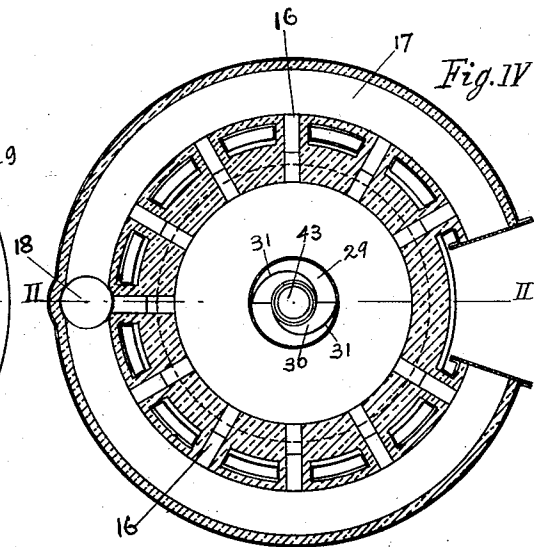
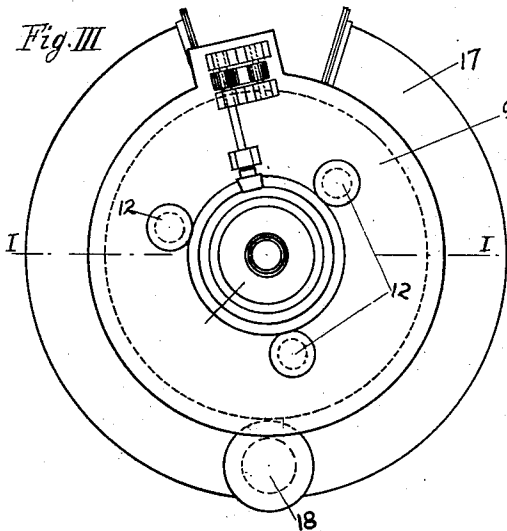
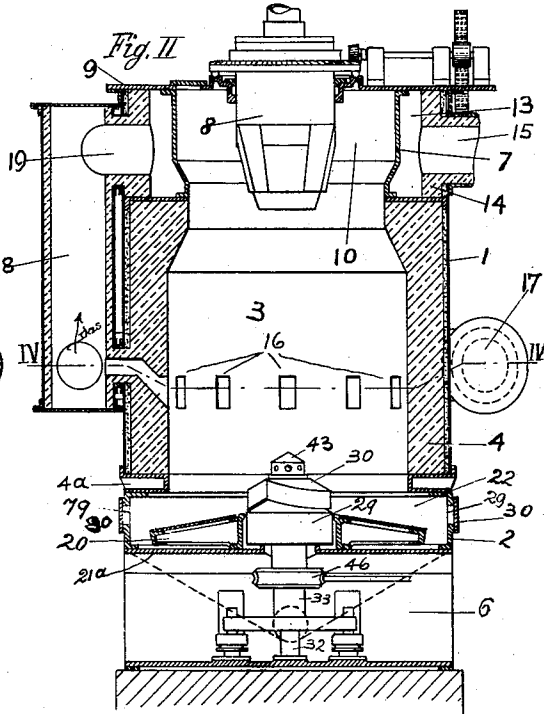
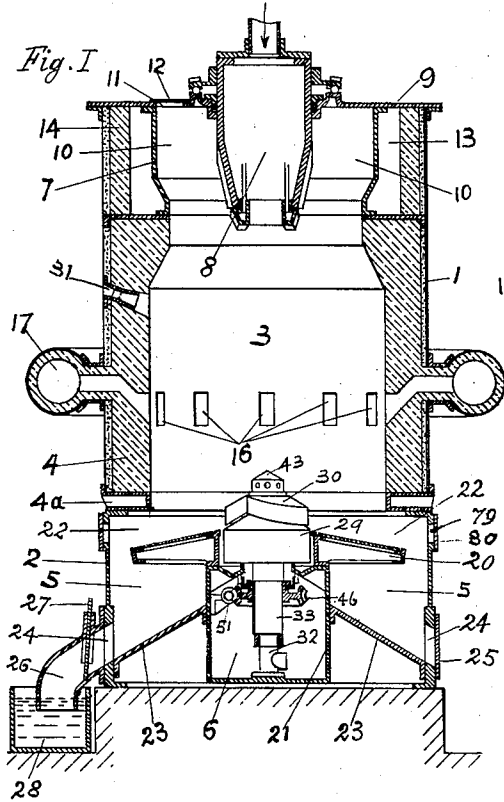


J. B. NAU.
GAS PRODUCER.
APPLICATION FILED APR. 8, 1912.

1,033,611.

