2 Sheets--Sheet 1.

O. BRAUN.

Apparatus for Purifying Gas.

No. 165,785. Patented July 20, 1875.

Fig. 1.

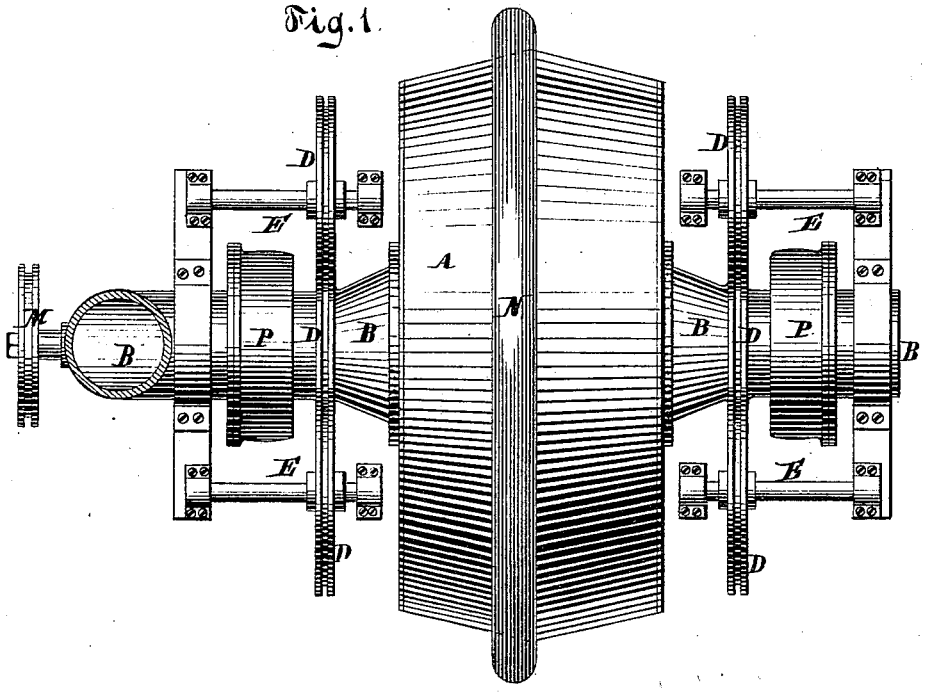
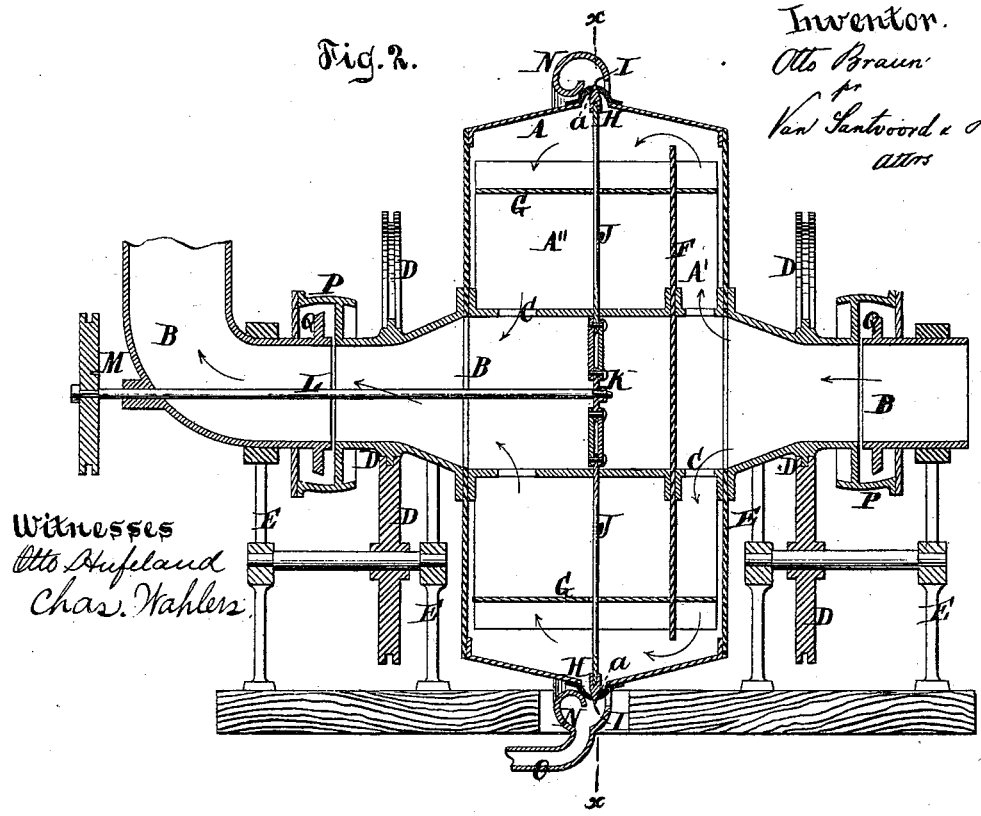


Fig. 2.



