No. 653,015. Patented July 3, 1900.

E. R. BESEMFELDER.

APPARATUS FOR MANUFACTURING ILLUMINATING GAS.

(Application filed Mar. 10, 1900.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

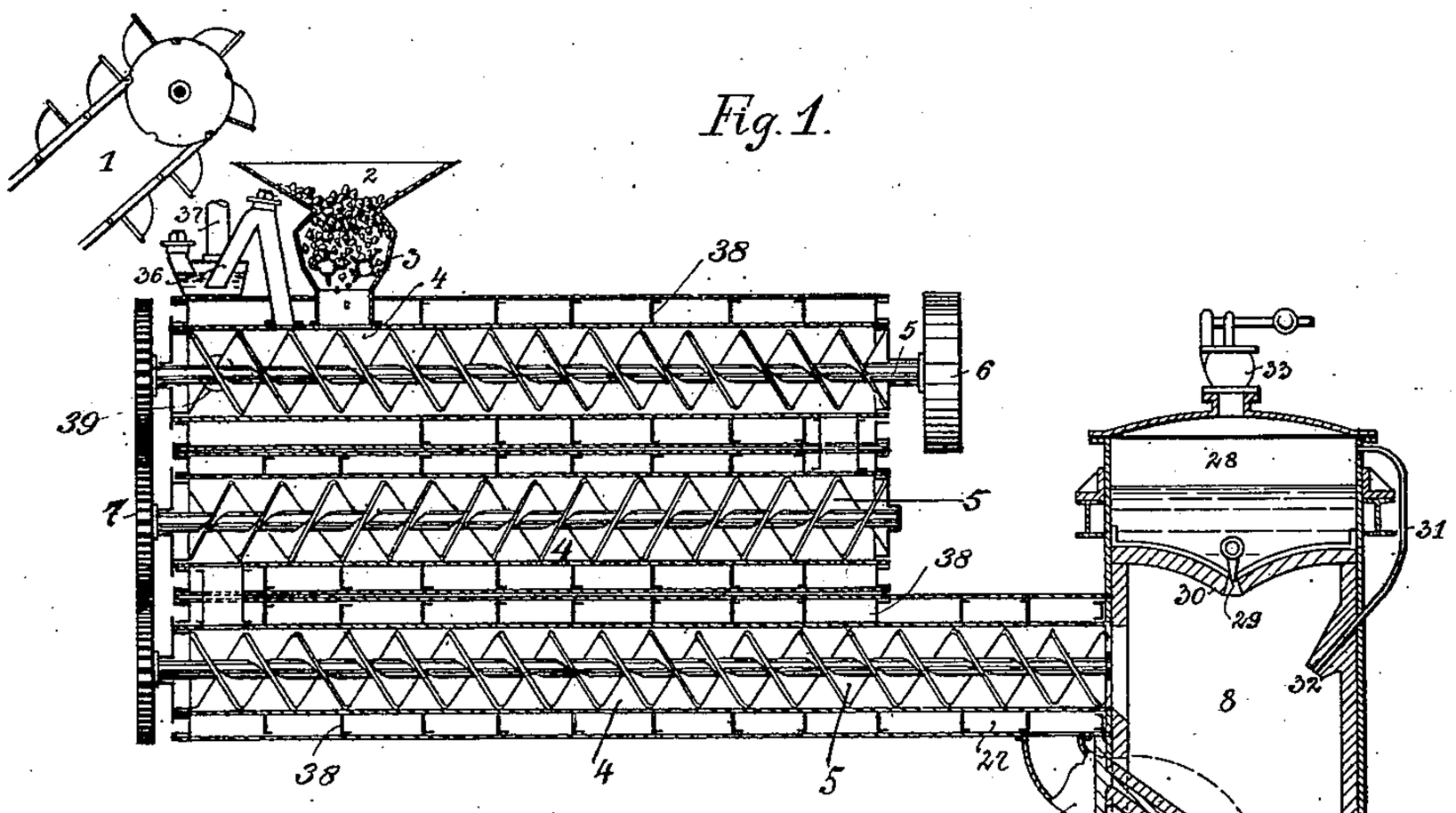

Fig. 2.

