

1,399,689.

Fig. 1.

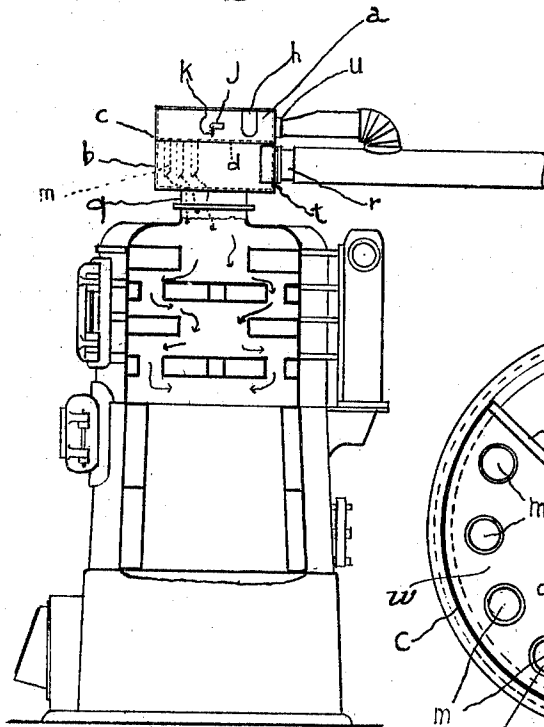


Fig-2.

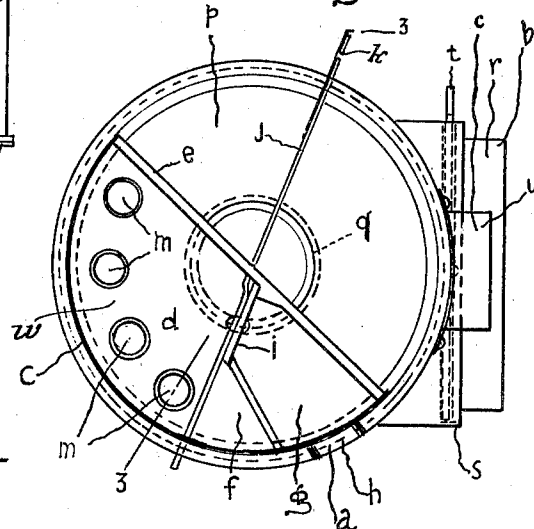


Fig. 3.

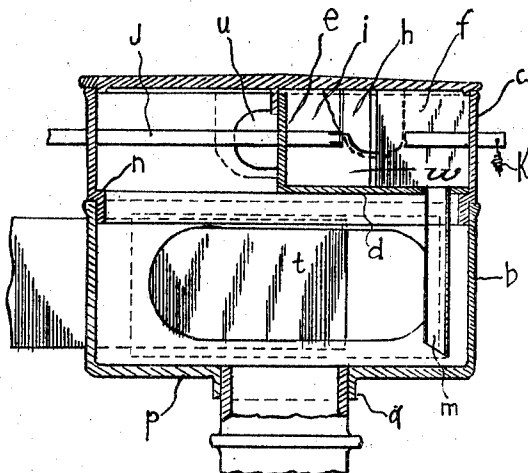
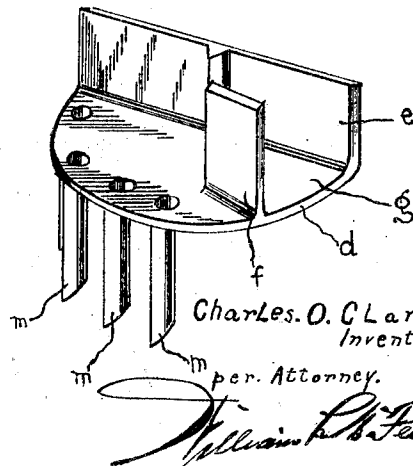


Fig-4.



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UNITED STATES PATENT OFFICE.

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FUEL-ECONOMIZER.

1,399,689.

Specification of Letters Patent.

Patented Dec. 6, 1921.

Application filed September 2, 1919. Serial No. 321,247.

To all whom it may concern:

Be it known that I, CHARLES OSBORNE CLARK, a resident of the city of Montreal, district of Montreal, Province of Quebec, a subject of the King of Great Britain, have invented certain new and useful Improvements in Fuel-Economizers, for which the following is a full, clear, and exact description thereof.

My invention relates to the economizing of fuel burned for domestic use and has more particular reference to fuel burned for the heating of dwellings and other buildings.

In the heating furnaces employed in connection with hot water and other systems for heating buildings there has been a considerable waste owing to the fact that a large percentage of carbon monoxid and other unconsumed and inflammable gases and particles of fuel are drawn to the chimney, leaving the furnace before combustion takes place. The loss of fuel in this manner is exceedingly high, and many attempts have been made to solve the problem of economizing it and particularly the fuel employed for heating purposes.

The object of my invention is to reduce to a minimum the amount of unconsumed inflammable gases and particles of fuel leaving the combustion chamber of the furnace of a heating system and at the same time afford an equipment which will enable the draft to be regulated and the fire controlled to meet any climatic requirements within the theoretical capacity of the furnace.

To this end the invention may be said, broadly, to consist of an equipment constructed and arranged to supply preheated air to the fire chamber and including means for controlling the draft to the chimney and the air intake to the air-preheating part of the equipment.

For full comprehension of my invention reference must be had to the accompanying drawings in which similar reference characters indicate the same parts and wherein:

Figure 1 is a part elevation and part vertical sectional view of the equipment applied to a domestic hot-water heating furnace;

Fig. 2 is a plan view of the equipment with the cover removed;

Fig. 3 is a vertical sectional view taken on line 3—3 Fig. 2 illustrating the damper in

closed position and the associated parts broken away; and

Fig. 4 is a detail perspective view of one of the parts of my improved economizer.

