

G. HILGENSTOCK.
PROCESS OF OBTAINING BY-PRODUCTS FROM GASES.
APPLICATION FILED DEC. 3, 1908.

928,974.

Patented July 27, 1909.

2 SHEETS—SHEET 1.

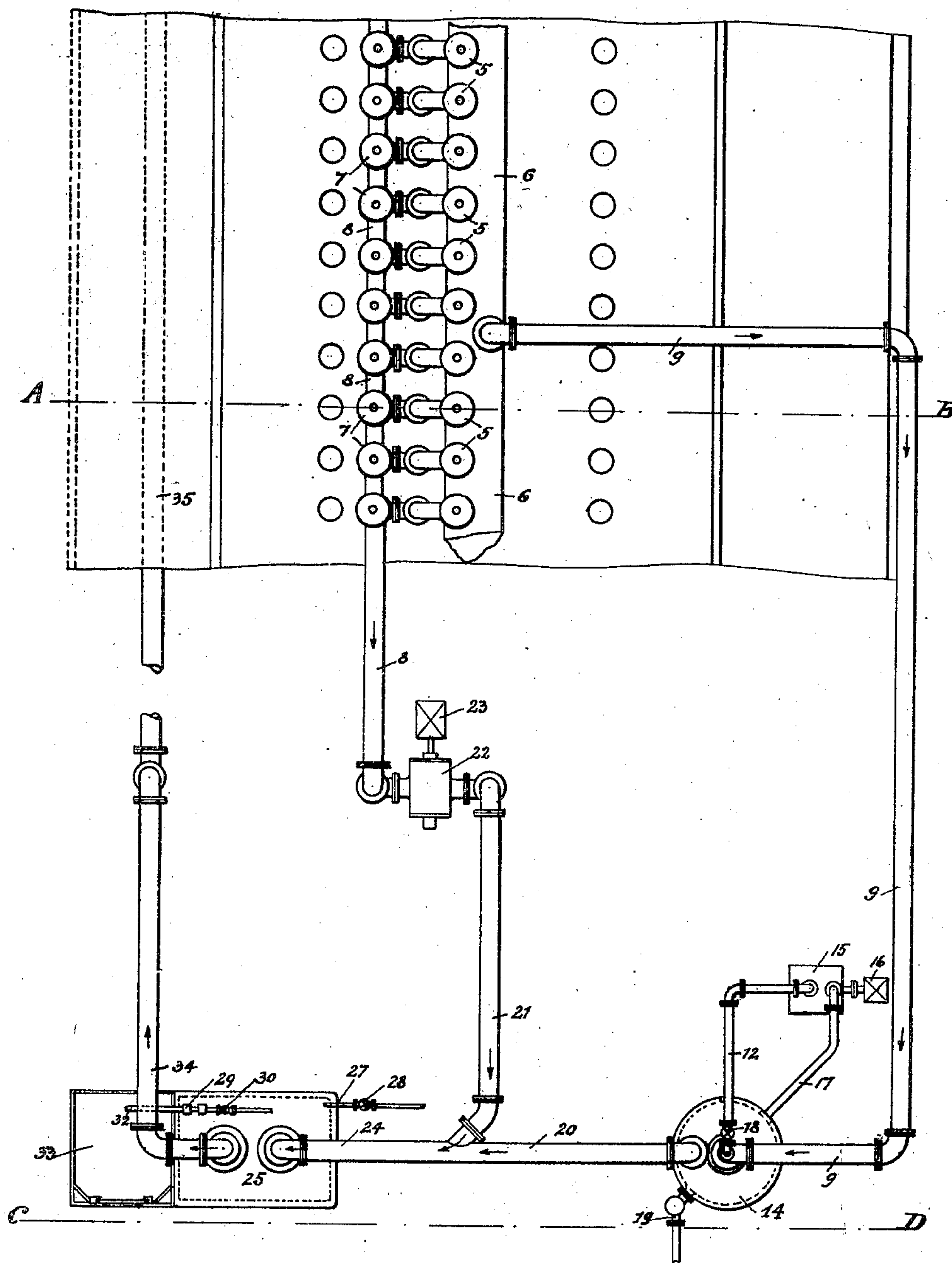


