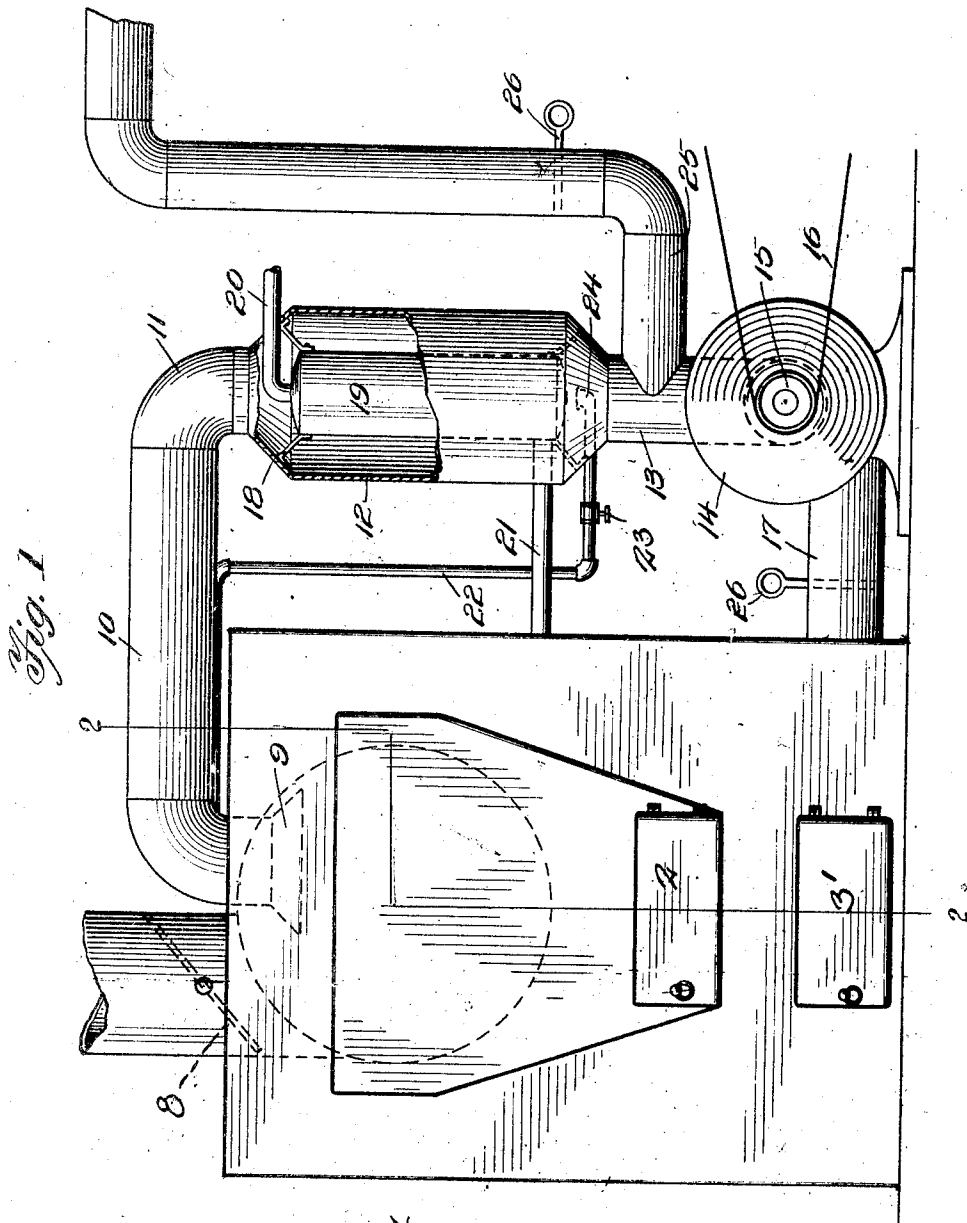


H. C. GARDNER.
SMOKE CONSUMER AND FUEL ECONOMIZER.
APPLICATION FILED AUG. 17, 1909.

1,050,639.

