

Aug. 18, 1936.

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2,051,567

DUST CATCHER

Filed Nov. 8, 1934

2 Sheets-Sheet 1

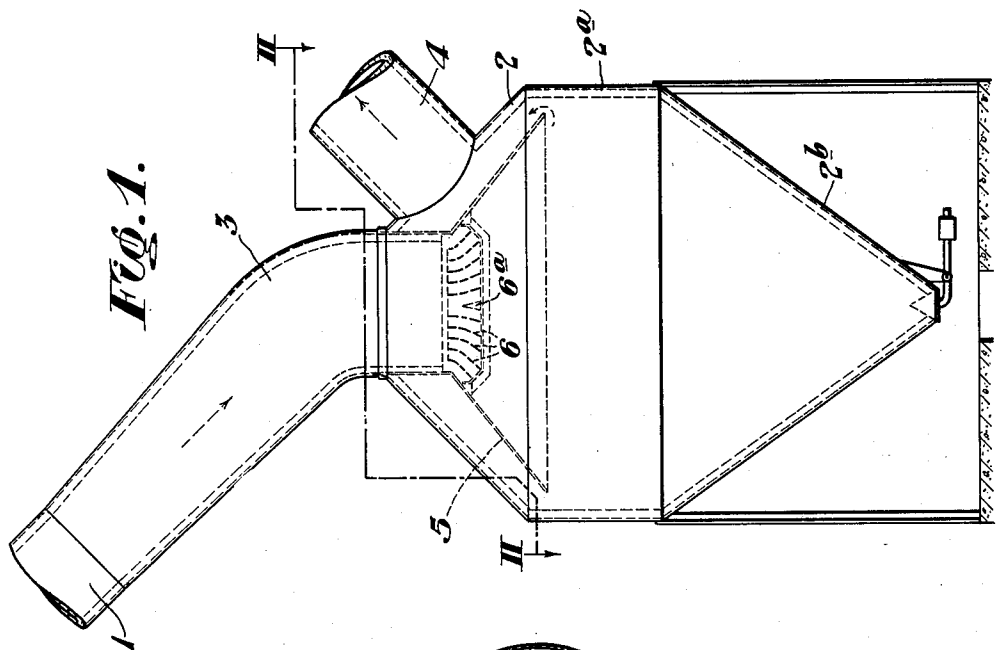
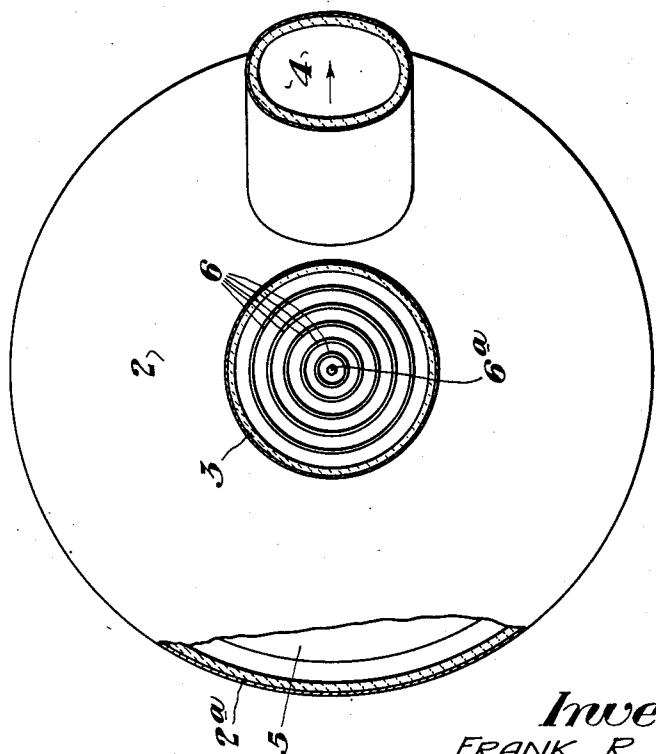


Fig. 2.



