(No Model.)

2 Sheets—Sheet 1.

J. D. GALLAGHER & D. L. ADLER.

OIL STOVE.

No. 551,466. Patented Dec. 17, 1895.

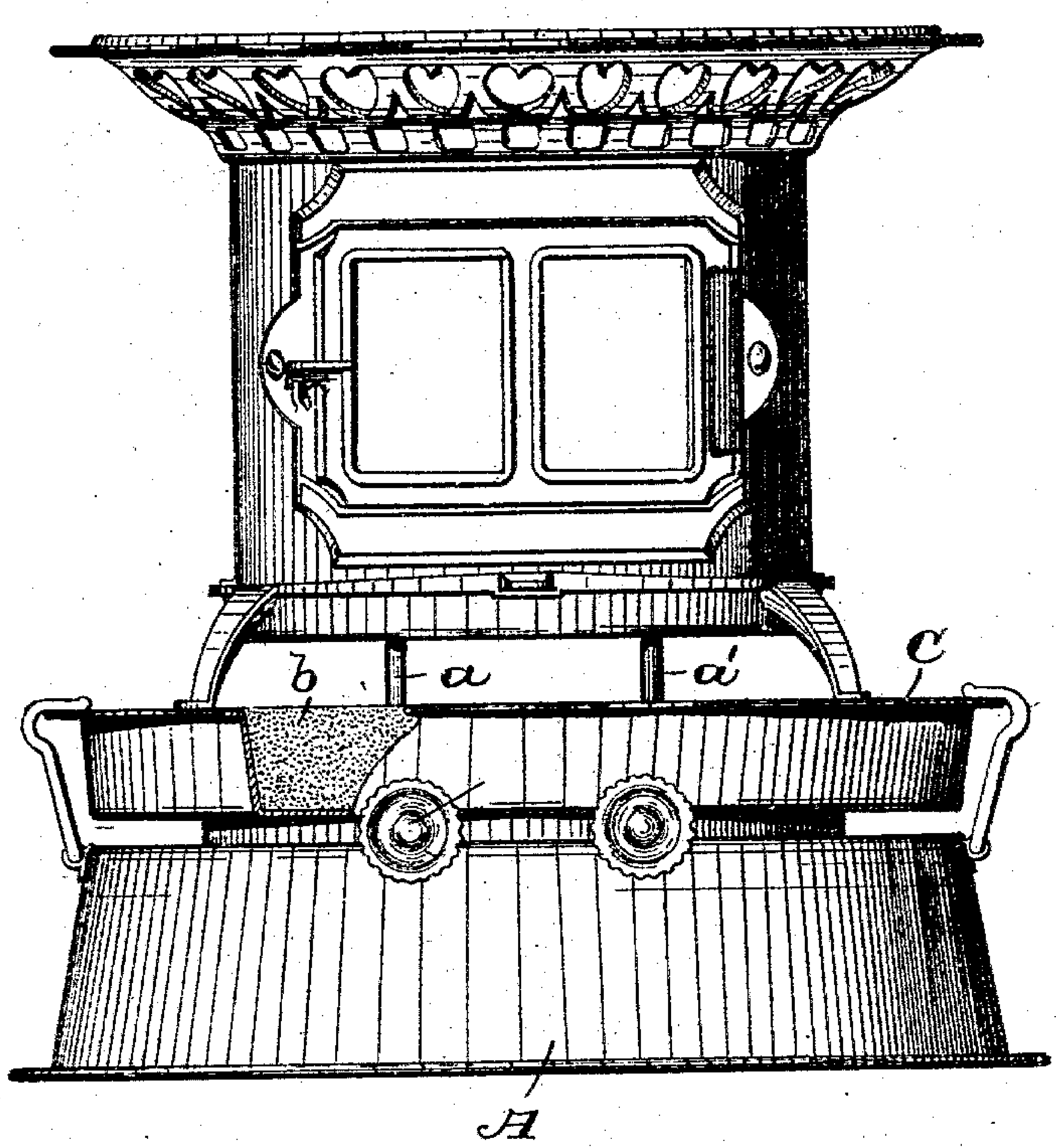

FIG. I

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David L. Adler

INVENTORS

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(No Model.) 2 Sheets—Sheet 2.

