(No Model.)

W. H. BURDEN.

SMOKE CONSUMER.

No. 472,981. Patented Apr. 19, 1892.

Fig 1

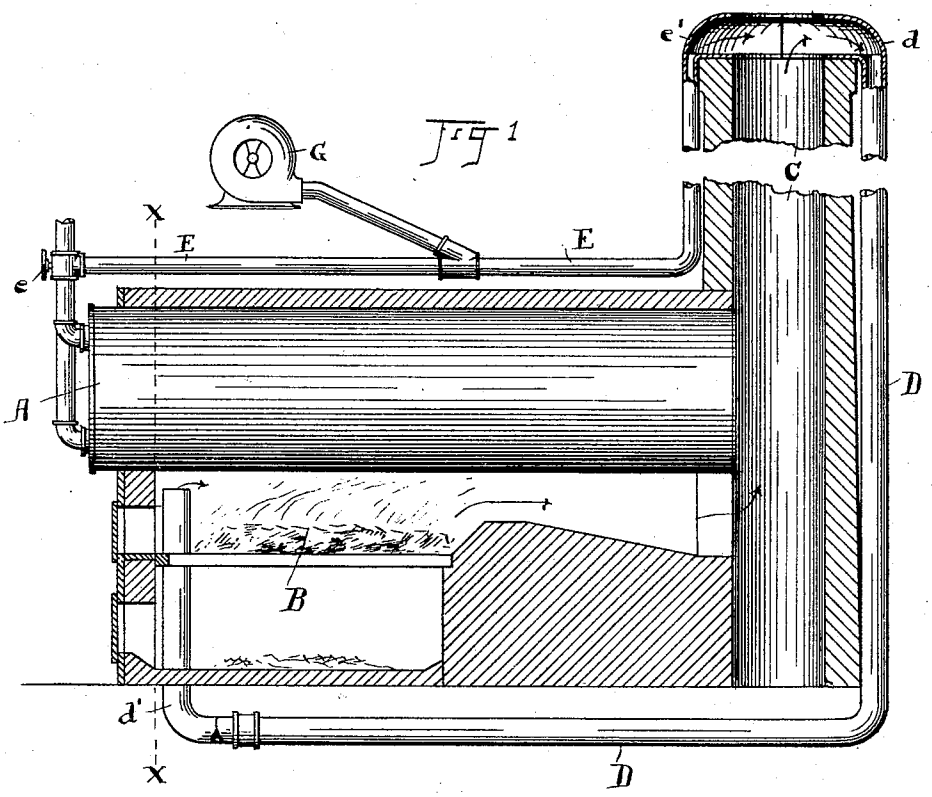


Fig 2

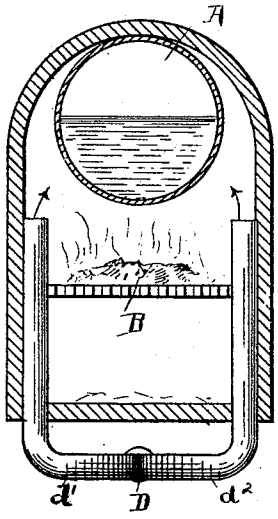


Fig 3

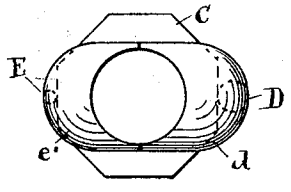
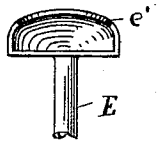


Fig 4



Attest.
R. B. Moser.
Nellie L. McLane.

Inventor
William H. Burden.

by H. T. Fisher Attorney.

UNITED STATES PATENT OFFICE.

WILLIAM H. BURDEN, OF CLEVELAND, OHIO.

SMOKE-CONSUMER.

SPECIFICATION forming part of Letters Patent No. 472,981, dated April 19, 1892.

Application filed September 30, 1891. Serial No. 407,219. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. BURDEN, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Smoke-Consumers; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to smoke-consumers; and it consists in the construction, combination, and arrangement of parts, substantially as shown and described, and particularly pointed out in the claim.

In the accompanying drawings, Figure 1 is a central sectional elevation of a steam-boiler and furnace and smoke-stack having my improved smoke-consuming attachments connected thereto. Fig. 2 is a cross-section on line *x x*, Fig. 1. Fig. 3 is a plan view of the smoke-stack with my attachment thereon; and Fig. 4 is a front view of the flaring mouthpiece of either the blast-pipe or the supply-pipe, shown in plan in Fig. 3.