Fig. 1

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Marion Hall

Inventor:
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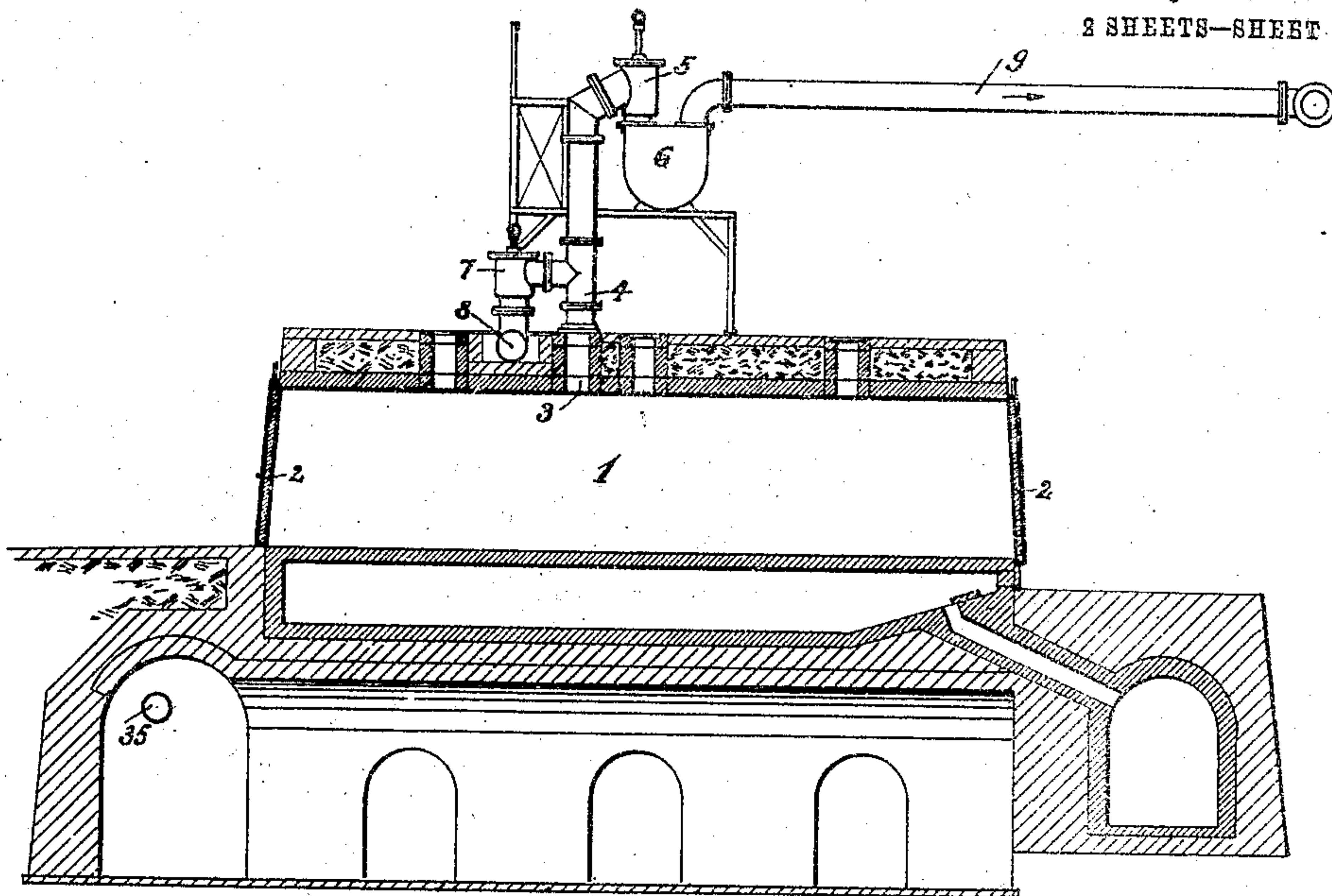