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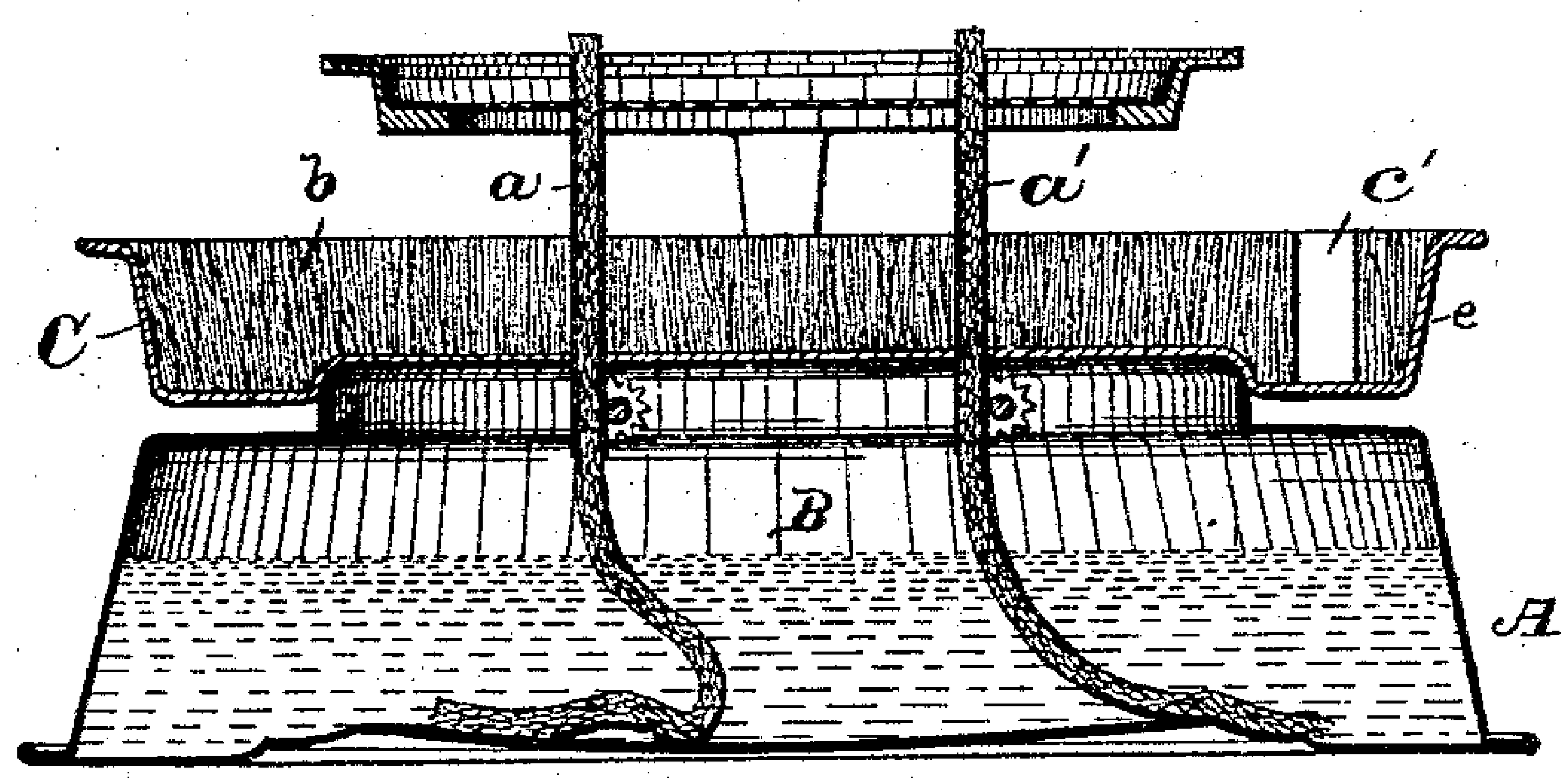

