C. PEPPER.

Heating Stove.

No. 69,242. Patented Sept. 24, 1867.

Fig. 1

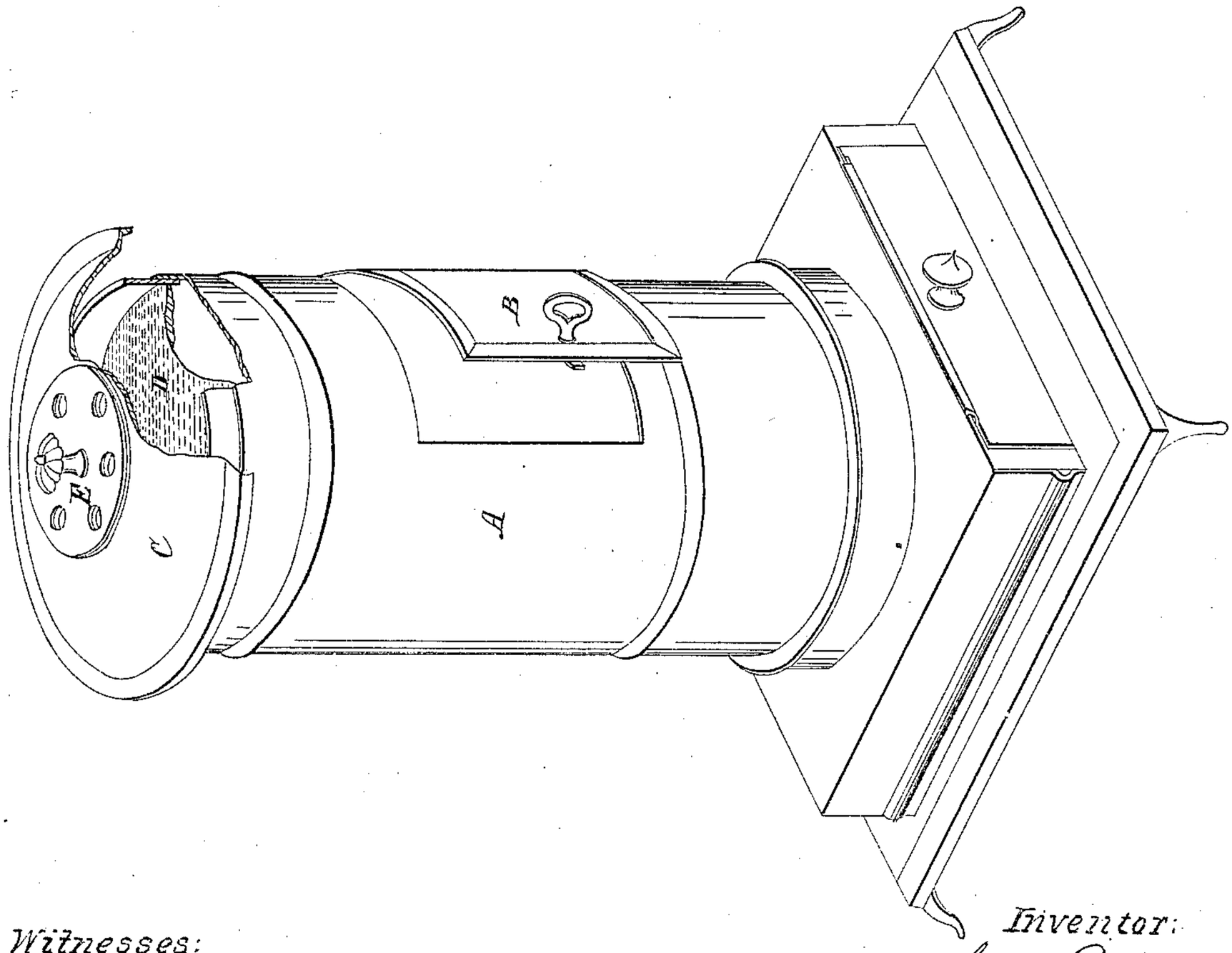
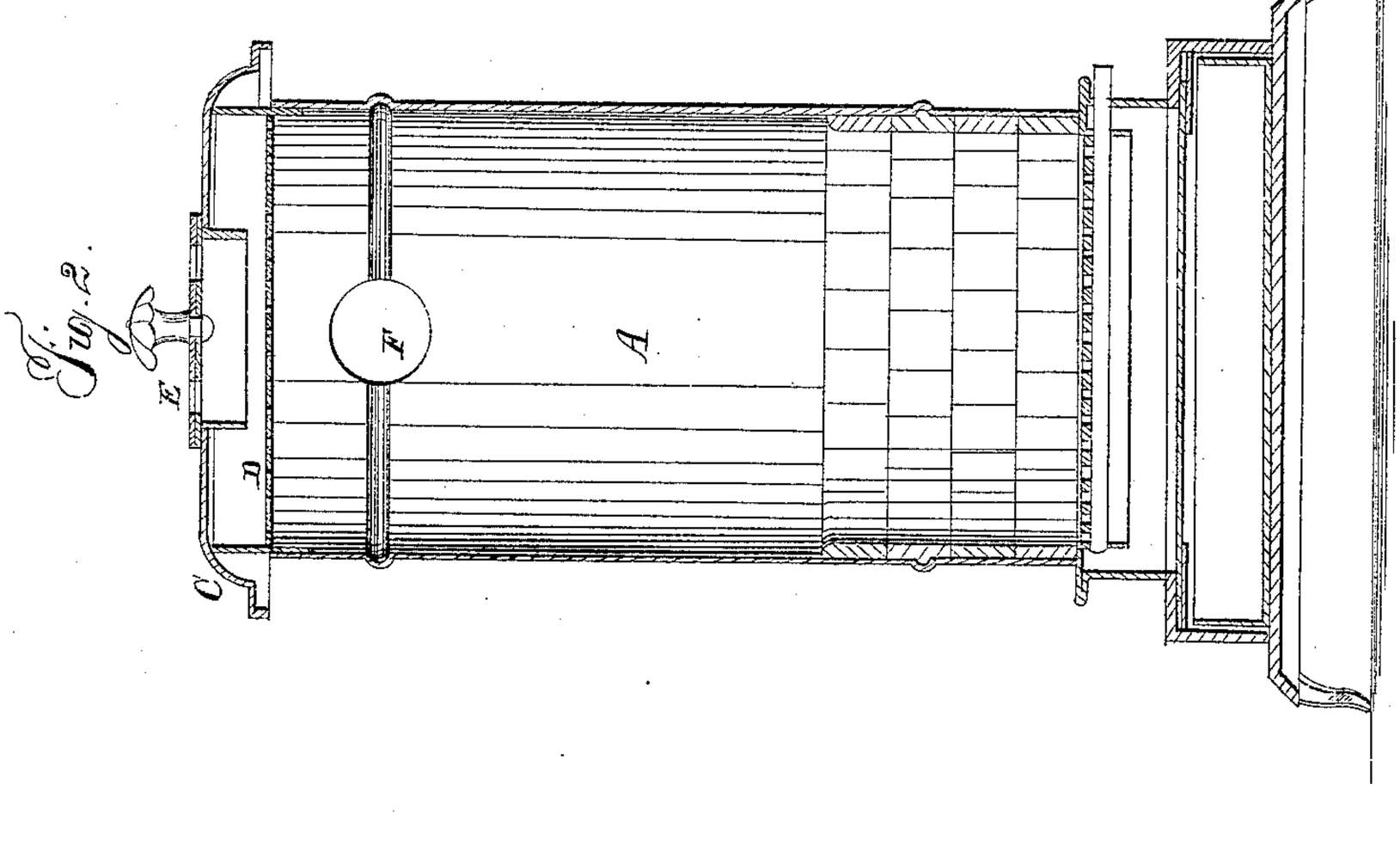


