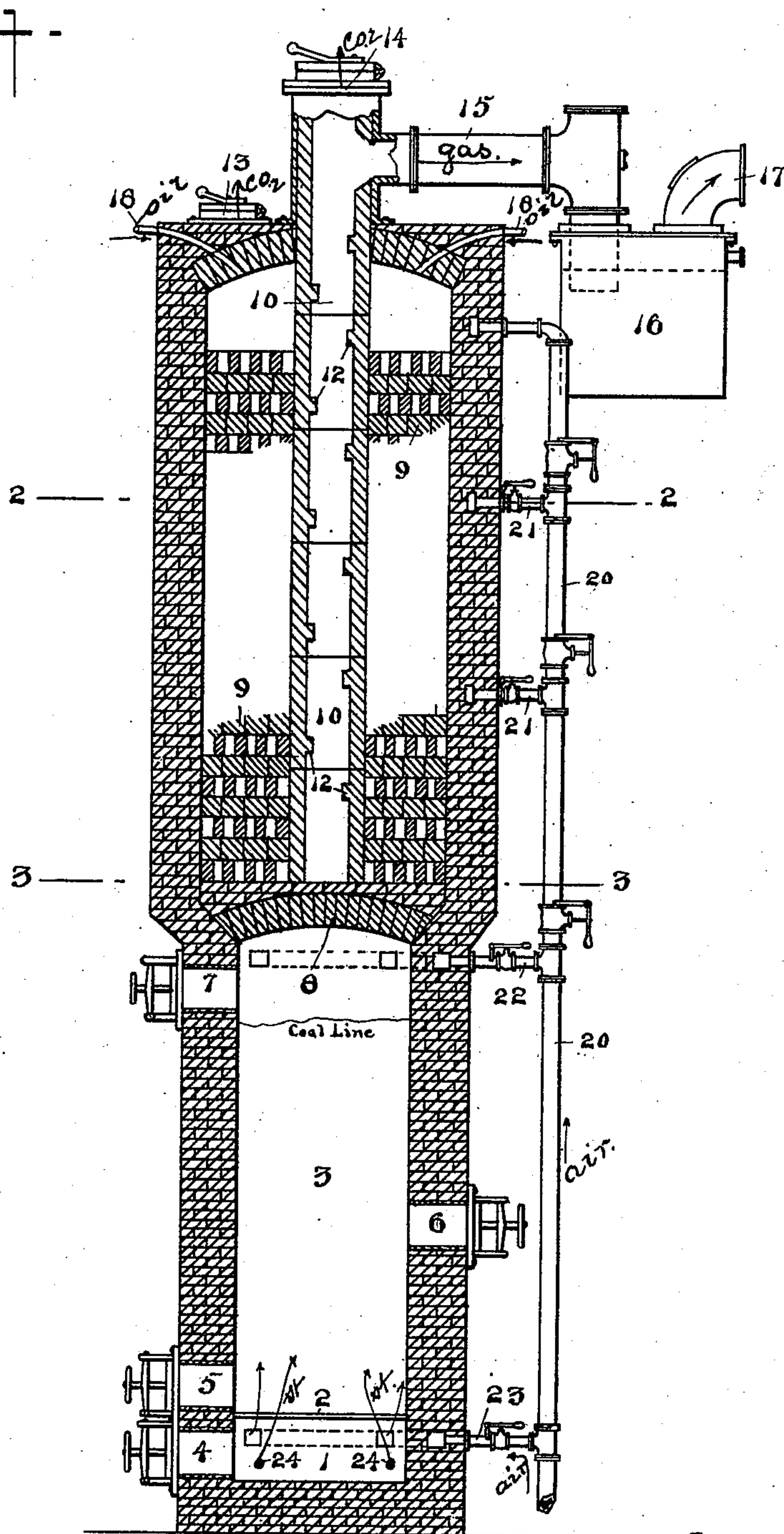


J. J. KIRKHAM.

APPARATUS FOR THE MANUFACTURE OF GAS.

No. 516,865.

Patented Mar. 20, 1894.



Witnesses

Arch. M. Catten
Franc. D. Blackstone.

