(No Model.)

W. M. JACKSON.

HEAT DEVELOPER AND RADIATOR.

No. 384,365. Patented June 12, 1888.

Fig. 1.

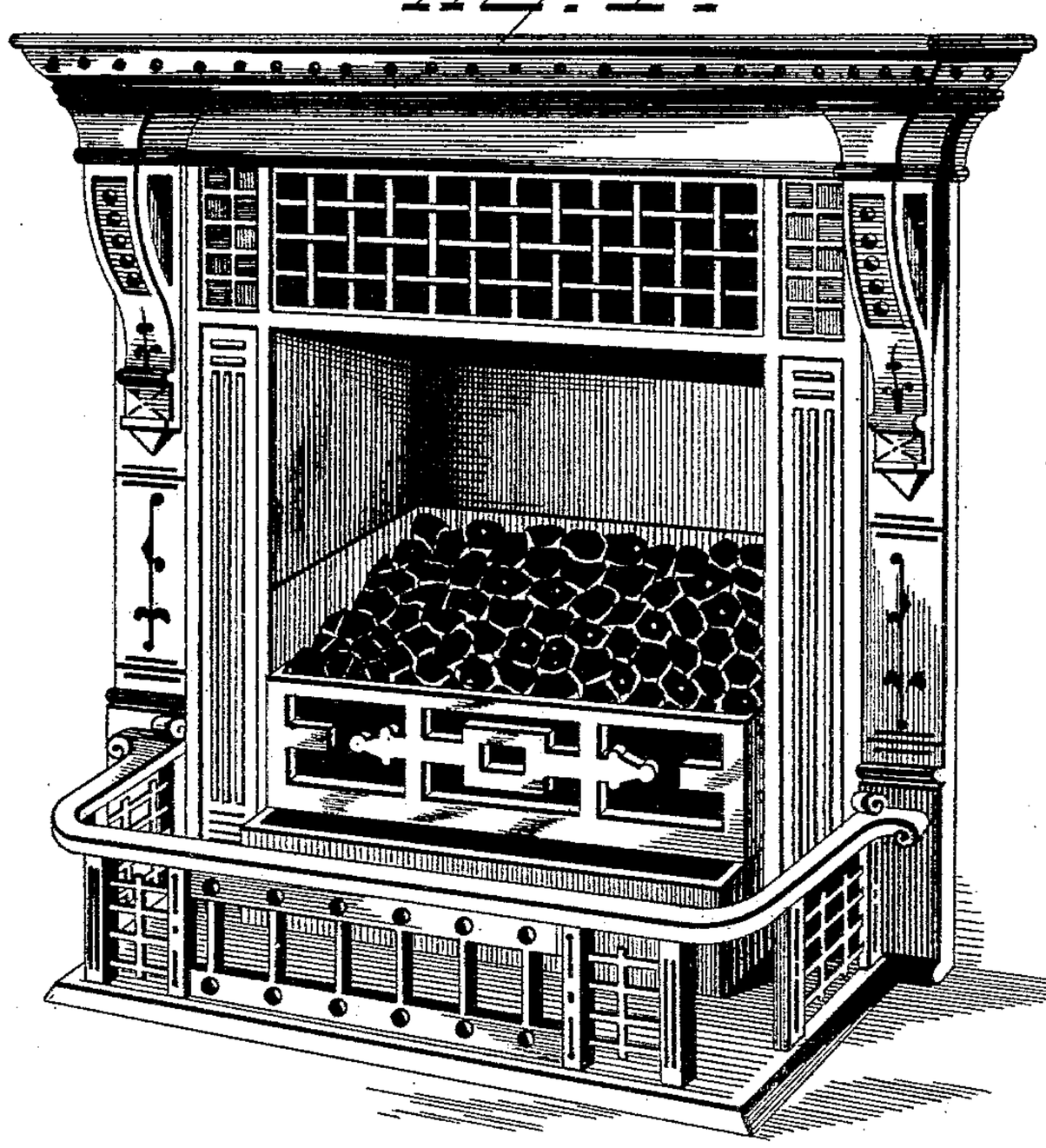
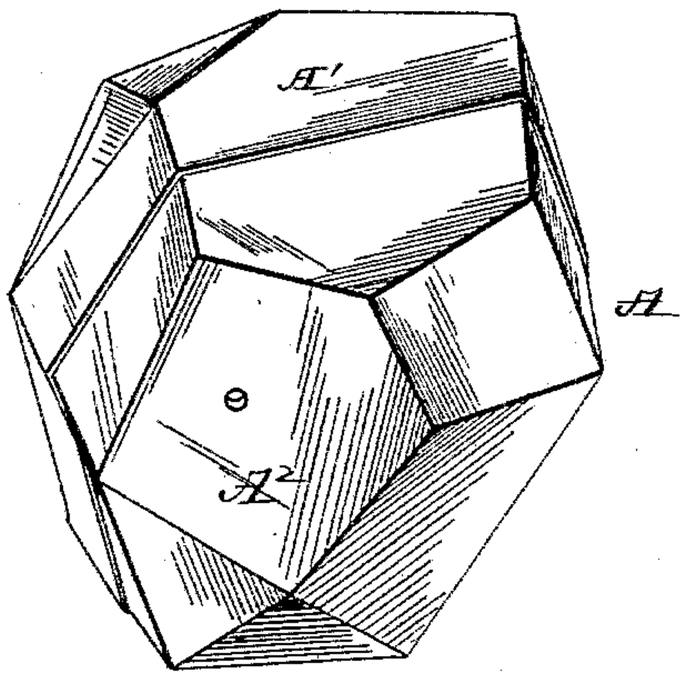