Fig. 2

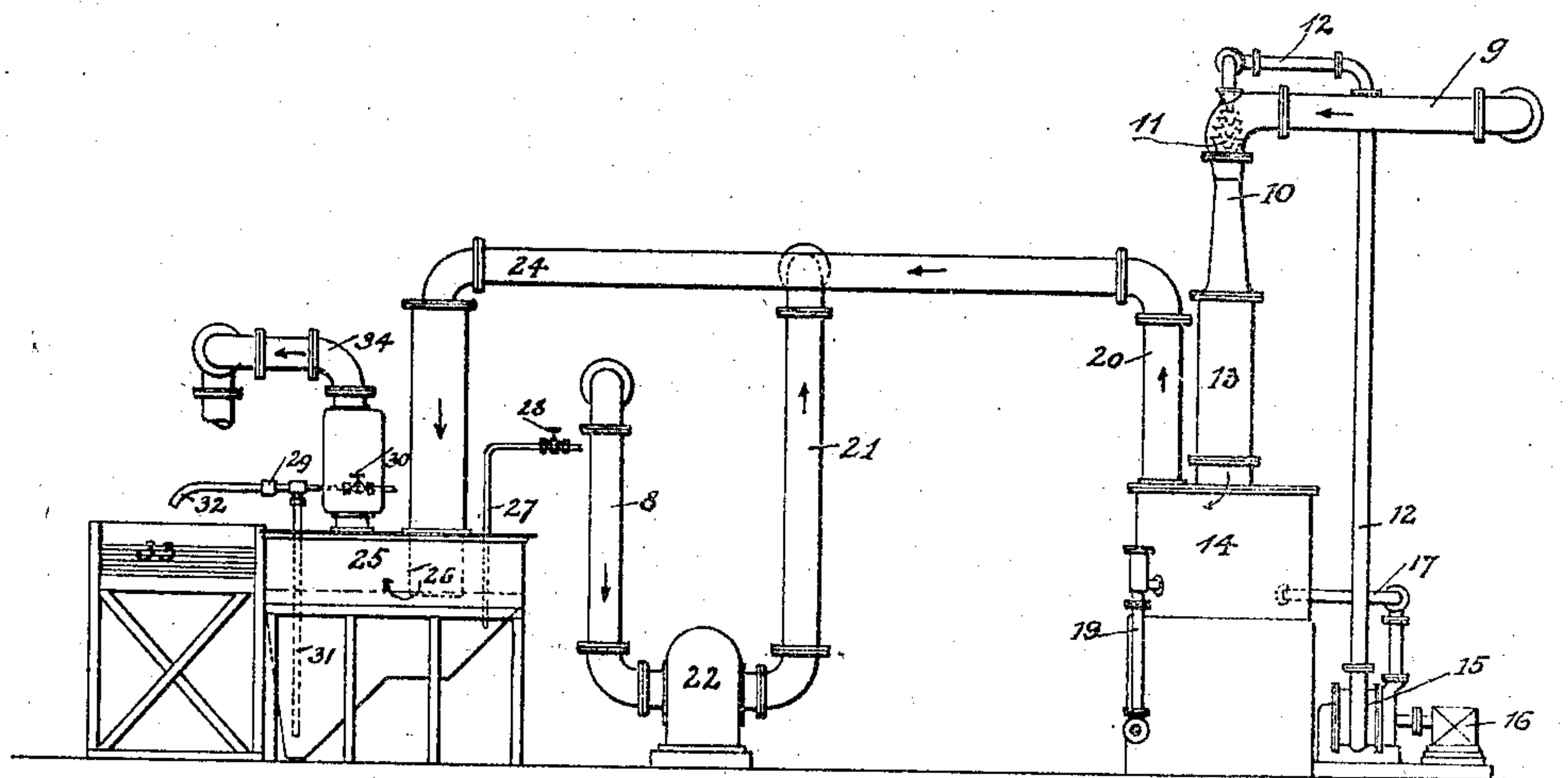


Fig. 3

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UNITED STATES PATENT OFFICE.

GUSTAV HILGENSTOCK, OF DAHLHAUSEN-ON-THE-RUHR, GERMANY.

PROCESS OF OBTAINING BY-PRODUCTS FROM GASES.

No. 928,974.

Specification of Letters Patent.

Patented July 27, 1909.

Application filed December 3, 1908. Serial No. 485,814

To all whom it may concern:

Be it known that I, GUSTAV HILGENSTOCK, a subject of the King of Prussia, Emperor of Germany, and a resident of Dahlhausen-on-the-Ruhr, Westphalia, Kingdom of Prussia, Germany, have invented certain new and useful Improvements in Processes of Obtaining By-Products from Gases Resulting from the Dry Distillation of Coal and other Materials, of which the following is a specification.

The removal of tar from the gases, resulting of the dry distillation of coal and other materials, has been formerly effected by cooling and washing the gases; the ammonia salts being obtained by distilling the ammonia liquor with steam in special stills and leading the vapors into an acid bath. Now-a-days the tendency is to remove the tar at higher temperatures in order to conduct the gases freed from tar directly into the acid bath for obtaining ammonia in the form of salts.

According to my invention the removal of tar is highly simplified and facilitated by dividing the gases after their formation in retorts or coke ovens fractionally into two parts, a larger and a smaller one. The latter part of the last hours of the distillation of a charge, which is practically free from tar, is added to the former and larger part after the same by any method has been freed from tar.

This process offers special advantages for eliminating the tar from the gases at higher temperatures, preventing the condensation of water and therefore allowing the direct precipitation of the ammonia salt in the saturator by means of an acid.

The best method of eliminating the tar at high temperatures is that by means of the tar injector, in which method tar, gas water containing tar or both are pressed into an injector, drawing in the gases and mixing them with the tar, gas water or both so that the gases containing tar are thoroughly mixed within the injector; the injector hereby serves a double purpose, first purifying the gas from tar and then assisting the draft of the gases by its sucking power. By means of the tar injector it is possible to remove the tar at once, the remainder being so small that it may be practically neglected.

