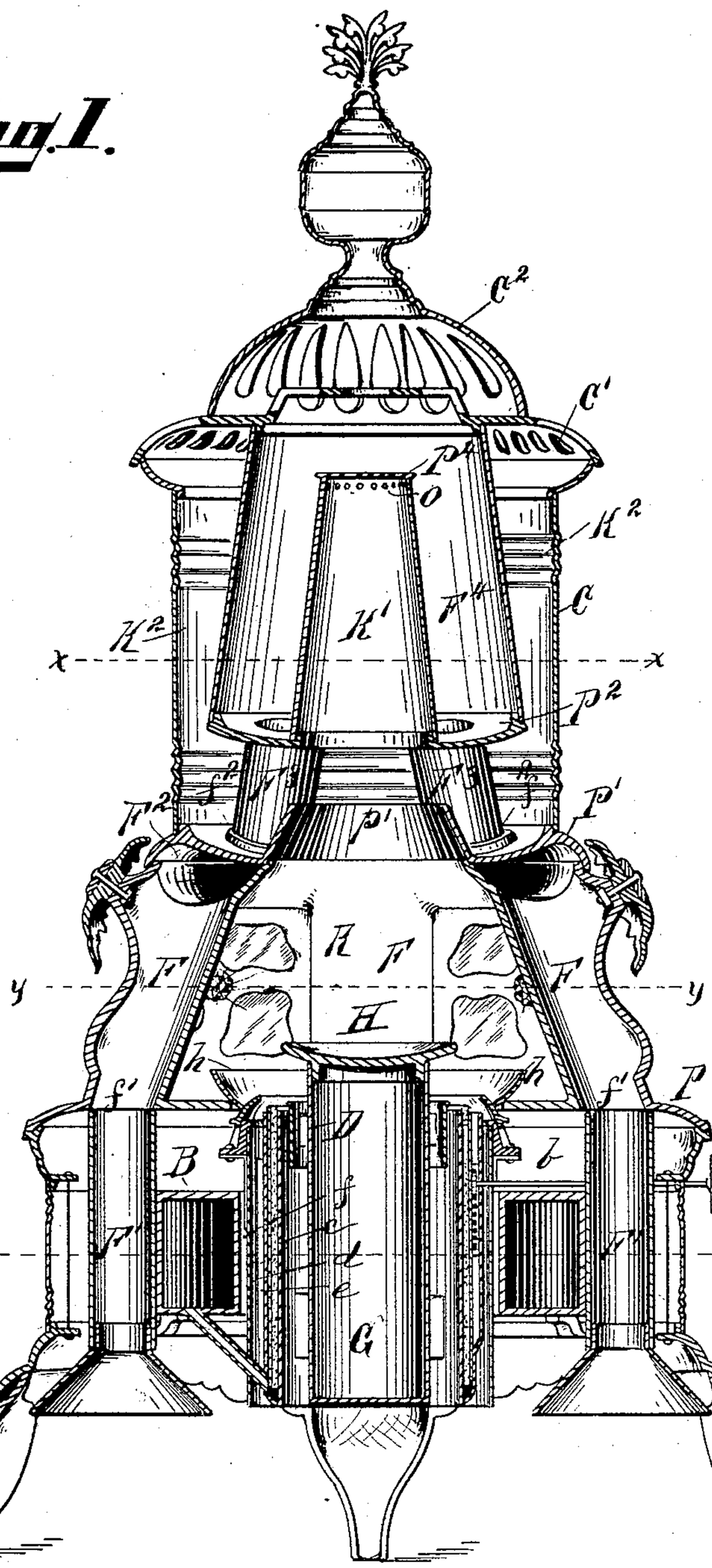
(No Model.) 2 Sheets—Sheet 1.

M. G. BENEDICT.

OIL STOVE.

No. 486,422. Patented Nov. 22, 1892.

Fig. 1.



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(No Model.) 2 Sheets—Sheet 2.

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Fig. 2.

