No. 885,480.

PATENTED APR. 21, 1908.

F. JAHNS.

PROCESS OF MAKING PRODUCER GAS.

APPLICATION FILED MAY 31, 1905.

2 SHEETS—SHEET 1.

Fig. 1

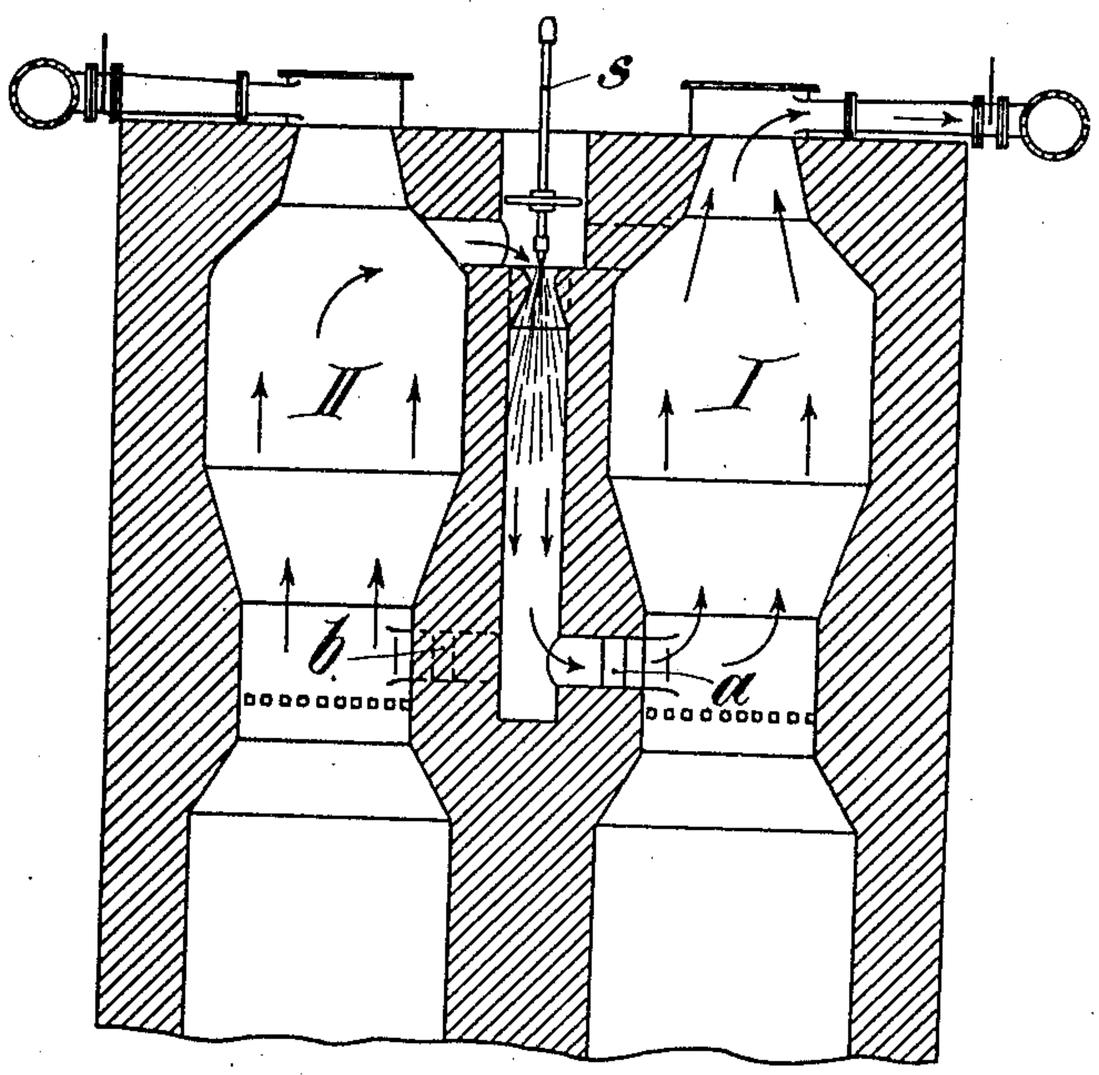

Fig. 2

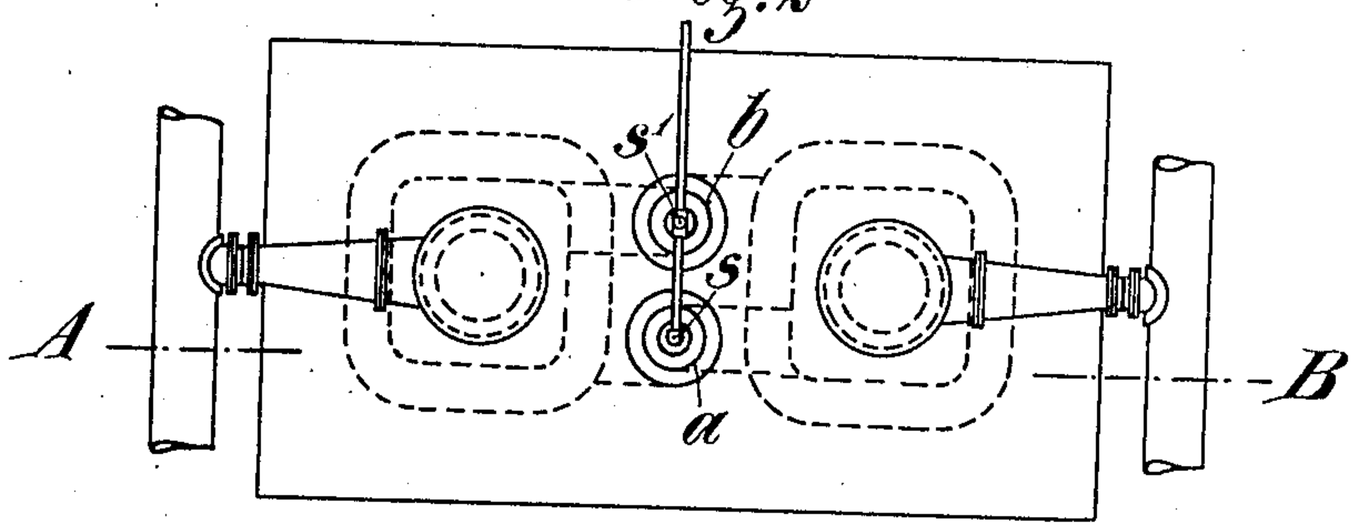

