

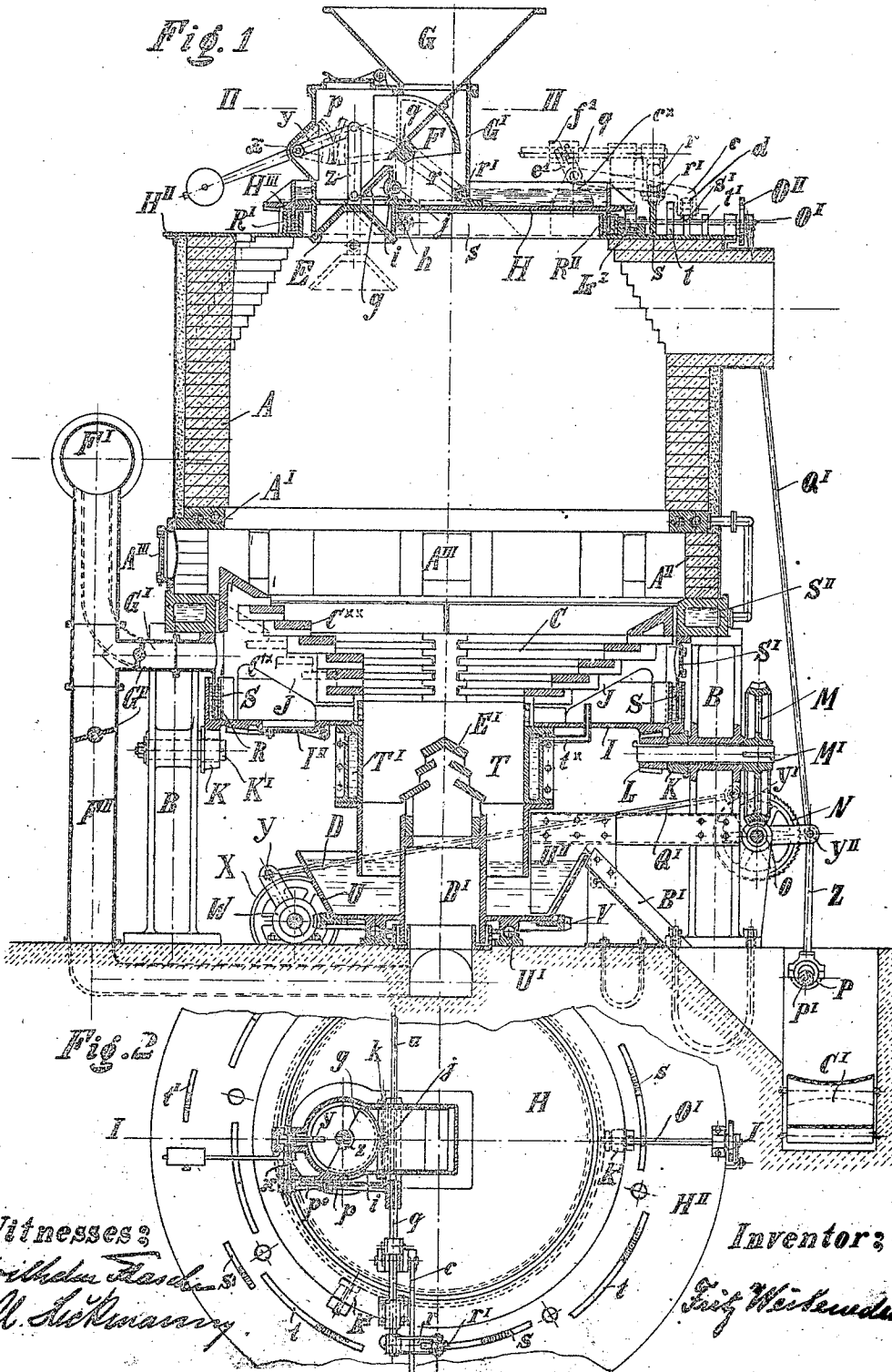
F. WEIDENEDER.

GAS PRODUCER.

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Patented Sept. 14, 1909.



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GAS-PRODUCER.

933,804.

