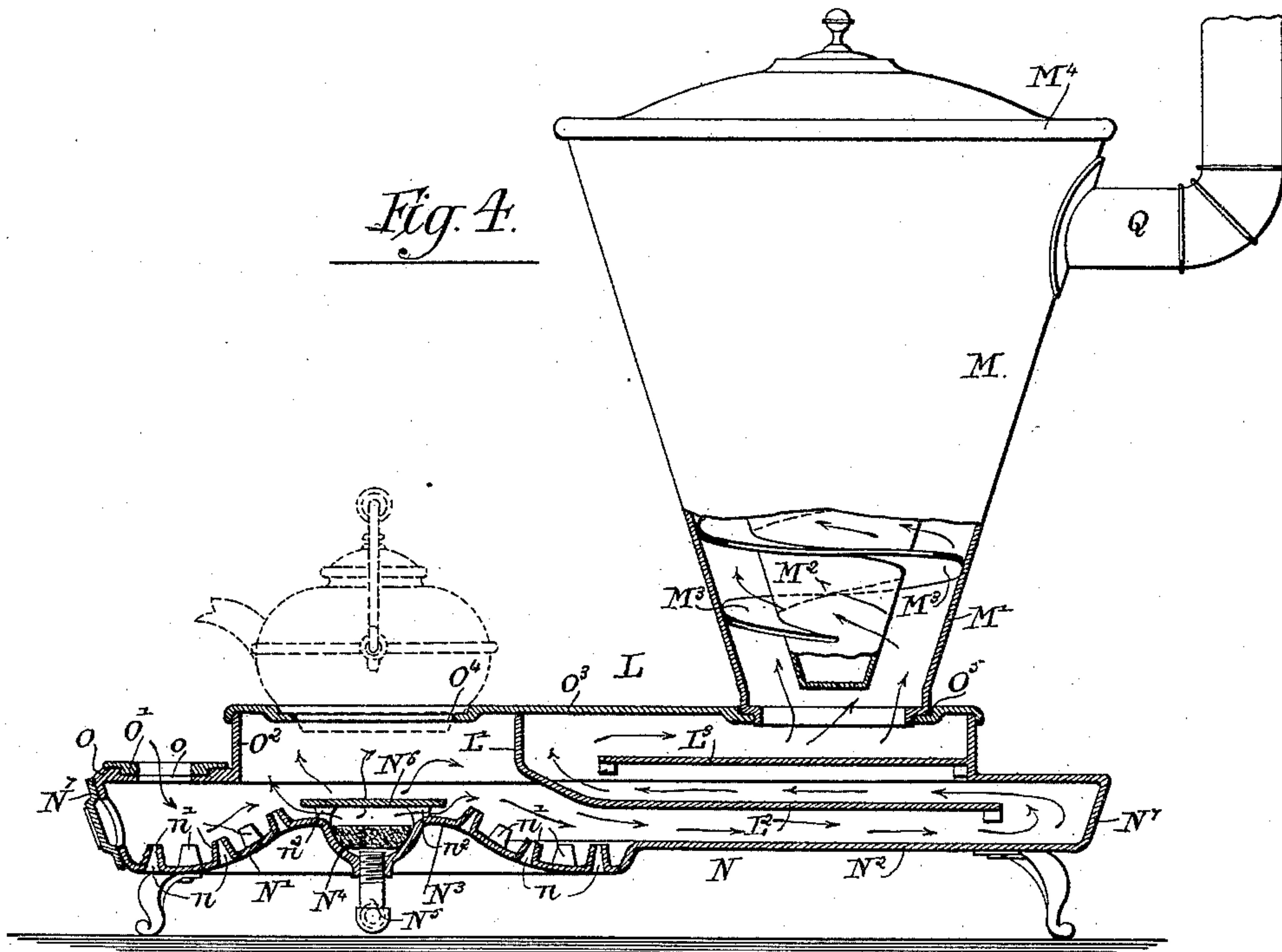
(No Model.)

2 Sheets—Sheet 2.

A. H. CALKINS.
OIL STOVE.

No. 408,210.

