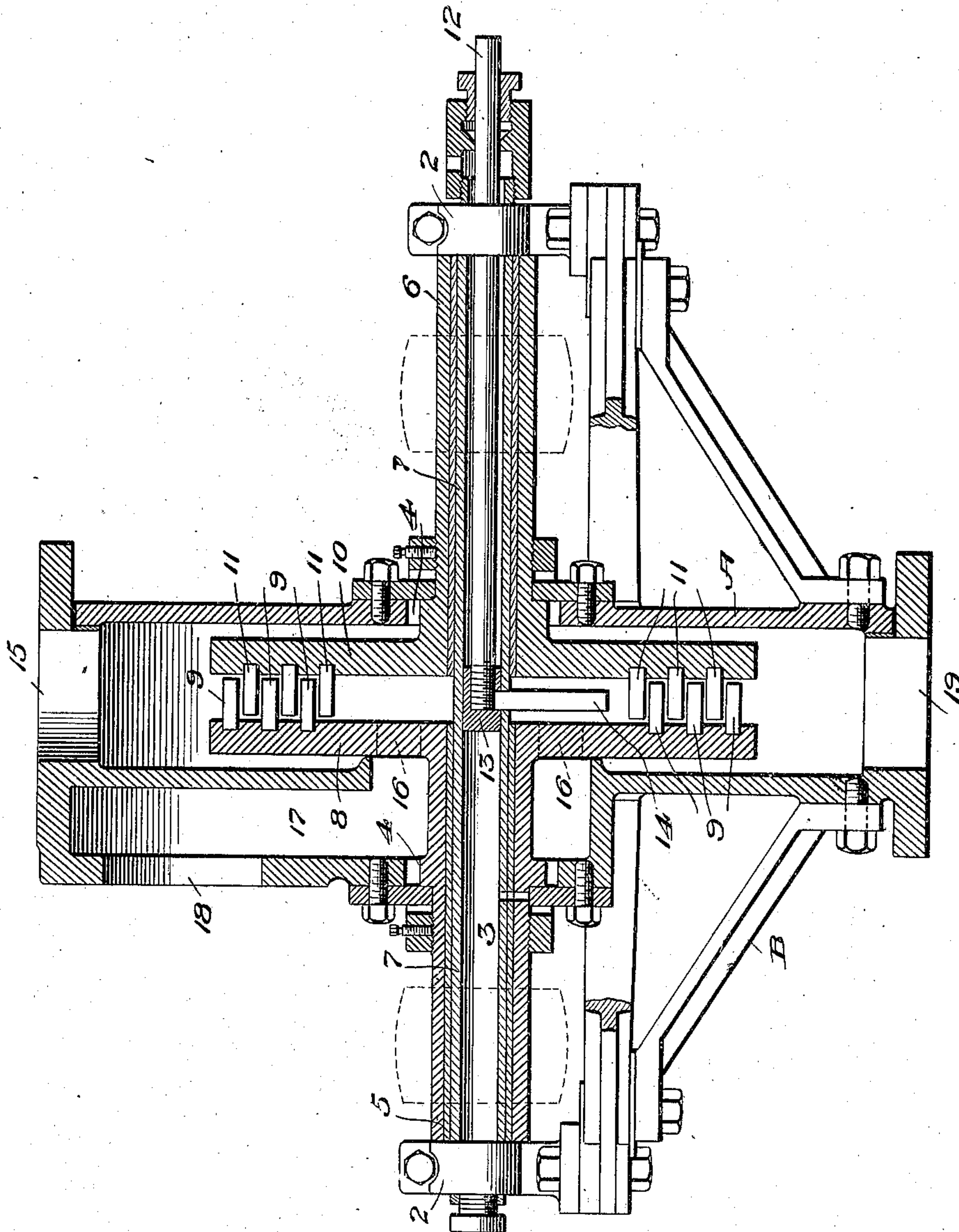


No. 894,753.

PATENTED JULY 28, 1908.

H. F. SMITH.  
APPARATUS FOR PURIFYING GAS.

APPLICATION FILED FEB. 21, 1908.



Witnesses  
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# UNITED STATES PATENT OFFICE.

HARRY F. SMITH, OF LEXINGTON, OHIO.

## APPARATUS FOR PURIFYING GAS.

No. 894,753.

Specification of Letters Patent.

Patented July 28, 1908.

Application filed February 21, 1908. Serial No. 417,160.

*To all whom it may concern:*

Be it known that I, HARRY F. SMITH, a citizen of the United States, residing at Lexington, in the county of Richland and State of Ohio, have invented certain new and useful Improvements in Apparatus for Purifying Gas, of which the following is a specification.

My invention relates to improvements in an apparatus for purifying gas, and the object is to remove dust, tar, and other impurities therefrom. These materials are usually carried in suspension in the gas in the form of minute particles, and consequently cannot be filtered out or removed by ordinary methods of cleaning. By my improvement I am enabled to remove such impurities by subjecting the gas to an extremely high rate of mechanical acceleration whereby the solid particles are drawn down by reason of their inertia.

Another object is to provide a series of alternately moving vanes which are set close together, and which are made in the form of blades through the openings between which the gas is caused to flow in such a manner as to pass through alternate sets of vanes moving in opposite directions so that the gas is subjected to violent acceleration, thereby causing any solid matter in suspension to be precipitated.