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Fig. 3

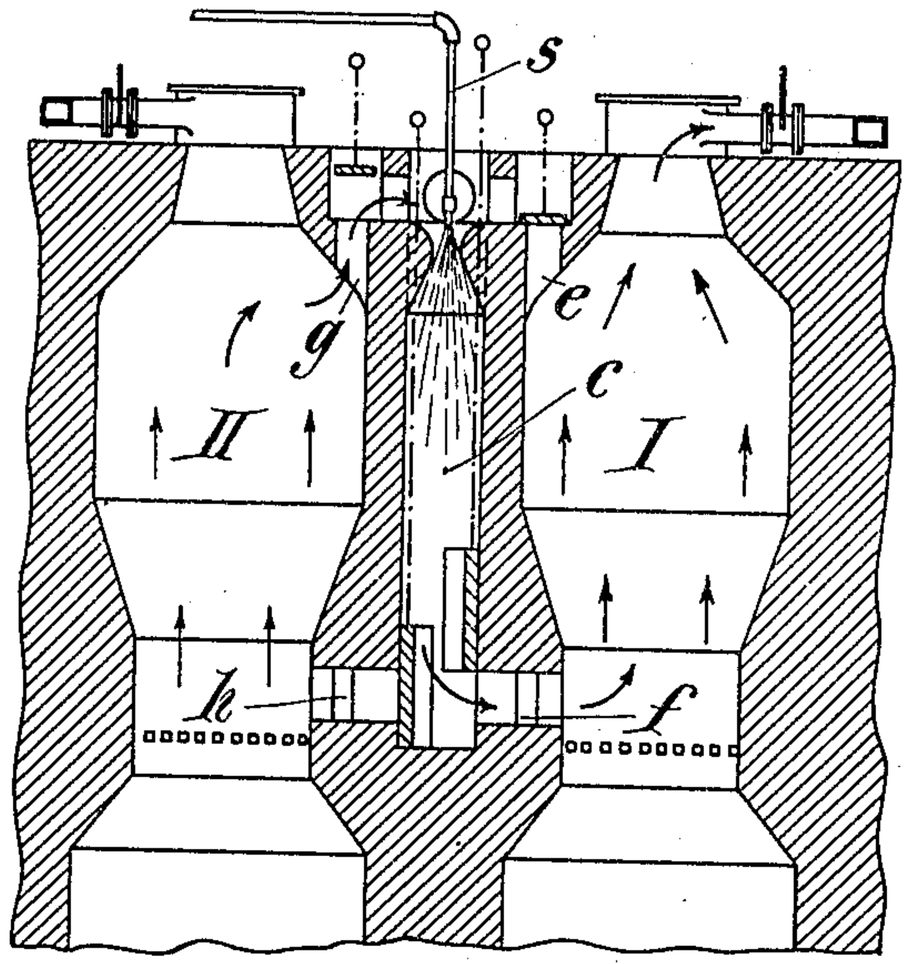
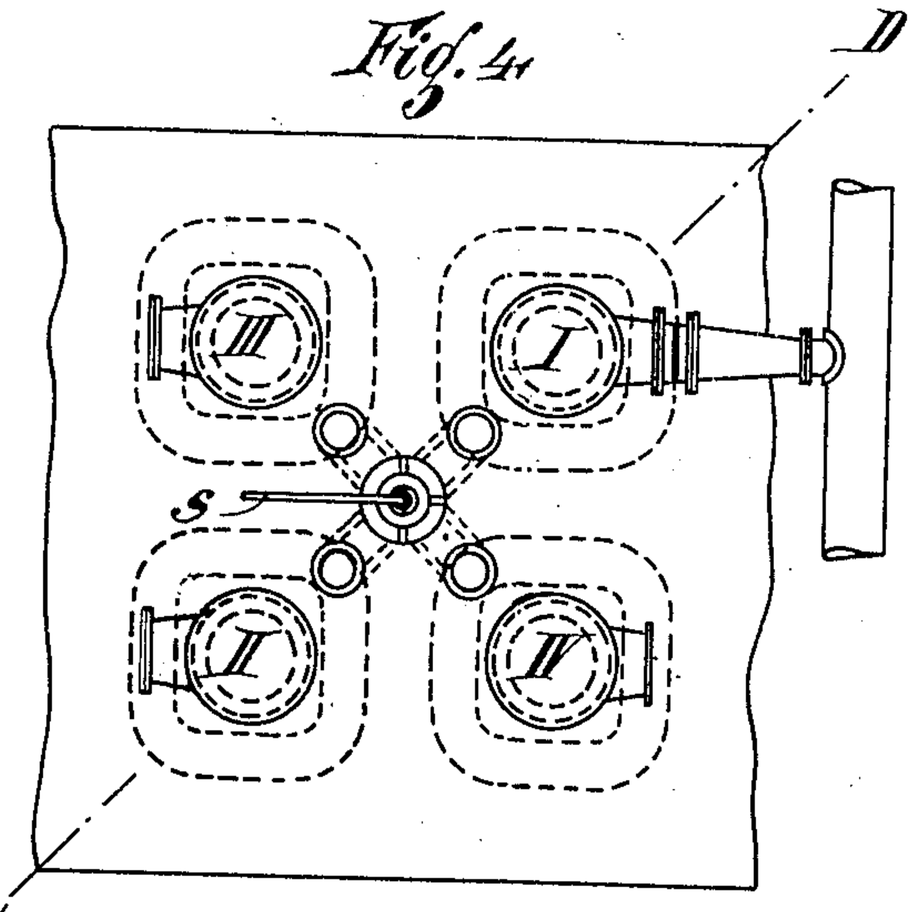


