(No Model.) 4 Sheets—Sheet 1.

J. PINTSCH.

Apparatus for Making Illuminating Gas.

No. 237,898. Patented Feb. 15, 1881.

Fig: 1

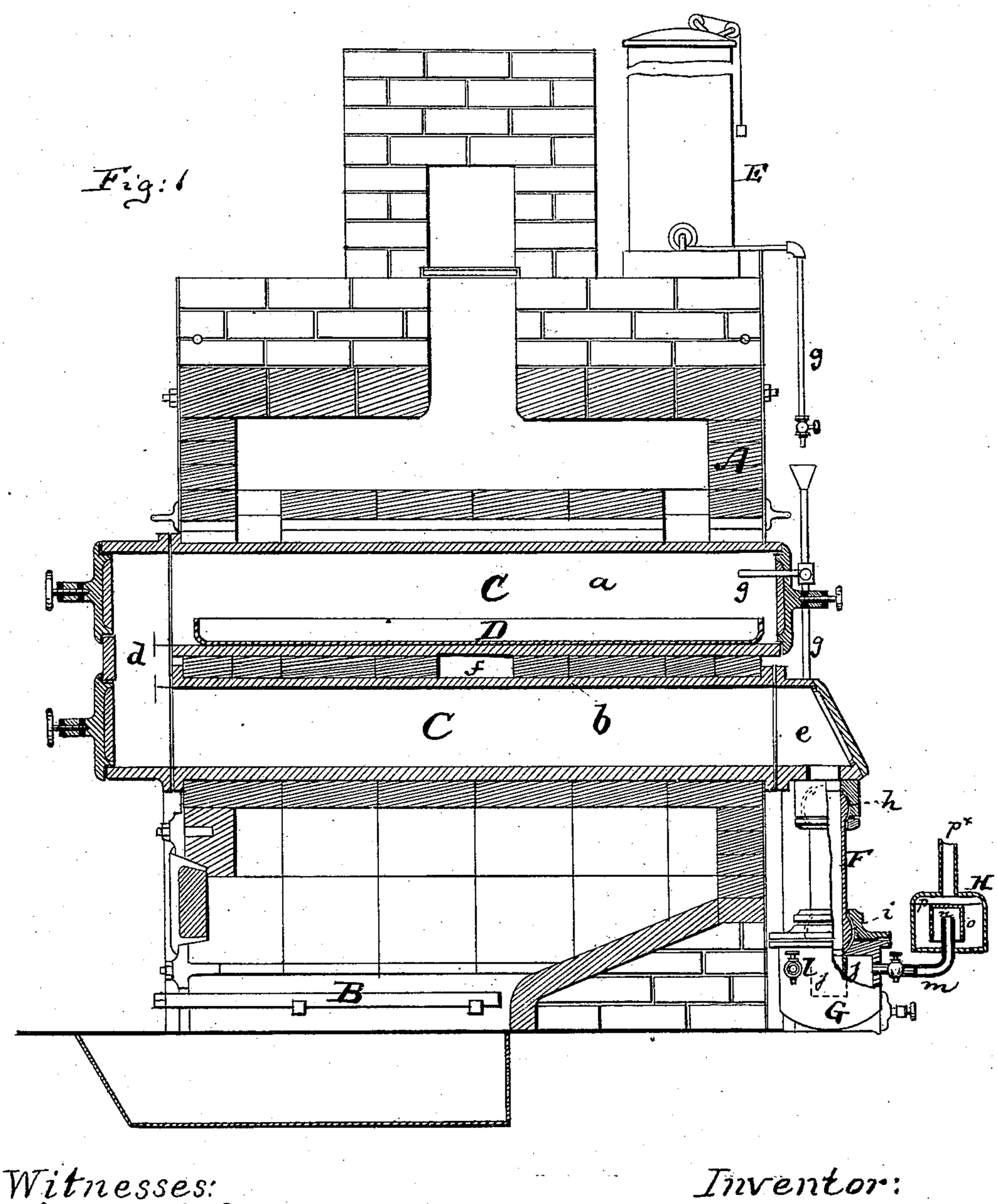

