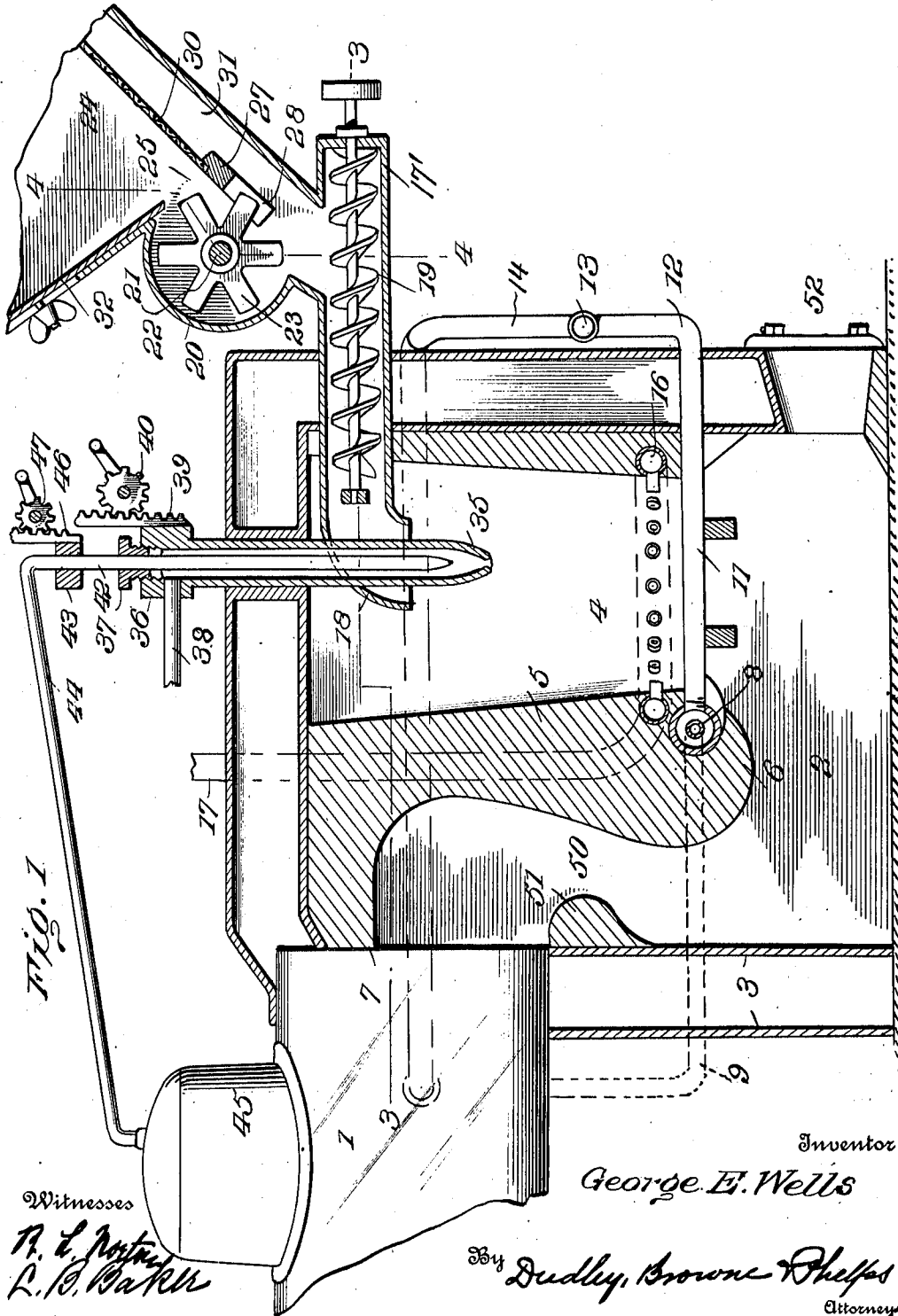


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APPLICATION FILED JULY 9, 1910.

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2 SHEETS—SHEET 1.