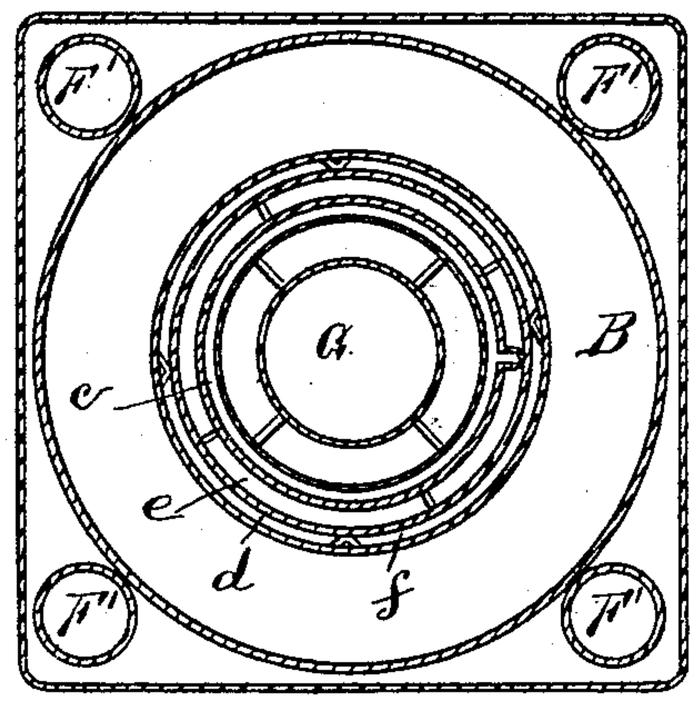


Fig. 3.

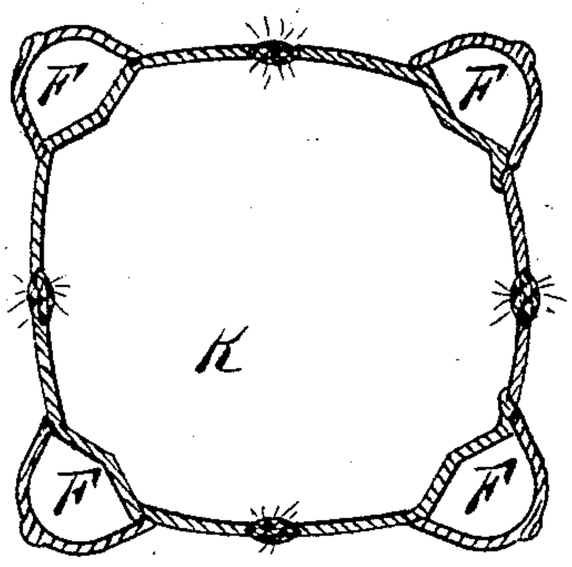
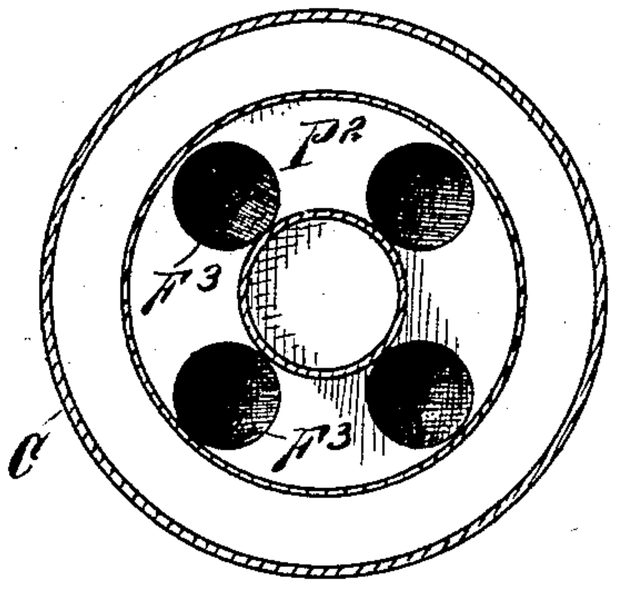


Fig. 4.



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UNITED STATES PATENT OFFICE.

MAURICE G. BENEDICT, OF DETROIT, ASSIGNOR TO THE COLDWATER OIL STOVE COMPANY, OF COLDWATER, MICHIGAN.

OIL-STOVE.

SPECIFICATION forming part of Letters Patent No. 486,422, dated November 22, 1892.

Application filed April 6, 1892. Serial No. 427,973. (No model.)