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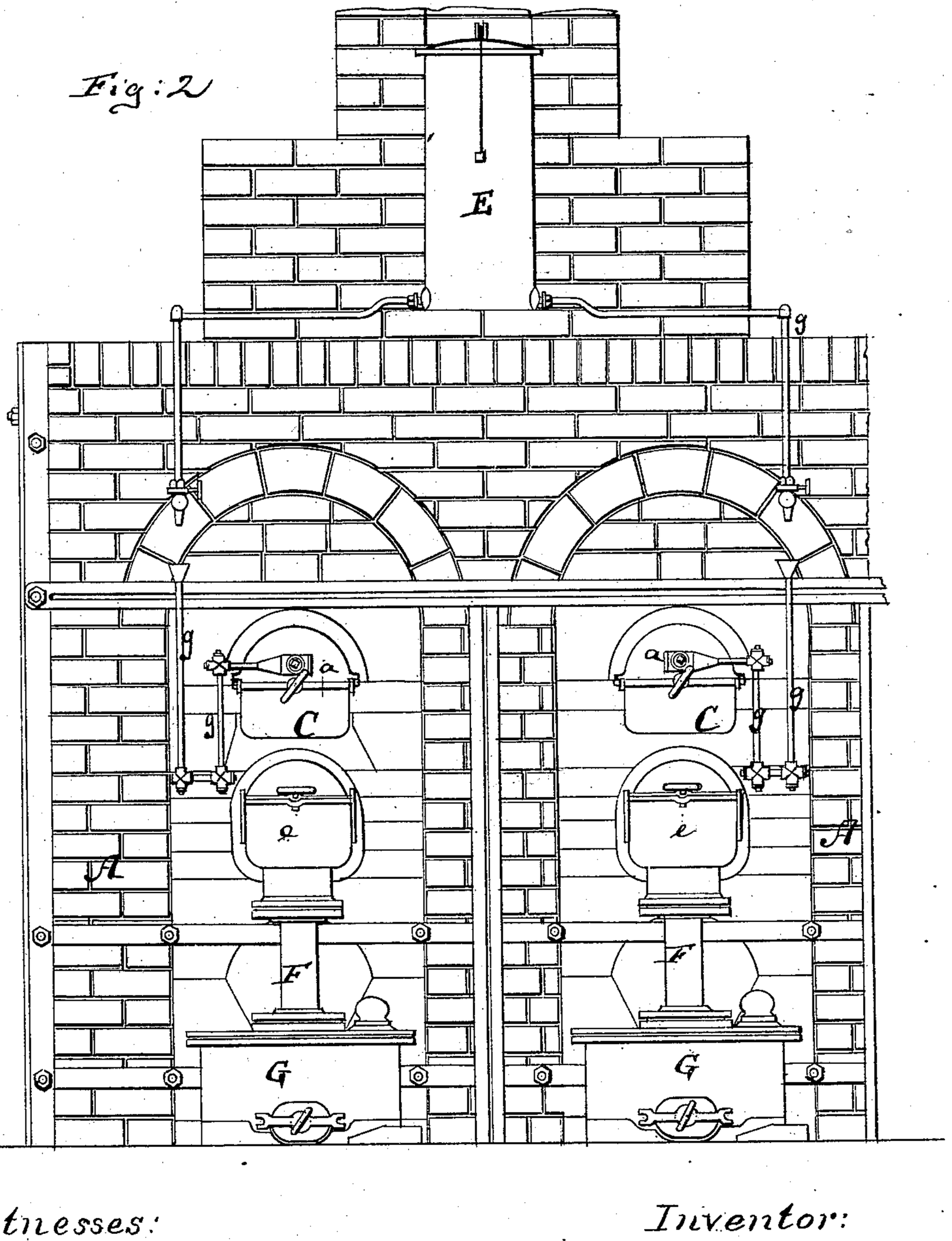
Fig: 2



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J. PINTSCH.

Apparatus for Making Illuminating Gas.