FIG.2

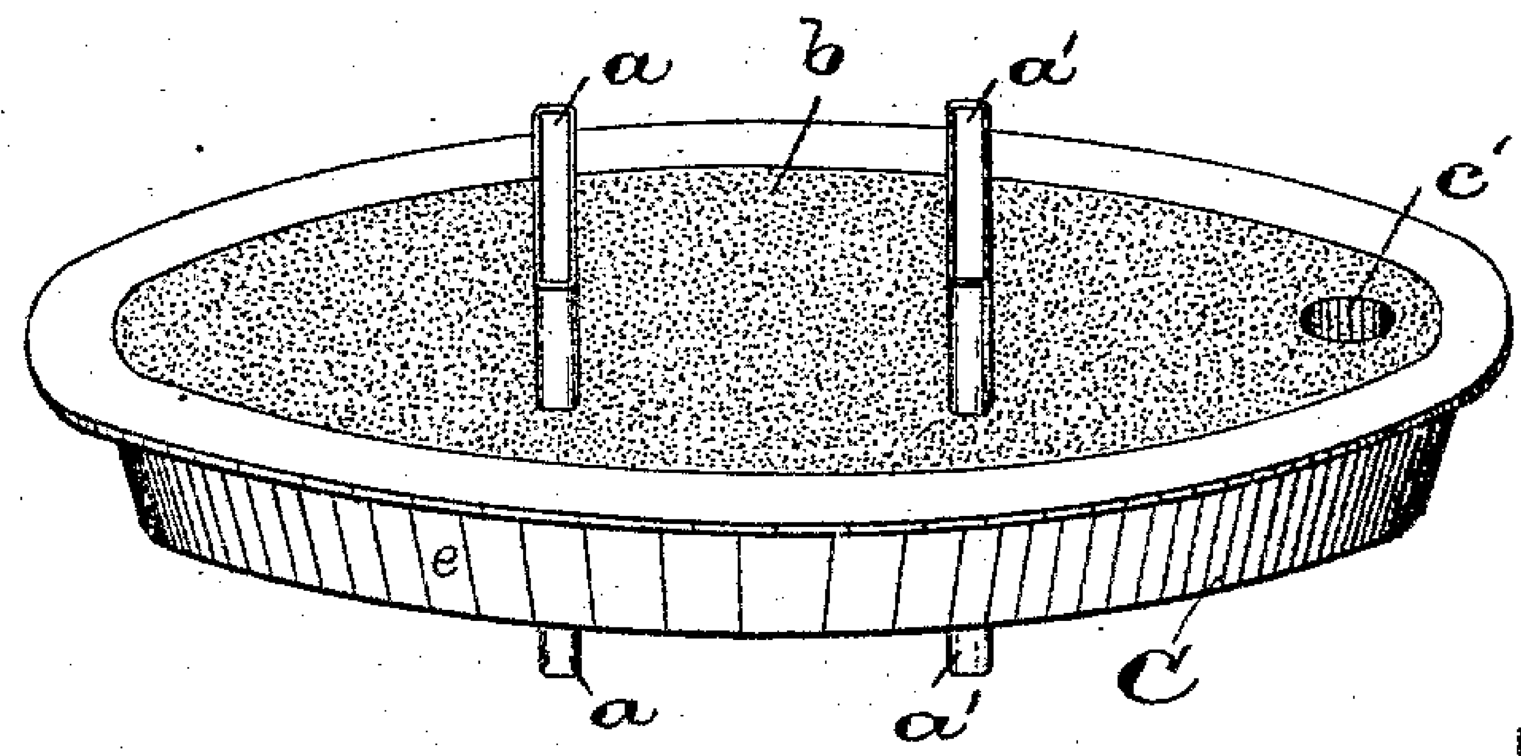

FIG.3

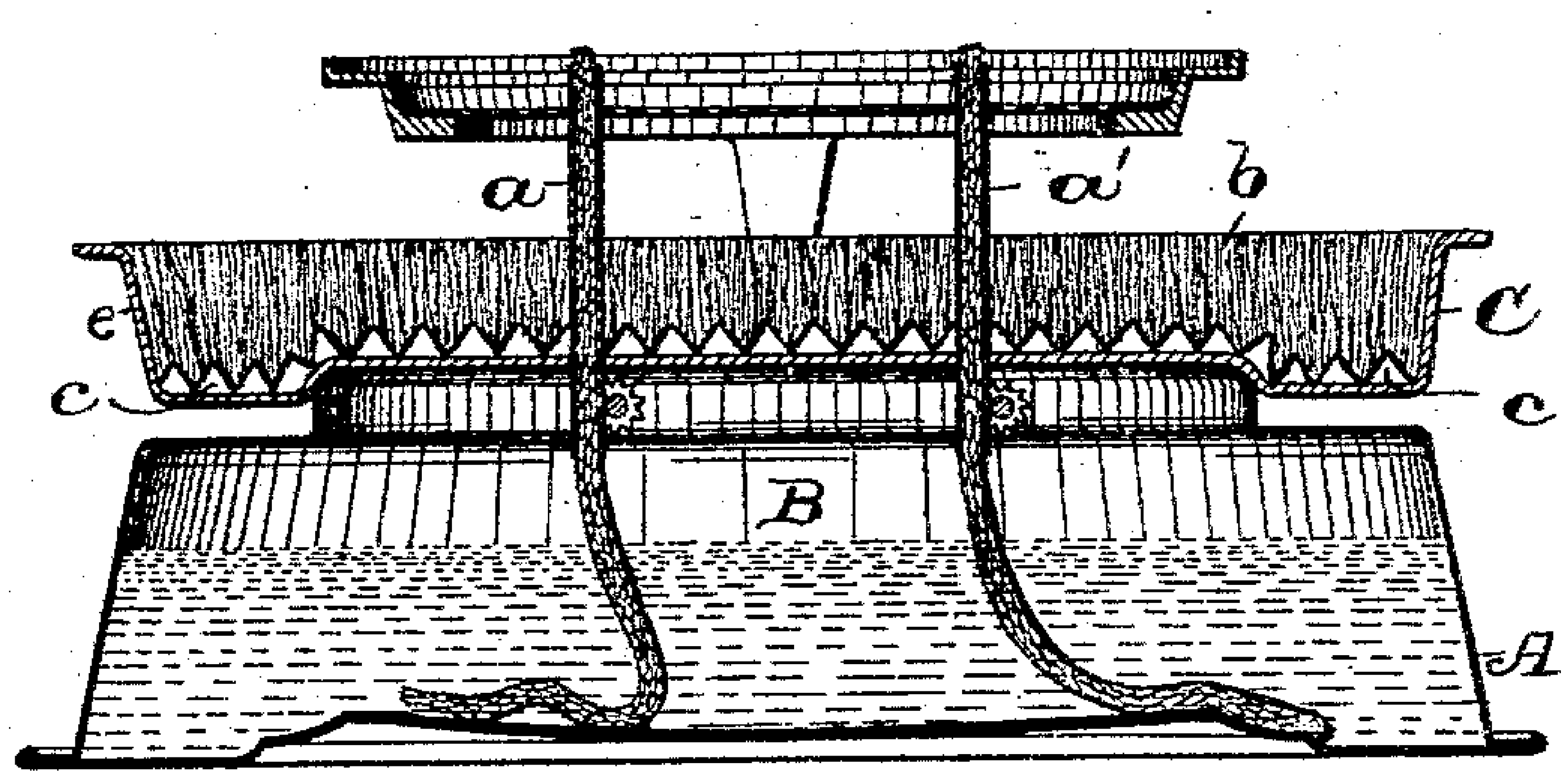

FIG.4

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UNITED STATES PATENT OFFICE.

JOSEPH D. GALLAGHER, OF BLOOMFIELD, AND DAVID L. ADLER, OF NEWARK, NEW JERSEY.

OIL-STOVE.

SPECIFICATION forming part of Letters Patent No. 551,466, dated December 17, 1895.

Application filed November 13, 1894. Serial No. 528,631. (No model.)

To all whom it may concern:

Be it known that we, JOSEPH D. GALLAGHER, residing at Bloomfield, and DAVID L. ADLER, residing at Newark, in the county of Essex and State of New Jersey, citizens of the United States, have invented certain new and useful Improvements in Oil-Stoves; and we do hereby 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 appertains to make and use the same.

Figure 1 of the drawings is a front elevation of the oil-stove with a part of the side of the burner-pan broken away to show the incombustible porous material *b* within it. Fig. 2 is a vertical section of the burner-pan C and the oil-reservoir B, showing the burner-pan filled with the incombustible porous material *b* and showing the well *c*. Fig. 3 is a perspective view of the burner-pan C, showing the surface of the incombustible porous material *b* and the well *c*. Fig. 4 is a vertical section of the base of the stove containing the oil-reservoir and of the burner-pan above, showing the incombustible porous material only partly filling the burner-pan C.

This invention relates to certain improvements in oil-stoves and particularly to the means employed to prevent the heating of the oil contained in the oil-reservoir and the generation of gases when the stove is in use.

In the use of oil-stoves there is always more or less danger of explosion. This is due to the heating of the oil in the oil-reservoir by the flames of the wicks and the consequent generation of gases which communicate with the flames of the wicks. It is also sometimes due to the overturning of the stove and the escape of the oil in a heated condition and its ignition from the flames of the wicks.