Fig. 2.



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CALVIN PEPPER, OF NORFOLK, VIRGINIA, ASSIGNOR TO SIDNEY SMITH.

Letters Patent No. 69,242, *dated September* 24, 1867.

IMPROVEMENT IN COAL-STOVE.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that I, CALVIN PEPPER, of Norfolk, in the county of Norfolk, and State of Virginia, have invented a new and useful Improvement in Heating Apparatus; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, in which—

Figure 1 is a perspective view of my stove.

Figure 2 is a vertical section through the centre of the fire-chamber of the same.

This invention relates to an improved method of introducing atmospheric air to a fire-chamber, for the purpose of producing combustion of the fuel in a more complete degree than has hitherto been attained; and it consists in introducing the air to support combustion through a finely-perforated partition or diaphragm, which is situated in the top of the stove above the fuel, and fills the entire internal circumference of the chamber which is immediately above the fire-pot, while the lower draught may be entirely closed.

That others may understand my invention, its construction and operation, I will particularly describe it as applied to an ordinary cylinder-stove, though its principles are equally applicable to any combustion-chamber, and I therefore do not restrict myself in its application to any particular class of heating apparatus, and shall simply confine my description to an ordinary stove, from motives of convenience.

A is the cylinder or sheet-iron casing of an ordinary stove. That portion which is designed to contain the fuel may be lined with fire-brick, if it is designed to consume coal, or with iron plates or otherwise if wood is to be used as fuel. At the bottom I deem it desirable to place an ordinary grate, for the purpose of easily removing the ashes which fall into the drawer such as is usually placed beneath the grate. The door B, as common, gives access to the interior of the fire-chamber to introduce fuel, or for any other purpose. At the top of the cylinder A, and a few inches below the cap or cover C, I place a diaphragm, D, extending entirely across the internal diameter of the cylinder, and secured on all sides to said cylinder. This diaphragm is made of any convenient material which possesses power to withstand heat. I prefer, as convenient and sufficiently durable, ordinary sheet iron, perforated with a great number of small holes. These perforations should not exceed in diameter one-sixteenth part of an inch each, and they should be as numerous as possible, without reducing the strength of the sheet so low as to render it unable to support its own weight when resting only on its edges. I find that the common perforated tin of the market meets the requirements of my invention very perfectly, as regards the size and proximity of the perforations. Through the cap C is an orifice, closed by a valve of any convenient description, the ordinary register valve E being preferred, through which the external atmospheric air is admitted to the space above the diaphragm. An ordinary pipe or funnel, F, conveys the products of combustion to the chimney or to the atmosphere without the house. This pipe or funnel I prefer to place high up in the fire-chamber, near to but below the diaphragm D, as I find that the best results are attained when so placed.