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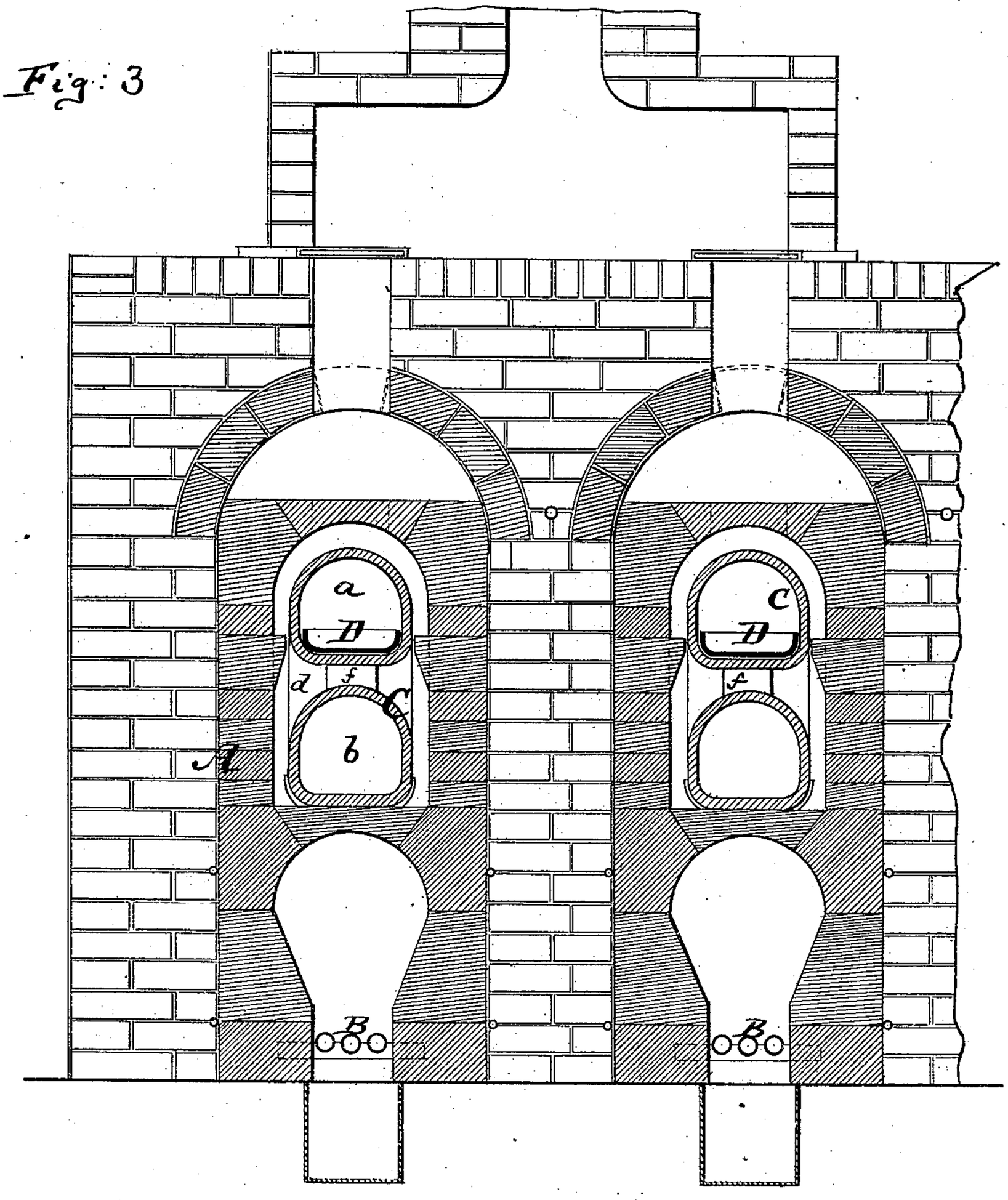
Fig: 3