Patented Jan. 14, 1913.

2 SHEETS—SHEET 1.



Inventor

Henry C. Gardner

By Victor J. Evans

Attorney

Witnesses

R. C. Clafflin
Wm. J. Nooth

H. C. GARDNER.
 SMOKE CONSUMER AND FUEL ECONOMIZER.
 APPLICATION FILED AUG. 17, 1909.

1,050,639.

Patented Jan. 14, 1913.

2 SHEETS-SHEET 2.

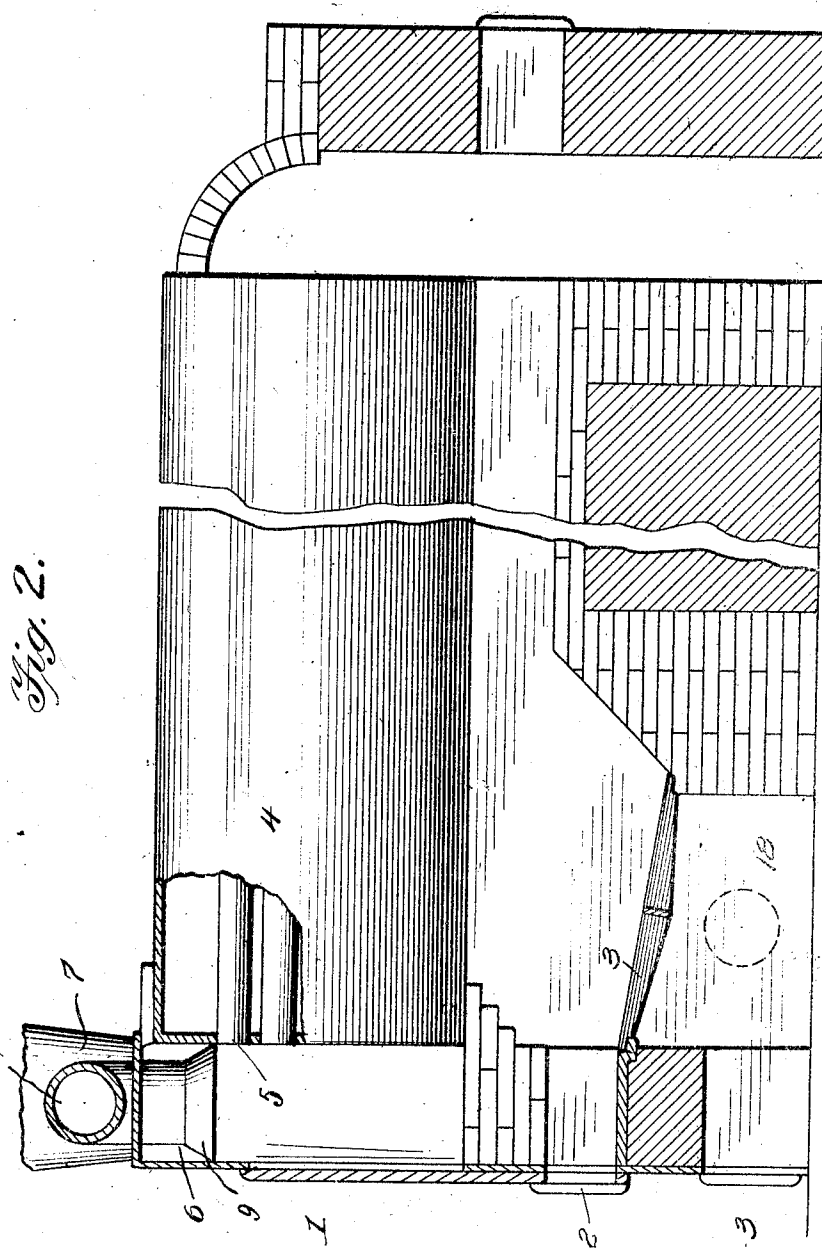


Fig. 2.