Patented Aug. 6, 1889.



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UNITED STATES PATENT OFFICE.

ALMON H. CALKINS, OF CHICAGO, ILLINOIS.

OIL-STOVE.

SPECIFICATION forming part of Letters Patent No. 408,210, dated August 6, 1889.

Application filed February 10, 1888. Serial No. 263,632. (No model.)

To all whom it may concern:

Be it known that I, ALMON H. CALKINS, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Oil-Stoves; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to a novel oil stove or heater for burning liquid fuel.

The invention consists in the matters hereinafter described, and pointed out in the appended claims.

In the accompanying drawings, illustrating my invention, Figure 1 is a central vertical section of one form of apparatus embodying the same. Fig. 2 is a view from below of a deflecting-plate shown in Fig. 1. Fig. 3 is a sectional view of the lower part of a heater generally similar to that shown in Fig. 1, illustrating a modified construction of the same. Fig. 4 illustrates a heating apparatus generally similar to that shown in Fig. 1, and which is adapted both for cooking and heating. Fig. 5 illustrates in section still another form of heating device embodying my invention.

As shown in the said drawings, Fig. 1, A is a horizontal metal casting forming the main supporting-plate of the heating apparatus. Said plate is provided with side walls A', upon which is supported a horizontal top wall B, which forms, with the plate A and walls A', a combustion-chamber within which fuel is burned. The plate B is provided about its outer margin with a series of air-inlet holes b b, which are controlled by means of a circular sliding damper B', provided with apertures b', corresponding in position with the openings b of the plate B. The said plate A is provided near its center with an elevated part A², the marginal parts of the plate forming an annular trough for containing the liquid fuel to be burned. In the said elevated part A² is formed an annular receptacle A³, to which the oil is supplied, and from which it flows over the outer edge of the trough downwardly over the inclined part of the plate A, which slopes outwardly from the receptacle A³, and into the receptacle formed by the depressed

marginal parts of the plate. The oil is burned from the top of the plate A as it flows over the inclined surface of the elevated part thereof and after reaching the annular trough or depression at the margin of the plate.

C is an oil-supply pipe connected at its end with a passage c, which is formed in the casting A and opens adjacent to and above the oil-receptacle A³. In the particular construction of the parts herein shown the plate A is provided at its center with an upwardly-extending tubular part A⁴, around which the oil-receptacle A³ is located, the passage c being formed in an integral tube connected with the side wall of the tube A⁴ and depending at the middle part of said tube, and provided at its lower end with a socket to receive the end of the supply-pipe C.

The plate A is provided in its part outside of the oil-receptacle A³ with a series of air-openings a a, surrounded upon the inner or upper face of the plate by a series of short upwardly-extending integral tubes a' a'. Said openings a a serve to admit an abundant supply of air for supporting combustion, while the tubes a' prevent the escape of the liquid fuel through the air-inlet holes.

The top plate B is provided with a central opening B², surrounding the tube A⁴, said opening B² affording a passage for the escape of flames and products of combustion from the combustion-chamber of the burner. On the top of the plate B is located a hollow casting D, forming a shallow chamber D', into which pass the products of combustion from the combustion-chamber. Within said chamber D' is located a horizontal plate, somewhat smaller in diameter than the said chamber and fitting closely at its inner edges against the tube A⁴. Said horizontal plate D² is located about midway between the top and bottom walls of the chamber D', and between the lower surface of the said plate D² and the horizontal plate B, forming the bottom wall of said chamber D', is located a series of spiral or helical walls d d, Fig. 2, extending in curved lines from the inner tube A⁴ to the outer edge of said plate D². Said helical partition-walls d d are herein shown as cast integral with the plate D²; but said walls may be otherwise constructed or supported, as may

be found convenient or desirable. The flames and products of combustion, passing from the combustion-chamber through the central opening B^2 of the plate B, enter the spaces between the spiral walls $d\ d$ at the inner parts of the latter, and then pass outwardly between the said helical walls to the outer part of the chamber D' . Said helical walls thus serve to give a rotary motion to the flames, and at the same time tend to break up and evenly distribute the body of flame about the exterior part of the said chamber D' .