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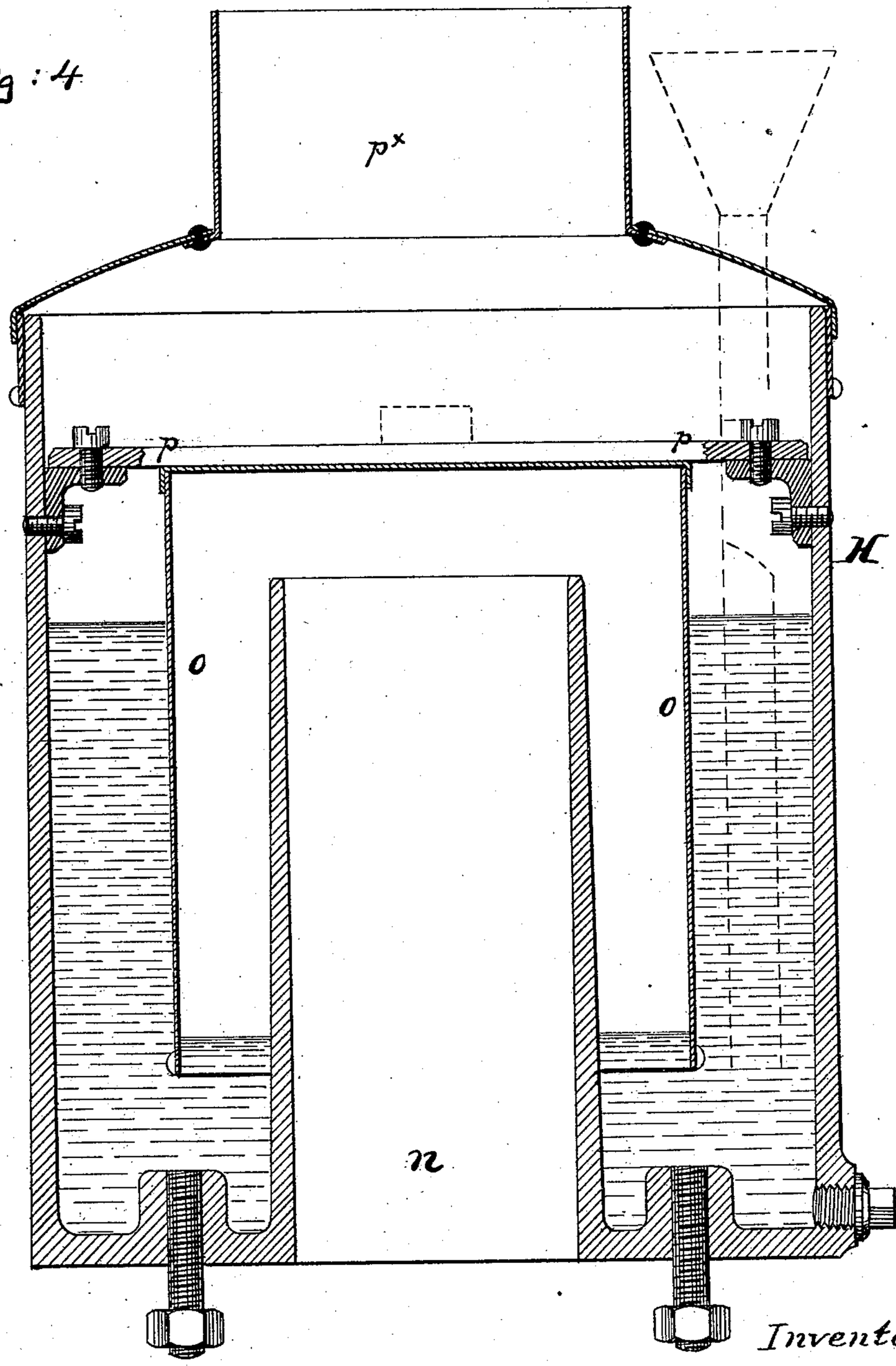
(No Model.) 4 Sheets—Sheet 4.

J. PINTSCH.

Apparatus for Making Illuminating Gas.

No. 237,898. Patented Feb. 15, 1881.

Fig: 4



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UNITED STATES PATENT OFFICE.

JULIUS PINTSCH, OF BERLIN, PRUSSIA, GERMANY.

APPARATUS FOR MAKING ILLUMINATING-GAS.

SPECIFICATION forming part of Letters Patent No. 237,898, dated February 15, 1881.

Application filed July 9, 1880. (No model.) Patented in Germany July 3, 1877.