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To all whom it may concern:

Be it known that I, FRITZ WEIDENEDER, a citizen of the German Empire, residing at Bredeney, near Essen, in the Province of Rhenish Prussia and Kingdom of Prussia, Germany, have invented certain new and useful Improvements in Gas-Producers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to gas producers in which carbon dioxide is formed by the distillation and combustion of coal or other fuel in a furnace with a cylindrical shaft lined with fire bricks. This furnace requires a determinate air supply. It is provided with a water seal, which closes the ash outlet at the bottom. The top of this producer is provided with an automatic feeder which regulates the fuel supply according to the requirements of the apparatus.

Air, or a mixture of air and steam is forced into the mass of ashes gathering in the lower portion of the producer and rises therefrom into the superposed mass of incandescent fuel; the water seals preventing the escape of air through the ash outlet, but permitting the withdrawal of the ashes therefrom.

By my invention I simplify the construction and therefore lessen the first cost of the producer and without arresting the operation of the producer, I provide for a constant removal of slag and ashes and for a constant feeding from a suitably located coal bin, so as to keep the fuel bed always under the same condition and at the same height.

By my invention I increase the capacity of the producer as compared with those hitherto constructed by providing automatic means for the effective breaking up of the clinkers in the hot zone of the producer, for which purpose I use a revolving grate, which forms the bottom of the producer. The breaking up of such clinkers in the hot zone of the producer by the use of a revolving grate renders it unnecessary to employ manual labor for this purpose either from underneath or from the top of the producer thus preventing the escape of soot and smoke, which means not only a loss but is a great nuisance and constant danger for the men having charge of these producers. The feeding is hitherto generally done by means

of hand operated hoppers equipped with bell valves, which are almost invariably situated in the center of the producer, thus throwing the coal constantly only at one place in the producer and leaving the sides and the middle without fresh coal, thereby making it necessary to distribute the coal by hand through poker holes at the top. Producers with one or more hoppers not centrally located cannot receive their supply of coal from a centrally located supply feeding device; they have therefore to be filled by hand. They throw with every charging operation a certain amount of coal into the middle of the producer, forming there a pile of raw coal, which the producer cannot gasify. The labor of filling the charging hoppers, of distributing the coal evenly at the top of the fuel bed and of breaking up the clinkers is extremely fatiguing and the laborers are frequently endangered by the leaking of the gas. Furthermore the old style of producers must be of limited capacity in order to facilitate the distribution of coal to the sides of the fuel bed and to gain access to all parts of the interior of the producer in order to get rid of slag and ashes. All these drawbacks are avoided by my new gas producer.

I will now describe my invention with reference to the accompanying drawings on which—

Figure 1 is a vertical section along line I—I of Fig. 2 of a gas producer embodying certain features of my invention and showing at the upper right side in dotted lines part of the gear for moving the feed valve as seen at right angle to the view shown in full lines; Fig. 2 is the horizontal section of the same taken at the line II—II of Fig. 1. Fig. 3 is a vertical section along line III—III of Fig. 4 of a gas producer of the same system as that of Fig. 1, but showing some modification in detail. Fig. 4 is the plan or top view of the producer Fig. 3 as seen on the line IV—IV Fig. 3.

Similar letters refer to similar parts throughout the several views.

The shaft or pit A, the legs B, the revolving grate C, the water seal D, constitute the lower part of the producer; the bell E, the valve F, the hopper G, the plate H form the cover of the producer.

In Fig. 1 of the drawing it will be noticed that the grate C is conical or funnel shaped, and forms the base for the fuel bed. The

bars forming the grate are supported by the arches J which stand upon the plate I. This plate rests on the conical rollers K, which are carried by pins K¹ or other supports fixed to the columns B and it is revolved by the motion of the conical gear L, which meshes with the teeth cast on the plate I. The gear L is connected with the worm wheel M by the shaft M¹. The power is transmitted to gear L from the main shaft F¹ which is driven from some suitable source of power, by means of the eccentric P, the ratchet wheel N, the worm O and the worm wheel M.

Another water seal formed by an annular trough R on the upper side of plate I together with the cylinder S above the plate I and fixed to the lower side of the water cooled ring S^{II} prevents the escape of air from the air space underneath the grate C. The grate C, the plate I, the water seal R and the cylinder S form a separate annular chamber, with several air inlets and which is entirely disconnected from the air inlet D¹.