Inventor.
Otto Braun
per
Van Santvoord & Hauff
attys

Witnesses
Otto Hufeland
Chas. Wahlers

2 Sheets--Sheet 2.

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Fig. 3.

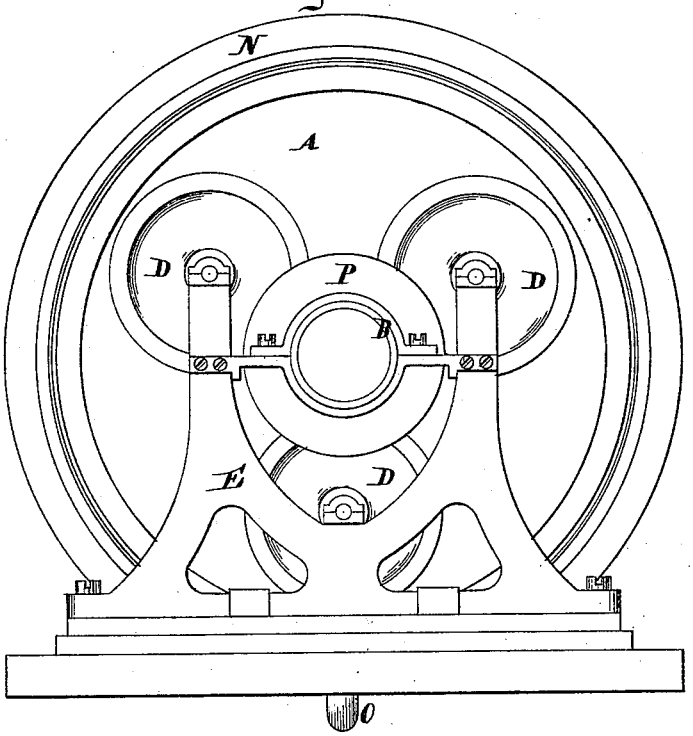
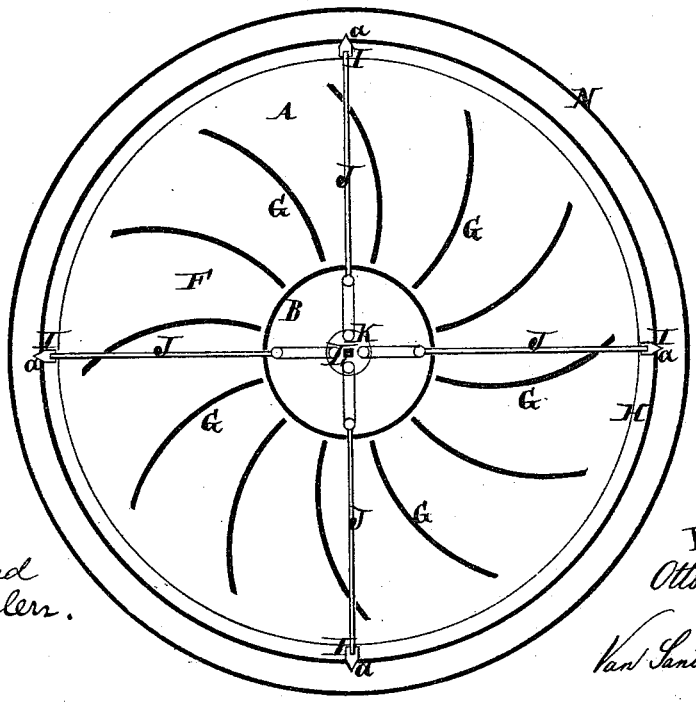


Fig. 4.



Witnesses.
Otto Stufeland
Char. Wahlers.

Inventor.
Otto Braun
pr
Van Santwood & Hauff
Attys

UNITED STATES PATENT OFFICE.

OTTO BRAUN, OF BERLIN, PRUSSIA.

IMPROVEMENT IN APPARATUS FOR PURIFYING GAS.

Specification forming part of Letters Patent No. **165,785**, dated July 20, 1875; application filed June 11, 1875.

To all whom it may concern:

Be it known that I, OTTO BRAUN, of Berlin, in the Kingdom of Prussia, have invented a new and useful Improvement in Apparatus for Purifying Gas, which improvement is fully set forth in the following specification, reference being had to the accompanying drawing, in which—

Figure 1 is a plan view of the apparatus used in carrying out my invention. Fig. 2 is a longitudinal central section thereof. Fig. 3 is an end view of the same. Fig. 4 is a cross-section in the plane of the line *x x*, Fig. 2.

Similar letters indicate corresponding parts.

My invention relates to an apparatus for removing impurities from gas, air, or smoke, and is intended particularly for obtaining useful products from the smoke of mineral coal.

My invention consists of a rotating drum, combined with a hollow shaft, through which the gas passes to and from the drum, and combined with valves, which are arranged in the periphery of the drum for the purpose of letting out the refuse matter eliminated from the smoke. The valves are connected to a swivel in such a manner that they may be simultaneously opened and without stopping the motion of the drum, while the valves are adapted to close by centrifugal force. With the rotating drum is combined, further, an annular gutter, to receive the impurities discharging from the drum by means of the valves, the gutter extending round the circumference of the drum in the path of the valves in such a manner that when the valves are opened the matter thus allowed to discharge from the drum by centrifugal force is received in the gutter, and may be thence conducted to a suitable tank.