To all whom it may concern:

Be it known that I, JULIUS PINTSCH, a German citizen, residing at Berlin, Prussia, have invented a new and Improved Apparatus (for which German Patent No. 1,797, for fifteen years, was granted to me July 3, 1877) for Making Illuminating-Gas from Hydrocarbon and other Oils and Fats, of which the following is a correct specification.

Apparatus for making illuminating-gas from hydrocarbon and other oils and fats have usually heretofore consisted of furnaces having ordinary straight retorts and suitable means of supplying the same with the liquid or fat, and with upwardly-extending discharge-pipes, through which the gas is to escape. The gases in such apparatus usually carry volatile particles of tar and other impurities which condense very rapidly and have the tendency to flow back into the retort, there to be again evaporated, recondensed, and so on *ad infinitum*, causing an objectionable deposit in the retort by the sudden contact of the condensed matter with the heated surface of the retort, and causing, also, an unnecessary waste of fuel and retardation of the process. Another objection to the former construction of such apparatus was that it did not provide against the injurious influence of possible rapid expansion or eruption of the gaseous matter within the retort, and the consequent destruction of the apparatus; and another objection was that no provision was made for allowing the adjustment of the parts without breaking when the retort or other parts of the apparatus were expanded by heat.

My invention consists, first, in the employment of a double retort having an upper and a lower arm or branch, which two arms are united at one end and separated from each other at the other, their separated ends being in connection respectively with the supply and the discharge pipes of the retort. By this construction of the retort many advantages which I will hereinafter specify are obtained.

Secondly, my invention consists in providing the retort with a downwardly-discharging outlet, so as thereby to prevent any reflow of condensed matter and insure a continuous and perfect utilization of the distilling and decomposing process.

My invention furthermore consists, in constructing the discharge-pipe which connects with the retort with a universal joint or connection, so that when the retort becomes expanded under the influence of heat the safety of the connection will not be jeopardized.

Thirdly, my invention consists in the new arrangement of a protecting-vessel, which is brought into connection with the first receptacle of the gas and so arranged as to allow a side discharge of gas in case of an eruption or explosion within the retort.

The invention also consists in the employment of a movable dish in the upper branch of the retort, and in other details of improvement, which are hereinafter more fully described.

In the accompanying drawings, Figure 1 represents a vertical cross-section of the furnace, showing one of the retorts in vertical longitudinal section. Fig. 2 is a rear elevation of part of the furnace; Fig. 3, a vertical section, showing the retorts in cross-section, and Fig. 4 is a detailed sectional view of the expansion-chamber.

The furnace A, having a grate, B, is of suitable construction, and contains one or more retorts, C, with a grate below each retort; though one grate may, if desired, be used under a series of retorts. The draft should be so arranged that the flames or products of combustion will properly envelop each retort and pass also between the arms or branches of each retort, as indicated in Fig. 3. Each retort, as is clearly shown in Fig. 1, is made of two horizontal arms or branches, the upper branch, *a*, joining the lower branch, *b*, at the front of the furnace by an upright connection, *d*, so that thus each retort constitutes a U-shaped passage, to which the liquid is admitted at the free end of the upper branch, *a*, and from which the gas is discharged at the free end of the lower branch, *b*. Practically the retort is constructed of four parts, one part being the upper branch, *a*, the next part the upright portion *d*, the third part the lower arm, *b*, and the fourth the head or discharge end *e*. A space, *f*, is between the two arms *a b* of the retort for the passage of the products of combustion, so as to insure a uniform degree of heat around each branch. The parts of the retort are clamped together in suitable manner.

In the upper branch, *a*, of the retort is placed a metal dish, D, which can be easily removed through one of the ends of the retort, made detachable for the purpose. Into this dish is

dropped the oil or fat to be distilled, it being supplied from a suitable tank, E, through a U-pipe, *g*, to the retort, as clearly shown in the drawings. The dish serves to collect particles of burnt matter which are produced when the oil suddenly comes in contact with the heated surface, and allows the ready removal of such impurities, serving thus to constantly keep the retorts clean and in workmanlike condition. From the upper branch of the retort the gases created pass through the upright connection *d* into the lower branch, *b*, where they are further exposed to the action of the heat, and proper distillation and decomposition take place. From the free end of arm *b* the gases pass into the head *e*, and thence downward through a pipe, F, into a vessel, G. The pipe F joins the head *e* and the vessel G by ball-and-socket joints *h* and *i*, so as thus to be universally jointed, allowing the expansion of the retort under the influence of heat, and preventing the rupture of the connections which takes place if such connections are made rigid.