The plate or casting D, forming the top of the chamber D' , is provided with a central opening D^3 , through which the flames and products of combustion escape from the chamber D' . Upon the top of said plate D is supported a drum E, which consists of a wall E' , attached at its lower margin to said plate D, outside of the central opening D^3 thereof, an inner wall E^2 , arranged inside of the wall E' , and a top plate E^3 . In the particular construction illustrated the walls E' and E^2 are conical and the wall E^2 is sustained upon the upper end of the tubular extension A^4 of the bottom plate A, which tubular extension is provided at its upper end with a rabbeted flange a^2 , to receive the lower margin of said wall E^2 . The walls E' and E^2 are herein shown as having the form of straight truncated cones arranged with their smaller ends downwardly. Said walls may, however, be made of other than conical shape without departure from my invention. Between said walls E' and E^2 of the drum is located a spiral partition E^4 , extending from the bottom to the top of said space. The space or opening inside of the inner wall E^2 is desirably closed by means of a flat annular plate E^5 , the central opening of which is closed by a circular cover e .

E^6 is an ornamental perforated top, which may be placed over the entire top of the drum.

F is a smoke-exit pipe attached to the exterior wall E and communicating with the upper end of the space inclosed between the windings or convolutions of the spiral partition E^4 . The heated air and products of combustion, entering the space between the walls E' and E^2 at the bottom of the latter through the opening D^3 , pass upwardly in the space inclosed between the convolutions or windings of the partition E^4 , so that said heated air, flames, and products of combustion are carried a number of times around the drum in their upward movement and finally escape at the smoke-pipe F.

In the employment of liquid fuel for heating purposes it is found possible to utilize all or a greater part of the heat generated by the combustion of the fuel by carrying or leading the flames and products of combustion through a passage of considerable length before the same enter the smoke or escape pipe of the apparatus. This result is produced in a simple and advantageous manner in the construction illustrated by means of the par-

allel walls E' E^2 of the drum and the spiral partition located between the same. A construction of this kind is therefore herein broadly claimed without restriction to the details of construction shown in the particular apparatus illustrated.

The tube A^4 affords a free passage for air upwardly into the bottom of the space within the inner wall E^2 of the drum E. When the cover e is removed, the air entering the tube A^4 passes upwardly through the central space of the drum, and, becoming heated therein, rises through the perforated top E^6 into the room, thereby adding greatly to the heating capacity of the apparatus. When the top E^6 is removed, the top plate E^5 and the cover e afford a support, upon which utensils may be placed for cooking, and, when desired, the cover e may be removed and a cooking utensil placed over the central opening of the top plate E^5 .

F' is a damper, shown in the drawings as placed in the lower part of the inner tubular wall of the drum and having a rod f extending through the walls of the drum to the outside thereof. The damper F' may be used in place of the cover e to prevent upward flow of air through the drum when a minimum amount of heating effect is desired.

Fig. 3 shows a burner made substantially in the manner before described, together with an air-heating device located above the burner and provided with a spiral duct for heated products of combustion, the means located adjacent to the burner for giving a tortuous or indirect course to the flames in this case, however, being differently constructed from the parts employed for the same purpose in the apparatus shown in Fig. 1. In said Fig. 3, G is the bottom plate of the burner, which is provided with an elevated central part G^2 , containing an oil-recess G^3 and with external walls G' . The said plate G is provided with perforations g , opening through upwardly-extending tubular projections g' , arranged and operating in the same manner as the corresponding parts $a\ a'$ shown in Fig. 1.

H is a top plate located over the plate G, and provided with peripheral inlet-openings h , controlled by a circular sliding damper H' . At its central part the top plate H is provided with an upwardly-extending annular wall H^2 , preferably of conical form. Upon said wall H rests a horizontal plate I, provided with a central opening i , to the margins of which is attached a depending outwardly-flaring conical flange I' .