Fig. 2.



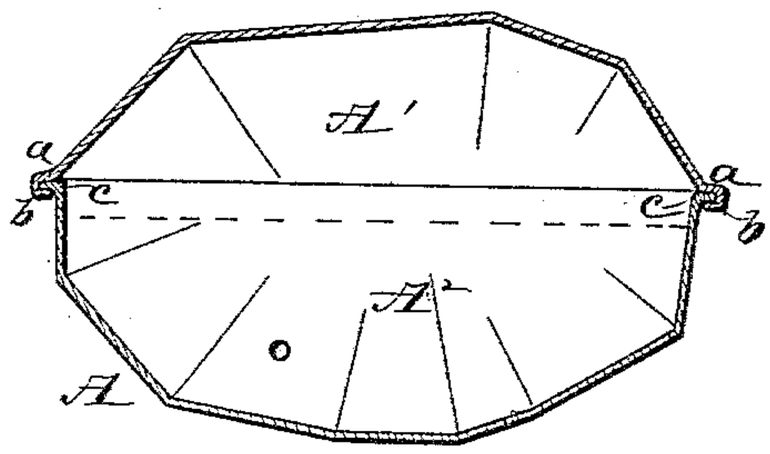


Fig. 3.

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UNITED STATES PATENT OFFICE.

WALTER MARSH JACKSON, OF NEW YORK, N. Y.

HEAT DEVELOPER AND RADIATOR.

SPECIFICATION forming part of Letters Patent No. 384,365, dated June 12, 1888.

Application filed December 28, 1887. Serial No. 259,201. (No model.)

To all whom it may concern:

Be it known that I, WALTER MARSH JACKSON, of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Heat Developers and Radiators; and I 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.

My invention relates to an improvement in artificial-heat developers and radiators for the economical and perfect combustion of gaseous fuel in a stove or open grate.

In the combustion of the ordinary coal of commerce as a fuel for house-warming or similar uses one of the most important requisites to insure good results is a good draft in the flue or chimney, and the next essential is an open fire, or one in which there are interstitial cracks or slight fissures pervading the mass of coal to permit free circulation throughout the fire-bed of atmospheric air, which is introduced from below and is made to permeate the coal-bed by the rarefied air creating a draft in the flue.