The vessel G is a tar-pot, serving to collect the tar and other impurities that are condensed from the gas that flows into said vessel, and a nipple or pendent pipe, *j*, extends from or below the pipe F downward into the vessel G, but not quite to the bottom thereof, lower, however, than the level of the pipe or pipes *l*, which take the gas from the vessel G to the places where it is to be stored or consumed. By this arrangement the tar and impurities will collect in the vessel to a height greater than the lower end of the nipple *j*, thus making a lock or trap to prevent the return-flow of the gas that has once entered the discharge-pipe *l*. A special branch, *m*, connects the vessel G with the expansion-chamber H, which is shown more fully in Fig. 4, and which receives the gas from the branch *m* at the bottom into a stand-pipe, *n*, whose open upper end is contained within an inverted cup, *o*, that is suspended by a bar or brace, *p*, within the main surrounding chamber H. Said chamber H has an upper outlet, $p^{\times}$.

Water or other liquid is to be placed into the space between the pipe *n* and the shell H, the pressure of the gas in the pipe *n* serving to hold the inner limb of the water a short distance above the lower open end of the cup *o*, the other limb of water being at a considerable height in the space between *o* and H. In case of eruption or sudden explosion within the retort the expansion thereby created will cause the gas to press still more thoroughly upon the lower limb of the water, causing the same to descend below, or at least to the lower edge of, the cup *o*, and allowing thereupon the gas to bubble up through the single column of water in the outer space between *o* and H and escape through the chimney $p^{\times}$. By this means a protection is afforded which allows the sudden expansion of the gas to expend its force in seeking to escape through the water in the vessel H rather than to destroy the walls of the retort and other apparatus, the resistance of the water to the escape of gas being less than the resistance of the walls of the apparatus. In fact, the height of the column of water in the vessel H is less than that in any of the other parts of the apparatus, so that the eruption or expansion chamber H will offer the least resistance of any to the abnormal expanding influence of the gas—enough resistance, however, to the normal expansion thereof. As soon as the pressure in the retort becomes normal the column of water in the vessel H will again reach its normal height, so as to prevent the further escape of gas through the same. Thus the vessel in reality takes the place of a safety-valve to protect the other parts of the apparatus from the effects of undue expansion. I wish to add that it is evident that by the downward discharge of gas and impurities from the retort all reflow of impurities or matter condensed to the retort is positively avoided. Condensed matter once out of the retort cannot come back into the same, and I thus insure a saving of fuel and of time in making gas which cannot be approached by any apparatus having an upward discharge of gas from the retort, and a consequent reflow of condensed matter.

I have described the retort as made of two arms, and am aware that a retort so shaped has particular advantages over other retorts known to me; but I desire to be distinctly understood that, as far as the downward discharge and the employment of the ball-and-socket joint on the discharge-pipe are concerned, I do not limit my invention to the use of said features on a retort of the specific construction here shown, for the reason that said features are equally advantageous and applicable to ordinary retorts, such as are now being used.

I claim—

1. The combination of the retort C with the discharge-pipe F and receiving-vessel G, the pipe F having a ball-and-socket connection, *h*, where it joins the body of the retort, and another ball-and-socket, *i*, at a distance from the retort, substantially as herein shown and described.

2. In an apparatus for making gas from oil or fat, the combination of the retort C and its downwardly-extending discharge-pipe, flexibly jointed thereto, with the extension-nipple *j*, tar-pot G, and gas-discharge pipe *l*, all arranged so that the gas-discharge pipe *l* is above the level of the lower end of the nipple *j*, substantially as described.

3. The combination of the retort C and its discharge-pipe F, tar-pot G, and pipe *l* with the eruption-chamber H, pipes *m n*, cup *a*, and pipe $p^{\times}$, for protecting the gas apparatus against the effects of eruption or explosion, substantially as specified.

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