Inventor

John J. Kirkham
by

Reij. R. Berlin Attorney

(No Model.)

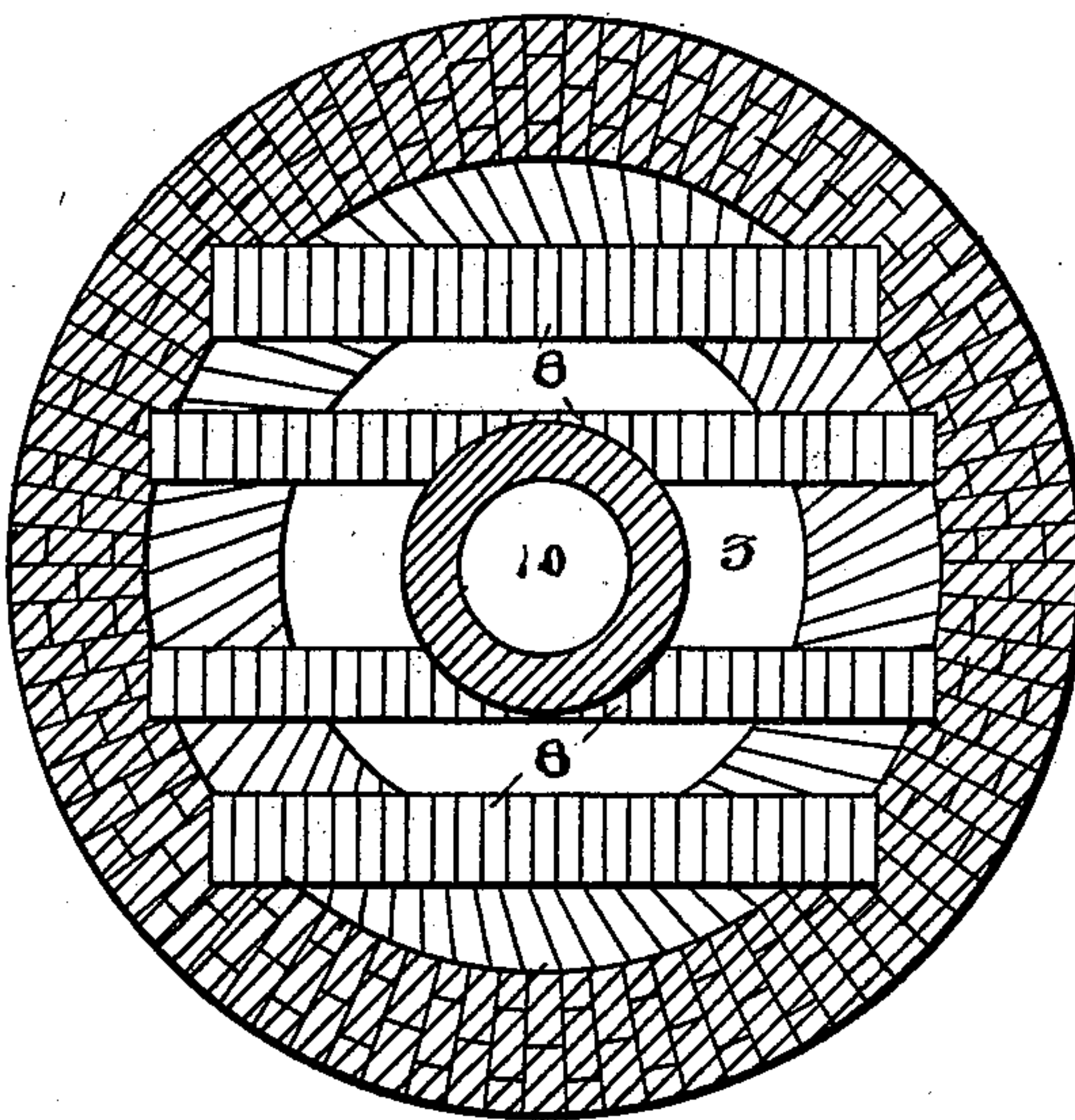
