No. 774,851. PATENTED NOV. 15, 1904.

A. G. McKEE.

MEANS FOR SEPARATING NON-GASEOUS MATERIAL FROM A MIXTURE THEREOF WITH GASEOUS MATERIAL.

APPLICATION FILED APR. 7, 1902.

NO MODEL.

FIG. I

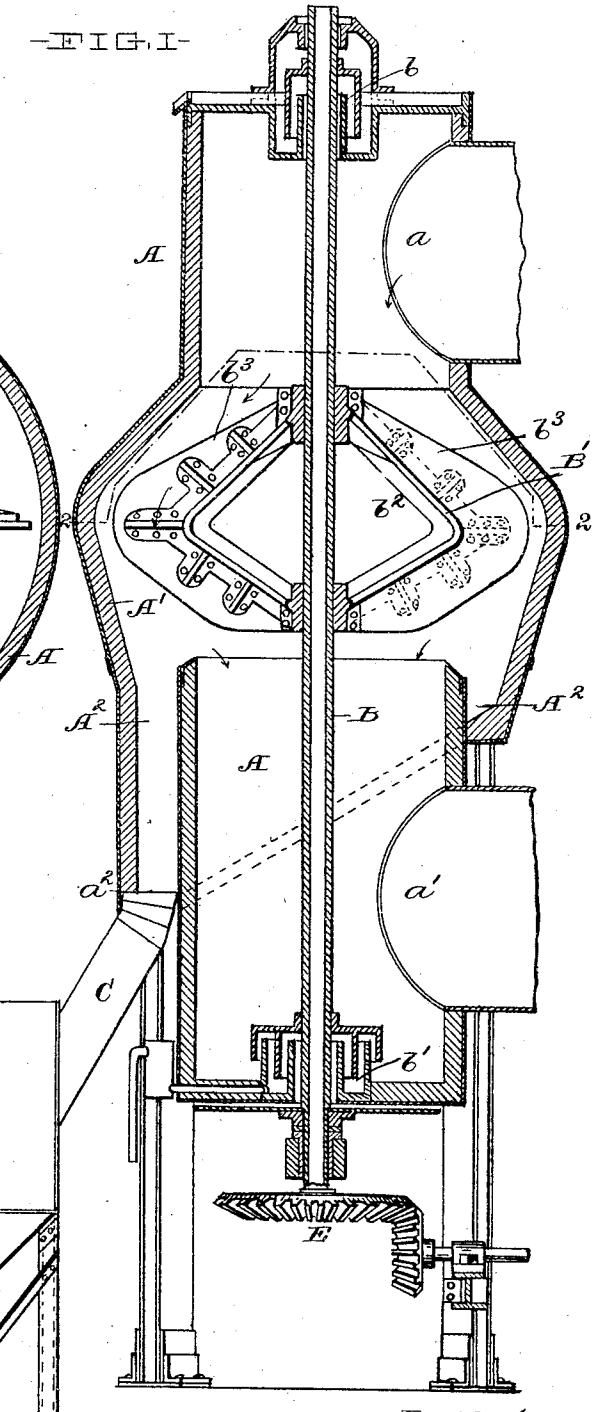
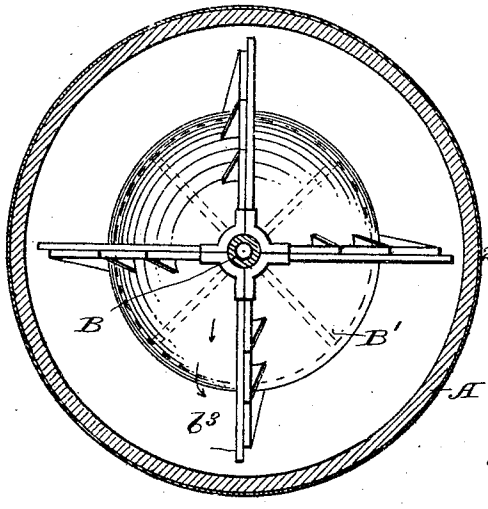


FIG. II



Witnesses
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No. 774,851. Patented November 15, 1904.

UNITED STATES PATENT OFFICE.

ARTHUR G. McKEE, OF CLEVELAND, OHIO.

MEANS FOR SEPARATING NON-GASEOUS MATERIAL FROM A MIXTURE THEREOF WITH GASEOUS MATERIAL.

SPECIFICATION forming part of Letters Patent No. 774,851, dated November 15, 1904.

Application filed April 7, 1902. Serial No. 101,728. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR G. McKEE, a citizen of the United States, and a resident of Cleveland, county of Cuyahoga, and State of Ohio, have invented a new and useful Improvement in Means for Separating Non-Gaseous Material from a Mixture Thereof with Gaseous Material, of which the following is a specification, the principle of the invention being herein explained, and the best mode in which I have contemplated applying that principle, so as to distinguish it from other inventions.

My invention relates to devices for separating non-gaseous material from a mixture thereof with gaseous material, and is particularly applicable for removing dust and the like from blast-furnace gases, so as to render such gases more suitable for use in stoves, boilers, and gas-engines. Said invention consists of means hereinafter fully described, and particularly pointed out in the claims.