I^2 is a conical deflecting-plate located between the flange I' and the wall H^2 . The lower edge of said deflecting-plate I^2 is connected with a horizontal annular plate I^3 , which closes the bottom opening of the annular deflecting-plate I^2 , and extends beneath the lower edge of the flange I' and between the latter and the plate G. Said plate I^3 is herein shown as provided with a centrally-arranged hollow cone I^4 , arranged with its

apex upwardly and within the conical deflector or flange I'. The parts I' I² I³ I⁴ together form a tortuous annular passage leading from the combustion-space above the plate G to the exit-opening i.

J is an oil-supply pipe leading to the central oil-receptacle G². Oil entering said receptacle flows outwardly and downwardly over the upper surface of the plate G, and is burned on the inclined surface and depressed marginal part of said plate. On the top of the horizontal plate I is sustained a drum K, consisting of two parallel conical walls K' K², between which is located a spiral partition K³, forming a spiral passage leading upwardly between said walls K' and K², in the same manner as before described. The lower end of the inner wall K² is in this case brought to a point over the opening i. The spiral passage formed by the walls K, K', and K² is connected at its upper end with a smoke-exit pipe in the same manner as before described in connection with the form of heater shown in Fig. 1.

In Fig. 4 I have shown an apparatus embodying the main features of my invention adapted both for cooking and heating. In this instance the apparatus embraces a lower horizontally-arranged part or base L, containing the oil-burner, and constructed to support a cooking utensil or utensils, together with a drum M, containing a spiral passage through which the flames and products of combustion are carried, so as to extract the greater part of the heat therefrom before the same pass to the exit-pipe. In this instance the horizontally-arranged part or base L of the apparatus comprises a bottom plate N, one part N' of which forms the bottom plate of the burner proper, and another part N² the lower wall of the passage leading from the burner to the smoke-exit pipe. The part N' of the bottom is provided with a central elevated portion N³, within which is formed a central depression or oil-receptacle N⁴, which is supplied with oil by means of an inlet-pipe N⁵, entering the same at its bottom. The plate N' is also provided with a series of air-inlet openings n, and with upwardly-extending tubular projections n' n', arranged in the same manner as the corresponding parts a a' shown in Fig. 1. Over the central receptacle N⁴ is placed a horizontal plate N⁶, which may be sustained by lugs n², resting on the plate N' or otherwise, as may be found convenient or desirable.

O is the top plate resting at its margins upon the side walls N⁷ of the bottom plate N. Said plate O is provided in its part adjacent to the burner with marginal air-inlet apertures o and with a sliding plate or damper O', controlling the influx of air through said openings. The plate O is provided with a vertical flange O², which, together with a horizontal plate O³, resting at its margins thereon, forms a central elevated part of the burner, the top of which affords a support for cook-

ing utensils, and upon which the heating-drum M is sustained. The plate O³ is provided at a point centrally over the burner with an opening O⁴, into or over which a cooking utensil may be placed. Said plate is also provided at the opposite end of the elevated part of the base with an opening O⁵, by means of which the heated air and products of combustion from the burner are admitted to the drum M.

L' is a vertical partition, located between the burner and the drum M, and L² is a horizontal partition extending from the lower margin of the partition L' rearwardly to a point near the rear wall N⁷ of the base part of the apparatus, above and parallel with the wall N².

L³ is another horizontal wall or partition, extending over the lower part of the flange O² toward the burner and terminating some distance from the vertical partition L'. The drum M consists of an exterior wall M', an inner wall M², and a spiral partition M³, located in the space between the said walls M' and M². The top of the drum is closed by a plate M⁴ and an exit smoke-pipe Q, connected with the upper part of the drum in the same manner as before described, in connection with a similar drum shown in Fig. 1.

In the operation of the heater illustrated in Fig. 4 and above described, the flames and heated products of combustion issuing from the burning oil upon the bottom plate N' of the burner come in contact with the vessel or cooking utensil over the burner, and then pass rearwardly through the tortuous passage formed by the deflecting plates or partitions L' L² L³ and into the spiral passage of the drum M. In the passage of said flames and heated products of combustion around and between said deflecting-plates and through the spiral passage, all, or nearly all, of the heat is extracted therefrom, and little is wasted by passing away through the chimney.