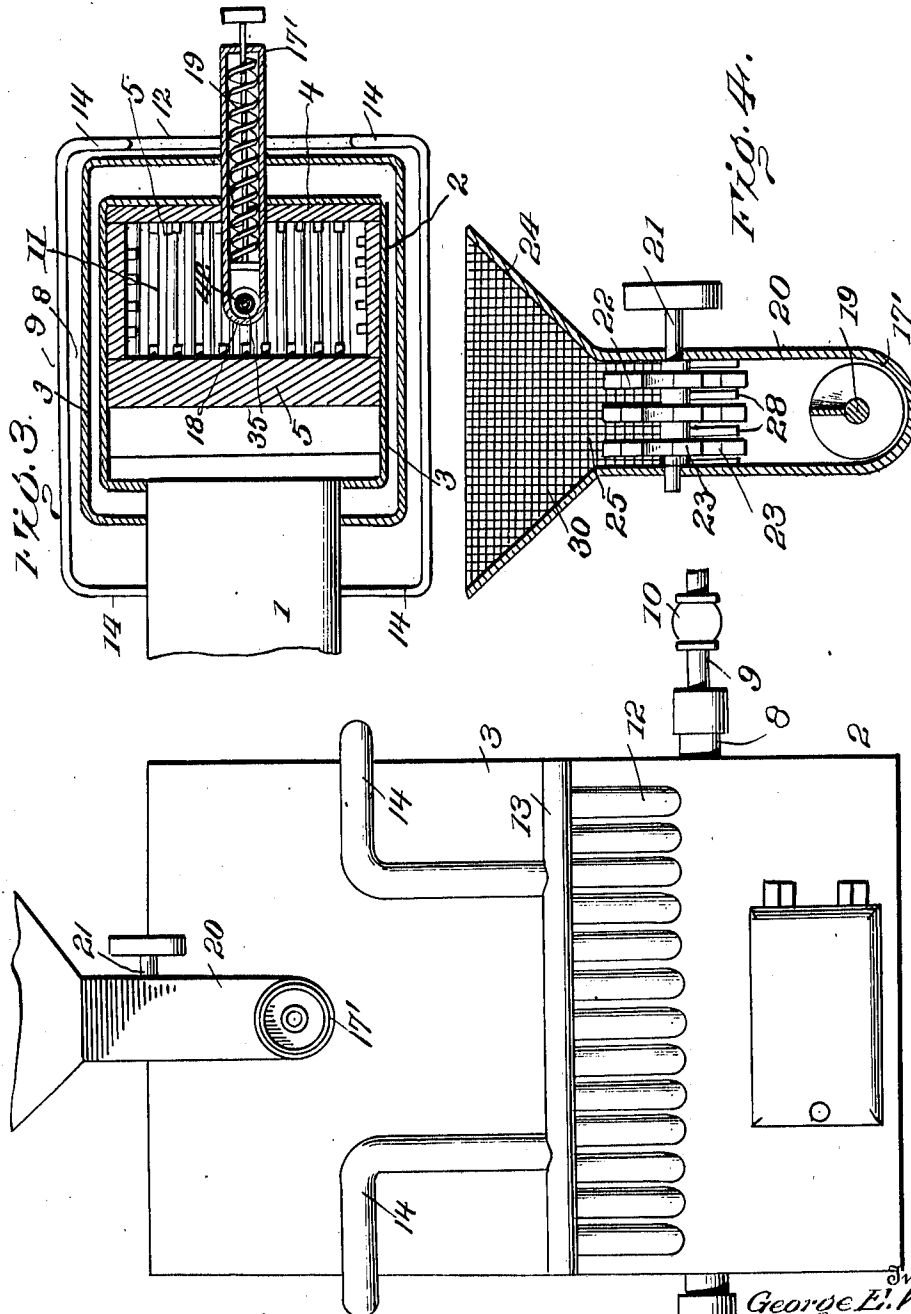


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Witnesses
R. L. Norton
C. B. Baker

Fig. 2.