Fig. 4



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UNITED STATES PATENT OFFICE.

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PROCESS OF MAKING PRODUCER-GAS.

No. 885,480. Specification of Letters Patent. Patented April 21, 1908.

Application filed May 31, 1905. Serial No. 262,993.

To all whom it may concern:

Be it known that I, FRIEDRICH JAHNS, director of mines, a subject of the Emperor of Germany, and residing at von der Heydt, near Saarbrücken, Germany, having invented a new and useful Improved Process of Making Producer-Gases, of which the following is a specification.

The present invention relates to the production of producer gases poor in tar from tarryfuels, which are also rich in clinker; the production is preferably effected in apparatus comprising several gas producers or gas producing chambers connected by ports and passages and which are lighted successively, one after the other, and burned out without being refilled, the gases being drawn off alternately from that generator or generator chamber which has been longest alight for the time being.

In such apparatus the generator chambers are connected with each other, by ports and passages, in such manner that the gases in the upper part of one of two adjacent gas producers can be led thence to the lower part of the other gas producer. Such gas generator plants attain their highest efficiency, both with respect to the quantity of the gases produced in a given time and the quality of said gases, when the depression, or reduced pressure due to suction, which is permissible in the exhausting generators, *i. e.* the generators which are connected to the suction main leading to the place of consumption, is greatest. The reduced pressure in the preparatory generators depends directly upon the reduced pressure in the exhausting generator and indirectly therefore upon the said suction main.

This is somewhat contradictory in view of the apparent fact that the greater depression or suction force acting from the place of consumption act upon the hotter generators with their looser charge and the lower depression acts upon the cooler generators with their denser charge.

I have discovered that an increase of the efficiency of the plant is therefore only possible, when the depression in the preparatory generators is raised, that is to say, the pressure therein reduced. As however it is not a matter of importance to produce a serviceable producer gas in the preparatory furnaces, the pressure may be reduced below that permissible in the exhausting generators and the efficiency of the apparatus be thus correspondingly increased. The preparatory periods may therefore be shortened in such manner and to such an extent that they form a comparatively small fractional part of the gas periods determined by the number of the generators employed, the gas periods being then particularly uniform, only when an uninterrupted and uniform working is maintained. In this case it is important to employ the greatest depression possible during the preparatory periods in order to draw the fire up as quickly as possible and spread it superficially over the whole contents of the generator by the great velocity of air which is thereby induced. By this means the degasification of the upper layers is anticipated while the penetrating consumption of the charge portions first takes place in the gas periods.

In a twin generator both periods of time must be obviously equal to one another, for which reason any inequalities arising are equalized again not by reducing the air velocities, but by throttling the quantity of air.

The invention is shown in the drawing applied to two arrangements of furnaces.

Figure 1 is a vertical section on the line A—B of Fig. 2 showing a generator plant having two gas producing chambers. Fig. 2 is a plan of the generator shown in Fig. 1. Fig. 3 is a vertical section on the line C—D of Fig. 4 showing a generator plant having four gas producing chambers. Fig. 4 is a plan of the generator shown in Fig. 3.

The furnace according to Figs. 1 and 2 has two gas producing chambers I and II which are connected by two passages *a*, *b*. The passage *a* conducts the gases generated in the chamber II from the upper part of said chamber to the lower part of the chamber I while the passage *b* similarly connects the chamber I to the chamber II.

