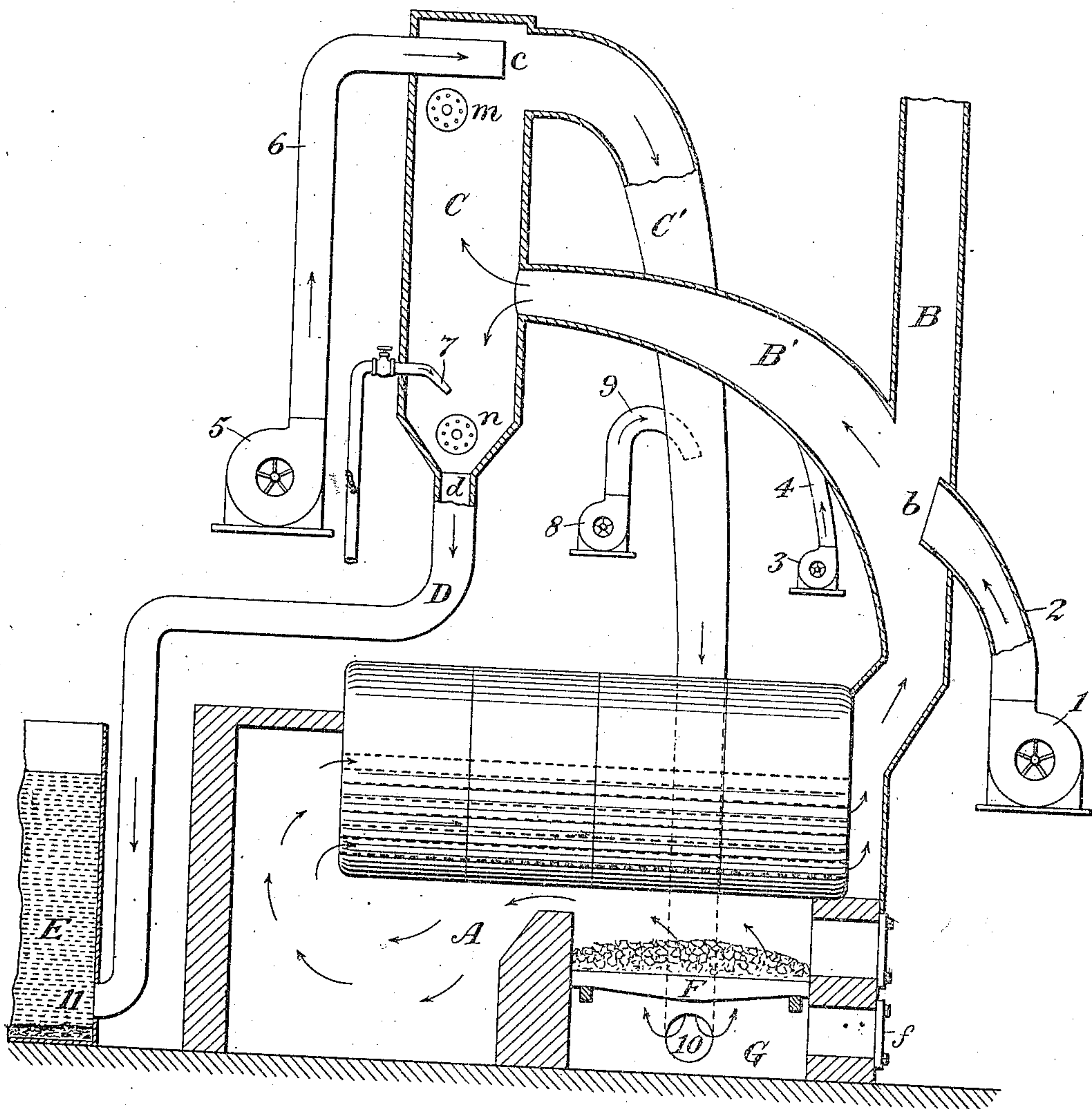


995,765.

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SMOKE CONSUMING FURNACE.
APPLICATION FILED AUG. 22, 1910.

Patented June 20, 1911.



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UNITED STATES PATENT OFFICE.

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SMOKE-CONSUMING FURNACE.

995,765.

Specification of Letters Patent. Patented June 20, 1911.

Application filed August 22, 1910. Serial No. 578,279.