By

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UNITED STATES PATENT OFFICE

GEORGE E. WELLS, OF DAYTON, OHIO.

SMOKE-CONSUMING FURNACE.

974,322.

Specification of Letters Patent.

Patented Nov. 1, 1910.

Application filed July 9, 1910. Serial No. 571,242.

To all whom it may concern:

Be it known that I, GEORGE E. WELLS, a citizen of the United States, residing at Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful Improvements in Smoke-Consuming Furnaces, of which the following is a specification.

This invention relates to improvements in smoke consuming furnaces.

The object of the invention is to provide in a fire box means for uniformly distributing fuel, and intermingle with the fuel a supply of steam and air to assist in promoting the combustion sufficient to consume the molecules of smoke.

A further object of the invention is to arrange in the furnace, means for directing the products of combustion around the wall of a flue to insure the proper heating of the fire box to assist in igniting the escaping gases to consume the molecules of gas.

A further object of the invention is to provide special means for automatically delivering fuel of substantially uniform size to a feeding mechanism to materially assist in promoting the combustion and breaking the molecules of gas so as to permit the steam and air introduced into the fire box to mix with the green fuel.

The invention also comprehends improvements in the specific details of construction and the arrangement of parts which will be hereinafter described and particularly pointed out in the claims.

In the drawings, Figure 1 is a longitudinal section of my improved smoke consumer, applied, Fig. 2 is a rear end elevation, Fig. 3 is a horizontal section on the line 3—3 of Fig. 1, and Fig. 4 is a transverse section on the line 4—4 of Fig. 1.

1 indicates a boiler provided with a furnace 2, having the usual spaced walls 3.

4 indicates a fire pot located in the furnace and which may be of terra cotta, fire brick, or other heat resisting material.

A partition 5 extends across the interior of the furnace and forms one wall of the fire box, and is rounded at its lower edge 6, and on its rear surface it is curved in ogee form, and is also curved on the under side of its rearwardly projecting portion, the rear end abutting against the end of the boiler 1, as indicated at 7. In the lower part of the partition 5, is embedded a feed water pipe 8, which extends through

the sides of the furnace walls and is provided on one end with a cap and at its opposite end it communicates with a feed water pipe 9, provided with a check valve 10. The pipe 9 leads to a force pump or injector (not shown) for the purpose of introducing water as will be described later on. Communicating with the pipe 8, are forwardly extending pipes or hollow grate bars 11, which extend through the front wall of the furnace and then are bent upwardly, as shown at 12, and communicate with a head 13. From the head 13 branch pipes 14 lead to the boiler 1, for introducing water thereto. The pipes, or grate bars 11, are supported by elbows 12, which extend from the inner side of the front of the furnace wall below the fire pot, and forwardly from the pipe 8. In addition to these flanges, bent pipes 14, are provided to further support the grate bars and the latter are arranged in concave relation in cross section, to form a curved bottom for the fuel in the fire pot.

Water is fed through the pipes 9 and 8 and is distributed through the various grate bars 11, which materially assists in cooling the latter. In the passage of the water through the pipes and grate bars, it becomes heated, which assists in generating steam.

The fire pot preferably tapers toward the bottom as shown in Fig. 1, and at or near its lower portion, just above the grate bars, is arranged a pipe 16, from which project a plurality of tips, such as lava or of other heat resisting material for the purpose of injecting to the fuel a plurality of streams of air to augment the combustion during the operation of the apparatus. From the pipe 16, leads a pipe 17 which extends through the side wall of the furnace to an air pump (not shown) so as to force air under pressure to the fuel.

Extending through the front of the furnace and near the top of the fire pot, is a tube 17', provided at its inner end with a downwardly extending open end hood 18, located approximately over the center of the fire pot for the purpose of directing fuel to the latter. Mounted in the tube 17' is a screw conveyer 19, to convey the fuel from a suitable hopper to the fire pot. Communicating with the upper part of the tube 17', is a housing 20, in which is mounted a shaft carrying a series of spaced apart revolving agitators 22, the fingers 23 of which

break the lumps of fuel as the latter pass from the hopper to the housing. A hopper 24 communicates by means of an opening 25 with the housing, over the front part of the

5 agitators.