Arranged in each passage is a separate suction device *s* or s^1 actuated, for example, by steam or air or gas under pressure, or the like and producing the desired depression in the chamber that is working for the time being as preparatory generator.

The furnace illustrated in Figs. 3 and 4 has four chambers I, II, III and IV. The transference of the gases to the preparatory generators takes place through a common centrally arranged passage *c* which communicates with and may be cut off from the upper and lower portions of all the generator chambers.

The cut off devices are so operated that in the generator which is exhausting for the time being generator I for example, the top port *e* leading to the central passage *c* is closed and the lower port *f* on the other hand is open. In all the preparatory generators on the contrary the upper ports *g* are open and the lower ports *h* closed.

Gases from the chambers III and IV are delivered into the chamber I similarly to those of the chamber II.

The advantage of this plant lies in the fact that only one depression device *s* is necessary for all the preparatory generators, whereas in generators constructed according to Figs. 1 and 2 for example with only two gas generating chambers two suction devices must be provided.

Gas producers with a single combustion chamber as hitherto used are generally worked in such a way that the consumed fuel is replenished from time to time from the top of the producer by fresh quantities. Accordingly the composition of the gas from such producers varies between gas poor and gas rich in tar. As soon as fresh fuel is filled in at the top of the charge, which is already in a glowing stage, the volatile constituents of the fresh charge are expulsed. With increasing heat of the fresh charge the expulsion of the volatile parts ceases, and the gasification sets in. Gasification can be continued so long as the oxygen of the air finds sufficient incandescent carbon to combine with. During the last period just described the gases from ordinary producers contain comparatively little tar. If gas were taken from such a producer during this period only, a gas fairly free from tar would be obtained. These considerations gave rise to the idea of obtaining a gas free from the products of the period of distillation, said products being the volatile constituents of the fuel, by not drawing off these products directly but first passing the products through other producer chambers in which the charges are in full incandescence and in the period of gasification. By thus passing the products of distillation through the glowing strata of fuel they are converted into permanent gases and as such are drawn off. By preference, several of the producer chambers are inter-connected by means of suitable passages, as shown and described, to form a ring or group, which group is worked in such a way that at least one of the chambers is always in the state of full incandescence, the products of distillation of the other chambers being passed through the incandescent fuel and converted into permanent gas which is drawn off. This process is continued so long as the amount of incandescent carbon allows it. As soon as the latter is no longer sufficient the next chamber which is in the most advanced stage of preparation for gasification, with its volatile parts having been driven out, takes the place of the first one which is then emptied and recharged. This process is continued through all the chambers of the ring or group and thus gas of any desired purity is produced without any interruption.

The important idea realized in the present invention is the shortening of the period of preparation or in other words the acceleration of the expulsion of all volatile parts in order to obtain a maximum producer capacity. I accomplish this by arranging injectors in the central passage between two or more producer chambers. These injectors admit of the regulation of a suction effect acting on the preparatory chambers in which distillation takes place independent of the suction maintained in the gasification chamber or chambers. Without the injectors the under pressure set up in the gasification chamber by the gas exhauster would also have to create the under pressure in the expulsion chamber or chambers which would then necessarily be smaller than in the gasification chamber. The air supply is as formerly obtained up through the grate, and when steam injectors are used the water from the steam is used for the water gas process in the gasifying chamber.

Having now particularly described and ascertained the nature of the said invention and in what manner the same is to be performed, I declare what I claim as my invention and desire to secure by Letters Patent, is:—

The method substantially as herein shown and described of manufacturing gas poor in tar from tarry fuels consisting in employing two or more generating chambers, conducting the volatile products of distillation from out of the top of one of the chambers and passing it up through another chamber while the fuel in this latter chamber is incandescent, exhausting the gas from this latter chamber, the preparatory generators being worked at a lower pressure than the pressure present in the exhausting generator, substantially as described.

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

FRIEDRICH JAHNS.

Witnesses:

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