Patented July 23, 1912.

2 SHEETS—SHEET 1.



WITNESSES:

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2 SHEETS—SHEET 2.

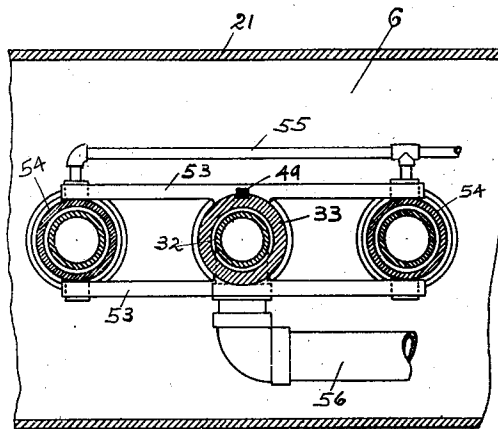
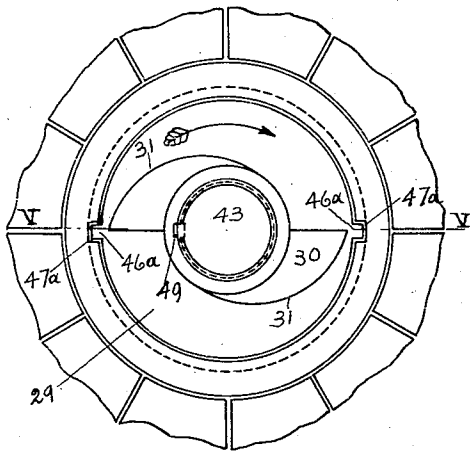
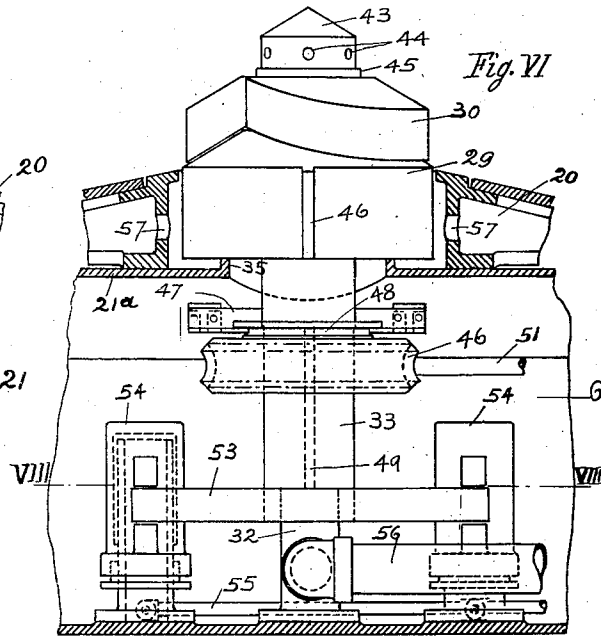
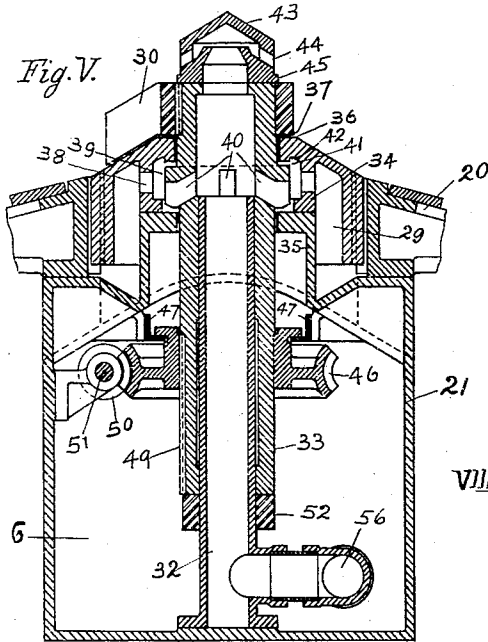


Fig. VII.

Fig. VIII.