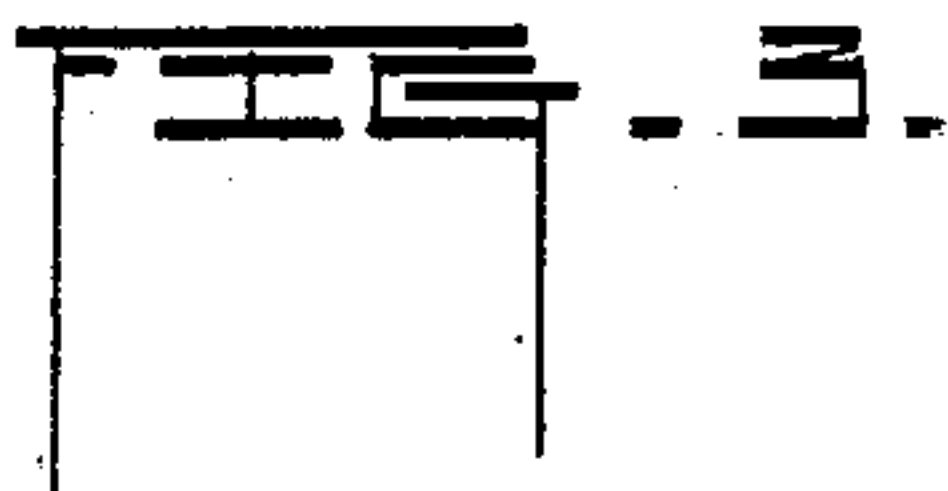
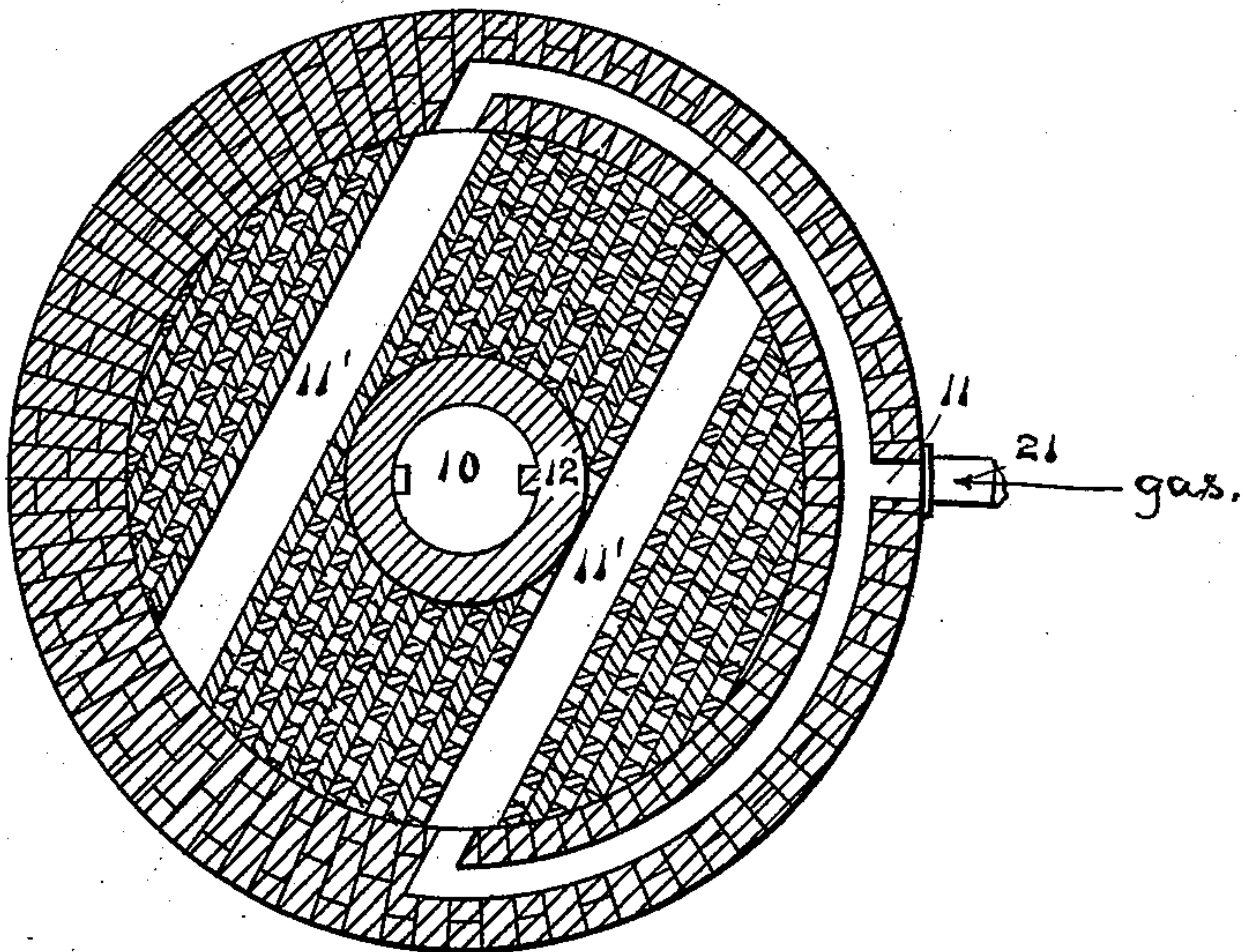