It is well known that the better grades of burning-oil will not ignite when brought into contact with flames unless the oil first be heated considerably. This heating of the oil is due among other things to the fact that the wick-tubes which communicate with the oil-reservoir become very much heated by the flames of the wicks and being usually of metal and continuous transmit the heat to the oil-reservoir. Various devices have been recommended and used to prevent this overheating of the oil in the oil-reservoir. Among these devices are the separation of the burner-pan from the oil-reservoir, leaving a layer of air interposed between the flames and the oil-reservoir, the interposition of a layer of some non-conducting material, such as asbestos or cement, and the filling of the burner-pan with water. All these devices have proceeded upon the principle of interposing some non-conducting material between the flames and the oil-reservoir so that the heat generated by the flames would be retarded in reaching the oil-reservoir. None of them have done away with the heating of the wick-tubes and the transmission of the heat along those tubes to the oil-reservoir, and none of them have operated upon the principle of actually consuming the heat and so preventing its transmission to the oil. When any of these old devices have been used the wick-tubes have still been heated and the very non-conductivity of the interposed layers of air, water, or cement has prevented the heat from being transmitted laterally from the wick-tubes through the filling interposed, and the consequence has been that all the heat communicated to the wick-tubes by the flames has been transmitted directly and in a practically undiminished degree to the oil in the oil-reservoir, and this must necessarily happen no matter what filling or layer is interposed between the wick-tubes and the oil-reservoir unless some means be devised to use or consume the heat generated by the flames in some work other than that of heating the oil in the oil-reservoir. It has therefore been the principal object of our invention to devise some method of consuming the heat before it reaches the oil-reservoir by providing other work for it to do.

It is a perfectly well-known physical fact that in the evaporation of water heat is consumed, and therefore if we could devise any method by which considerable quantities of water could be evaporated by the heat generated by the flames of the wicks it was manifest that the heat generated by the flames would be exhausted or consumed by doing the work of evaporating the water and would not be transmitted to the oil-reservoir. Also it was manifest that even if the upper part of the wick-tube became heated there was no necessity that this heat should be transmitted to the oil-reservoir if at some point along the wick-tubes the heat could be utilized for the purpose of evaporating water. It was likewise manifest upon the most casual inspection that placing a solid or continuous body of water between the flames and the oil-reservoir was practically useless, as such a body of water did not present enough surfaces to the heat and the atmosphere to be quickly evaporated, and instead of the heat being entirely consumed in turning that body of water into vapor a large portion was used in heating the entire body of water, which also heated the oil-reservoir, and another portion transmitted along the wick-tubes directly to the oil-reservoir.

We discovered that by means of certain mechanical arrangements hereinafter specified it was possible to divide the water which we desired to interpose between the flames and the oil-reservoir into innumerable small particles or bodies, each of which would present all its surfaces to the heat and atmosphere and would thus be much more readily turned into vapor than a large and compact body of water would be, and we discovered that when such a finely-divided body of water was interposed between the flames and the oil-reservoir the heat generated by the flames was expended in evaporating this water.

The mechanical arrangement to which we have referred consists of the interposition between the flames of the wicks and the oil-reservoir of some body so constructed as to contain within its mass a large number of very small chambers, spaces, or cells having comparatively free communication one with the other throughout the mass. This structure enables the filling of the chambers or cells of such interposed body with water which will pass from one part to the other of the interposed body almost as freely as if not separated into divisions, and yet will be divided into innumerable small particles or bodies presenting many exposed surfaces to the heat and atmosphere. The heat from the flames being then communicated to the substance of this interposed body and to the wick-tubes passing through the same is expended or consumed in the work of evaporating the water contained in each of these small spaces, chambers, or cells. At the same time if by reason of unequal distribution of the heat, as will happen, the water from a certain portion of this interposed body is more quickly evaporated than that in other portions, by reason of the free intercommunication between the different chambers or cells, the water will flow from other parts to that part which has been exhausted and thus the heat at the hottest portion will be continually employed or expended in turning these fresh supplies of water into vapor. The advantages of this method and structure over the former methods and structures are manifest.