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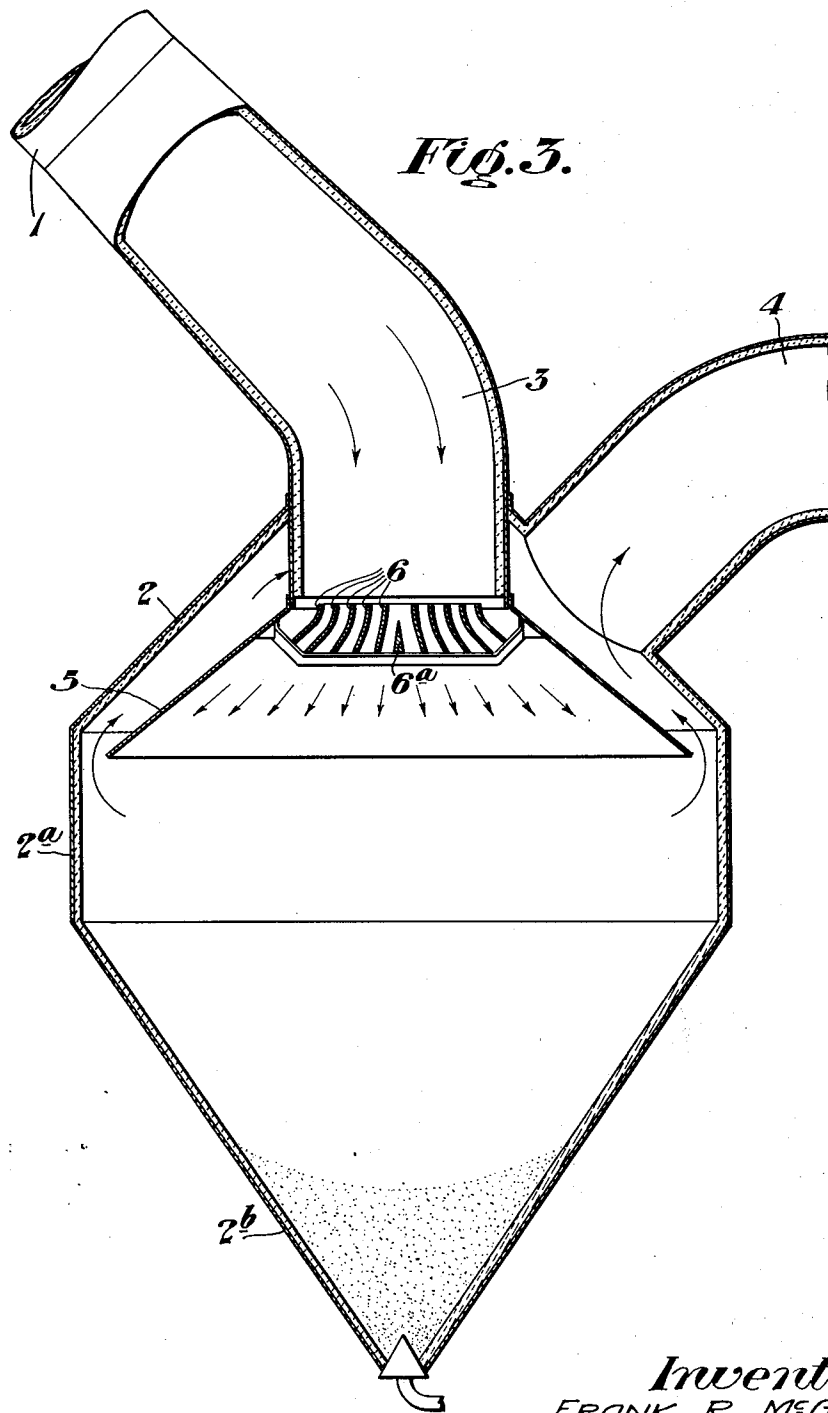
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UNITED STATES PATENT OFFICE

2,051,567

DUST CATCHER

Frank R. McGee, Steubenville, Ohio

Application November 8, 1934, Serial No. 752,137

4 Claims. (Cl. 183-106)

This invention relates to dust catchers and is a continuation in part of my application entitled "Gas cleaners", filed March 14, 1932 and bearing Serial No. 598,833, one of the objects being to provide a generally improved dust catcher particularly of the type adapted for connection with the downcomer of a blast furnace. Other objects may be inferred.

Referring to the accompanying drawings:

Figure 1 is an elevation of a dust catcher that embodies the present invention.

Figure 2 is a cross-section of this catcher taken from the line II-II in Figure 1.

Figure 3 is a vertical section of this catcher.

More specifically, the illustrated dust catcher is intended for connection with the downcomer 1 of a blast furnace and to function to remove the flue dust blown through this downcomer with the gas leaving the furnace.

It includes a chamber 2 providing a vertical, cylindrical section 2^a of substantial length and of a cross-sectional area substantially greater than that of the downcomer 1. This chamber also provides a converging dust-receiving section 2^b beneath the cylindrical section 2^a.

An inlet 3 opens into the top of the chamber 2 concentrically with the cylindrical section 2^a and is constructed for connection with the downcomer 1. An outlet 4 opens from the top of the chamber 2 adjacent the opening of this inlet 3.

An annular shield 5 flares downwardly away from the opening of the inlet 3 past the opening to the outlet 4 and concentrically approaches the inside of the cylindrical section 2^a of the chamber 2 remotely above the latter's dust-receiving section 2^b. This shield is proportioned so as to form an annular space between its outer periphery and the inside of the section 2^a of the chamber 2, that is of substantially the same cross-sectional area as that of the downcomer 1.

A plurality of superimposed, annular gas guides 6 flare away from the opening of the inlet 3. The outer one of these guides flares less than the shield 5, and each of the remainder of these guides flares less than the next outer one of the same. A conical gas guide 6^a is arranged concentrically within the innermost one of the gas guides 6 so as to point towards the gas flow. The guides 6 have shapes which start cylindrically and then gradually flare away from the opening of the inlet 3.