The rotating drum contains a series of vanes, by the action of which the smoke is made to partake of the motion of the drum. The drum, moreover, is divided into two unequal compartments communicating with each other, by means of which and of the vanes the rotary velocity of the smoke is alternately increased and diminished, and thus the elimination of impurities from the smoke is facilitated.

In carrying out my invention I moisten the smoke or gas to be purified either by turning into it water or other liquid in the form of spray, or by cooling it, in order to condense part of the steam which it invariably contains. I then pass the smoke or gas through a rapidly rotating vessel or drum, so as to expose it to centrifugal power, and by this operation the moisture, saturated with the impure substances of the smoke, (chiefly with compounds of ammonia,) is deposited with tar or soot against the periphery of the drum, and in this way the solid substances are eliminated from the gaseous portion of the smoke, and the gas escapes clear.

In the drawing, the letter A designates the form of drum which I prefer to use in carrying out my invention. This drum is mounted on a hollow shaft, B, and communicates therewith through openings C C formed in the shaft. The hollow shaft B carries tongued wheels D, which engage with grooved wheels D′, mounted in a frame-work, E. By these wheels D the hollow shaft B and the drum are supported and steadied in their rotary motion. F designates a plate, by means of which the drum A is divided into two unequal compartments, A′ A″, the plate F being fastened to the hollow shaft B and crosswise thereof, in such a manner as to close the shaft, and cause a deflection of the smoke passing to the drum. The diameter of the plate F is less than that of the drum A, so that a communication is formed between the two compartments A′ A″. G designates a series of vanes which are arranged within the drum A for the purpose of assisting in driving the impure substances from the moist smoke when a rotary motion is imparted to the drum. These vanes G are fastened to the plate F, and are placed in a tangential position, as shown in Fig. 4.

By the action of the vanes G the rotary velocity of the smoke passing through the drum increases in the compartment A′, while it is retarded in the compartment A″.

The periphery of the drum A contains a furrow, H, in which are arranged valves I, the latter being placed in apertures *a*, formed in the furrow. The valves are affixed to the ends of rods J, which are connected to a swivel, K, having the form of a wheel, and which is mounted on a spindle, L. This spindle has on its outer end a hand-wheel, M. By turning this wheel in either direction, the spindle L and the swivel K partake of the movement,

and by this means the valves I can be withdrawn from the apertures *a*, and any substance contained in the drum allowed to escape. The valves may in like manner be closed, and they have a tendency to retain their closed position, by the centrifugal power of the rods J, when the drum is rotated. The valves are intended to be opened from time to time—say, every ten minutes—during the rotation of the drum, in order to free the drum from refuse matter. In the line of the furrow H, on the exterior of the drum A, is placed an annular gutter, N, from the lower part of which extends a tube, O, that is intended to be connected with a tank. Thus, when the valves I are opened, and refuse matter escapes from the rotating drum, it is received in the gutter N and led to the tank. The hollow shaft B is provided with a pulley, P, on either side of the drum A, by means of which pulley the shaft and the drum may be given a rotary motion. This pulley P is hollow, and serves to form a hermetic coupling for the sections of the hollow shaft B, as follows: The outer sections of the hollow shaft are provided with a flange, Q, (see Fig. 2,) which is made to project into the hollow pulleys P, in such a manner that if the pulleys are partially filled with water, and are given a revolving motion, the water arranges itself against the inner circumference of the pulleys, and the inlet or outlet of gas or air is prevented.

By this construction, moreover, the part of the hollow shaft carrying the drum A is adapted to rotate, while the remaining sections are stationary.

The frame of my apparatus is not described in detail, as it has no special form. The form of the rotating drum, the number and position of the vanes, and of the valves, and the pulleys, can be varied.

It is obvious that my invention is adapted for purifying gases of any kind, as well as smoke. It is applicable also for providing theaters and other buildings with pure, cool, humid air, inasmuch as if air (or gas) is passed through the drum A, after having been exposed to moisture, all impurities are extracted in like manner as described with respect to smoke. To get solid bodies out of gases in a dry state, as, for instance, oxide of zinc from air, (in the preparation of zinc white,) I vary somewhat the form of the rotating drum and of the valves.

What I claim as new, and desire to secure by Letters Patent, is—

1. The apparatus constructed of the drum A, hollow shaft B, and valves I, for the purpose of purifying gases, substantially as described.

2. In combination with the valves I, the swivel K, for opening and closing the valves, substantially as described.

3. The annular gutter N, in combination with the rotating drum A, and valves I, substantially as described.

4. The rotating drum A, divided into two unequal compartments, A′ A″, as shown, in combination with the vanes G, connected tangentially with the plate F, substantially as described, whereby the rotary velocity of the gases, &c., passed into the said drum is alternately increased and diminished, and the impurities separated therefrom, as set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 1st day of May, 1875.

DR. OTTO BRAUN.

Witnesses:
F. RICKTER,
E. HUMBURG.