

No. 758,775.

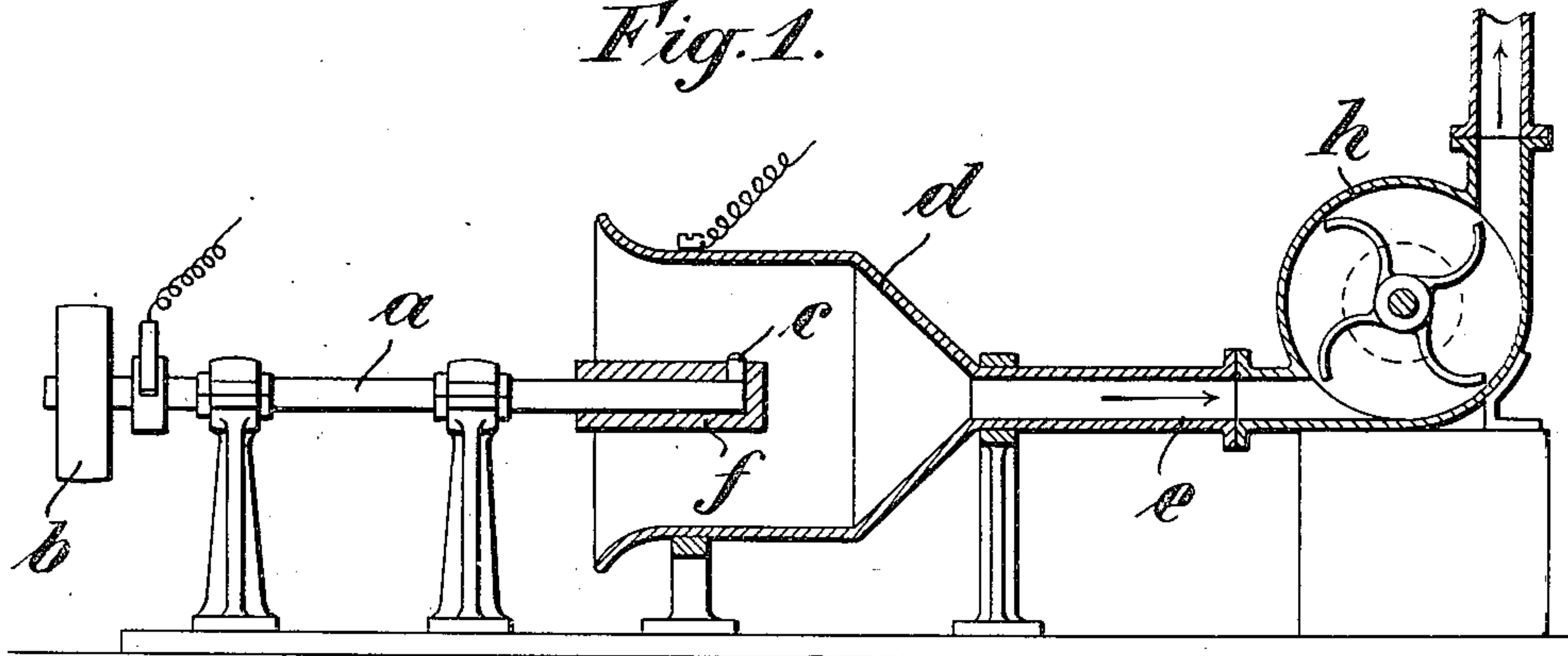
PATENTED MAY 3, 1904.