The ash pit T and the ash pan U form the water seal D, through which the ashes leave the producer; this process being visible to the operator. The ash pan U revolves on rollers or balls U¹, as the drawing shows and it gets its revolving motion through the worm wheel V, the worm W, the ratchet wheel X and the lever Y with a pawl thereon, which is indirectly connected with the prime motor by the rod Q and levers Y¹, Y^{II} and eccentric rod Z. The extraction of the ashes is performed by means of a wing or plate U^{II}, which serves as a scraper and which throws the ashes and slag over the edge of the ash pan U. It is obvious that nothing in the function of the water seal would be altered if the ash pan U were to be made stationary and also the gist of the invention would be uninfluenced as far as the emptying of the ash pan is concerned if in the just mentioned case the plate U^{II} were fixed to the revolving plate I or the part T respectively.

Through the trough B¹, the ashes slide down into a transverse conveyer C¹, whereby they are deposited at any desired place. Rising from the ash pan into and through the center of the ash pit is a vertical pipe D¹, having several conical hoods E¹. The air coming from the main air pipes F¹, F^{II} rises through the vertical pipe D¹, and escapes from under the hoods through the mass of ashes into the lower part of the producer. By using an exposed water sealed ash extractor the amount of the extracted ashes may be easily seen and regulated by changing the position of the wing U^{II}. The ash pit T, which consists of two separable parts is built as a water jacket T¹, so as to cool down the ashes before they reach the water seal D. The formation of steam which

occurs when hot ashes are brought into contact with the water seal is thereby prevented, this being an advisable aim since the rise of steam from the water to the incandescent fuel in a volume greater than can be readily decomposed by the latter ought in practice always to be avoided. The steam produced in this water jacket and escaping therefrom by a pipe E² may be used for mixing with the air blown in through the grate C.

Air to be blown in through the revolving grate enters the space underneath the grate through a desirable number of inlets by means of elbow pipes G¹. The amount of air is regulated by throttle valves G^{II} placed in the air supply pipes. A number of doors S¹ are distributed between the columns of the producer in the ring S for the special purpose of enabling the operator to examine the condition of the producer, to examine the grate bars C; to clean the grates, to repair and replace them. This is a very important feature of my producer.

Doors I^{II} at the bottom of the grate chamber in the plate I permit the removal of ashes and slag. Doors S¹ and A^{III} (6 or 8 in number) permit the poking of the slag if necessary. A water cooled ring of iron A¹ above these doors A^{III} will keep the brick walls above and below it at a certain low temperature, so that the slag cannot adhere to them, for which purpose also the wall A^{II} below the cooled ring recedes a little.

To effect a more thorough stirring up of the slag above the grate C, to tear off the clinkers from the walls of the producer, furthermore to lift and stir up the fuel bed, thus helping to destroy air holes in the latter, some of the different sections of the revolving grate will be constructed at a higher level than others, (as indicated in full lines and dotted lines C^x C^{xx}), so that the higher ones C^x work like teeth upon the superposed fuel bed. This is of importance for the good working of the furnace.

The top plate II of the producer is water cooled and rests upon a number of conical rollers K¹ fixed on the top foundation plate II^{II} situated on the top of shaft A; said plate II formed by an annular trough R^{II} and foundation plate H^{II} and a ring H^{III} at the lower side of plate II. The bevel gear L¹ meshes into teeth on the under surface of the plate II, so as to produce the desired rotation of the latter. For this purpose the outer end of the shaft O¹ carries a ratchet wheel O^{II} which is connected with the driving shaft and the main driving shaft P¹ by means of the connecting rod Q¹ an eccentric rod Z and eccentric P. The plate H carries the feed device or coal bin which is composed of two parts, i. e. the centrally located conical hopper proper G and the lower rectangular part or receiver G¹, the latter containing the feed regulating devices F and