The smoke-consuming attachment embodying my invention is shown here in connection with a single boiler A and fireplace or furnace B and any common form of smoke-stack C. It is of course intended that the attachment shall be made to furnaces and smoke-stacks or chimneys as they may be found in every-day use, whether the form be as here shown or widely different therefrom.

The plan of the invention is to intercept the smoke on its way out of the stack or chimney and carry it back by a separate channel to the furnace to be consumed. It is of course understood that the smoke arising from coal fires in furnaces is produced by or is the result of imperfect combustion. If combustion were complete, such clouds of smoke as are commonly seen issuing from furnace-chimneys would not occur; but since combustion itself will continue no better than it is to-day until new principles in constructing and operating furnaces may improve present results, we shall continue to have the presence of offensive smoke as the product of the furnace, and hence my invention has to do with taking care of this product and reducing to the minimum its obnoxious character. Manifestly the practical way is to burn by a second or subsequent exposure that which should have been burned originally, and to do this the dark volume passing up the chimney and consisting largely of particles of carbon and hydrocarbon gases in some form or other must be returned to the furnace in which they originated or to some other convenient furnace and consumed. In my invention I provide for their return to the same furnace and establish a circuit around which they travel over and over again until all the combustible elements are wholly eliminated. To accomplish this result I employ, first, a return pipe or flue D, connected with the top of the smoke-stack or chimney, whatever its height, and having extending in over the wall of the same to the inner edge of the passage a horizontally-arranged flaring mouth *d*, the mouth of the pipe being as wide as the passage of the chimney or stack, so as not to allow any smoke to pass out of the chimney. From the top of the chimney the pipe or tube D extends down to the base thereof and thence runs in at the bottom or side of the furnace and discharges through branch pipes $d' d^2$ into the front portion of the furnace, so as to expose the issuing contents of the pipe to the consuming heat therein. The pipe or flue D of course is made large enough to receive and convey the smoke passing up through the chimney along with such quantity of air or air and steam as may be forced into the same from the force or blast pipe or tube E. This tube has two sources of supply shown here, either of which may be employed. Thus there is a live-steam supply having a suitable controlling-valve *e*, which may be a continuation of pipe E or a branch thereof, and in any event conveys steam under suitable pressure and in sufficient quantity for my purpose into pipe E. This pipe leads to the top of the smoke-stack or chimney C and has a flaring mouth *e'* corresponding to mouth *d* of the draft-pipe D and directly opposite said mouth, so as to feed directly into the same. If steam be used, it issues under a constant flow out of mouth *e'* and by its pressure carries the rising smoke with it into the mouth *d* and down into the pipe or tube D far enough to supply the suction in the pipe by reason of the furnace receiving all its draft and air-supply through

this channel. If air alone be used, I employ a blower G, suitably located, and force a sufficient volume of air up through the pipe E to establish a strong and constant air-blast across the smoke-passage between the flaring mouths *d* and *e'*. This likewise will carry the volume of smoke into pipe D the same as steam, and will at the same time maintain an abundant fresh-air supply for the furnace.

One or more upright pipes *d'* may be used, and one or more furnaces may be fed from the same pipe D.

The wall of the stack is built up between the opposed ends of the two pipes, or the intervening space may be otherwise closed; but it must be closed by some means, so that no smoke can escape in that direction. By thus walling up or otherwise inclosing the space between the flaring mouths *d* and *e'* a conduit is formed from one mouth to the other. In Figs. 1 and 3 the flaring mouth-pieces themselves are shown as each extending half-way across the top of the chimney and meeting at their ends, so as to close the passage from side to side. It will be seen that by this construction no smoke can escape from the chimney without being subjected to the blast or blow on one side and the draft on the other, and the steam or air is directed at once in a channel toward the discharge-pipe.

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

In a smoke-consumer, a chimney, a draft-pipe having its mouth at the top of the chimney and its discharge end in the furnace over the coal, and an air or steam supply pipe having its mouth at the top of the chimney opposite the mouth of the draft-pipe and the space between the two pipes closed at the sides, whereby a conduit is formed from one pipe to the other and smoke is prevented from escaping, substantially as described.

Witness my hand to the foregoing specification this 24th day of September, 1891.

WILLIAM H. BURDEN.

Witnesses:
H. T. FISHER,
NELLIE L. MCLANE.