H. PAULING.  
APPARATUS FOR THE TREATMENT OF GASES.

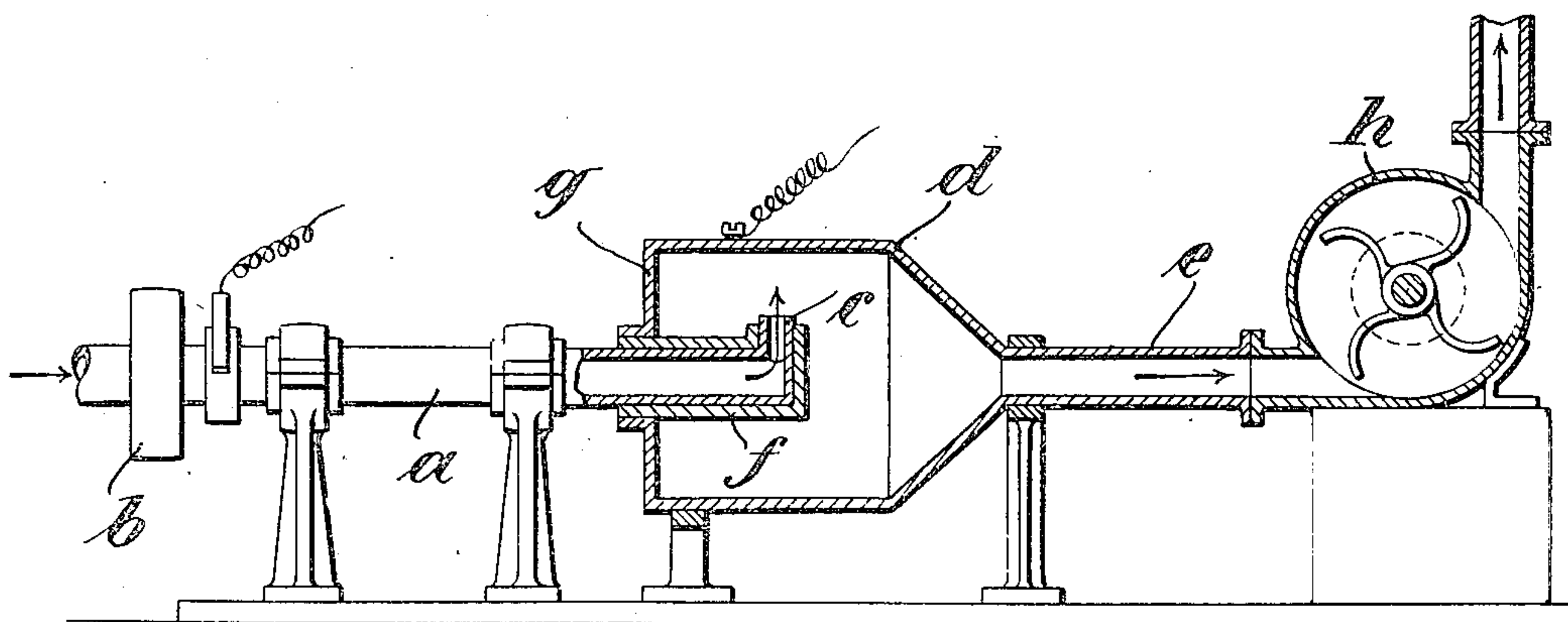
APPLICATION FILED NOV. 20, 1903.

NO MODEL.

*Fig. 1.*



*Fig. 2.*



*Witnesses:*  
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## UNITED STATES PATENT OFFICE.

HARRY PAULING, OF GELSENKIRCHEN, GERMANY.

## APPARATUS FOR THE TREATMENT OF GASES.

SPECIFICATION forming part of Letters Patent No. 758,775, dated May 3, 1904.

Application filed November 20, 1903. Serial No. 182,040. (No model.)

*To all whom it may concern:*

Be it known that I, HARRY PAULING, engineer of mines, a citizen of the Kingdom of Saxony, and a resident of and whose post-office address is Gelsenkirchen, Prussia, German Empire, have invented certain new and useful Improvements in Apparatus for the Treatment of Gases, Vapors, and the Like by Electric Spark Discharges, of which the following is a specification.

This invention relates to an improved apparatus for the treatment of gases, vapors, and the like by electric spark discharges. For certain purposes—for example, the ozonizing of oxygen for converting the nitrogen of the atmosphere into nitrous acid and the like—it is necessary to expose air, gases, gas mixtures, or mixtures of gas and air or vapors of all kinds and the like which may contain liquids in a finely-divided condition separately or several simultaneously to the effect of electric spark discharges. The method hitherto in use consisted in producing the electric spark in a space or chamber filled with the particular gas or in a current of gas between two ordinary electrodes. It will be obvious that in this case the spark could only act upon a small quantity of gas at a time, and it is impossible to subject all parts of a given volume of gas uniformly to the action of the electric spark.

