H. SAVAGE.

APPARATUS FOR PURIFYING BLAST FURNACE GAS.

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948,664.

Patented Feb. 8, 1910.

Fig. 1.

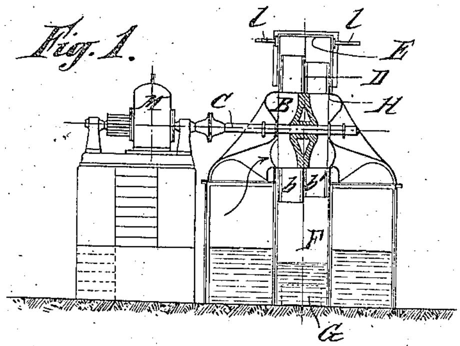


Fig. 2.

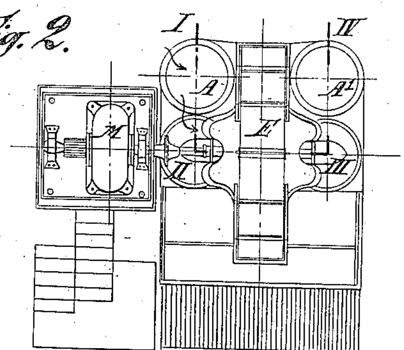
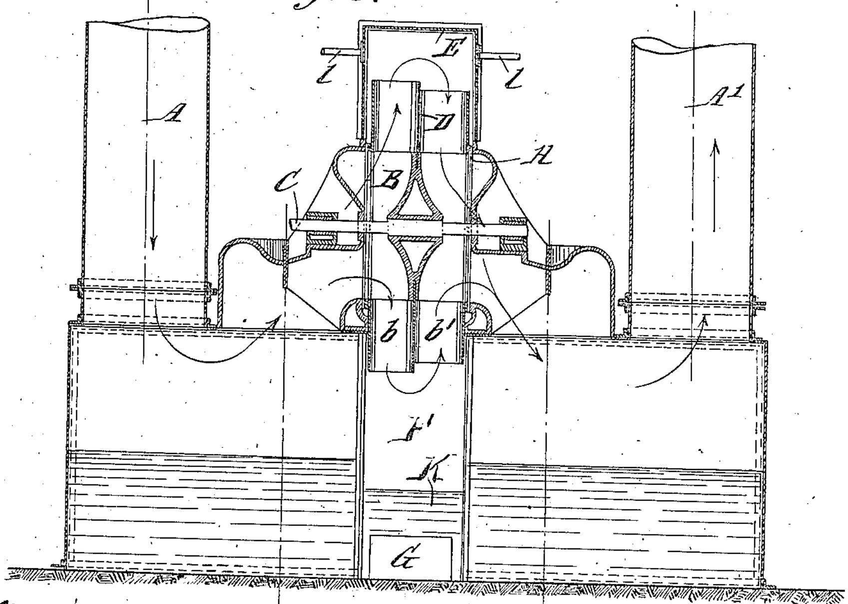


Fig. 3.



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UNITED STATES PATENT OFFICE.

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APPARATUS FOR PURIFYING BLAST-FURNACE GAS.

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Application filed July 14, 1908. Serial No. 443,553.

To all whom it may concern:

Be it known that I, HUGH SAVAGE, a subject of Great Britain, residing at Seraing, in the Kingdom of Belgium, have invented new and useful Improvements in Apparatus for Purifying Blast-Furnace Gas, of which the following is a specification.

This invention relates to apparatus for purifying blast-furnace gas and has for its object to improve the construction of this class of apparatus for the purpose of treating great quantities of gas by means of a centrifugal fan but without necessitating, generally speaking, the use of water.

The improved apparatus is adapted to be used principally to cleanse the gas from the main part of heavy and solid dusts which are carried with it at its exit from the blast-furnace and according to the improvements this separating operation may be advantageously performed by the aid of centrifugal force and without the use of finely divided water which requires a great consumption of motive power and restricts the capacity of the apparatus. At its exit from the improved apparatus the gas is adapted to be burned in boiler-furnaces and is in very suitable condition to be further purified in a cleansing apparatus working with finely divided water if it is to be used in gas engines.

The invention consists essentially in the special arrangement and combination of parts as will be hereinafter fully described and pointed out in the appended claims.

In the annexed drawing: Figure 1 is a vertical longitudinal section of an apparatus constructed according to the invention. Fig. 2 is a plan view of the same. Fig. 3 is a developed section of the apparatus taken on line I—II—III—IV of Fig. 1, showing, on a larger scale the details of the apparatus and the course of the gas through the apparatus.