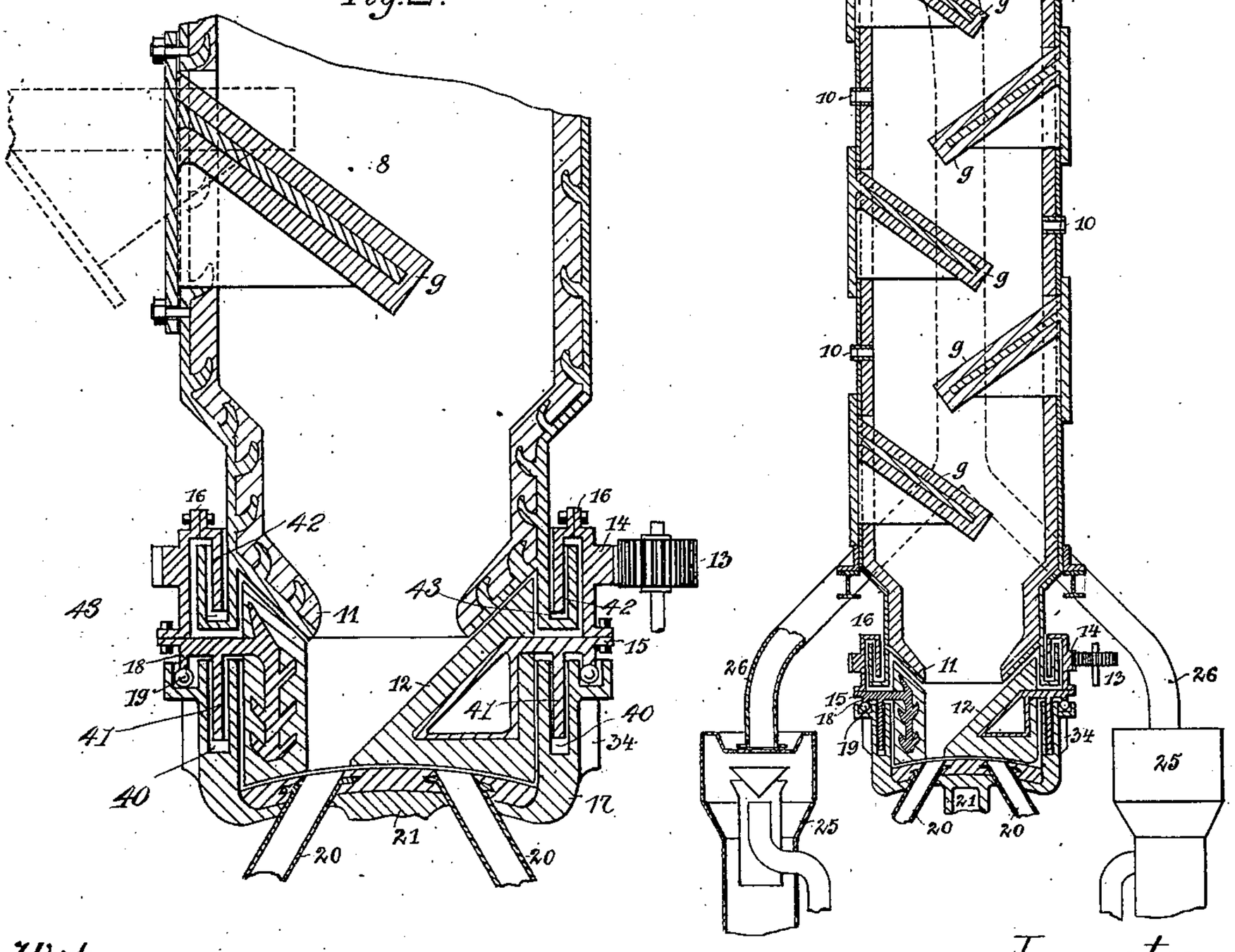

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Fig. 3.