Extending across the housing just in front of the agitators is a bar 27, provided with rearwardly extending teeth 28, which fit in the spaces formed between the agitators to form a comb like construction. The teeth of the agitators pass in the spaces formed between the teeth of the bar 27, and crush the lumps of coal into suitable size to be conveniently conveyed through the tube 17'. Extending upwardly through the bar 27 into the hopper, is a screen 30, which is spaced from the front wall of the housing and hopper, the space 31 so formed receiving the fine fuel passing through the screen and deflecting the same past the agitators and into the tube 17. A valve 32 may be provided for regulating the opening 25 that the amount of fuel introduced into the housing may be under perfect control. The agitators may be revolved by any suitable means.

Vertically disposed in the mouth of the hood 18, is a tube 35, open at its bottom and provided on its upper end with a head 36, and a stuffing box 37. A pipe 38 connects with the head and leads to an air pump (not shown) to direct a supply of air downwardly into the tube. The tube 35 is adjustable vertically within the fire pot by any suitable means, but for the purpose of illustration, I have shown a rack bar 39 attached to the head 36, and a gear 40 meshes with said rack bar so as to move the tube up or down to regulate the admission of air according to the lay of the fuel in the fire pot.

Passing centrally through the stuffing box 37, in the tube 35, is a smaller tube 42 which is spaced from the inner walls of the tube 35, and at its upper end it is provided with a head 43, with which communicates a pipe 44, which leads to the steam dome 45, of the boiler 1 to admit steam into the fire pot. The end of the tube 42, terminates a short distance above the open lower end of the tube 35, so as to inject the steam into the end of said tube 35 to mix with the air passing through the latter, before being introduced to the fuel. The tube 42, is vertically adjustable by any suitable means, but for the purpose of illustration, there is a rack bar 46, attached to the head 43, and with it meshes a gear 47. The gears 40 and 47 may be revolved in any suitable manner, and if desired means may be provided for holding the tubes 35, and 42 in adjusted position.

In operation, fuel is introduced in the hopper 24 and the finer particles pass through the sieve 30 into the space 31 and it passes the agitators 22, and into the tube 17'. The larger lumps of fuel pass through the opening 25, and come into contact with the fin-

gers of the agitators and the comb bar 27, and as the fingers revolve, the said lumps of fuel are broken into smaller particles and fall through the opening in the top of the tube 17' and into the path of movement of the conveyer 19. The fuel is thus fed by the conveyer 19, forwardly and it falls through the opening in the hood 18 and is delivered to the center portion of the fire box. The air from the series of nozzles or jets connected with the pipe 16, and the downward current of air and steam from the tubes 35 and 42, meet the rising gases from the fuel and mix with the combustion, and thereby improves the same. The draft through the boiler flues tends to draw the products of combustion around the enlarged rounded portion 6, of the partition 5, and into the passageway 50 formed by the rear wall of the partition 5, and the forward projecting curved lug 51 on the inside wall of the rear wall of the furnace. The gases passing around the passageway 50 necessarily highly heat the partition 5, which augments the combustion in the fire pot so that the fuel from the time it is introduced into the fire pot, is subjected to intense heat, which is sufficient to consume the molecules of smoke and ignite the same, so that little, if any, smoke gases escape through the tubes of the boiler.

The mixture of steam and air, augmented by the various jets of air so intermingles with the gases and the products of combustion, produces a result, which tends to ignite and consume the gases immediately they are liberated from the particles of fuel.

A door 52 in the front wall of the furnace is provided for the purpose of removing ashes from the ash pit or for gaining admission to the interior of the furnace to permit a mechanic to make repairs.

Both ends of the pipe 8, may be provided with an inlet pipe 9, and check valve 10. The water entering the pipe 8 at one end, and at the opposite pipe 10, leads to the lower part of the boiler to cause the water to circulate.