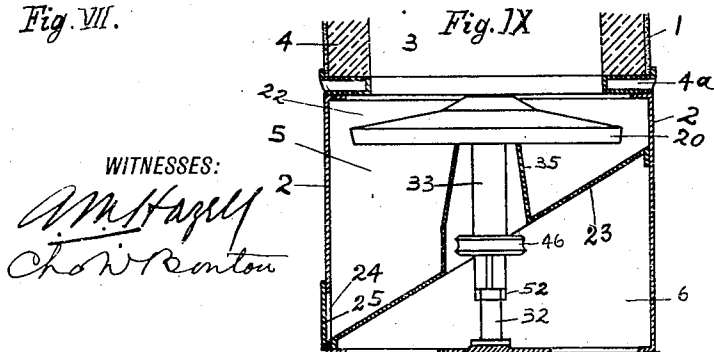


Fig. IX.

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UNITED STATES PATENT OFFICE.

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GAS-PRODUCER.

1,033,611.

Specification of Letters Patent. Patented July 23, 1912.

Application filed April 8, 1912. Serial No. 689,249.

To all whom it may concern:

Be it known that I, JOHN B. NAU, a citizen of the United States, and a resident of New York city, in the county of New York and State of New York, have invented certain new and useful Improvements in Gas-Producers, of which the following is a specification.

This invention relates to gas producers, but more particularly to gas producer devices having mainly for purpose the loosening up of the ash and fuel bed, the removal of the ashes from and the introduction of combustion air into the loosened up part of gas producers in general, but in a more particular way of bituminous coal treating gas producers of the downdraft or partly downdraft style, whose successful operation is often endangered by the packing and the accumulation of the ashes and clinkers in the ashbed of the lower part of the combustion or gas producing chamber. The same features may find application on other gas producers of, for instance, the updraft style, or in the treatment of other grades of coal or gas producing combustibles.

The present appliances, meant to fill in some respects the same purpose as those described in my application, Serial No. 680409 of February 28, 1912, work on a different principle and are of a design illustrated on the two accompanying sheets of drawings, where—

Figure I is a vertical cross-section on line I—I of Fig. III., Fig. II. a vertical cross-section on line II—II of Fig. IV., Fig. III. a top plan view of Fig. I; Fig. IV. a horizontal cross-section on line IV—IV of Fig. II; Fig. V. a vertical cross-section of the mechanical poker, ash-removing and air-introducing apparatus, made on line V—V of Fig. VII; Fig. VI. a side elevation of the same apparatus; Fig. VII. a top plan view of Fig. V., Fig. VIII. a horizontal cross-section on line VIII—VIII. of Fig. VI. and Fig. IX. an arrangement with one single ashpit and one ash discharge opening.

In the drawings where I have shown the application of the device on a double combustion zone gas producer, 1 represents an iron shell, inclosing the upper part, 2 an iron shell inclosing the ashpit of the producer; 3 a combustion or gas producing chamber inclosed in walls 4 carried by lintels 4^a; 5 is an ashpit of one or more compartments united above the operating chamber

6, from which it is separated by partitions 21; 7 is a coal hopper of cast iron or cast steel, which together with twyer 8 and top plate 9 incloses a coal distillation chamber 10, having coal charging openings 11 normally closed by covers 12 or otherwise. Surrounding chamber 10 is a gas chamber 13 inclosed by walls 14, and having gas outlet 15. Gas ports 16 placed conveniently around the circumference in wall 4 lead the gas from chamber 3 to gas collector 17 connected by gas pipe 18 and port 19 with gas chamber 13. A stationary grate 20, surrounding the hereinafter described poking and ashpushing apparatus and resting on roof 21^a of operating chamber or space 6, or on other suitable supports, is placed in the upper part of ashpit 5. An annular free space 22 between grate 20 and lintel 4^a will constitute the necessary and most suitable means to evacuate the ashes from chamber 3 to ashpit 5. The bottom of the ashpit or of each ashpit compartment here partly formed of plates 23, is provided with a sufficient slope in the right direction to automatically lead to the ash discharge openings 24 all ashes and clinkers pushed off grate 20 through openings 22. Openings 24 may be closed with a door or cover 25 or may be continued outside by an additional pipe 26 of such a shape that when damper 27 is raised, the ashes are discharged automatically into a water tank 28, in which the level of the water is normally kept high enough to water seal the lower open end of pipe 26. Openings 29, normally closed by doors or covers 30, are placed in sufficient number and in convenient places around shell 2 to clear, if necessary, the annular opening 22 of obstructing clinkers. Other poke holes 31 may be placed in convenient places to poke gas producing chamber 3.