Inventor

Henry C. Gardner

Witnesses

R. C. O'Brien
 Wm. H. North

By Victor J. Evans

Attorney

UNITED STATES PATENT OFFICE.

HENRY C. GARDNER, OF NASHVILLE, TENNESSEE, ASSIGNOR OF ONE-THIRD TO CHARLES L. DAVISON AND ONE-THIRD TO FRANK M. MCBRYDE, OF NASHVILLE, TENNESSEE.

SMOKE-CONSUMER AND FUEL-ECONOMIZER.

1,050,639.

Specification of Letters Patent.

Patented Jan. 14, 1913.

Application filed August 17, 1909. Serial No. 513,223.

To all whom it may concern:

Be it known that I, HENRY C. GARDNER, a citizen of the United States, residing at Nashville, in the county of Davidson and State of Tennessee, have invented new and useful Improvements in Smoke-Consumers and Fuel-Economizers, of which the following is a specification.

This invention relates to smoke consumers and fuel economizers, and the primary object of the invention is to provide a device of this character wherein the products of combustion are fed beneath the burner grate of the furnace.

Another object of the invention is to provide a device of this character having means whereby the feed water is partially warmed before being fed into the boiler proper.

A still further object of the invention is to provide a furnace with means whereby the products of combustion are returned to the fire and oxygen from an adjoining work room or the like is forced through the medium of a suitable rotary fan to commingle with the said products of combustion while the latter is being forced beneath the grate.

A still further object of the invention is to provide an auxiliary heater for the boiler feed positioned within a suitable casing, the said casing being provided with a steam jet connected with the boiler, whereby the sparks of the products of combustion passing through the casing and adapted to be fed beneath the grate are dampened, and wherein the furnace is provided with an automatic damper so as to allow for the escape of a superfluous amount of smoke.

With the above, and other objects in view which will appear as the description progresses, the invention resides in the novel construction and arrangement of parts hereinafter fully described and claimed.

In the accompanying drawings there has been illustrated a simple and preferred embodiment of the invention, and in which,

Figure 1 is a front elevation of a furnace provided with my improvement, parts being broken away to more clearly illustrate the details thereof. Fig. 2 is a longitudinal sectional view taken upon the line 2-2 of Fig. 1, looking in the direction of the arrows.

In the accompanying drawings, the numeral 1 designates the furnace proper. This furnace is of the ordinary brick construction, having its face provided with a fuel

door 2 and an ash door 3'. The fuel door 2 communicates with the grate 3 of the device, and it will be noted by reference to Fig. 2 of the drawing that the grate bars 3 are inclined rearwardly within the fire box so as to provide, for a deeper bed for the fuel. The furnace 1 is provided with the usual cylindrical boiler 4 which has the usual tubular longitudinally extending smoke tubes 5, as shown in Fig. 2 of the drawings. The boiler 4 has its front face positioned a suitable distance away from the outer casing of the furnace 1 so as to provide a smoke passage 6. The upper portion of this passage 6 is provided with the usual stack 7, and pivotally mounted within this stack is an inclined self-regulating damper 8. The damper 8 is of the usual construction and may have its opposite central portions provided with trunnions or may be otherwise pivotally connected with the stack 7. It will be noted that the diameter of the said damper 8 is greater than the diameter of the stack 7, so that the said damper is always retained at a suitable angle within the stack. It will be obvious that the products of combustion, passing through the tubes 5 will have a tendency to contact with the inclined damper 8. It will be further understood that the said damper can only open in one direction and when the said products of combustion attain a sufficient force the damper will be opened automatically and as the pressure of the products is reduced the said damper will be automatically closed.

