

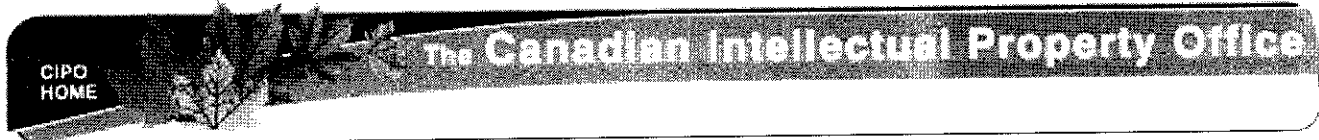


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12/19/2001 - 08:15:24
(1) CA 266382

(12) Patent:

(54) GAS PURIFYING PROCESS

(54) PROCEDE DE PURIFICATION DE GAZ

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(45) Date of Patent: **Dec. 7, 1926**

(22) Filing Date:

(43) Publication Date:

(52) International Class: **23/343**

(51) International Patent Class: **N/A**

(30) Priority: **No**

(30) Priority: **None**

(30) Priority: **N/A**

(30) Priority: **Unknown**

*** Note: Data on abstracts and claims is shown in the official language in which it was submitted.

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To all whom it may concern:

Be it known, that we, Professor Doctor Franz Fischer, citizen of Germany, and Doctor engineer Hans Tropesch, citizen of the Czechoslovak republic, both residing at 1, Kaiser-Wilhelm-Platz, Mülheim on the Ruhr, Germany, having invented certain new and useful improvements in a "Process for purifying gases from sulphur", do hereby declare that the following is a full, clear and exact description of the same:

This invention relates to a process for the desulphuration of gases and vapours by converting the carbonous sulphur combinations of such gases and vapours into sulphuretted hydrogen and by absorption of the thus formed sulphuretted hydrogen. It has already been proposed to use for this purpose contact-substances, specially metallic oxides, preferably oxide of zinc, and to conduct the gases or vapours at very high pressure over these metallic oxides or the like. It has further been proposed to use metals of the iron-group for this purpose, but at the practical carrying out of this proposition only gases have been obtained which contain still about 17 gr. of sulphur per 100 cubic meters of gas (compare Evans J. Soc. Chem. Ind. of 1915, 34, 9.). This unsatisfactory result is evidently due to the fact, that the ordinary contact-substances are not sufficiently active or do not permanently preserve their activity.

We now have found, that a permanently active contact can be obtained, if the contact-metal is in finely divided state and in intimate admixture with anorganic substances which remain solid at the reaction temperature, such as bases or acid anhydrides, such contact-means being preferably used, which do not otherwise alter the gases or gas mixtures present. Such a contact preserves its activity for months. The working can be

carried out preferably at a temperature of 400 to 600°C under atmospheric pressure, all sulphur-combinations of the gas then being converted into easily absorbable sulphuretted hydrogen. The permanency of the contact is so high that it is not necessary in its application to remove from the technical gas first the present free sulphuretted hydrogen in the usual manner, and to only subsequently convert with the aid of the contact-substance according to the invention the other sulphur-combinations into sulphuretted hydrogen. On the contrary the raw-gas can be directly conducted over the contact. After the separation of the originally present and freshly formed sulphuretted hydrogen by absorption or the like, the gas or gas mixture is practically free from all sulphur-combinations. For instance we have succeeded to reduce in this manner the percentage of sulphur of gases to less than 0,1 gr. in 100 cubic meters.

According to the present invention as contact-metals such metals or metal-alloys are preferably employed the melting point of which is lower than the reaction-temperature, such as for instance lead and tin. When such metals or metal-alloys are used, the added substances which remain solid at the reaction temperature, as bases or acid anhydrides, and with which said metals are intimately mixed, prevent the conglomerating of the contact metals or the flowing together of the same to form drops at the reaction temperature. It is therefore advisable to use as solid carriers for the easily fusible metals substances of large surface or to add such substances, such as highly porous substances.