The poking and the loosening up of the ash and fuel bed in the combustion or gas producing chamber and the automatic removal of the ash and clinkers by pushing them in an outward direction from the center of the producer through the open annular space between the producer wall and stationary grate into the ashpit below is obtained by means of a centrally located poking and ashpushing apparatus, which in order to obtain better control of the operation, comprises two principal independent unconnected pieces, of which the one 29 is a drum with its top terminated preferably

by a flat or conical surface of any desired slope to form what I call the ash table, while the other one 30 forms an ashpushing device located immediately above 29, whose top surface it fits suitably. It must be borne in mind that these two pieces, structurally independent of each other and disconnected, should be each of such a shape and size as will suit its particular function, and that both should co-act in a manner such as to constitute the principal organs to (1) push ash and clinkers from the center of the producer toward the open space 22. This result can be obtained either by making both pieces simultaneously revoluble each in any desired direction and with any desired speed, or by making only one of them revoluble, provided, however, that the final result of the relative movement, or as the case may be, of the relative speed, of the two pieces in regard to each other in the first case, or of the revolving movement of the one piece in the second case be the same as if the eccentric surface 31 of the cams alone were sweeping over the ash table in the direction of the arrow; (2) poke and loosen up the ash and coal bed above. This poking can be obtained by either the independent raising and lowering of any one or the joint raising and lowering of both pieces. In my design I have chosen to obtain these two results in a practical and efficient manner by making one piece alone revoluble and by raising mechanically one piece, allowing the second piece to be raised automatically and simultaneously with the first one.

The apparatus is composed essentially of a central column or standpipe 32 fastened to the bottom of the operating tunnel or chamber 6 and extending with its open top through the roof of the tunnel into the producer, a hollow shaft 33 loosely surrounding said standpipe but extending higher up, an ashpushing device 30, provided with one or more cams with eccentric ashpushing surfaces 31, the lower rim of these cams fitting the ashtable of drum 29 placed immediately below the ashpushing device, and their extreme length being so as not to extend farther out and preferably less than the outside diameter of the drum 29. The drawing shows that I have made them somewhat shorter. Drum 29, loosely placed around shaft 33, is open below and has an inner concentric cylindrical addition 34, which, when the drum is in its lower position, rests on the cylindrical extension 35 of the roof of the tunnel. The upper end of the drum is terminated by a horizontal face 36, reaching to within a short distance of the lower horizontal face 37 of the ashpushing device. A suitable number of holes 38 are provided in cylinder 34 for the purpose hereinafter disclosed.

Shaft 33 has an enlarged circular rim 39

with holes 40, placed within cylinder 34. The horizontal top 41 of said rim is placed within a short distance of lower horizontal face 42 of the top part of the ashtable. The shaft is capped by a hollow crown 43, bolted or otherwise fastened to the top, having air holes 44 and a lower flange 45 partly extending over device 30, which thereby it holds in place. The drum 29 is prevented from revolving by means of suitable guides 46^a placed in grooves 47^a of the surrounding grate. These guides may be left out. The lower end of the shaft, somewhat reduced in diameter, is long enough to allow of its being raised sliding through a worm gear 46 held in place by suitable means, for instance by angle irons 47 engaging on either side into a hub of the gear, which latter is loosely keyed on the shaft by means of a key 49, and is acted on by a worm 50 on a shaft 51, which receives its motion in any convenient manner not shown here.

The raising of the hollow shaft is realized by means of a ring 52 loosely placed under the shaft around stand pipe 32. This ring is provided with suitable branches 53, acted on either by air, steam or hydraulic cylinders 54, which receive or evacuate the power-giving air, steam or water through pipe 55. Any other lifting appliance could naturally be used.