the discharge bell E. The bell E by means of a rod *z*, arm *y*, shaft *x* and the quadrant gears *p*, *p* and the shaft *q* is connected with the lever *r* and roller *r*¹ (Fig. 2) which
 5 move upon the projecting ribs *s* or *t* alternately. In a similar way, the valve F in connection with the shaft *u* and the lever and roller moves also upon the projections *s*¹ or *t*¹, so that when the roller *t*¹ moves on
 10 the projections *s*, the roller *v*¹ moves on the projections *t*¹ and vice versa. The up and down movements of these rollers *r*¹ and *v*¹ cause the opening and closing of the bell E and the revolving valve F, with the result
 15 that when the bell is opened, the valve F is closed and vice versa. The revolving of the top plate H causes the opening of the bell E a certain number of times every revolution, thus charging the producer every time with
 20 a certain amount of coal. For example, the coal drops from the coal bin G, through the open valve F upon the closed bell E. On rotating further the valve F closes, the bell E opens and the coal falls into the producer.
 25 In this way any escape of gas during the charging period is prevented.

The coal bin G may be made large enough to receive any desirable quantity of coal, but two or three hours' supply is usually
 30 deemed sufficient. It will be noticed that the bell E is moved by the projections *s* and the valve F by the projections *t*, during one revolution, while during the next revolution the bell E is moved by the projections *t* and the valve F by the projections *s*, so that
 35 the charges of each revolution of the plate H drop midway between the charges of the previous revolution and thus an even distribution of coal is insured. This change of
 40 the rollers *r*¹ from the projections *s* to *t* and vice versa is produced by the lever *c* fulcrumed on a bracket *c*¹ on plate H and the roller *d* and the projecting ribs *s*¹ and *t*¹, which after each revolution of the plate H
 45 shift the shafts *q* and *u* to their new positions by means of the forked lever *e*¹ connected to lever *c* and hub *f*¹.

The hopper above the bell E is equipped with an inclined plate *g* of any desired shape,
 50 *e. g.*, flat, concave or convex, which rest upon the ring *h* and the position of which is regulated by hand by means of the worm *j*, the worm wheel *i*, and the shaft *k*. This plate has the beneficial effect that each charge falls
 55 in the form of a semicircle upon the conical bell instead of covering its whole circumference and since its position can be changed as shown above the coal can be deposited according to the conditions of the fuel bed
 60 and the requirements of the moment.

Having thus described my invention, what I claim is:

1. In a gas producer the combination of a cylindrical shaft A, a water cooled ring
 65 S¹¹ and A¹ below said shaft, columns B car-

rying said water cooled rings and shaft, with a revolving plate I, means for revolving said plate, conical rollers K carrying said plate, a conical grate C resting on plate I, an ash pit T suspending from said
 70 plate, an ash pan U below the ash pit and forming together with it a water seal, the whole as described.

2. In a gas producer the combination of a cylindrical shaft A, a water cooled ring S¹¹
 75 and A¹ below the shaft, columns B carrying said water cooled rings and shaft, a revolving plate I provided with geared teeth at its lower side, conical rollers K carrying said plate, a conical grate C resting on plate
 80 I, an ash pit T suspended from said plate, an ash pan U below the ash pit and forming together with it a water seal in combination with a gear L, meshing with the teeth at the bottom of said plate I, a shaft
 85 M journaled in one of said columns B, a worm wheel M on said shaft meshing with a worm O, a ratchet wheel N connected with worm O, a ratchet lever Y¹, an eccentric rod Z linked to said lever Y¹ an eccentric on
 90 main driving shaft P¹, the whole as described.

3. In a gas producer the combination of a cylindrical shaft A, a water cooled ring S¹¹
 95 and A¹ below said shaft, columns B carrying said shaft and rings, a revolving plate I and means for revolving the same conical rollers K carrying said plate, a grate C resting thereon, an ash pit T suspending
 100 from said plate, an ash pan U below the ash pit and forming together with it a water seal, rollers U¹ carrying said ash pan a worm wheel V fixed to the lower part of the same and meshing with a worm W, a ratchet
 105 wheel X connected to said worm, a ratchet lever and pawl Y shifting said wheel X, a connecting rod Q, lever Y¹, shaft O, lever Y¹¹, eccentric rod Z, eccentric P and main shaft P¹ the whole as described and for the
 110 purpose set forth.