The annexed drawings and the following description set forth in detail certain mechanism embodying the invention, such disclosed means constituting but one of various mechanical forms in which the principle of the invention may be used.

In said annexed drawings, Figure I represents a vertical axial section of a device embodying my invention, showing the fan partly in side elevation; and Fig. II represents a view taken upon the planes indicated by the lines 2 2, Fig. I.

The upright gas-duct A is provided with an upper inlet-opening a and a lower outlet-opening a' of equal cross-sectional area and an intermediately-located enlarged portion A'. The two ends of the structure are closed, so as to be air-tight, and supported in such ends is an axially-located shaft B, water seals b and b' being provided to preserve the air-tight structure and at the same time permit of the free rotation of the shaft. Secured to said shaft and located in the enlarged duct portion A' is a fan B'. Such fan consists of a hub b^2 of double-cone form, having its section of greatest diameter located intermediately of the fan's ends, as shown, and a series of peripherally-arranged vanes b^3, secured to said hub. The diameter of the fan is made somewhat greater than the inner diameter of the gas-duct, and surrounding the upper end of the lower portion of such duct is an annular receptacle A^2, such receptacle hence being open to communication with the enlarged portion A', but separated from the lower duct portion, as shown. The lower wall or floor of the receptacle is caused to downwardly converge to the point a^2, at which is formed an opening communicating with a chute C, discharging into a receptacle or bin D.

Suitable gearing E is provided for driving the shaft B.

In the operation of the above-described device the shaft and fan are continuously and positively rotated. Furnace-gas being now admitted through the inlet-opening a passes through the duct and out at the opening a'. During its passage, however, it comes into contact with the vanes of the fan and has imparted to it a rotary motion, the cone-shaped hub causing all of the gas to move toward the periphery of the fan, and hence into the zone of maximum velocity thereof. A rapid rotary movement of the gas is hence effected, all of the foreign extraneous or non-gaseous material—such as coke, ore, duct, &c.—being forced outwardly by virtue of the resultant centrifugal action. Such non-gaseous material on being so acted upon strikes the stationary or fixed walls of the portion A' surrounding the fan and falls downwardly into the receptacle A^2 as a result of the arrest of the rotary and radial movement of said material resulting from its impact with such fixed walls. Said material falls into the chute C and is discharged into bin D, from whence it may be removed without interference with the operation of the device. The gaseous material, however, passes on through duct A unaccompanied by any of the solid material, which has been effectually removed, as described, by being carried outwardly and deposited in a zone untraversed by the gas-current.

The inlet and outlet openings being of equal cross-sectional area and similarly located on either side of the fan there is a minimum impediment to the movement of the gas through the duct, and hence a minimum addition to

the normal back pressure of the gas where the vanes used are axial, as shown in the drawings. The construction shown is such as to create no suction, and is hence applicable to furnaces in which leakage is liable to take place if the pressure is reduced below that of the surrounding atmosphere. In case it is found desirable to accelerate the gas in its exit from the furnace this can readily be accomplished by the use of helically-formed vanes instead of the radially-formed vanes shown.

I therefore particularly point out and distinctly claim as my invention—

1. In means for separating non-gaseous material from a mixture thereof with gaseous material, the combination of a fixed upright gas-duct forming a passage-way for the material to be separated, having a receiving-opening for such material, a discharge-opening for the gaseous material, and an intermediate enlarged portion; a positively-driven rotary fan located in said portion; the wall of said duct adjacent to said discharge-opening extending up into said enlarged portion, and being imperforate, thereby providing around said wall an annular receptacle, separated from the gas-path, adapted to receive non-gaseous material, and not open to communication with the lower duct portion; and a discharge-chute communicating with said receptacle for removing said non-gaseous material permanently from the gas-path.

2. In means for separating non-gaseous material from a mixture thereof with gaseous material, the combination of a gas-duct forming a passage-way for the material to be separated, and having an intermediate enlarged portion forming a chamber; a positively-driven fan located in said enlarged portion; the wall of the lower duct portion extending up into said enlarged portion, and being imperforate, thereby providing around said wall an annular receptacle, not open to communication with the lower duct portion, adapted to receive separated non-gaseous material, located adjacent to and laterally below said chamber, and separated from the path of the gas; and a discharge-chute communicating with said receptacle for removing said non-gaseous material permanently from the gas-path.

3. In means for separating non-gaseous material from a mixture thereof with gaseous material, the combination of a gas-duct forming a passage-way for the material to be separated; positively-driven means within said duct for imparting rotary motion to said mixture; said duct provided with an enlarged portion inclosing said means having fixed walls adapted to receive the impact of the non-gaseous material separated by the attendant centrifugal action, the wall of the lower duct portion extending up into said enlarged portion, and being imperforate, thereby providing around said wall an annular receptacle communicating with said enlarged portion, but not open to communication with the lower duct portion, located laterally below the enlarged portion, and separated from the path of the gas in the duct; and a discharge-chute communicating with said receptacle for removing permanently from the gas-path such separated non-gaseous material.

Signed by me this 3d day of April, 1902.

ARTHUR G. McKEE.

Attest:
D. T. DAVIES,
A. E. MERKEL.