Stand pipe 32, connected below with a pipe 56, is used to deliver air and steam to the lower combustion zone. The air delivered to the stand pipe may be partly discharged directly into this zone through the holes 44 in cap 43, and partly under the grate through holes 40 and 38 as well as holes 57 in the lower grate, from where it enters the ashpit and the gas producing chamber above. Instead of introducing the air through this standpipe, it may be introduced into the ashpit by any other suitable means, such as, for instance, through doors 79 or ash discharge openings 24 or through other specially devised appliances. But the introduction of the air through the cap above the poking and ash removing apparatus is considered particularly advantageous, especially in downdraft or double zone producers, because it introduces the air into the central part of the producer, where it will enter directly into the part loosened up by the poker, and from where it will have to traverse the fuel containing space before it can reach the gas collector 17.

From the description it results that when raising shaft 33 with its connected ash pushing device 30, drum 29 is raised simultaneously. If the ashpushing device would lift alone, ash and clinkers would naturally tumble on the ash table below the ashpushing cams, there to form an unavoidable obstruction that would effectually prevent the subsequent lowering of the ashpushing

device. The principal function of the simultaneous raising of the drum with the ash pushing device is therefore to make the unobstructed lowering of the ash pusher or poker possible and practical. For the same reason it is advisable to prevent the cams from extending beyond the outside rim of the drum, if as in my construction, no power other than the weight of the apparatus and the column of material above it is used to lower the apparatus. With the use of special power to produce this, the cams might extend beyond the drum. The space below the drum in the ashpit should also be kept free from obstructions. In my design it will be noticed, that owing to the peculiar shape of the bottom of the ashpit, no obstructions from falling coal or clinker will ever be found under the drum. The latter is neither limited in its shape nor its size. When round for instance, it could be made the inside diameter of lintel 4^a, with enough clearance for its clear operations.

Briefly, the operation is as follows: Power is communicated to shaft 51 whereby ashpushing device 30 is revolved and pushes ashes and clinkers over the ashtable underneath and the surrounding grate from the center toward the circular opening 22, there to be dropped into the ashpit and evacuated through the ash discharge openings. When poking is required, power is admitted to cylinders 54, shaft 33 will raise device 30 and also carry upwardly drum 29. When evacuating the power from the cylinders, the whole apparatus will descend under its own weight and the weight of the ash and coal above.

The operating chamber 6 in some gas producers could be left out. This could be done with a double zone gas producer of the kind illustrated in the drawing, where air is admitted through twyer 8 to the upper combustion zone and through either standpipe 32 or by any of the other means mentioned to the lower combustion zone above grate 20. Under the conditions, ashpit 5 normally containing no gas but air at a relatively low temperature, the mechanical means for the operation of the ashpushing and poking apparatus could be located in the ashpit itself below the protecting roof 21^a shielding them from coal or clinkers falling from the grate above. This could easily be realized by keeping the roof 21^a, but removing the side partitions 21 of the operating chamber 6. Whether there be a separate operating chamber or only a protecting roof, in both cases, this protecting roof would exist. This roof could easily be fastened to the shell 2.

What I claim is:

1. In a gas producer the combination with a gas producing chamber of, an ash pushing and poking apparatus located centrally in

the lower part of said producer for work to be performed in the lower part of said chamber, said apparatus comprising an ash pushing device and a drum with an ashtable immediately below said device, structurally disconnected, one of said pieces (drum and device) being revoluble in a direction and at a speed such as to produce in co-action with the other piece the pushing of the ash from the center toward the circumference when revolving, means to revolve one of said pieces, means to lift one of said pieces, and means to make the other of said pieces lift and lower jointly with said one piece, substantially as described.

2. In a gas producer the combination with a gas producing chamber of, an ash pushing and poking apparatus located centrally in the lower part of said producer for work to be performed in the lower part of said chamber, said apparatus comprising an ash pushing device and a drum with an ashtable immediately below said device, structurally disconnected, one of said two pieces (drum and device) being non-revoluble, and the other revoluble in a direction such as to produce the pushing of the ashes from the center of said chamber toward its circumference when revolving, means to revolve said revoluble piece, means to lift one of said pieces, and means to make the other of said pieces lift and lower jointly with said one piece, substantially as described.

3. In a gas producer the combination with a gas producing chamber and an ashpit of, a centrally located ashpushing and poking apparatus operating in the lower part of said chamber, a separate operating chamber, said apparatus comprising a revoluble ashpushing device connected with a shaft extending downwardly into said operating chamber, and an independent normally non-revolving drum with an ashtable, loosely surrounding said shaft immediately under said device and above said operating chamber, in said operating chamber mechanical means to revolve and mechanical means to raise said shaft with said device, and means to raise said drum simultaneously with said shaft, substantially as described.