The air introduced in an ordinary coal fire by percolation throughout its mass is rarefied by heat, expanded in volume, and thus adapted to assimilate with the carbon vapor driven off from the lumps of coal by the heat, thus producing carbonic-oxide gas, which is very inflammable in its nature, and if proper proportions of oxygen and carbon can thus be maintained a clear hot fire will result; but if sufficient air is not inducted into the mass by reason of an insufficient draft or the want of proper ramifications throughout the bed of coal, incomplete combustion will be effected and a dull smoky fire will be afforded.

It has been determined by scientists that fully one-half the condensed carbon contained in coal used as a fuel is wasted by improper combustion, and that the carbonaceous atoms that do not assimilate with the oxygen of the air are driven off and lost. In view of this fact it has been considered that the conversion of coal into a gas which is stored in a suitable receiver for ultimate use as a fuel will prevent the waste, to a large extent, that is incidental to the use of coal in the lump or crude state, as it is evident that if a gaseous fuel is produced it may all be consumed when mixed in proper proportions with atmospheric air.

One of the impediments heretofore experienced in the utilization of carbon gas as a fuel is the want of a more perfect means for the intimate admixture in a stove or grate of atmospheric air in combination with the gas and a better heat developer and radiator for use in stoves or open grates, the latter method of heating having preference if the cherry view of an incandescent fire can be afforded with a strong radiation of heat and perfect combustion of the gaseous fuel.

Artificial back-logs or imitations of a wood fire by employment of several metal tubes in the form of sticks of wood have been used to simulate a wood fire. Gas issuing in jets from concealed burners is consumed between these imitation sticks. Such devices are expensive failures as far as heating is concerned, and are very poor substitutes for the wood fire they represent.

The object of my present invention is to produce a cheap substantial device that will simulate in appearance and effect a free-burning mass of lump-coal in a stove or open grate, and will also be of light weight, have a large heat-radiating surface, with an ample provision for the free commingling together of rarefied air and carbon gas, which latter may be evolved from the combustion of a solid material or be supplied by suitable pipes to mix with the hot air and produce a carbonic-oxide gaseous fuel.

A further object is to afford a convenient portable heat-generator of metal or other proper material which may be employed in a stove, range, or open grate for general heating purposes, and that will utilize with great efficiency and economy a gaseous fuel or carbon vapor evolved from combustion of a solid carbonaceous substance or a liquid hydrocarbon material.

With these objects in view, my invention consists in certain features of construction and combinations of parts, that will be hereinafter described, and pointed out in the claims.

Referring to the drawings, Figure 1 represents a mass of the imitation coal lumps or irregular blocks located in a grate for use as an open fire. Fig. 2 is an enlarged view of one of the heat generators and radiators separated at the junction-line of its two half shells.

Fig. 3 exhibits an exterior view of one of the hollow irregular polygonal blocks which are employed in a mass to imitate a coal fire, and by incandescence of their surface develop and radiate heat from contact with gaseous fuel.

In Figs. 2 and 3 my improved heat-developer and its radiator is shown. It consists, essentially, of a hollow polygonal block, A, which is preferably made of sheet-iron or sheet-steel struck into form by proper machinery, cutting and forming dies being employed to give shape to each of the two half shells or sections A′ A². The section A′ is provided with an extended flange, *a*, that has downwardly-projected integral rim *b* formed at its outer edge. The other half shell or section, A², is also furnished with a flanged edge, *c*, which is made to conform in peripheral contour with the recess produced on the other shell, so that the flanged edge of the shell A² will lie closely upon the flange *a* of the shell A′ when the two shells are joined together. In order to firmly secure one shell to the other, the rimmed edge *b* of the shell or section A′ is folded inwardly upon the bottom surface of the flange of the mating shell A² and hammered or otherwise forcibly set down upon it, so as to render the joint firm. The hollow irregular cube or polygonal shell that has just been described is perforated, one or several small holes being made in its wall, this being for the admission and expulsion of atmospheric air into and from the chamber formed in the imitation coal block or lump. Any desired variation in form of these hollow imitations of broken coal may be made, so that when a number are placed in the fire-pot of a stove or an open grate they will resemble in form the substance they represent, and these irregular shells may be blackened, or will become so from use, and thus give them the color of coal. In use these counterfeits of lump-coal are placed, we will say, in an open grate in sufficient quantity to afford a proper radiating-surface, the pieces being arranged to simulate a bed of coal, and as the shapes of the several shells are various and all provided with a multitude of projecting angles, it follows that numerous interstitial fissures or spaces will pervade the mass.