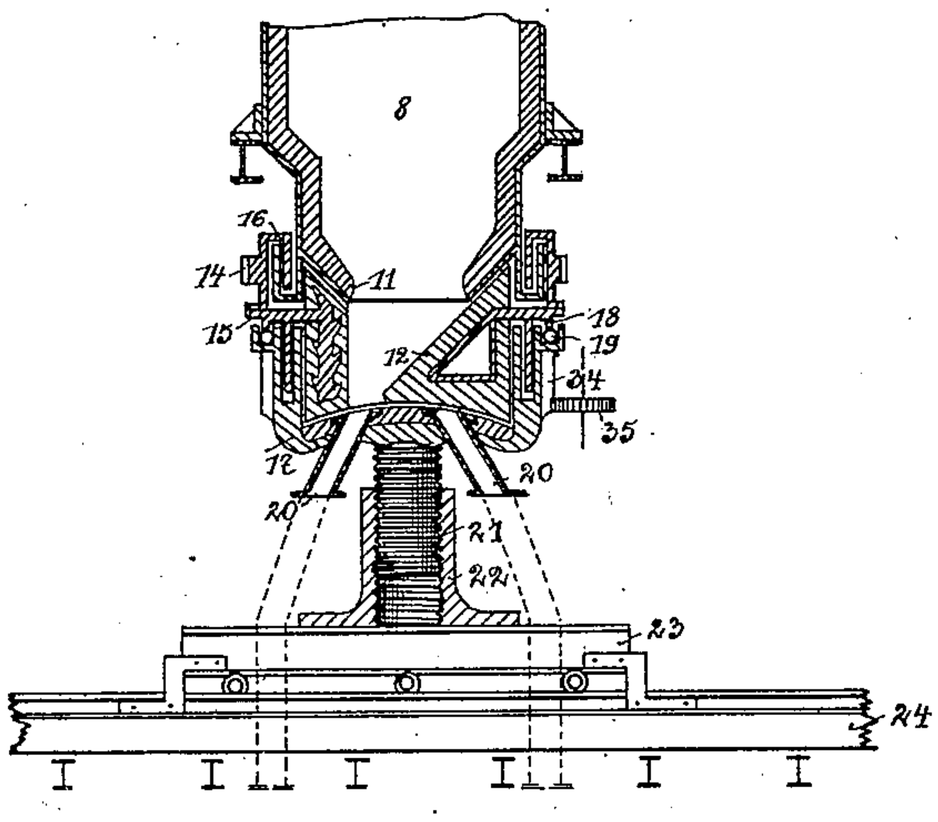


Fig. 4.

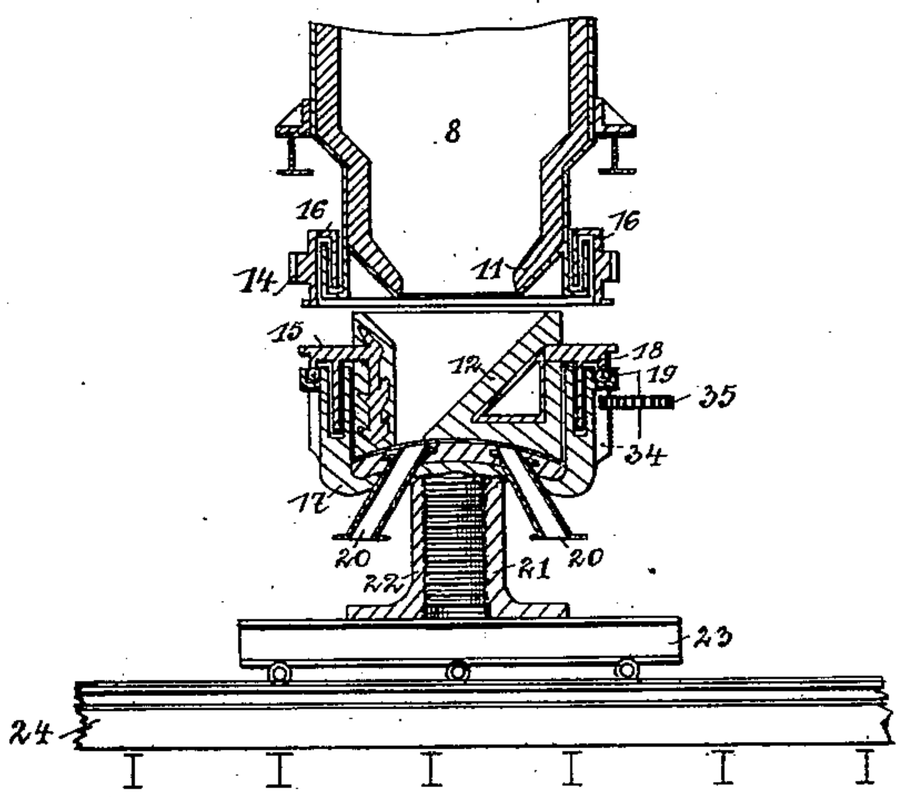
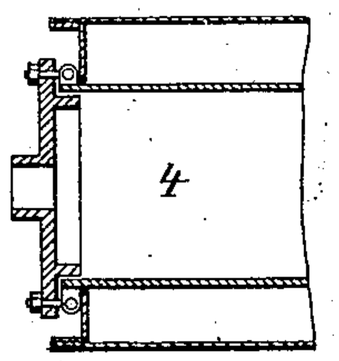