4. In a gas producer the combination with a gas producing chamber and an ashpit of, a centrally located ashpushing and poking apparatus operating in the lower part of said chamber, a separate operating chamber, said apparatus comprising a revoluble ashpushing device connected with a shaft extending downwardly into said operating chamber, an independent non-revoluble drum with an ashtable, loosely surrounding said shaft immediately under said ashpushing device and above said operating chamber, in said operating chamber mechanical means to revolve said shaft and mechanical means to raise said shaft without stopping its revolving

motion, means to raise said drum simultaneously with said shaft without revolving said drum when raised, substantially as described.

5 5. In a gas producer the combination with a gas producing chamber of, an ashpit having an ash discharge opening, an operating chamber separated from said ashpit by a partition, a centrally located ashpushing
10 and poking apparatus operating in the lower part of said gas-producing chamber, and comprising an ashpushing device connected with a shaft extending downwardly into said operating chamber, and an independent
15 drum with ashtable loosely surrounding said shaft immediately below said ashpushing device and above the roof of said operating chamber, inside said operating chamber mechanical means to revolve and mechanical
20 means to raise said shaft, and means to raise said drum simultaneously with said shaft, substantially as described.

6. In a gas producer the combination with a gas producing chamber of, an ashpit having an ash discharge opening and a bottom sloping toward said opening, a centrally located mechanically operated ashpushing and poking apparatus comprising, an independent revoluble ashpushing device and immediately below said device a normally non-revoluble independent drum co-acting with
30 said device in the manner set forth, an independent stationary grate loosely surrounding said drum and leaving an open annular space between its outer rim and the walls
35 surrounding the producer to drop the ashes from said chamber into the pit, substantially as described.

7. In a gas producer the combination
40 with a gas producing chamber of an ashpit, a separate operating chamber dividing said ashpit into compartments, each compartment having an ashdischarge opening and a bottom sloping toward said opening, a
45 centrally located ashpushing and poking apparatus comprising an ashpushing device connected with a shaft extending downwardly into said operating chamber and an independent drum with ashtable loosely
50 surrounding said shaft between the top of the roof of said operating chamber and said ashpushing device, inside said operating chamber mechanical means to revolve and mechanical means to raise said shaft,
55 and means to raise said drum simultaneously with said shaft, substantially as described.

8. In a gas producer the combination
60 having an ash discharge opening in the

shell surrounding said pit and a bottom sloping toward said opening, an independent grate separating said pit from said chamber, a centrally located ashpushing device loosely surrounded by said grate and
65 extending through said grate from the upper part of said pit to the lower part of said chamber, a downwardly extending hollow shaft connected in its top region with said device, a hollow standpipe fastened below and surrounded by said shaft,
70 means to admit air through said standpipe into said shaft, from said shaft into said ashpushing device, and from there into said producer, and means to revolve said shaft,
75 substantially as described.

9. In a gas producer the combination with a gas producing chamber of, an ashpit having an ash discharge opening in the shell surrounding said pit and a bottom sloping
80 toward said opening, an independent grate separating said pit from said chamber, a poker centrally located in the lower part of said chamber and connected to a downwardly extending hollow shaft loosely surrounded
85 by said grate, a hollow standpipe fastened below and surrounded by said shaft, means to admit air through said standpipe to said poker, and from said poker to said producer, and means to raise said poker, substantially as described.

10. In a gas producer the combination with a gas-producing chamber and an ashpit of, a centrally located ashpushing and poking apparatus having, an independent
95 ashpushing device connected with a downwardly directed hollow shaft, and an independent drum loosely surrounding said shaft immediately below said device and normally supported below, an independent
100 stationary grate loosely surrounding said drum, a hollow upwardly extending standpipe held in place below, open on top and surrounded by said shaft, means to admit
105 air to said standpipe and from said standpipe to said shaft and means to admit air above said grate from said shaft to said producer, and means to admit air from said shaft through said drum to said ashpit, mechanical means to revolve and mechanical
110 means to raise said shaft, and means to jointly raise and lower said drum with said shaft, substantially as described.

Signed at New York in the county of New York and State of New York this 5th
115 day of April A. D. 1912.

JOHN B. NAU.

Witnesses:

B. M. KEON,
MARY I. GOSS.