A is the gas inlet orifice and A′ the gas outlet orifice of the apparatus which comprises a centrifugal fan the movable member B of which is carried on a rotating axis C which is driven by an electromotor M or by any suitable means. The movable member or wheel B of the centrifugal fan is divided in two parts by a solid wall D placed at right angles on the rotating axis C and on each side of which are located respectively wings *b* and *b′*. The wheel B is inclosed by a casing E completely closed on its periphery and having a diameter exceeding notably the diameter of the wheel B. The casing E forms at its lower end a vessel F provided with a water seal K and with a discharge opening G normally closed. On the outlet side, the casing E is further provided with a joint H for the purpose of preventing the return of gas between the wheel B and the casing E.

l (Fig. 3) are water inlets which may be used, if desired, as will be further indicated. The apparatus being interposed in a gas pipe, the gas is sucked in the centrifugal fan by the wings *b* of the wheel B and is subjected to centrifugal action and thrown to the periphery of the casing E, in such a manner that it can only escape through the outlet orifice A′ after having circulated from the periphery to the center of the second part of the wheel B comprising the wings *b′*.

Theoretically speaking, the speed of the gas at its entrance into the apparatus and at its exit therefrom should be the same but, on account of the resistances which oppose the passage of the gas, the speed at the outlet orifice A′ would be reduced if the two parts *b b′* of the wheel B on each side of the wall D had exactly the same diameter. In order to avoid the said loss of speed, the part of the wheel B on the inlet side comprising the wings *b* is constructed of a greater diameter than the second part comprising the wings *b′*, in such a manner that a positive difference of pressure is produced at the periphery of the first part (wings *b*) of the wheel B, which difference of pressure facilitates the entrance of the gas in the second part of the wheel B (wings *b′*) and also the exit through the outlet orifice A′. The fact that the wings *b* have a larger diameter than the wings *b′*, develops a difference of pressure or force sufficient to preserve a rapid flow of the gas through the apparatus. This is partly because the fan rotates at high velocity, and partly because there is no resistance to the flow except the friction of the walls of the passages, and as the passages are large, this friction is slight. The amount of power consumed in the apparatus is, of course, directly proportional to the difference of pressure produced by the wings *b* and the wings *b′*, and by making this difference small, the power consumption is proportionately reduced. Nevertheless a high velocity of the gases is attained in the apparatus, this latter fact being necessary in order to remove the ore particles as hereinafter described.

On account of their density, the solid or liquid particles of dust are violently projected against the internal wall of the casing E and fall on the bottom of the casing that is to say in the vessel F whence they can be withdrawn through the orifice G.

The separating action of the apparatus can be intensified if desired, by injections of water through the water inlets l at the periphery of the casing E, but it is to be noted that, in this case, said water is not subjected to the centrifugal action with the gas, said water forming a layer on the casing E and being used to retain the dust or to condense the liquids which may be contained in the gas which is to be purified. The fact that said water is not subjected to the centrifugal action secures a great economy of motive power.

Having thus described my invention what I claim is:

1. In an apparatus of the class described, the combination of a fixed casing having a central inlet opening on one side and a central outlet opening on the other side, a shaft rotatable in said casing, a wall or disk fixed to said shaft in a transverse plane thereof, and wings on each side of said wall or disk, the wings facing the inlet side of the casing having a greater diameter than those facing the outlet side of the casing.

2. In an apparatus of the class described, the combination of a fixed casing having a central inlet opening on one side and an outlet opening on the other side, a collecting vessel formed in the lower part of the casing, a rotatable shaft in said casing, a wall or disk fixed to said shaft transversely thereof, and wings on each side of said wall, the wings facing the inlet side of the casing having a greater diameter than the wings facing the outlet side of the casing, whereby a positive difference of pressure is produced at the periphery of the wings having the greater diameter.

3. In an apparatus of the class described, the combination of a centrifugal fan comprising a wheel, a rotating shaft carrying said wheel, a wall or disk fixed to said shaft, wings on either side of said wall, a closed casing surrounding said wheel, a collecting vessel formed at the lower part of said casing, said wheel having an inlet orifice on one side and an outlet orifice on the other side, the wings on the inlet side of the wheel having a diameter greater than the wings on the outlet side of the wheel, whereby an excess of pressure is produced at the periphery of the inlet side of the wheel to facilitate the entrance of the gas in the outlet side of the wheel.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

H. SAVAGE.

Witnesses:
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