Fig. 5.



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UNITED STATES PATENT OFFICE.

EDUARD R. BESEMFELDER, OF CHARLOTTENBURG, GERMANY.

APPARATUS FOR MANUFACTURING ILLUMINATING-GAS.

SPECIFICATION forming part of Letters Patent No. 653,015, dated July 3, 1900.

Application filed March 10, 1900. Serial No. 8,172. (No model.)

To all whom it may concern:

Be it known that I, EDUARD R. BESEMFELDER, of Charlottenburg, Berlin, in the Kingdom of Prussia and Empire of Germany, have invented certain new and useful Improvements in Apparatus for Manufacturing Illuminating-Gas, of which the following is a specification.

In my application for Letters Patent for improvements in the manufacture of illuminating-gas, Serial No. 732,080, filed September 29, 1899, a continuous process is described by which a suitable carbonaceous material is converted into gas in a continuous and nearly-automatic manner by working up the glowing coke directly as it leaves the gas-retorts and before a loss of heat can take place into water-gas and by utilizing the heat at which the water-gas leaves the generators for the distillation of the coal by conducting the gas directly from the generators through the gas-retorts, in which it is mixed with the gas obtained from the coal, and by heating the gas-retorts by the gases obtained by the hot-blowing of the water-gas generators. For the purpose of rendering this process continuous and automatic an apparatus is employed which consists in its essential features, first, in a rotary horizontal or slightly-inclined retort in which the distillation of the coal takes place; secondly, in water-gas generators in which the incandescent material which is discharged from the retort is conducted through a suitable delivery mechanism to said generators, while the water-gas is conducted in a direction opposite to the distilled incandescent material directly into the retort, and, thirdly, in a device for collecting the dust by which the waste gases obtained in the hot blowing of the water-gas generators are conducted into and through a jacket surrounding the retort.

The fact that the generation of the gas from the carbonaceous material in the retort takes place under the influence of the heat of the water-gas (interior heating of the retorts) and under the influence of the waste gas obtained by the hot-blowing of the water-gas generators (exterior heating of the retorts) takes place slowly, which is also the case in the well-known process of making illuminating-gas at present in use, while the extraction of the carbonaceous residue conducted from the retorts into the water-gas generators is carried on quickly, makes it necessary in practically carrying out the process to employ a retort of considerable length, so that on one side a sufficient supply of the incandescent carbonaceous residue from the retort to the water-gas generators and on the other side the highest possible yield of gas from the coal in the retort are obtained during its passage through the retort. It will therefore in most cases be preferable to use for the apparatus referred to in place of a single long retort a number of superposed short retorts—in other words, to divide the long retort into several retorts, which are arranged one below the other, and to transfer a portion of the work which is to be done in the retort, and also the generation of gas from the carbonaceous material, to an independent tower or shaft, which is arranged adjacent to and below the lowermost retort and which can really be considered as a continuation of the retort, said tower being provided with inclined shedding-shelves that are located alternately at opposite sides of the tower below a reservoir or tank from which the carbonaceous waste material is delivered to the tower.