If a coal or other hard carbonaceous material is to be employed to produce the carbon vapor that is to be utilized as a fuel to render incandescent the artificial coal previously described, this fire is built below the mass of hollow polygonal shells, so that the hot and unconsumed carbon vapor which is not consumed will pass upward through the mass of hollow shells, and by assimilation with the oxygen of rarefied air that penetrates throughout the mass of these substitutes for a full grate of coal, the latter will be rendered incandescent and radiate a large volume of heat that has been produced by their agency; or, if a gaseous fuel is to be used that is either a natural or artificial product, and which is conveyed in proper pipes to the place of consumption, a perforated pipe or other device for the proper feeding and distribution of this fuel-gas is located below the grate, so that a graduated volume of gas may be introduced through the grate-bars and percolate up through the open mass of counterfeit coal and be ignited.

When first the gas is started to burn, it will immediately warm the comparatively thin walls of the metallic polygonal blocks and rarefy the air contained within them, accumulating a slight pressure inside by reason of expansion of the volume of contained air. This hot air will be forced out of the small perforations of the shells and be intimately commingled with the ascending gas which is filtering through the ramified passages between the shells, which will result in the instant assimilation of the oxygen of the air with the carbon atoms of the gas, and approximately perfect combustion will ensue.

If desired, a liquid carbon fuel may be inserted in the grate below the hollow shells that have been placed in the same. This may be petroleum or a distillate of it—such as coal-oil—which may be made to saturate continuously a porous absorbent material—as, for instance, asbestus wool—and be ignited. The results from its employment for a fuel will be similar to the destructive combustion of a solid fuel or jets of hydrocarbon gas, as relates to the economic and perfect combustion of any of these different carbonaceous materials.

It is apparent that from the large surface for heat development and radiation afforded by a grate full of the metallic shells or imitation coal lumps just described an intensely hot incandescent mass may be quickly produced and maintained for any desired length of time if a proper volume of gas is afforded, the heat being graduated to avoid melting of the shells. It is also evident that from the form of construction of the heat developing and radiating device and method of employment of the same in a stove or open grate great economy of fuel consumption is afforded, as the perfect assimilation of gas and air, and the consequent evolution of carbonic-oxide gaseous fuel, insures an approximately perfect combustion without loss or waste of any carbonaceous matter.

I have described the heat developing and radiating shells as being formed preferably of sheet metal. I do not, however, restrict myself to the use of such a material, as it is feasible to employ a molded and cast-metal shell; or a refractory clay or mixture of clay and plumbago may be used as a material from which to manufacture these hollow perforated shells, and good results be obtained.

Other slight changes might be made in the manner of attachment of the two sheet-metal shells together to produce a hollow polygonal block or cube, and still lie within the spirit and scope of my invention; hence I do not wish to limit myself to the exact method of

construction or material employed to carry into effect my invention; but,

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

1. A heat developer and radiator to utilize gaseous or other fuel, consisting, essentially, of a hollow chamber with numerous angles and a perforated wall, substantially as set forth.

2. A heat developer and radiator to be used in connection with combustible material and atmospheric air, consisting of a hollow polygonal chamber having its wall perforated, substantially as set forth.

3. A device for the economical combustion of gaseous or other fuel, consisting, essentially, of a hollow polygonal chamber that is formed of two half-shells joined at their edges, one or more perforations being made through the wall of the chamber, substantially as set forth.

4. A heat producer and radiator that is adapted to utilize economically a liquid, solid, or gaseous fuel, consisting of a hollow perforated chamber or thin shell made of metal, and provided with such an angular contour or exterior surface that interstices will be afforded for the percolation of air and gas between a mass of these polygonal chambers located in a fire-pot or open grate, substantially as set forth.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

WALTER MARSH JACKSON.

Witnesses:
GEO. T. GADEN,
JNO. M. WARD.