4. In a gas producer the combination of a cylindrical shaft, A, a water cooled ring
 115 S¹¹ and A¹ below said shaft, columns B carrying said rings and shaft, a revolving plate I and means for revolving the same, conical rollers K carrying said plate, a grate C resting thereon on arches J, an ash pit T
 120 suspending from said plate I, an ash pan U below the ash pit T and forming together with it a water seal, rollers U¹ carrying said ash pan, means for revolving said ash pan, in combination with scraper plates U¹¹ for
 125 emptying the ash pan from ashes, a trough B¹ delivering the ashes to the conveyer C¹, the whole as described.

5. In a gas producer the combination of a cylindrical shaft A, a water cooled ring S¹¹
 130 and A¹ below said shaft, columns B carrying said rings and shaft, a revolving plate I means for revolving the same, a grate C

resting on said plate, arches J carrying said grate C, an ash pit T suspending from said plate I an ash pan U below said ash pit T and forming a water seal together with the ash pan in combination with a cylinder S fixed to the bottom of said water cooled ring S^{II} an annular trough R on the top of said plate I and forming together with said cylinder a water seal, inspecting doors S^I in the circumference of said cylinder S, the whole as described.

6. In a gas producer the combination of a cylindrical shaft A, a water cooled ring S^{II} and A^I below said shaft, columns B carrying said rings and shaft, a revolving plate I, means for revolving said plate, a grate C resting on said plate I, arches J carrying said grate C, an ash pit T suspending from said plate I, an ash pan U below said ash pit and forming a water seal together with the ash pan, a cylinder S fixed to the bottom of said water cooled ring S^{II}, an annular trough R on the top of said plate I, forming a water seal together with said cylinder S, inspecting doors S^I in the circumference of said cylinder S, doors A^{III} in the circumference of the reduced part A^{II}, of shaft A, in combination with an air pipe F^I, an air pipe G^I leading air to the revolving grate C above the plate I, a throttle valve G^{II} in said air pipe for regulating the amount of air delivered to the grate from the sides, an air pipe F^{II} and throttle valve in the same for regulating the amount of air delivered into the vertical pipe D^I below the grate C into the ash pit T, hoods E^I on the top of said pipe D^I for distributing the air in the ashes, the whole as described.

7. In a gas producer having a vertical shaft A, a water cooled ring S^{II} and A^I, a revolving grate C, a plate I, an ash pit T, an ash pan U forming together a water seal, a vertical air inlet pipe D^I reaching into said ash pit, constructing this ash pit in its upper part as a water jacket T^I in combination with a steam escape pipe F* leading the steam formed in the water jacket T^I into the

annular space between the grate C, the plate I and the fixed cylinder S; the whole as described and for the purpose set forth.

8. In a gas producer the combination of a cylindrical shaft A, a water cooled ring S^{II} and A^I below said shaft, columns B carrying said rings and shaft A, a revolving plate I, means for revolving the same conical rollers K carrying said plate a grate C resting on said plate I, arches J carrying said grate, an ash pit T suspending from plate I, a water jacket T^I around said ash pit T, an ash pan U below said ash pit T and forming together with this a water seal, means for revolving said ash pan, scraper plates U^{II} for emptying the ash pan from ashes, a trough B^I delivering the ashes into the ash conveyer C^I, an annular trough R combined with said plate I, a fixed ring S reaching into said trough R to form a water seal, inspecting doors S^I and A^{III} respectively in cylinder S and reduced part A^{II} of shaft A, air pipes F^I, F^{II} and G^I respectively, a vertical air pipe D^I, distributing hoods E^I on top of said air pipe D^I, all substantially as and for the purpose set forth.

9. In a gas producer a cylindrical shaft A, a water cooled ring A^I below shaft A, a reduced part A^{II}, doors A^{III} in said reduced part, another water cooled ring S^{II}, columns B carrying said shaft and rings A, A^{II}, A^I, S^{II}, a revolving plate I, means for revolving said plate, conical rollers K carrying said plate in combination with a revolving conical or funnel shaped grate C having certain parts C^{xx} rising above the others C^x and resting on a plate I, an ash pit T suspending from said plate, an ash pan U below the ash pit and forming together with it a water seal, the whole as described.

In testimony whereof, I have signed my name to this specification in the presence of two subscribing witnesses.

FRITZ WEIDENEDER.

Witnesses:

WILHELM FLASCHE,
CL. HICKMANN.