The opening of the inlet 3 to the chamber 2 is of substantially greater cross-sectional area than that of the downcomer 1 and is of substantially less cross-sectional area than that of the

cylindrical section 2^a of the chamber 2. This inlet tapers away from the chamber to a cross-sectional area that is substantially the same as that of the downcomer 1 so that it may be connected with the latter.

As is well known, the downcomer of a blast furnace discharges large volumes of gas which are heavily laden with flue dust. This dust is very light and fine, and remains suspended in the gas as long as the velocity of the latter is sufficiently great to provide the required energy. The ordinary dust catcher functions on the principle that a reduction in the velocity of the gas will permit the dust to drop by gravity. However, it fails in this function because it is constructed so as to cause the gas expanded within it to acquire a turbulent action which picks up the dropped dust to a great extent and carries it from the catcher.

In the case of the dust catcher herein described, the gas leaves the downcomer 1 and enters the inlet 3, where its velocity is reduced to such an extent that erosion of the gas guides 6 is not a serious factor. These gas guides then direct the gas into a series of annular flows. There is no turbulent action because the flare of the shield 5 is greater than that of the outermost flow and therefore does not exert any confining action. Furthermore, the shields successively flare less as they approach the center shield, the annular flows created by them therefore being each separate and individual and not crowding each other. As a result of all this, the gas is suddenly expanded within the cylindrical section 2^a of the chamber 2 so that its velocity is suddenly reduced, and the dust drops into the section 2^b. Since this cylindrical section is of substantial depth, the slow moving gases can drift laterally without again picking up this dust, while their reduced velocity prevents them from interfering with the dropping dust.

The gas is accelerated as it starts to leave the dust catcher because the space between the periphery of the shield 5 and the inside of the section 2^a is substantially the same as that of the downcomer 1. This does not disturb the dropping dust because it occurs close to the inside of the chamber 2. Once the gas is on the other side of the shield 5 its velocity is relatively immaterial, since it is then protected both from the dusty gas and the dust in the bottom of the chamber. Therefore, it leaves by way of the outlet 4 in a very clean condition.

Although the invention has been illustrated and described as applied to a blast-furnace dust

catcher, it is to be understood that it may also be applied to dust catchers of other types and that, therefore, its scope is not to be limited except as defined by the following claims.

5 I claim:

1. A dust catcher for connection with a conduit carrying dusty gas, including a chamber of substantially greater cross-sectional area than that of said conduit, an inlet centrally opening into the top of said chamber, an outlet opening from said chamber adjacent the opening of said inlet, an annular shield flaring downwardly away from the opening of said inlet past the opening of said outlet and concentrically approaching the inside of said chamber, and a plurality of superimposed annular gas guides flaring from the opening of said inlet, the outer one of said guides flaring less than said shield.

2. A dust catcher for connection with a conduit carrying dusty gas, including a chamber of substantially greater cross-sectional area than that of said conduit, an inlet centrally opening into the top of said chamber, an outlet opening from said chamber adjacent the opening of said inlet, an annular shield flaring downwardly away from the opening of said inlet past the opening of said outlet and concentrically approaching the inside of said chamber, and a plurality of superimposed annular gas guides flaring from the opening of said inlet, the outer one of said guides flaring less than said shield and each of the remainder of said guides flaring less than the next outer one of the same.

3. A dust catcher for connection with a conduit carrying dusty gas, including a chamber providing a vertical cylindrical section of substantial length and of a cross-sectional area substantially greater than that of said conduit and a converging dust receiving section beneath said cylindrical section, an inlet opening into the top of said chamber concentrically with said cylindrical section and constructed for connection with said conduit, an outlet opening from said chamber adjacent the opening of said inlet, an annular shield flaring downwardly away from the open-

ing of said inlet past the opening to said outlet and concentrically approaching the inside of said cylindrical section of said chamber remotely above said converging dust receiving section of the latter so as to form an annular space of substantially the same cross-sectional area as that of said conduit, and a plurality of superimposed annular gas guides flaring away from the opening of said inlet, the outer one of said guides flaring less than said shield and each of the remainder of said guides flaring less than the next outer one of the same.

4. A dust catcher for connection with a conduit carrying dusty gas, including a chamber providing a vertical cylindrical section of substantial length and of a cross-sectional area substantially greater than that of said conduit and a converging dust receiving section beneath said cylindrical section, an inlet opening into the top of said chamber concentrically with said cylindrical section and constructed for connection with said conduit, an outlet opening from said chamber adjacent the opening of said inlet, an annular shield flaring downwardly away from the opening of said inlet past the opening to said outlet and concentrically approaching the inside of said cylindrical section of said chamber remotely above said converging dust receiving section of the latter so as to form an annular space of substantially the same cross-sectional area as that of said conduit, and a plurality of superimposed annular gas guides flaring away from the opening of said inlet, the outer one of said guides flaring less than said shield and each of the remainder of said guides flaring less than the next outer one of the same, the opening of said inlet being of substantially greater cross-sectional area than that of said conduit and of substantially less cross-sectional area than that of said cylindrical section of said chamber and tapering away from the latter to a cross-sectional area that is substantially the same as that of said conduit so that it may connect therewith.

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45