What I claim is:

1. In a furnace, the combination with a casing, a fire-pot within the casing and spaced from one end wall and the bottom thereof, to provide an exit flue for the products of combustion, a grate in the bottom of the fire pot a fuel casing extending into the fire pot, a conveyer in the casing, means for feeding fuel to the latter casing, an air supply tube extending into the fire pot and through the open end of the fuel casing, a steam pipe fitting within the air supply tube, and means for introducing steam to the steam tube.

2. In a furnace, the combination with a casing, a fire pot within the casing and spaced from one end wall and the bottom thereof, to provide an exit flue for the prod-

ducts of combustion, a grate in the bottom of the fire pot, a fuel supply for delivering fuel downwardly to the center of the fire, means for supplying fuel to the delivery means
 5 an air supply tube extending in the fire pot above the level of the fuel, a steam pipe within and spaced from the inner walls of the air tube and terminating a short distance from the end of the latter, a plurality of jets
 10 near the bottom of the fire pot, a pipe connecting the jets to supply air thereto and means for adjusting the air and steam tubes.

3. In a furnace the combination with a casing, a transverse partition extending
 15 across the casing, the said partition being upwardly inclined on its front face and rounded on its bottom, the latter being spaced from the bottom of the casing, the rear surface of the partition being in the
 20 form of an ogee curve and spaced from the rear inner wall of the casing to form an exit flue for the products of combustion, a projection extending from the rear wall of the casing to provide a contracted portion in the
 25 flue, a fire pot in the casing, the partition forming one wall of said fire pot, a grate in the bottom of the fire pot, a plurality of jets extending within the fire pot near the bottom thereof, a pipe connected with the
 30 jets to supply air thereto, a fuel casing extending with the fire pot to deliver fuel downwardly in the same, and means adjacent the fuel delivery casing for introducing a mixture of steam and air to the fuel
 35 as it is delivered to the fire pot.

4. In a furnace, the combination of a casing, a partition extending across the casing and spaced from one end and the bottom, a projection on the casing extending toward
 40 but spaced from the rear wall of the partition to form a restricted exit flue for the products of combustion, a fire pot in the casing, the front of the partition forming a part of the fire pot, a grate in the flue pot including a series of pipes, a pipe embedded
 45 in the partition and communicating with the pipes forming the grate bars, the grate bars extending outside of the casing, a head one side the casing with which the pipes com-

municate, a boiler, pipes connecting the head
 50 and the boiler, a series of jets projecting in the fire pot above the grate, means for supplying the jets with air, fuel feeding means extending within the fire pot, a pipe passing
 55 through the end of the feeding means to supply the fuel with steam, a pipe surrounding the steam pipe to supply the steam and fuel with air, and means for independently adjusting the steam and air pipes in the fire
 60 pot.

5. In an apparatus of the class described, the combination of a fire pot, a tube through which fuel is fed to the fire pot, the inner
 65 end of the tube being turned downwardly a pipe passing through the turned down end of the tube, means for supplying the tube with air, a pipe within and spaced from the air inlet pipe, and terminating some distance
 70 from the end of the latter, means for supplying the inner pipe with steam, means for independently adjusting the steam, and air inlet pipes in the furnace, a series of jet
 75 pipes in the fire pot below the level of the bottoms of the steam and air inlet pipes, and means for supplying air to the jet pipes.

6. In an apparatus of the class described, the combination of a casing, a fire pot therein, means for supplying a mixture of air and
 80 steam downwardly in the fire pot, an exit flue for the products of combustion communicating with the bottom of the fire pot, fuel feeding means communicating with the fire pot, the exit end of the feeding means
 85 being in the plane of the ends of the means for supplying the steam and air, the fuel feeding means including a tube, a conveyer in the tube, a hopper and housing communicating with the tube, a series of rotary
 90 agitators in the housing, a comb extending across the housing to cooperate with the agitators, and a screen spaced from the hopper and extending upwardly from the comb.

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

GEORGE E. WELLS.

Witnesses:

WELLMORE B. TURNER,

MASON CRABEL.