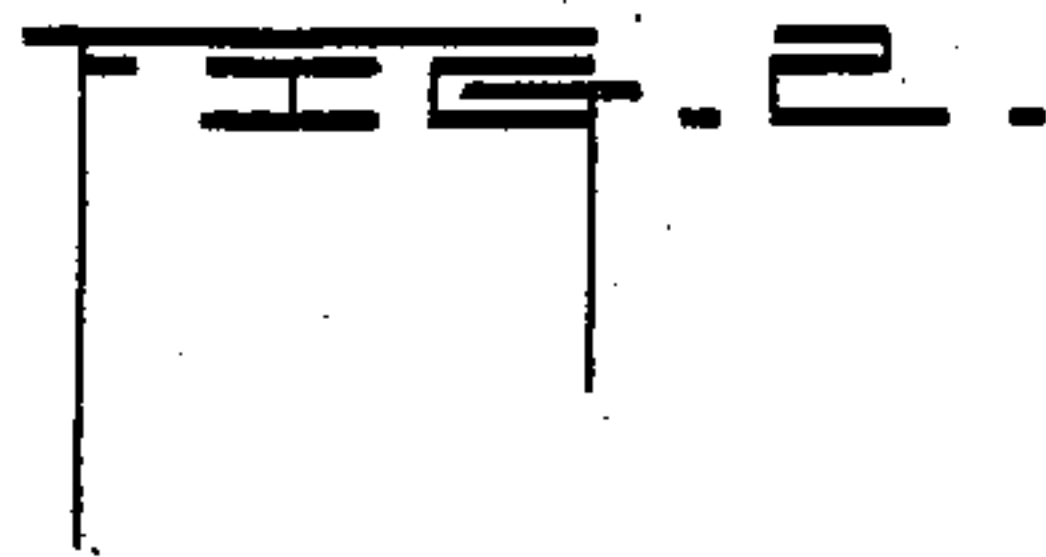
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UNITED STATES PATENT OFFICE.