In Fig. 5 I have illustrated another embodiment of the main features of my invention, in which the burner proper is detachable or removable from the other parts of the apparatus. In said Fig. 5, R indicates the burner as a whole; S, a drum, upon the upper end of which the burner is supported, and T a hollow base sustaining the drum and provided with legs t t.

U is a smoke-exit pipe connected with the base T. The burner R is provided with an annular oil-receptacle R', peripheral air-inlet openings r r, and a central exit-opening R² for the exit of products of combustion downwardly through the bottom of the burner, the parts being constructed and operating in the same manner as the burner shown in an application for Letters Patent made by William Vogel on the 6th day of December, 1887, Serial No. 257,068. The drum S consists of an outer wall S', an inner wall S², both of which are herein shown as made of conical shape, and a spiral partition S³. The top of the in-

ner wall S^2 is closed by a cover S^4 , and the top of the outer wall S' is closed by a top or cover S^5 , arranged above the cover S^4 and provided with a central opening s .

5 S^6 is a circular wall or cylinder resting on the top of the cover S^5 , and provided with a top plate S^7 , containing a circular opening s' , over or within which the burner R is placed.

10 s^2 is a horizontal ring or annular flange connected with the wall S^6 , and s^3 s^4 are two circular plates or deflectors, one of which s^3 is located between the top plate S^7 and the flange S^2 , and the other one s^4 of which is located between the flange s^2 and the top plate 15 S^5 of the drum. Said plates s^3 s^4 are constructed with the annular flange s^2 to deflect or direct the flames and products of combustion passing downwardly out of the burner inwardly and outwardly in a zigzag or tortu- 20 ous path, as the said flames and products of combustion pass from the said burner to the inlet-opening s of the drum. After entering the drum the said flames and products of combustion are carried through the spiral 25 passage formed by the partition S^3 until they reach the bottom of the drum and enter the hollow base T , from which they enter the smoke-pipe U .

30 The burner shown in the drawings and described in the specification is not herein claimed as a part of the present invention, it being merely shown for the purpose of convenience in illustrating the application thereto of the drum, it being entirely obvious that 35 any other oil-burner of the same general style might be substituted therefor.

40 The essence of the present invention therefore consists in an oil-stove or heating apparatus, embracing in a single structure an oil-burner and a drum or equivalent part having double walls and a spiral partition between the walls forming a spiral flame-passage between the burner and the smoke-exit pipe of the heating apparatus, this passage possess- 45 ing peculiar advantages, as hereinafter pointed out. This construction is broadly

claimed without restriction to the other features of construction herein illustrated and above described. As, for instance, such drum may be used in connection with a cylindric 50 heating and cooking device having an oven and removable top burner, as illustrated in an application filed by me of even date herewith.

In the use of oil as a fuel in burners of the general character herein shown the flame is 55 always of great length, and in order to utilize all the heat from such flame I have found that it is necessary to provide an extended and tortuous or indirect passage, within which the flame is confined and held in a small space 60 adjacent to the burner, for the reason that otherwise it would pass directly through the heating-chamber, and the sides thereof would not be heated to any considerable extent, so that most of the heat would be wasted. 65

I claim as my invention—

1. An oil stove or heater embracing an oil-burner having a combustion-chamber, air-inlet openings thereto, and an exit-opening for products of combustion, parallel tubular 70 inner and outer walls, a spiral partition between the same forming a spiral flame-passage communicating at one end with the said exit-opening of the combustion-chamber, and a smoke-pipe connected with the opposite end 75 of said flame-passage, substantially as described.

2. An oil stove or heater comprising a combustion-chamber having a bottom plate provided with a central upwardly-projecting 80 tubular part A^4 , a drum comprising an exterior wall E , and an inner tubular wall E' , parallel with said outer wall and resting upon the tubular projection A^4 , substantially as 85 described.

In testimony that I claim the foregoing as my invention I affix my signature in presence of two witnesses.

ALMON H. CALKINS.

Witnesses:

C. CLARENCE POOLE,
O. N. WILLIS.