The invention consists, further, in an improved rotary delivering mechanism for the glowing coke having a rotary interior distributing-cone and mechanism for raising or lowering said cone, as will be fully described hereinafter and finally pointed out in the claims.

In the accompanying drawings, Figure 1 represents a vertical section through that part of my improved apparatus for making illuminating-gas located above the generators for the water-gas. Fig. 2 is a vertical central section through the lower part of the conducting-tower and of the delivery mechanism at its lower end or base. Figs. 3 and 4 are vertical transverse sections of the lower part of the tower and of the delivery mechanism, with its supporting-carriage, showing the delivery mechanism respectively in raised or lowered position. Fig. 5 is a detail section of the end of one of the gas-retorts.

Similar figures of reference indicate corresponding parts.

Referring to the drawings, 1 is an elevator

by which the coal or other carbonaceous material is raised and delivered to the hopper 2, in which are arranged rotary feed-rollers by which the material is conducted uniformly into the uppermost retort of a series of superposed retorts 4, which are connected alternately at opposite ends with each other. The retorts are arranged horizontally, each being provided with an interior rotary conveyer 5, that turns in suitable bearings in the heads of the retort. The shaft of the uppermost conveyer 5 is provided with a pulley 6 at one end and with a gear-wheel 7 at the opposite end, said gear-wheel meshing with the gear-wheel on the shaft of the conveyer of the retort next below, and so on, so that by said gear-wheels rotary motion alternately in opposite direction is imparted to the conveyers in the different superposed retorts 4. Each retort is inclosed by a jacket, which is provided with suitable baffle-plates 38, the jackets of the retorts being likewise connected alternately at opposite ends like the retorts 4 and the upper jacket being provided at one side with an outlet 39. The lowermost retort is extended at one end beyond the retorts, above the same, and connected with a vertical tower or shaft 8, which is provided alternately at opposite sides with inclined shelves 9, over which the glowing material delivered by the conveyer of the lowermost retort is dropped or shed successively toward the lower contracted end or throat of the tower 8. The interior walls of the tower 8, as well as the inclined shelves 9, are covered with a lining of a suitable refractory material. The tower 8 is supplied at opposite sides and at different height, preferably opposite to the different inclined shelves, with peep-holes 10. The glowing carbonaceous material after having been subjected to a partial extraction of its gas is conducted from the lowermost retort into the tower and in the same from one inclined shelf to the other, it being conducted in an opposite direction to the hot water-gas delivered from the shafts 20 of water-gas generators, located below the tower, so that the hydrocarbon vapors still contained in the fuel are almost completely evaporated by the heat of the water-gas. The mixed gas thus obtained is conducted from the upper part of the tower into the lowermost retort and from the same successively over the glowing material in the several retorts until it leaves the uppermost retort through a hydraulically-sealed outlet device 36 37, which is arranged near the supply-hopper 2.