When a body of dead air is relied upon to form the non-conducting or protective body interposed between the flames and the oil-reservoir, while it doubtless prevents in some degree the direct communication by radiation of the heat from the flames to the oil, it in no wise prevents the transmission of the heat from the flames along the wick-tubes, but rather aids in such transmission, as the dead air, being a bad conductor of heat, prevents the lateral radiation of the heat from the wick-tubes and the whole heat imparted to the wick-tubes by the flames in practically-undiminished degree is transmitted to the oil in the oil-reservoir. When a filling or stratum of some solid non-conducting material is interposed between the flames and the oil-reservoir about the same condition of affairs exists. The non-conducting layer or stratum to a certain degree prevents the transmission of heat by radiation from the flames to the oil-reservoir and thus protects the oil from the heat; but on the other hand it acts, as does the dead air, as a non-conductor and so prevents the heat transmitted through the wick-tubes from being radiated laterally through the non-conducting layer and compels its transmission in practically-undiminished degree to the oil-reservoir. When a continuous and compact body of water is interposed between the flames and the oil-reservoir, as is very common in oil-stoves, the same difficulty is again met with only to not so large a degree. Some portion of the heat is doubtless expended or consumed in evaporating this body of water at the surface and to this extent is prevented from being transmitted to the oil; but on the other hand the heat communicated to the wick-tubes is not readily transmitted laterally through the water and is consequently carried in practically undiminished degree along the wick-tubes to the oil. Again the water is heated throughout its whole body and that heat again is transmitted to the oil-reservoir. Again the water is liable to spill out when the stove is moved, and in no sense is such a body of water the equivalent of our invention.

Our invention does not consist in the interposition of a porous layer between the flames and the oil-reservoir, but in the interposition of a body of water between the flames and the oil, divided into innumerable small particles or bodies each presenting its surface to the heat and atmosphere, so that such water will be readily evaporated and the heat from the wicks will be consumed in that work and prevented from reaching the oil-reservoir. A part of this invention is also the mechanical means used to keep the water in such finely-divided condition.

Referring to the accompanying drawings, the letter A designates the base of the oil-stove, having therein the oil-reservoir B.

The letter C designates the burner-pan

which rests upon said base A and contains the wick-tubes $a\ a'$ and the incombustible porous layer or filling b. The letter c designates the water-reservoir below the porous filling which we employ in one of our described constructions, and the letter c' designates the well into which the water is poured and which serves to indicate the amount of water in the filling.

The base A is constructed in any of the ways in which the bases for oil-stoves are usually constructed, our invention not requiring any particular construction of the base, except that it shall be so constructed that the burner-pan C if made a separate part shall fit accurately on the base and be held there in any of the ordinary ways.

The burner-pan C in our invention may either be integral with the base A containing the oil-reservoir B or it may be separate from it, the second form being shown in the drawings, it being only essential that the burner-pan shall be absolutely water-tight and that the flange or side e of the burner-pan shall be of sufficient height to contain a sufficiently thick layer of incombustible porous material. We have found that from one inch to one and a half inches is a sufficient height for such flange e in the smaller sizes of stoves, but the height will of course vary with the size of the stove.

In the burner-pan C, around the wick-tubes $a\ a'$, we then place a permanent and substantial layer or filling of some exceedingly porous or cellular substance, preferably filling the whole of the burner-pan, though we may only partly fill the same, leaving below the filling from one-quarter to one-half an inch of unfilled space to form a water-reservoir c, as is shown in Fig. 4. This porous material may be composed of any porous substance which is incombustible and rigid or hard. It must, however, be of sufficient porosity to absorb a considerable quantity of water and its porosity should be such as to provide free communication between its cells. We prefer to use for this layer an exceedingly porous and cellular unglazed earthenware which is made in a form to fit the burner-pan and is then fastened into place by cement or plaster in the usual way. When this porous or cellular filling is so constructed as to only partly fill the burner-pan, leaving a water-reservoir below, it must be provided with a series of closely-contiguous points extending from its bottom to the bottom of the water-reservoir below. When this layer of porous or cellular material has been placed in the burner-pan and firmly fastened into place, we pour into it through the well c' as much water as the porous or cellular filling will take up. If sufficiently porous and cellular it should take up not less than one-half of its own volume of water, and when the form is used in which the water-reservoir c is contained it will take up even more, and we continue to pour in water until the water rises to the surface of the porous filling, which will be indicated by the permanent level of the water in the well c'. When this is done the stove is complete and ready for use.

We claim—

1. In an oil stove, a permanent substantial layer of incombustible porous or cellular material of the kind described filled or combined with water and interposed between the top of the wick tubes and the oil reservoir, substantially as described.

2. In an oil stove, the combination of the burner pan C with a permanent and substantial layer of incombustible porous or cellular material of the kind described filled or combined with water, and having the well c', substantially as described.

In testimony whereof we affix our signatures in presence of two witnesses.

JOSEPH D. GALLAGHER.
DAVID L. ADLER.

Witnesses:
A. B. VAN LIEW,
A. E. BENNETT.