The apparatus forming the subject of the present invention is based upon a process which enables the continuous treatment of gases and the like by means of spark discharges in such a manner that every particle of the gas is compelled to come into contact with the spark.

The said process consists, essentially, in the fact that by a suitable form of the electrodes between which the spark is produced or by a suitable movement of the electrodes toward one another the sparking-surface is drawn out in disk shape and the gases are blown or sucked through the spark-gap so formed. A disk-shaped sparking-surface can be produced, for instance, by allowing the points between which the spark has to pass to make a rapid lateral displacement. The apparatus suitable for this arrangement and forming the subject of this invention is represented in two forms in longitudinal section in Figures 1 and 2.

A shaft *a* is rotarily mounted in suitable bearings and driven by a belt passing round the pulley *b* or in any other suitable manner. The shaft carries at its other end a laterally-directed projection *c*. This shaft is suitably connected with the pole of a strong induction-coil—for instance, by brushes. *d* is a vessel reduced on one side to form a funnel, the shaft *a* extending into the open end thereof. This vessel is connected with an air-pump *h* or the like through a tube *e* and is made at its front part, at least, of conductive material and is connected to the other pole of the induction-coil. If the coil is sufficiently powerful, a spark will jump from point *c* to *d*. If the shaft *a* is rotated, the part where the jumping of the spark takes place will be continuously displaced and on sufficiently rapid rotation will result in a circular spark disk. If suction is simultaneously effected in the vessel *d* through pipe *e*, the atmospheric air drawn in will have to pass through the spark discharged and is thereby decomposed by the latter.

To prevent a spark jumping at any other point except *c*, the front end of the shaft *a* is provided with a suitable insulating-casing *f*, from which the conducting-point *c* projects.

Fig. 2 represents another construction of the above-described apparatus. Here the funnel *d* is closed and the shaft *a* projects through the end *g* and packed by a stuffing-box or the like. Instead of the solid shaft *a* a hollow one is provided, the radial projection of which is also hollow. The electrical connections of the parts are the same as previously described. On the shaft being rotated the spark-disk is formed between the projection *c*, formed as a nozzle, and the funnel *d*. The gases to be treated are blown in through the hollow shaft *a*, serving as an electrode, through the nozzle *c* into the cylinder *d*. This outlet takes place within the path of the spark-disk coming from said drum, and the gases, being for some considerable time subjected to the effect of the spark, are more energetically treated by the latter than if they simply cross the path of the spark.

In the apparatus described above the gases, gas mixtures, or vapors can be subjected to the treatment in a more or less cooled or heated



state and under normal, increased, or reduced pressure. They can also be saturated with finely-divided liquids, such as water.

5 The temperature of the gases or vapors to be treated in this apparatus, as well as their pressure, changes according to the nature of the gases or vapors and the nature of the products to be obtained.

10 Having now particularly described and ascertained the nature of my invention, I declare that what I claim is--

1. An apparatus for the treatment of gases, vapors and the like by electric spark discharges, comprising a funnel-shaped electrode, 15 another electrode of shaft form rotarily mounted in suitable bearings, one end of said electrode being covered with insulated material and projecting into the open end of the funnel-shaped electrode, a laterally-directed projection arranged on this end of the shaft and 20 projecting through the insulating material, means for rotating the shaft-electrode, means

for sucking air through the funnel and electric connection between the electrodes and a source of electricity, substantially as shown and described. 25

2. An apparatus for the treatment of gases, vapors and the like by electric spark discharges, comprising a funnel-shaped electrode, a shaft-shaped electrode rotarily mounted in 30 suitable bearings, one end of the shaft-shaped electrode projecting into the funnel, a laterally-directed projection arranged on this end of the shaft, the shaft and the projection fastened to it being hollowed tubes, and a lid closing 35 the funnel and embracing the shaft, substantially as shown and described.

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

HARRY PAULING.

Witnesses:

WOLDEMAR HAUPT,  
HENRY HASPER.