For producing the proper carbureting of the gas, as well as for the utilization of the tar obtained in the course of the process or of petroleum residues, the vertical tower 8 is provided at its upper part above its top plate with a tank or reservoir 28, having a central discharge-port 29 for the tar, &c., and an injector 30 for the steam. The discharge-port 29 and the injector 30 serve for conducting the tar or the petroleum residues from the reservoir into the tower. For equalizing the pressure in the reservoir and tower a tube 31 extends from the upper end of the reservoir 28 to a nozzle or twyer 32 at the interior of the upper part of the tower. The reservoir 28 is furthermore provided with a safety-valve 33. As the tar or other petroleum residues are delivered directly into the tower on the glowing carbonaceous material, which is dropped from shelf to shelf in its passage through the tower, a caking or settling of carbonaceous sediments on the shelves is prevented, the quick and complete vaporization of the tar, &c., obtained, and the use of a fixing-chamber dispensed with. The carbonaceous material from which the gas is extracted leaves the contracted lower end or throat of the tower 8 and is conducted by an axially-rotating delivery mechanism into the shafts 20 of four or more water-gas generators, which are arranged below the same, said delivery mechanism supplying uniformly three of the four generators, while communication with the interior of the fourth generator, which during this time is in the act of hot-blowing, is prevented by a suitable closing device. As already described in my pending application before referred to, the delivery mechanism can be constructed in different ways; but it is preferable to use the construction shown in Figs. 2 to 4 of the drawings. The glowing material is conducted from the throat 11 into the distributing-cone 12 of the casing 17 of the delivery mechanism. The casing 17 is provided with an annular groove 40, into which extends a tongue 41 on the ring-shaped horizontal plate 15, surrounding the distributing-cone, said groove-and-tongue connection producing the tight connection between the casing 17 and cone 12. The ring-shaped plate 15 is connected by bolts to a suspension-ring 16, which extends by a downwardly-extending tongue 42 into an annular groove 43, formed around the throat of the tower 8. The ring-shaped plate 15 and the suspension-ring 16 form together the supporting-frame for the rotary distributing-cone 12. The rotation of the distributing-cone 12 is produced by means of a pinion 13, that meshes with gear-teeth arranged on the exterior circumference of the suspension-ring 16. The ring-shaped frame 15 is provided with an annular downwardly-extending flange 18, concentric with the tongue of said frame, said flange being supported in a ball-bearing 19, located in an annular groove of the delivery-receptacle, said ball-bearing running in oil, so as to facilitate the motion of the distributing-cone. The annular groove of the delivery-receptacle 17 is filled with water, which serves for cooling the tongue of the ring-shaped frame 15 and of the flange 18 and ball-bearing 19 of the same. The vertically-adjustable casing 17 is supported on a strong exteriorly-threaded spindle 21, which is supported in an interiorly-threaded hollow post 22, that is mounted on a carriage 23, which is guided by roll-

ers on ways 24. On the exterior of the delivery-receptacle 17 is arranged a crown-wheel 34, which is placed in mesh with a pinion 35, (shown in Figs. 3 and 4,) so as to permit the rotating of the casing 17 on its axis, and consequently by the connection of the screw-spindle with its supporting-post the lowering of the distributing-cone and its casing, after connecting-bolts between the ring-shaped frame 15 and suspension-ring 16 are removed, so as to give access to the tower for repairs or other purposes. When the apparatus is to be used again, the delivery mechanism is replaced in position below the throat of the tower, raised by the screw-spindle and post, and reconnected with the suspension-ring by the fastening-bolts. The delivery mechanism described has the advantage that all its movable parts are located at the outside of the same, so that they can always be observed while in operation, and can be quickly and conveniently repaired in all its parts whenever it should be necessary. From the delivery mechanism the glowing material is conducted by the distributing-cone 12 to the conduits or shafts 20 of the water-gas generators and distributed in the same in the manner described. The water-gas is conducted in upward direction through the tower and the retorts and produces by its heat the complete extraction of the gas from the glowing material and the vaporization of the tar supplied to the tower. The waste gases obtained by the hot-blowing of the water-gas generators are utilized in the same manner as described in my prior application for the exterior heating of the retorts, being conducted from the generators through tubes 26 after the dust has been removed from the same in the dust-collectors 25. The upper ends of the conducting-tubes 26 are united into one single flue, which is connected with the lower end of the jacket 27 of the lowermost retort 4.

As compared with the long single retort heretofore employed, in which the hot gases from the water-gas generators are directly supplied, the arrangement of a series of shorter superposed retorts in connection with the conducting-tower has the advantage that the conveyers in the retorts suffer much less from the high temperature to which they are subjected and that really only the conveyer of the lowermost retort is subjected to wear, and this conveyer can be readily exchanged by making its head detachable, as shown in Fig. 5.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. An apparatus for making illuminating-gas, consisting of a series of superposed retorts connected alternately at opposite ends, rotary conveyers in said retorts, a conducting-tower connected with the lowermost retort, inclined shelves located alternately at opposite sides of said tower, a rotary delivery mechanism for the glowing material below the lower end or throat of the tower, and means for connecting water-gas generators with said delivery mechanism, substantially as set forth.