The invention relates to certain other novel features of construction and combinations of parts which will be hereinafter described and pointed out in the claims.

The accompanying drawing is a vertical longitudinal sectional view of my proposed purifier.

A, represents the housing or casing, which is stationary, and mounted on the casing is a frame B. Journaled in bearings 2, 2 of the frame is a hollow shaft 3, which extends through openings 4, 4 in the casing. Mounted on the shaft are axles 5 and 6, and between the axles and hollow shaft 3 are bushings 7, 7.

Mounted on the axle 5 is a disk 8 having vanes or blades 9, 9 thereon, and mounted on the axle 6 is a similar disk 10 having blades or vanes 11, 11 thereon. The blades or vanes 9 and 11 are preferably spaced a short distance apart, and the blades of the two disks are alternately and concentrically assembled. These disks are adapted to rotate in opposite directions.

A pipe 12 extends from one side of the housing or casing into the hollow shaft 3 and is held in a bearing block 13 in the hollow shaft. Connected to the block 13 and passing through the hollow shaft and between the two disks 8 and 10 is a tube 14.

The gas is admitted from the circumference of the housing or casing 15 and is then taken radially through the apparatus from the circumference inwardly toward the center and passes through openings 16 in the disk 8 into the annular passage 17, which surrounds the shaft 3 and axle 5 and extends upwardly through the casing or housing, where it passes out of the casing through an opening 18.

The water which is admitted passes through the pipe 12 in the hollow shaft 3 and through the tube 14 to the vanes or blades 9 and 11. The gas will travel radially through the vanes or blades and the water will traverse the apparatus in the reverse direction and will pass out of the apparatus through the discharge opening 19.

The centrifugal force exerted by the blades on the solid particles suffices to keep it moving continuously outward toward the circumference of the apparatus, while the greater force moving the gas through the apparatus, which may be produced by any suitable means, will cause the gas to flow from the circumference radially inward toward the center or in the opposite direction to the flow of water. By this method the apparatus becomes not only an efficient cleaning apparatus, but also a very efficient means for cooling the gas as well as by the treatment with the cold water.

As the gas is admitted to the housing or casing for cleaning it will pass into the narrow spaces between a row of the rotating blades or vanes, and by the fact of its presence between such rotating blades it is compelled to revolve with a velocity equal to that of the blades themselves and travel radially inward into a closely adjacent set of blades revolving in the opposite direction. The clearance between the two rows of blades being relatively small, the time required for the passage of the gas from the rapidly moving blades to the rapidly moving blades traveling in the opposite direction is very brief, and as a consequence the rate of change of velocity or the acceleration imparted to the gas is correspondingly great.



The gas passes from the different rows of blades to an oppositely rotating set, and so on alternately through as many sets of blades as it is desired or necessary to use in continuing the operation. It will be noted that this is an entirely different step from the centrifugal action imparted in the method of cleaning or purifying gas, as the blades which are alternately assembled rotate in opposite directions, and the gas is compelled to revolve with a velocity equal to that of the blades themselves, and the gas does not flow by centrifugal force but by whatever external force is used in circulating the gas. It is obvious that if both sets of vanes or blades moved in the same direction, the apparatus would be entirely inoperative, as there would be no real change in the velocity imparted to the gas. By my method the gas is alternately accelerated, and the rate of acceleration can be much higher than in a centrifugal apparatus with much lower rotative speed. By mounting two sets of blades adapted to rotate in opposite directions, the actual rate of speed for each part can be reduced, and at the same time maintain the same relative rate of motion between the adjacent rows of blades.

Having fully described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. An apparatus for purifying gas, comprising a housing, rotatable means therein traveling in different directions, and means for passing the gas through the rotatable means whereby the gas is alternately accelerated.

2. An apparatus for purifying gas comprising a housing, rotary vanes therein traveling in different directions, and means for passing the gas through the vanes whereby the gas is alternately accelerated.

3. An apparatus for purifying gas comprising a housing, rotary disks journaled therein and traveling in different directions,

vanes or blades on the disks alternately assembled, and means for passing the gas through the vanes or blades whereby the gas is alternately accelerated.

4. An apparatus for purifying gas comprising a housing, rotary vanes therein traveling in different directions, and means for passing gas and water through the vanes whereby the gas and water are alternately accelerated.

5. An apparatus for purifying gas comprising a housing, rotary vanes therein traveling in different directions, and means for passing gas and water through the vanes in different directions.

6. An apparatus for purifying gas comprising a housing, rotary vanes therein traveling in different directions, means for passing the gas through the vanes and passing out through the side of the housing, and means for passing water through the vanes in a different direction from the flow of the gas.

7. An apparatus for purifying gas comprising a housing, a hollow shaft, rotary disks journaled therein, vanes on the disks alternately assembled, means for passing the gas through the vanes, means for passing the water through the hollow shaft to the vanes, and means for rotating the disks in different directions whereby the water and gas are alternately accelerated.

8. An apparatus for purifying gas, comprising a housing, rotary disks journaled therein and traveling in different directions, vanes on the disks alternately assembled and means for passing gas and water through the vanes whereby the gas and water are alternately accelerated.

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

HARRY F. SMITH.

Witnesses:

A. B. BEVERSTOCK,  
R. B. HUNTER.