To all whom it may concern:

Be it known that I, MAURICE G. BENEDICT, a citizen of the United States, residing at Detroit, county of Wayne, State of Michigan, have invented a certain new and useful Improvement in Oil-Stoves; and I declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

This invention relates to oil heating-stoves, and has for its object the arrangement of flues, by means of which a large amount of air is taken from without the stove and passed through heating-chambers and heating-flues in the stove and detained in contact with the heated walls of the chambers and flues until it becomes heated and is then discharged into the air of the room. In stoves of this character some of the main requirements are that there shall be an oil or fuel tank so located that its contents shall be kept cool. There must also be a burner adapted to produce perfect combustion in order that none of the offensive products of imperfectly-burned oil shall escape into the room. There must be a comparatively-large heating-surface acted upon by the hot products of combustion, which should be detained in the interior of the stove as long as possible before being allowed to escape into the room, and the entire structure should be compact and neat in appearance.

It is well known that when an attempt is made to burn coal-oil without the use of something to produce a draft the combustion is imperfect, and the use of side walls or a chimney to produce a draft confines the flame so that only a small portion of air comes in contact with the flame and becomes heated, and this small portion of air rising through an unobstructed chimney passes rapidly to the upper part of the room and does not produce the heating effect that is desired. I therefore stop the direct upward flow of this column of air, which would otherwise rise directly from the top of the chimney, and cause it to pass around and on all sides of a heating-chamber, through which is passing other air drawn from the outside of the stove, and thus I subject the second mass of air to the heat produced by the combustion without allowing the second mass of air to interfere with the proper combustion at the burner.

In the drawings, Figure 1 is a section of a complete stove. Figs. 2, 3, and 4 are cross-sections at *z z*, *y y*, and *x x*, respectively.

In the drawings, A represents the base, and B an oil-tank supported by the base. The oil-tank is annular in form, and within it is located the burner, of which *c* is the wick-tube, and *d* a tube surrounding the wick-tube and separated from it by an annular air-space *e*. The air-space *e* is open at the bottom and at the top and furnishes the necessary air at the top of the wick for combustion. The tube *d* is separated from the oil-tank B by an air-space *f*, the object of the air-space *f* being to aid in keeping the oil-tank B cool. Inside of the wick-tube *c* is a cup or tank G, whose walls form with the inner wall of the wick-tube an annular space open at the bottom and top and furnishing an air-passage for the necessary air to produce combustion. Above the water-tank G is a deflecting-plate H, that drives the flame outward. Above the tube *d* is an inwardly-extending ring D, that compels the flame to rise straight up for a short distance before it is acted upon by the deflecting-plate H.

The parts so far described are in common use in many lamps and stoves and need no further description.

Above the ring D, I place a guard-ring *h*, that rests on the upper and outer side of the guard-ring D. Its walls flare outwardly from below, so that with the ring D it forms a cup-shaped ring extending about parallel with the flame and serving to protect the under and outer sides of the flame from air-drafts and the eddying currents of air that are apt to form in the lower corners, where the combustion-chamber K rests on the top plate above the base. At the upper side of the base and above the oil-tank B, separated from that tank by an air-space *b*, is a plate P, having perforations, one of which is central, to permit the passage through it of the burner

and its appurtenances other perforations of which, as f', are at the sides and register with the flues, to be described hereinafter.

Through or adjacent to the walls of the oil-tank B are a number of vertical flues F'. These are open below to the air underneath the base of the stove and register above with the openings f' through the plate P. I prefer to make the base square in shape and the oil-tank B round and to place the flues F' in the corners of the base in the triangular-shaped space between the walls of the base and the walls of the oil-tank, making one of the walls of the flue conform to the adjacent wall of the oil-tank, thus compelling the air which passes up through the flue F' to pass along the side of the oil-tank and cool it.

Above the plate P is the combustion-chamber K. The general form of this combustion-chamber is pyramidal or conical; but its side walls are broken up by the flues F, which pass up along the outside of it, utilizing a part of the walls of the combustion-chamber as walls for the flues F. The flues F lead at their upper end into an annular chamber F^2, whose lower interior wall forms part of the wall of the combustion-chamber K and whose upper wall is formed by a plate P'. The plate P' is centrally perforated and provided with an upturned flange p', which forms an extension or continuation of the combustion-chamber K. The plate P' is also provided with other perforations f^2, in which are inserted the lower ends of short tubular flues F^3, that extend upward to still another plate P^2, upon which rests an annular chamber F^4. The perforations f^2 are preferably so located that they lead out from the annular chamber F^2 intermediate between the leading-in points of two adjacent flues F F, so that, while the flues F^3 are equal in number to the flues F, they do not form continuous straight passage-ways with each other, but compel the air rising through F to move horizontally a short distance before it can rise again through F^3, thus bringing it in contact not only with the heated inner side of the flue F, but with the heated lower side of the chamber F^2.