2. An apparatus for making illuminating-gas, consisting of a series of superposed retorts connected alternately at opposite ends, rotary conveyers in said retorts, a conducting-tower connected with the lowermost retort, said tower being provided with inclined shelves located alternately at opposite sides, a reservoir for the liquid-hydrocarbon material at the upper end of the tower, means for supplying said liquid hydrocarbon to the upper part of the tower, and a delivery mechanism for the glowing coke at the lower end or throat of the tower, substantially as set forth.

3. In an apparatus for the continuous production of illuminating-gas, the combination of a series of connected superposed retorts, rotary conveyers in said retorts, and a conducting-tower having a contracted lower end or throat, with a delivery mechanism consisting of an exterior casing, an interior distributing-cone, a supporting-frame for the distributing-cone, and means for tightly connecting the supporting-frame of the distributing-cone with the lower end of the tower and the casing of the delivery mechanism, substantially as set forth.

4. In an apparatus for the continuous production of illuminating-gas, the combination of a series of superposed retorts, rotary conveyers in the same, a tower connected with the lowermost retort, said tower being provided with a series of inclined shelves arranged alternately at opposite sides of the tower, a reservoir for liquid hydrocarbon at the upper end of the tower, means for supplying said liquid hydrocarbon into the tower, means for equalizing the pressure in the tower and reservoir, and a delivery mechanism at the lower end of said tower, substantially as set forth.

5. In an apparatus for the continuous production of illuminating-gas, the combination of a series of connected superposed retorts, rotary conveyers in said retorts, exterior jackets surrounding said retorts, a tower connected with the lowermost retort, inclined shelves arranged alternately at opposite sides in said tower, a reservoir at the upper end of said tower for liquid hydrocarbon, means for supplying said liquid hydrocarbon to the tower, a rotary delivery mechanism at the lower end of said tower, chutes for connecting the delivery mechanism with water-gas generators below said tower, and flues for connecting said water-gas generators with the jacket of the lowermost retort for conducting the waste gases from the water-gas generators successively through the jackets of the different retorts, substantially as set forth.

6. In an apparatus for the continuous production of illuminating-gas, the combination of a series of superposed retorts, rotary con-

veyers in said retorts, a tower connected with the lowermost retort, inclined shelves arranged alternately at opposite sides of said tower, a delivery mechanism located below the contracted lower end or throat of said tower, said delivery mechanism being composed of an interior distributing-cone, a supporting-frame for said cone, means for rotating said supporting-frame and cone, a casing surrounding the distributing-cone, and chutes for conducting the glowing material from the distributing-cone to water-gas generators located below the delivery mechanism, substantially as set forth.

7. In an apparatus for the continuous production of illuminating-gas, the combination, with a conducting-tower having inclined shelves at alternately-opposite sides and a contracted lower end or throat, of a delivery mechanism consisting of an exterior casing provided with chutes for conducting the glowing material to the water-gas generators located below the tower, a distributing-cone in said casing, a suspension-frame for said distributing-cone, means for rotating said suspension-frame and cone, a tightening-joint between the suspension-frame and the lower end of the tower and between the distributing-cone and casing, means for rotating the casing, and means for raising or lowering said delivery mechanism, substantially as set forth.

8. In an apparatus for the continuous production of illuminating-gas, the combination, with a conducting-tower having inclined shelves arranged alternately at opposite sides, of a delivery mechanism, consisting of a casing, means for rotating the same on its axis, an interior distributing-cone, means for rotating said delivery-cone, a carriage, and means between said carriage and the casing of the delivery mechanism for raising and lowering the latter, substantially as set forth.

9. In an apparatus for the continuous production of illuminating-gas, the combination of a conducting-tower, inclined shelves arranged alternately at opposite sides of the same, a delivery mechanism below the lower end or throat of the tower, said delivery mechanism consisting of an exterior casing having an exteriorly-threaded center spindle, a distributing-cone in said casing, a supporting-frame for said distributing-cone, means for rotating said supporting-frame and cone, an interiorly-threaded post for supporting the spindle of the casing, means for rotating said casing so as to raise or lower the same, and a carriage for the supporting-post of the casing, substantially as set forth.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

EDUARD R. BESEMFELDER.

Witnesses:

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CLARA KOHRS.