To all whom it may concern:

Be it known that I, BENARD F. BRADY, a citizen of the United States, residing at the borough of Brooklyn, city of New York, in the county of Kings and State of New York, have invented a new and useful Improvement in Smoke-Consuming Furnaces, of which the following is a specification.

My invention relates to smoke-consuming devices, and it has for its object to effect the entire consumption of smoke in furnaces, including all the gases, carbonaceous materials and other unconsumed products of combustion which are carried by the draft from the furnace into the smoke-flue along with the smoke proper. I attain this object by the mechanism illustrated in the accompanying drawing.

The figure in the drawing is a side elevation of my improved smoke-consuming device, partly in section, in connection with an ordinary steam boiler furnace.

Similar letters and numbers refer to similar parts throughout the view in my drawing.

The letter B represents a smoke-flue leading from furnace A and provided with a rotary fan or blower 1 communicating with the same by means of eduction pipe 2 which should project into flue B in the direction and opposite to the opening of hollow arm or flue B', with which flue B is also provided for the purpose of connecting the same with separating-tank C at a point approximately two-thirds of the distance from the top to the bottom of said separating-tank C. Arm or flue B' is provided with rotary fan or blower 3 communicating with the same by means of eduction pipe 4. Separating-tank C, connected as aforesaid with flue B, is provided at the top with hollow arm C', and also rotary fan or blower 5 communicating with said separating-tank C by means of eduction pipe 6 which should project into said separating-tank C in the direction of and opposite to the opening of said arm C'. The sides of separating-tank C converge at the lower end to a narrow opening d, and above said opening d near where the sides begin to converge, water jet 7 enters separating-tank C, its nozzle inclining downward. From the bottom opening d of separating-tank C leads pipe D communicating with water tank E with its opening 11 near and within a few feet of the bottom of said water tank E. Arm C' communicating

with separating-tank C as aforesaid, is provided with rotary fan or blower 8 communicating with the same by means of eduction pipe 9. Said arm C' with converging sides leads downward to the ash-pit G of the furnace A below the grate bars F, its opening 10 being well below said grate bars.

In order to effectually carry all the smoke and its accompanying unconsumed products of combustion into flue B' from flue B, as is hereinafter described, projection b of eduction pipe 2 should extend into flue B to a distance to equal one-half of the diameter of flue B; its diameter should equal that of flue B, and the distance between the periphery of the outlet of said projection b and the points of junction of flue B' with flue B should also equal the diameter of said flue B. Projection c of eduction pipe 6 should extend well into separating-tank C, say to a distance to equal three-quarters of the diameter of the latter, so that the smoke may be effectually forced into arm C' as is hereinafter described.

Instead of pipe D leading to a water tank such as indicated by letter E, it may lead to a natural body of water if such happens to be conveniently located. But care should be taken to have the opening 11 of pipe D enter said body of water near and within a few feet of the bottom, or in any event a considerable distance from the surface.

Rotary fan or blower 8 may be used for cleaning the narrow and lower end of arm C' as well as for creating the false draft to force the smoke downward. The rotary fans or blowers 1, 3, 5, and 8 may be operated by any convenient or suitable means and with any speed necessary to obtain air force sufficient for the successful operation of the device. Separating-tank C may be provided with man-holes m and n in order to gain access therein for cleaning purposes.

The operation of my above described invention is as follows: The smoke and all unconsumed products of combustion, carried forward by the draft in furnace A into flue B until the same reaches the point occupied by projection b of pipe 2, will then be forced into and through arm or flue B' by means of the false draft created by rotary fan 1 issuing from said projection b, and aided by false draft created by rotary fan 3, all the smoke together with its accompanying heavy products, carbonaceous material, etc., will enter separating-tank C. At this point said

heavy products, carbonaceous material, etc., will by force of gravity fall to the bottom of said separating-tank C and by means of a stream of water issuing from jet 7 they will be forced out of said tank C through its bottom opening *d* into pipe D, and downward through the latter's opening 11 into water tank E, where said heavy unconsumed products of combustion will settle at the bottom of said water tank E, or, in order to prevent the bottom of said tank E from clogging, by means of a screen conveyer, they may be brought to the surface where they can be carried away through an over-flow pipe. Returning to the point where the smoke and its accompanying heavy unconsumed products of combustion enter separating-tank C from arm or flue B', the smoke proper and gases will rise to the top of said separating-tank C and will be carried, by means of a false draft created by rotary fan 5, issuing from projection *c*, into arm C', and, aided by a false draft created by a rotary fan 8, will be forced downward through opening 10 of said arm C' into the ash-pit G and below grate bars F, whereupon said smoke and gases will rise as far as said grate bars F and will then be entirely consumed by means of the draft issuing from door *f* to the ash-pit G and the intense heat from the fire-box.