As contact substance chromate of lead may be used for instance, in which case, owing to the reducing effect of the

gas employed, a mixture of chromic oxide and finely divided lead is produced, which exerts the desired effect and preserves the same for months. Instead of the chromates other salts, for instance silicates, aluminates and the like may be used, or such salts in which the effective metal is contained in the basic portion of the salt, for instance calcium-plumbate. To such substances other substances might further be added either for increasing the effect, for instance small quantities of copper or copper-oxide, or for enlarging the surface, for instance infusorial silica or the like. Several of the above stated or of other effective salts might be used in mixture. But we may also start at once from the free metal and bring the same, in a mechanical manner, into intimate admixture with the anorganic substances which remain solid at the reaction temperature. Or we may apply, for the production of the contact, an organic salt, as acetate of lead, spread upon a solid inorganic body possessing a large surface, as a porous slab of clay or earthenware, or pumice, and subsequently dry and reduce the mass.

The selection of the contact-means applied depends on the kind of gases or vapours to be purified. Contact-substances which do not contain any metal of the iron-group are specially valuable if such gases have to be purified which should not be altered otherwise by said contact. In the stated manner any technical gases, as lighting-gas, generator gas or watergas and the like, can be completely freed from their contents of carbonic disulphide and of other sulphur combinations by making the hydrogen reduce the sulphur-combinations quantitatively to sulphuretted hydrogen through the action of the contact-means, the sulphuretted hydrogen being then also quantitatively removed in a manner known per se, for instance by gas-purifying mass or by active carbon.

Example :

In a tube of a cross section of 5 square meters a quantity of 300 cubic centimeters of contact mass is arranged over a length of 60 mm., said contact mass consisting, to equal parts, of chromate of lead and oxide of copper. This mass is first reduced by means of a reducing gas, for instance hydrogen, watergas or generator-gas at 400° C., so that it cannot possess any longer oxidising properties. This mass then possesses neither the capability to separate carbon from gases containing carbonic oxide nor that to form methane therefrom, but it possesses the only desirable property to convert the organic sulphur-combinations of such gases into sulphuretted hydrogen.

If the gas has passed over this contact-mass, the sulphuretted hydrogen is removed with the aid of the commonly used means, as for instance meadow iron ore or active carbon. This contact-mass therefore is not an absorption-means for sulphur combinations but a catalytic converter. For this reason the mass remains active for any length of time. For instance over the above mentioned 300 cubic centimeters of contact-mass sulphur containing gas has been conducted at 500° C during several months at a speed of 1 cubic meter per hour, and the contact-mass did not show any decrease of its activity. It has also been ascertained, that even more than 1 cubic meter of gas could be conducted per hour over said contact-mass.

contact-means consisting of metals brought into a finely divided state by intimate admixture with inorganic substances which remain solid at the reaction temperature, whereupon the formed sulphuretted hydrogen is separated.

2.- A process for purifying gases from sulphur by converting the carbonous sulphur-combinations into sulphuretted hydrogen by means of contact-substances in the presence of hydrogen, and absorption of the sulphuretted hydrogen, consisting in that the hydrogen containing gases are passed over contact-means consisting of metals brought into a finely divided state by intimate admixture with inorganic bases which remain solid at the reaction temperature, whereupon the formed sulphuretted hydrogen is separated.

3.- A process as claimed in claim 1 characterised by the use of such metals, the melting point of which is lower than the reaction temperature.

4.- A process as claimed in claim 1 characterised by the use of mixtures of several different metals in the contact means.

5.- A process as claimed in claim 1 characterised by the use of such inorganic non-fusing substances which have a great surface, for carrying said contact metals.

6.- A process as claimed in claim 1 characterised in that such contact-materials are used, which do not otherwise alter the existing gases or gas-mixtures.

Signed at Waltham, Germany, this 29th day of April, 1926.

WITNESSES:
Hans Broche
Waltham

Dr. An. Fridm. Fischer
Doctor Hans Traub

What we do claim as our invention and desire to
secure by Letters Patent is:-

1.- A process for purifying gases from sulphur by
converting the carbonous sulphur-combinations into sulphuretted
hydrogen by means of contact-substances in the presence of
hydrogen, and absorption of the sulphuretted hydrogen, con -
sisting in that the hydrogen containing gases are passed over