JOHN J. KIRKHAM, OF TERRE HAUTE, INDIANA.

APPARATUS FOR THE MANUFACTURE OF GAS.

SPECIFICATION forming part of Letters Patent No. 516,865, dated March 20, 1894.

Application filed July 28, 1893. Serial No. 481,687. (No model.)

To all whom it may concern:

Be it known that I, JOHN J. KIRKHAM, a resident of Terre Haute, in the county of Vigo and State of Indiana, have invented certain
5 new and useful Improvements in Apparatus for the Manufacture of Gas; 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 per-
10 tains to make and use the same.

The invention relates to the manufacture of oil and water gas or the like, and it has for its object to vaporize oil and to fix the vapors and gases in a manner to avoid the produc-
15 tion of either lamp black or "slush." Here- tofore oil has been fed to the hottest part of the furnace with the effect to quickly drive off its lighter constituents before the vapor- ization of the heavier constituents and a con-
20 siderable part of the latter were carried out of the apparatus with undecomposed steam, both oil and water vapors being condensed in the seal and scrubber. If to avoid this result the heat of the furnace was increased suffi-
25 ciently to fix the heavier products the lighter vapors were carbonized, that is converted into lamp black.

My invention consists in the improvements hereinafter described and particularly pointed
30 out whereby the aforesaid evils are avoided.

In the accompanying drawings: Figure 1 is a vertical central section. Figs. 2 and 3 are transverse sections on lines 2—2 and 3—3 of Fig. 1 respectively.

35 Numerals 1, 2 and 3 denote respectively the ash pit, grate and combustion, or steam decomposing, chamber of a gas furnace.

4, 5, 6 and 7 denote doors or manholes, the first two giving access just above and below
40 the grate for the removal of ashes and the like. Door 6 provides for breaking up clinkers and 7 for charging coke or coal.

8 denote narrow arches supporting loosely piled refractory material 9 and an interior
45 flue 10 which acts as a fixing chamber. This flue is provided with interior projections 12 which are adapted to impart a rotary or spiral motion to the gas currents and also to conduct heat to the interior of the flue or retort. The
50 chamber 3 communicates with said fixing chamber and with the vaporizing chamber which contains the open brick work through

the spaces between the arches. The upper part of the furnace which includes the vapor- izing and fixing chambers is preferably made
55 larger in horizontal section than the steam decomposing or combustion chamber 3 as illus- trated.

13 denotes an exit from the vaporizing chamber and 14 an exit from the fixing cham-
60 ber or retort. Both exits are provided with suitable valves. The conduit 15 connects the retort and a water seal 16, and exit 17 may communicate with scrubbers not shown.

18 denote oil inlet pipes and 20 an air blast
65 pipe provided with valves as shown.

21 denote branches of the air blast pipe which communicate with passages 11 that
70 lead to open spaces 11' in the vaporizing chamber, which spaces extend across the vaporiz- ing chamber. These branches may, if de- sired, be provided each with a valve.

22 is a valved branch communicating with the upper part of the combustion chamber and 23 a valved branch communicating with
75 the ash pit.

24 denotes a steam inlet to the ash pit.

The furnace may be made about thirty feet high and its lowest part about six feet in di-
80 ameter and its upper part about seven feet in diameter and the door 6 may be situated two and a half or three feet above the grate but these dimensions are not essential neither are the exact proportions shown in the drawings.

In practice coal or coke is charged into the
85 chamber 3 through door 7 and air supplied to burn the same. The products of combus- tion are passed through the open brick work to heat it and discharged at 13. After this
90 brick work is heated exit 13 is closed and air shut off and steam admitted below the fuel which at such time will be incandescent and decomposes the steam. Oil, which may be
95 crude, is simultaneously admitted to the top of the vaporizing chamber which is less heated than the parts below, the greatest heat being in the region of the arches. The lighter por- tions of the oil are vaporized immediately be-
100 low the inlets while the heavier parts are carried down to the hotter regions of the vapor- izing chamber. The lighter vapors tend to accumulate in the upper part of the vaporiz- ing chamber and produce a small degree of pressure therein so that they follow or mix

and flow with the heavier products, and they do not quickly escape in advance as in constructions of the usual form. The heavier oil constituents are preheated by their passage through the upper part of the open brick work and by their enforced contact with the light vapors, the heat of which latter is thereby also moderated. As the heavy oil constituents descend toward and between the arches they are vaporized and both the light and heavy vapors are mixed with the water gas ascending from the coke and are fixed upon entering and ascending in the retort and then passed to the water seal. By this method the production and collection in the water seal and washers of a large amount of slush is avoided and also the production of an excessive amount of lamp black. If however under any conditions carbon is deposited in the furnace, especially in the fixing retort, it can be easily burned out by omitting air and discharging the products at 14. It will of course be understood that the heating up and gas making operations are alternated in usual manner.

Air may be admitted if desired through one or more of the branch pipes 21 to complete the combustion of escaping gases in the heating up operation, and these pipes are situated at various elevations in order to permit corresponding variations in admission of air. It is also obvious that, if desired, small portions of air may be admitted through these pipes 21 during the gas making operation with a view to produce combustion and prolong the heat of the vaporizing chamber.