The plate P^2 is centrally perforated, and above the central perforation is placed the conical inner wall of the chamber F^4, closed at the upper end by a cap or plate P^4, below which are a few small side openings O. The side openings O are not sufficient to carry away the heated air or products of combustion that rise to the interior of the cone, but suffice to create a circulation on the interior. The main mass of the products of combustion rise through the opening at the top of the combustion-chamber K and pass up into the interior of the conical chamber K', and not finding an exit at the top sufficiently large to permit them all to pass outward are nearly all returned between the flues F^3, under the plate P^2, and pass up into the chamber K^2, surrounding the chamber F^4, and between that chamber and the walls of the exterior casing or drum C, whence they escape into the outer air through the openings C'. The upper end of the annular chamber F^4 is open to the air or is covered only by a perforated ornamental cap C^2.

It will be seen that a very large part of all the flues and chambers are so located and arranged as to present almost all their surface to contact with the heated air coming from the combustion-chamber, excepting, however, the flues F', which present a large cooling-surface to the oil-tank and tend to keep that cool. The flues F, while furnishing a very ornamental design, expose fully one-half of their surface directly to the flame. The annular chamber F^2 has nearly one-half of its surface exposed to the flame and nearly one-half of the remaining half to the hot products of combustion as they pass over the flange p' and are returning from the conical cavity K'. The remaining flues F^3 and the annular chamber F^4 present all of their walls to the action of the heated products of combustion, and thus a large and rapidly-moving mass of air is carried through the flues of the stove and heated in its passage.

I find that the flange p' must be properly adjusted, both as to its depth or the distance it extends upward, and as to the size of the opening through it, the adjustment of course depending on the size of the wick of the burner used. I find that with a wick of five inches in diameter very good results are attained when the central opening through the plate P is from four and one-half to five inches in diameter and the upper edge of the flange about seven inches above the flame; but these dimensions might be materially changed by giving a slightly-different shape to the walls of the combustion-chamber K, and consequently I do not wish to confine myself to them in any respect.

The wick is fed upward in the ordinary way by a thumb-wheel W turning a toothed wheel or lifting a rack, as is common in devices of this kind.

What I claim is—

1. In an oil-burning heating-stove, the combination of the base, an oil-burner located therein, a combustion-chamber surrounding said burner, a heating-drum located above said combustion-chamber, divided by annular walls into three compartments, one of said compartments being directly above said combustion-chamber and provided with a mouth opening downward into said combustion-chamber, the second of said compartments being annular in form and surrounding the first and provided with an exit-opening at the top and with inlet-flues at the bottom, and the third or outermost of said chambers being also annular in form, provided at its upper side with outlet-openings and at its lower side being connected by passage-ways that lead between the flues from the said combustion-chamber, substantially as and for the purpose described.

2. In an oil heating-stove, the combination of a base, a burner located therein, a combustion-chamber, an annular flue at the summit of and surrounding said combustion-chamber, inlet-flues leading from beneath said combustion-chamber upward along the sides thereof and entering said annular flue, and outlet-flues leading from the upper side of said annular flue through an interposed drum and discharging into a heating-chamber communicating with the open air at the top of said heater, substantially as and for the purpose described.

3. In combination with the base of an oil-stove, a combustion-chamber having formed integral therewith an annular heating-chamber located horizontally around the top of the combustion-chamber, a number of upright flues leading into said annular chamber from below said combustion-chamber, and an equal number of outlet-flues leading from above said annular chamber and communicating with the outer air through an interposed heating-chamber, in which all said last-mentioned flues unite, substantially as and for the purpose described.

4. In an oil heating-stove, the combination of a combustion-chamber, a base and a burner supported therein, a heating-chamber located above said combustion-chamber, provided with an internal space adapted to receive the products of combustion and to pass part of them therethrough into the open air and to deflect another part of them around the under side and to the outer walls of said chamber, and a casing adapted to confine the deflected products of combustion and direct them against the outer wall of said heating-chamber, substantially as and for the purpose specified.

In testimony whereof I sign this specification in the presence of two witnesses.

MAURICE G. BENEDICT.

Witnesses:

EFFIE I. CROFT,

DELL J. BROWNE.