In the accompanying drawings a plant is diagrammatically represented, by which the

process is carried out in combination with coke ovens for the recovery of by-products.

Figure 1 shows a plan-view of the plant, Fig. 2 shows a section on the line A—B of Fig. 1, Fig. 3 shows a section on the line C—D of Fig. 1.

Referring to the drawings, 1 is a coke-oven, 2 the doors which are airtightly closed; each oven has an opening 3 conducting to the stand-pipe 4, through which the gases are drawn off. Pipe 4 is connected by valve 5 to the hydraulic main 6 and by a second valve 7 to the gas conduit 8.

As long as the gases of distillation still contain tar, which is the case till several hours before the coking process is finished, they are conducted into the hydraulic main 6, through the open valve 5, whereas valve 7 remains closed. The gas collected in the hydraulic main is conducted through pipe 9 to the tar injector 10, by which the gas is drawn in and pressed forward. The tar injector is of the same construction as the steam injector, but instead of steam thin and pressed tar is used. Within the nozzles 11 of the tar injector the tar coming from the tube 12 is brought into intimate contact with the hot gases coming from the tube 9, whereby nearly all the particles of tar are removed from the gas. The tar is collected in the vessel 14; part of the tar is used for operating the tar injector. A centrifugal pump 15, driven by motor 16, draws tar from suction pipe 17 and forces it through pipe 12 into the injector, while the valve 18 regulates the quantities to be drawn in. The excess of tar flows off through pipe 19. The gas cleaned by the tar injector, being so hot that no water is condensed and containing all the ammonia, descends through tube 13 into vessel 14 and is conducted off through tube 20 toward an acid bath for the direct precipitation of the ammonia salt. Before however the gas enters the saturator, it is mixed with hot gas from tube 21 which is taken from the coke-oven in the following manner.

In those ovens where the distillation process is nearly finished valve 5 is closed and valve 7 is opened; the gas from these ovens is very hot and nearly free from tar. This gas is drawn from the collecting main 8 by a blower 22 driven by motor 23, pressed through tube 21 and mixed with the clean gas coming from the tar injector. The gas

mixture is then conducted through tube 24 into the saturater 25 for directly obtaining ammonia in the form of salts. In the saturater 25 the gas is brought into intimate contact with the acid by means of the diving tube 26 reaching below the level of the acid.

27 is a lead pipe with valve 28 through which as much acid is continuously added as is wasted in the saturater in order that the bath within the saturater retains its acid character. The ammonia salt depositing at the lowest part within the saturater 25 is drawn out from time to time through a suction tube 31 connected with an ejector 29 to which steam is conducted through valve 30; the salt is deposited on the platform 33 by means of tube 32. In case the ejector should not operate the salt can be removed by hand. From the platform the salt is transported to a drying apparatus as usually and then packed in bags. The gas freed from tar and ammonia is conducted through tube 34 into the distributing main 35 beneath the ovens from which the gas is distributed to the burners of each oven for heating purposes.

What I claim is:

1. The process of obtaining by-products from gases of dry distillation of coal and other materials consisting in dividing the first quantities of gases from the retorts or coke ovens, containing the greater part of the tar yield from the latter quantities of the gas from the retorts or coke ovens, containing relative little tar, removing the tar from the said first quantities of gas and then combining the substantially tar-free gas so produced with the said latter quantities of the gas.

2. The process of obtaining by-products from gases of dry distillation of coal and other materials consisting in dividing the first quantities of gases from the retorts or coke ovens, containing the greater part of

the tar yield from the latter quantities of the gas from the retorts or coke ovens, containing relative little tar, removing the tar from the said first quantities of gas and then combining the substantially tar-free gas so produced with the said latter quantities of the gas, and then leading the combined gases directly into the acid bath for obtaining ammonia salts.

3. The process of obtaining by-products from gases of dry distillation of coal and other materials consisting in dividing the first quantities of gases from the retorts or coke ovens, containing the greater part of the tar yield from the latter quantities of the gas from the retorts or coke ovens, containing relative little tar, removing the tar from the said first quantities of the gas by injecting tar therethrough, and then combining the substantially tar free gas with the said latter quantities of the gas.

4. The process of obtaining by-products from gases of dry distillation of coal and other materials consisting in dividing the first quantities of gases from the retorts or coke ovens, containing the greater part of the tar yield from the latter quantities of the gas from the retorts or coke ovens, containing relative little tar, removing the tar from the said first quantities of the gas by injecting tar therethrough, and then combining the substantially tar-free gas with the said latter quantities of the gas, and then leading the combined gases directly into the acid bath for obtaining ammonia salts.

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

GUSTAV HILGENSTOCK.

Witnesses:

LOUIS VANDORN,
H. STELZER.