I am well aware that heretofore devices have been invented whereby the smoke, together with the heavy unconsumed products of combustion, are, by various means, forced into the ash-pit and discharged through the grate into the bed of fuel where it is intended that the same should be consumed by the fire. Nevertheless I have found by means of practical experiments that such heavy products, carbonaceous material, etc., originally unconsumed by combustion, will never be entirely consumed by a second passage into the fire-box, but that on the contrary most of it has already been reduced to incombustible matter and would therefore remain in the fuel bed, bank the fire, and possibly block the boiler tubes.

In order to carry away the heavy unconsumed products of combustion I have provided a separating-tank C, as above-described, which separates the heavy products from the smoke proper and eliminates the necessity of forcing the former back into either the ash-pit or the fire box. In my device only the smoke and gases return to the ash-pit, where they are consumed below the grate bars; while the heavier products are forced from the separating-tank C in an entirely different direction and are carried into a water tank E or a natural body of water if such is conveniently located.

What I claim as new and desire to be secured by Letters Patent is:

1. In combination with a furnace having

an ash-pit and grate bars, smoke-flue B, eduction pipe 2 provided with projection *b* communicating with said smoke-flue B, separating-tank C, smoke-flue B' connecting said smoke-flue B with said separating-tank C, eduction pipe 4 communicating with said smoke-flue B', eduction pipe 6 provided with projection *c*, communicating with said separating-tank C, water jet 7 communicating with said separating-tank C, water-tank E, pipe D leading from said separating-tank C to said water-tank E, passage C' leading from said separating-tank C to the ash-pit below the grate bars, eduction pipe 9 communicating with said passage C', said eduction pipes 2 and 4 being in communication with means for forcing the smoke and heavy unconsumed products of combustion through said smoke-flue B' into said separating-tank C, said eduction pipes 6 and 9 being in communication with means for forcing the smoke proper from said separating-tank C through said passage C' respectively into said ash-pit below said grate bars, and said water jet 7 being in communication with water supply for the purpose of forcing the heavy unconsumed products of combustion from said separating-tank C through said pipe D into said water-tank E, substantially as described.

2. In combination with a furnace having an ash-pit and grate bars, a smoke-flue, an eduction pipe projecting into said smoke flue to a distance to equal one-half of the diameter of said smoke-flue, the diameter of the outlet of said eduction pipe being equal to that of said smoke-flue, a hollow separating-tank, a passage connecting said smoke-flue with said separating-tank, the distance between the points of junction of said passage with said smoke-flue and the periphery of the outlet of said eduction pipe being equal to the diameter of said smoke-flue; a passage leading from the top of said separating-tank to the ash-pit below the grate bars, a water-tank, and a passage leading from the bottom of said separating-tank to said water-tank, said eduction pipe being in communication with means for forcing the smoke from said smoke-flue into the passage connecting said smoke-flue with said separating-tank, said separating-tank and said passages being provided with means for forcing the smoke and heavy unconsumed products of combustion into said ash-pit and water-tank, respectively, substantially as described.

3. In combination with a furnace having an ash-pit, a smoke-flue, an eduction pipe projecting into said smoke-flue to a distance to equal one-half of the diameter of said smoke-flue, the diameter of the outlet of said eduction pipe being equal to that of said smoke-flue, a separating-tank provided with passages leading to the ash-pit and a

water-tank respectively, another passage
connecting said smoke-flue with said sepa-
rating-tank, the distance between the points
of junction of said passage with said smoke-
5 flue and the periphery of the outlet of said
eduction pipe being equal to the diameter
of said smoke-flue, said eduction pipe be-
ing in communication with means for forc-
ing the smoke from said smoke-flue into said
10 passage connecting said smoke-flue with said
separating-tank, said passages and said sep-
arating-tank being provided with means for

forcing the smoke and heavy unconsumed
products of combustion into said ash-pit and
said water-tank, respectively, substantially 15
as described.

In testimony whereof I have hereunto set
my hand and seal in the presence of two
subscribing witnesses.

BENARD F. BRADY. [L. S.]

Witnesses:

M. T. HAWKINS,
EDGAR W. SHAW.