I have now described all of the peculiarities of the construction of my apparatus, as applied to an ordinary stove, and the following description of the results which I have secured will make it evident that it will require no material modification to adapt it to any other class of heat-producing apparatus.

Combustion consists in the chemical union of the inflammable gases arising from incandescent fuel with oxygen, the latter being in all ordinary cases derived from the atmospheric air. Chemical unions only take place when the substances having affinity are brought into immediate contact or within insensible distances. Professor Faraday says that, "although in making mixtures of gases they will become uniform without agitation if sufficient time be allowed, the period required will be very long, extending even to hours in narrow vessels," so that to produce a rapid union, agitation or a mechanical mixture must precede and aid the chemical one. This mechanical mixture forms the gist of the results attained by my construction; because the air containing the oxygen to support combustion is strained or sifted, so to speak, through the diaphragm D in minute streams, upon and into the volume of inflammable and highly-heated gas which is ascending from the fuel. It is well known that sifting or straining is the most expeditious and effective method of producing a thorough mechanical mixture of material substances in a finely-comminuted condition, and the same process is equally effective in producing a mechanical mixture of gases. As chemical unions take place with rapidity, in proportion to the surfaces of contact, and as the surface area is increased with every division and subdivision, it follows that more atoms will

be brought in contact within a given time, if an intimate and minute mechanical mixture is produced, than if uniting elements be simply introduced in masses or streams of considerable thickness.

From the mass of incandescent fuel in the bottom of the fire-pot are constantly ascending, in a vertical column, the inflammable gases evolved. These can only be consumed by a proper mixture and union with oxygen, and this mixture is produced, by the means above described, in a more thorough and expeditious manner than has hitherto been used or known, and in proportion to the rapidity and completeness of the mechanical mixture of air and gas in the fire-chamber will be the rapidity and consequent completeness of the combustion therein. As my diaphragm extends entirely across the cylinder of the stove the entire surface of the fuel is covered thereby, and the ascending currents of gas are met by descending currents of air. The effect of these moving currents may be illustrated by supposing a person to have two bundles of needles which he wishes to mix in the most thorough manner. If he thrusts the points of one bundle against the sides of the other they will be imperfectly and with difficulty mingled, but if he brings them together points to points, and moving in exactly opposite directions, the mingling will be effected with ease and completeness. With a free supply of air pouring in through the perforations of my diaphragm it may be considered as impossible that any atom of inflammable gas should find its way to the funnel without contact with the atom of oxygen required to unite with it in combustion.

The results produced in stoves and other fire-chambers fitted with my arrangement of the diaphragm above described, so that the whole or principal part of the draught shall enter the fire-chamber through the perforations of said diaphragm, are commensurate with the above-stated facts. A great saving of fuel has been secured, and the operation has been so complete and perfect that I have been enabled to kindle and maintain a fire of anthracite coal without the admission of any air more than that supplied through the perforations of the diaphragm as above described, and I have found also that in most instances the ordinary draught upward or through the fuel may with advantage be dispensed with.

It is evident, from the foregoing description, that this invention may be produced as an article or manufacture to be sold and applied to stoves now in use, as to so apply it requires only that the ordinary cap C should be removed and the diaphragm D secured thereto, or to the inner side of the cylinder A, in some convenient manner, and the cap C replaced. Openings are commonly made in the caps of heating-stoves, and where such openings are closed by a lid or cover the same may be replaced by a register or valve of some convenient construction. This is perfectly feasible, because stoves are now almost invariably manufactured of certain definite sizes.

I am aware that fire-chambers have heretofore been constructed with openings above the fire, through which currents of air are admitted to descend upon the burning fuel in vertical currents, but these orifices have invariably been made of so great diameter and so few in number as to render them incapable of producing the results above described, which are produced by the use of my perforated diaphragm. I therefore do not claim the methods of admitting air to the fire in downward currents, as heretofore practised, *i. e.*, through large orifices few in number, pipes, or in bulk, as through a register; but what I do claim, and desire to secure by Letters Patent, is—

The use of the finely-perforated diaphragm D, placed at a distance above and covering the fire, substantially as shown and described for the purpose and effect set forth.

As a new article of manufacture, a cap or cover for a heating-stove, constructed with the diaphragm D, to be applied to stoves already constructed and in use.

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Witnesses:

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