(No Model.)

# O. BLEIER.

## APPARATUS FOR GAS ANALYSIS.

No. 605,991. Patented June 21, 1898.

Fig: 1.

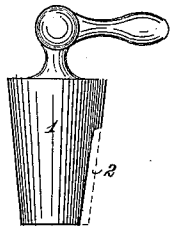



Fig: 2.

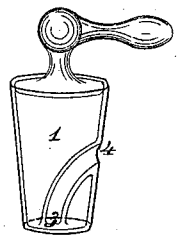



Fig: 3.

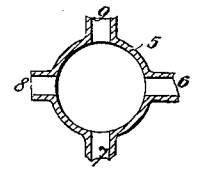



Fig: 7.

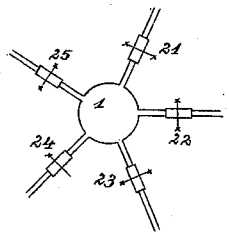



Fig: 6.

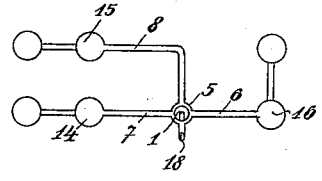



Fig: 4.

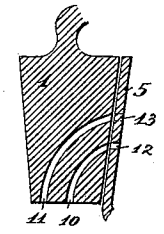
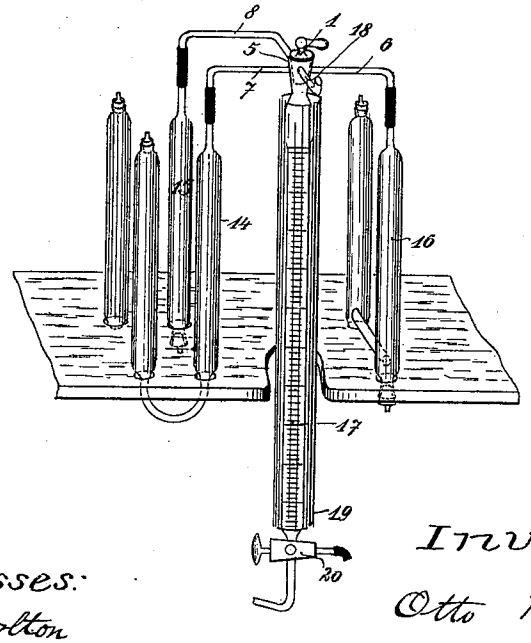



Fig: 5.




Witnesses:
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[illegible]

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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

# UNITED STATES PATENT OFFICE.

OTTO BLEIER, OF VIENNA, AUSTRIA-HUNGARY.

## APPARATUS FOR GAS ANALYSIS.

SPECIFICATION forming part of Letters Patent No. 605,991, dated June 21, 1898.

Application filed June 10, 1897. Serial No. 640,276. (No model.)

*To all whom it may concern:*

Be it known that I, OTTO BLEIER, chemist, a subject of the Emperor of Austria-Hungary, residing at IV Schlüsselgasse 3, Vienna, in the Province of Austria, in the Empire of Austria-Hungary, have invented certain new and useful Improvements in Apparatus for Gas Analysis; 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 appertains to make and use the same, reference being had to the accompanying drawings, and to figures of reference marked thereon, which form a part of this specification.

The present invention relates to an apparatus for the purposes of gas analysis.

It consists, essentially, in the characteristic that each single absorption vessel (glass pipettes) is brought into permanent connection with the vessel serving for measuring by means of a special capillary. Hitherto these glass pipettes were arranged consecutively one behind the other and connected by a capillary common to all with the measuring vessel, and in this arrangement each single pipette needed a stop-cock. (See Orsat's apparatus and its modifications.) In these apparatuses there is a space left between the connecting-capillaries between the individual pipettes, and this space is rather injurious, causing errors in measuring. This drawback is abolished in the present apparatus, as each pipette is connected directly with the measuring vessel by means of a separate capillary, and one single cock is sufficient to effect the connection of the measuring vessel with the separate pipettes.

In the drawings, Figure 1 is a side view of the plug. Fig. 2 is also a view of a cock or plug. Fig. 3 is a sectional view of the plug-casing. Fig. 4 is a sectional view of a cock or plug with part of the casing. Fig. 5 is a perspective view of the apparatus for gas analysis having my plug attached. Figs. 6 and 7 represent plan views, in diagrammatic form, of apparatus embodying my invention.

Figs. 5 and 6 of the accompanying sketch show such apparatus in general and diagram view. It consists of a graduated measuring-tube 17, which is surrounded by a water-coat 19 and terminates below in a three-way cock. At the upper end it passes into a plug-box 5, from which the capillaries 18, 6, 7, and 8 branch off. The latter three serve for the connection of the absorbing vessels 14, 15, and 16 with the measuring vessel, while any desired amount of pipettes and apparatuses may be connected with the measuring vessels by means of the capillaries 18.

As a matter of completeness I will here describe still the shape of the plug 1 for the cock-box 5. It may either be in the shape of an ordinary pipette-stopper, Fig. 1, with a sideway-channel 2 or may be provided with a boring 3 4, according to Fig. 2. The cock-box 5 has a number of borings 6 9 in the height corresponding to the orifice 4 of the plug, arranged in the manner that by turning the plug 1 the bore 4 can be brought alternately into correspondence with the bores 6 9, whereby the bottom of the plug-box is set into communication with one of the side spaces of the same, but appears closed in each middle position, (between 6 7 or 7 8, 8 9, or 9 6.) As many such communications can be established as can be placed within the circumference of the box 5. Should more be required and in order to forestall the danger that an increased circumference would imperil the easy turning of the plug, two or more canals 10 11 may be arranged aside or above each other in the plug 1, as shown in Fig. 4, while in the box 5 corresponding lateral orifices are provided in one or two rows 12 13, which may be advantageously arranged in position toward each other.

The gas mixture to be examined is allowed to enter into the water-filled measuring vessel at 18 and measured. Then the measured gas is brought into contact by raising and lowering the neighboring leveling vessel with the individual pipette-openings by means of turning the plug 1, and the difference in level is measured, as in the Orsat apparatus.

If the gas is to be brought into contact with means of absorption which are not permanently provided in the apparatus, the proper pipettes are connected with the capillaries 18. As represented in Fig. 7, pinch-cocks may be placed at 21 25 in place of the individual capillaries.

I claim—

1. An apparatus for complete analysis of

gas mixtures comprising the measuring vessel, the plurality of absorbing vessels, the valve-casing connected with the measuring vessel, an independent pipe connection from each absorbing vessel to said valve-casing, and a turning cock adapted to place each of said absorbing vessels separately in communication with said measuring vessel, substantially as described.

2. An apparatus for complete analysis of gas mixtures comprising the measuring vessel, the plurality of absorbing vessels, the valve-casing connected with the measuring vessel, an independent pipe connection from each absorbing vessel to said valve-casing, and a turning cock adapted to place each of said absorbing vessels separately in communication with said measuring vessel and a separate cock for each pipe connection, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

OTTO BLEIER.

Witnesses:
HARRY BELMONT,
KARL HÜTTER.