More specifically stated the embodiment of my invention hereinafter described in detail is an equipment for a vertical sectional water heater of the type having the smoke pipe connection at the center of its top.

The parts of my fuel economizing equipment are preferably made of the same material as the furnace. The shell or drum is of straight cylindrical form and for convenience in manufacturing and assembly it is made in two parts *b* and *c* respectively, and the interior is divided to provide an air heating chamber and a smoke chamber. The division is effected by a floor plate *d* and a vertical wall *e* extending diametrically of the shell, while a short wall *f* divides off a portion *g* to serve as a passage or flue with the outer end of which an air intake *h* in the shell communicates. This passage or flue is controlled by a damper *i* operated by a slide bar *j* extending diametrically through the shell and having its opposite ends protruding and provided with handles *k*. The walls *e* and *f* and damper *i* are substantially equal in height to the upper part of the shell. A series of preferably four vertical air tubes *m* are carried by the floor *d* and extend downwardly to within a short distance from the bottom of the lower section *b*. The bottom edge of this top tube section is offset inwardly at substantially the level of the floor *d* in order to form a neck *n* to fit into the lower part of the shell and a shoulder to be set upon the upper edge of such part. This lower part of the shell has its bottom partly closed by a floor *p* having an annular depending rim *q* adapted to make connections with the smoke pipe connection of the furnace. Connections are made between the shell and smoke-pipe by a collar rim *r* presented by a slide box *s* cast in one or otherwise formed integrally with the lower section *b* and containing a slidable damper *t* of plate form; while a connection *u* for a bypass pipe is presented by the upper section and communicates with the space between the wall *e* and that side of the shell opposite to the air heating chamber *w*.

The capacity of the bypass connection

with the interior of the shell is greater than the collective capacity of the tubes *m*, in order to guard against back drafts outwardly through the tubes and passage *g* to the atmosphere.

Operation: A heating furnace equipped with my invention may have its drafts regulated in a very simple manner, the full blast condition being obtained by opening the bottom damper of the furnace and allowing full draft into the smoke pipe which is secured by simply opening the damper *t* to its full extent. When the fire has been fully started, if allowed to burn under full draft conditions, a very considerable waste occurs owing to the loss of unconsumed inflammable gases and fuel particles which escape from the fire chamber. This is checked and the intensity of heat in the fire chamber increased by opening the damper *i* and closing the damper *t*, the bypass connection *u* being open under all conditions. The currents are then as follows: Air enters the air heating chamber *w*, the floor and walls of which are hot, and its temperature is raised as it flows through the tubes *m* and although heated it is at a very much lower temperature than the gases rising from the fire and consequently falls through the openings in the sections of the furnace until it reaches a place more or less close to the burning gases and at which place its temperature has reached burning point. This has the effect of igniting the inflammable gases and fuel particles which would otherwise pass in a dead state to the chimney connection and be lost. In this manner the actual fire burning in the furnace and which usually does not extend above the flames dancing on the surface of the fire bed is extended to practically the top of the sections, thus obtaining a very much larger percentage of heat units from the body of fuel stoked and, therefore, permitting a smaller quantity of fuel to be used to obtain the required heating radiation.

What I claim is as follows:

1. The combination with a furnace having a smoke pipe connection located at the top of the furnace and a smoke pipe; of a fuel economizing device adapted to be mounted upon said connection exteriorly of the furnace and effect communication between said connection and said smoke pipe, said device consisting of a hollow member the interior of which is divided into a smoke chamber and an air-heating chamber, the smoke chamber being in communication with the interior of the furnace and with the smoke pipe, said member having an air intake communicating with the air-heating chamber, a damper controlling said intake and

a plurality of tubes located within said member and effecting communication between the two chambers.

2. The combination with a furnace having a smoke pipe connection located at the top of the furnace, and a smoke pipe; of a fuel economizing device adapted to be mounted upon the said pipe connection exteriorly of the furnace and adapted to effect communication between the interior of the latter and the smoke pipe, said device consisting of a hollow member divided into a smoke chamber and an air heating chamber, the former being in communication with both the interior of the furnace and the smoke pipe, said member having an air intake communicating with the air heating chamber, a damper controlling said intake and a plurality of tubes effecting communication between said two chambers and a bypass effecting communication between the smoke chamber and the smoke pipe for the purpose set forth.

3. The combination with a furnace and a smoke pipe; of a fuel economizing device adapted to be connected to the furnace and to the smoke pipe and consisting of a shell of cylindrical form having a closed end, said end having an opening therein for communication with the interior of the furnace and a cover closing the opposite end of said shell, means dividing the interior of said shell into a smoke chamber and an air heating chamber, said means consisting of a unitary partition constituted by a pair of walls one of which is disposed parallel to the cover and extends between the other wall and the cylindrical wall of the shell said other wall extending from the first mentioned wall perpendicularly to and contacting with the cover, said device having an air intake communicating with said air heating chamber, a damper slidably located within the chamber in position controlling the intake, a plurality of tubes mounted in said partition and projecting into the smoke chamber, said tubes effecting communication between the two chambers, a smoke pipe connection upon said shell and adapted to effect communication between the smoke pipe and the smoke chamber, a damper controlling said connection and a by-pass effecting communication between the smoke pipe and the smoke chamber.

In testimony whereof I have signed my name to this specification in the presence of two witnesses.

CHARLES O. CLARK.

Witnesses:

GORDON G. COOKE,
HAROLD W. ROBERTS.