I am aware that a retort filled with refractory material for vaporizing oil and centrally situated in a gas fixing chamber both being above a water gas generator and adapted to mingle oil vapors with water gas near the said generator are not new and such matter is not herein claimed except in the form and combination particularly pointed out. In such prior construction though the oil vaporizing retort had a valve which was operative to prevent the passage of heating gases the entire products of combustion during the heating up process could not be passed therethrough for the reason that such retort had no exit or passage for waste gases independent of the larger passage through the superheater around said retort. It being necessary to open the valve controlling said larger passage to render it possible to pass any heating gases through the retort, this operation to a great extent was prevented by their freer flow through the said larger surrounding passage. Further in such prior construction during the fixing operation the gases are drawn to one side of the fixing chambers and cannot be equally distributed throughout said chamber. And besides the fixing chamber being exterior to the retort and subject to a greater amount of radiation is cooled more quickly than desirable. By my improvement all hot gases for heating up purposes can be com-

pelled to pass through the vaporizing chamber. This has a much larger extent than the fixing retort and has preferably an oil supply pipe on each side from which two features of construction it results that the oil is more fully vaporized and expanded. The heat of my comparatively small centrally situated fixing retort is maintained by radiation inwardly from the vaporizing brick work. And further owing to the relatively small size of the fixing retort the mixed gases ascend in equal contact with all parts thereof instead of passing obliquely through the same as happens in fixing chambers of comparatively large areas having an exit at one side. It is for the purpose of preventing a somewhat similar one-sided operation in the vaporizing chamber that the use of oil supply pipes on two or more sides thereof is preferable. By my construction provision is made not only for expanding and mingling the oil vapors in a very thorough manner but these vapors thus highly heated and expanded are brought in contact with the exterior of an ascending current of water gas which is being drawn toward and into a central and comparatively narrow retort flue which flue is adapted by means of inward heat-conducting projections therein to impart a rotary or whirling motion to the highly heated gases whereby their intimate mixture is more thoroughly effected. I am aware that this retort is not new and it is not herein claimed. It however cooperates with the comparatively large surrounding vaporizing chamber adapted to bring a large area of highly expanded vapor as compared with the retort flue in contact with an equal area of water gas and pass them together into the relatively narrow mouth of the fixing retort in which a rapid whirling current of mingling gases is produced. The horizontal area of contact of the vapors and gases is practically equal to that of the generator, and the narrow arches having considerable unobstructed spaces between them are much more favorable for the commingling of the gases than the perforated domes heretofore employed.

Having thus described my improvement, what I claim is—

1. In a gas making apparatus, a combustion chamber adapted to be supplied with coal or coke and with either air or steam, the superposed vaporizing chamber containing refractory material and having an exit for waste gases and provided with a damper, and the fixing retort inclosed by said open refractory material also having an exit for waste gases provided with a damper, said exits being entirely independent and the fixing retort interiorly situated, and means for supplying oil to the vaporizing chamber whereby in heating up all the hot gases may be passed through the oil vaporizing chamber and whereby radiation from the fixing chamber may be retarded, all combined substantially as set forth.
2. In a gas making apparatus, combustion

chambers adapted to be supplied with coal or coke and with either air or steam, the superposed vaporizing chamber containing refractory material and having an independent
5 valved exit, and the fixing retort having distinct exits for products and gas inclosed by said open refractory material of the vaporizing chamber, and narrow separate arches supporting the retort, said vaporizing chamber
10 and generator or combustion chamber having an approximately equal horizontal area, all combined substantially as set forth.

3. In a gas making apparatus the combustion chamber provided with an air inlet in
15 combination with a superposed vaporizing chamber containing refractory material and having an independent valved exit for products of combustion, a fixing retort centrally

inclosed by said material also having an independent valved exit, air inlet pipes adapted to communicate at various altitudes with the vaporizing chamber, and an oil supply pipe whereby air may be introduced directly into the brick work of the vaporizing chamber and whereby in heating up all the gases
25 can be passed through the vaporizing chamber and whereby in fixing the gases they may be excluded from said chamber, substantially as set forth.

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

JOHN J. KIRKHAM.

Witnesses:

THOMAS PATTERSON,
JAMES E. PIETY.