Positioned within the chamber 6 of the device is a funnel shaped mouth 9 of a pipe member 10. This pipe member 10 has a suitable elbow 11 through the medium of which it is connected with a suitable preferably cylindrical casing 12. The casing 12 is also provided with an extending pipe 13 which in turn is connected with a fan casing 14 provided with a suitable rotary fan. The fan within the casing 14 has its shaft projecting upon one side of the said casing and this projection is provided with a suitable pulley 15 adapted for the reception of a belt 16 which receives motion from any suitable source of power. The lower extremity of the casing 14 is provided with a pipe extension 17, and this extension is adapted to communicate with the ash pit 18 of the furnace directly below the inclined

grate 3. By this arrangement it will be noted that when the fan contained within the casing 14 is revolved the products of combustion passing through the pipe members 5 of the boiler 4 are drawn through the pipe section 10 downwardly through the casing 14 and from thence to the ash pit directly below the grate and it will be further understood that the air from the fan will not only add to the combustion of the fuel upon the grate 3 but will return the products forced through the pipe 17.

Positioned within the casing 12 and supported therein through the medium of suitable brackets 18 is an auxiliary water receiving tank 19. This tank 19 has its upper extremity provided with an inlet pipe 20 and has its lower portion provided with a feed pipe 21. This feed pipe 21 communicates with the boiler 4 and it will be readily noted that as the heated products of combustion are passed through the casing 12 the water within the tank 19 will be partially heated, so that steam may be generated within the boiler in a comparatively short length of time.

Connected with the boiler 4 is a pipe member 22. This pipe member has a suitable valve 23 and the extremity of the said pipe member 22 projects within the casing 12 directly below the tank 19. The end of this projecting portion is provided with a perforated nozzle 24, and it will be noted that as the steam is passed through the pipe member 22 into the casing 12 and directly below the tank 19, the said steam will not only assist in heating the water within the tank 19 but will effectively dampen the sparks of the fuel passing through the said casing 12.

The pipe extension 13, positioned directly below the casing 12, is provided with an offset member 25. This pipe member 25 is adapted to be extended within an adjoining work room so that the dust and other foul material will be sucked, through the medium of the fan within the casing 14, to the ash box of the furnace and from thence forced upwardly upon the grate 3 to be ignited with the fuel upon the said grate. The pipe member 25 is provided with an ordinary damper 26, as is the pipe extension 17 leading directly to the ash pit 18.

The products of combustion flowing through the conduit 10 and into the casing

12 are deflected by the tank 19 against the wall of the casing 12 and after heating the water flowing through said tank 19 they will come in contact with the steam exhaust by the nozzle 24, and distributed by the lower end of the tank 19 and against the lower end of the casing, thereby effecting an intimate mixture of the products of combustion with the steam whereby the density of these products is increased so as to promote the final passage thereof to the furnace. It will thus be seen that the construction shown provides for a practical novel cooperation of a water preheating means and the smoke consuming means.

From the above description, taken in connection with the accompanying drawings, it will be noted that I have provided a comparatively cheap and extremely simple device for the purpose intended, one which may be attached to any furnace of the ordinary construction and one which will perform the functions for which it is intended with ease and accuracy.

Having thus described the invention what is claimed as new is:—

A smoke consumer comprising in combination with a furnace and boiler, a conduit adapted to receive products of combustion from the furnace, a water tank, a cylinder surrounding said water tank and having a conical end extending above said tank and connected with said conduit, an exhaust conduit connected with the lower end of said cylinder, means for returning products of combustion passing through said cylinder to the furnace under pressure, an inlet and outlet pipe connected with said water tank, a steam nozzle located in said cylinder adapted to direct steam against the bottom of said water tank, said water tank being disposed concentrically in said cylinder and providing an annular space, the bottom of the water tank serving to spread the steam to separate the downflowing products of combustion, whereby the specific gravity of said products will be increased.

In testimony whereof I affix my signature in presence of two witnesses.

HENRY C. GARDNER.

Witnesses:

ERNEST CHASE,
R. M. TATE.