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INDUCED DRAFT UNIT FOR SPRAY BOOTHS

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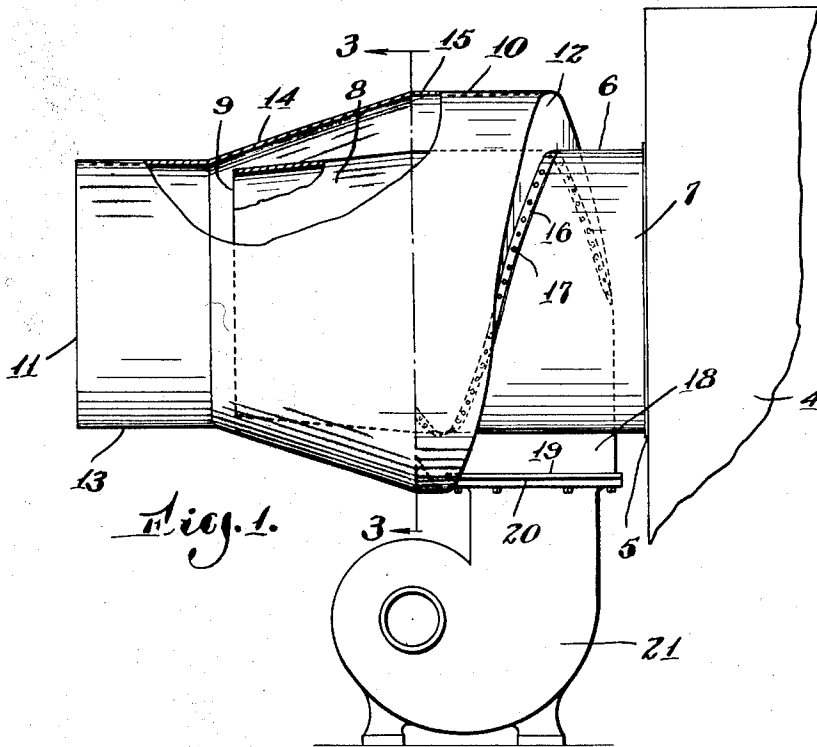
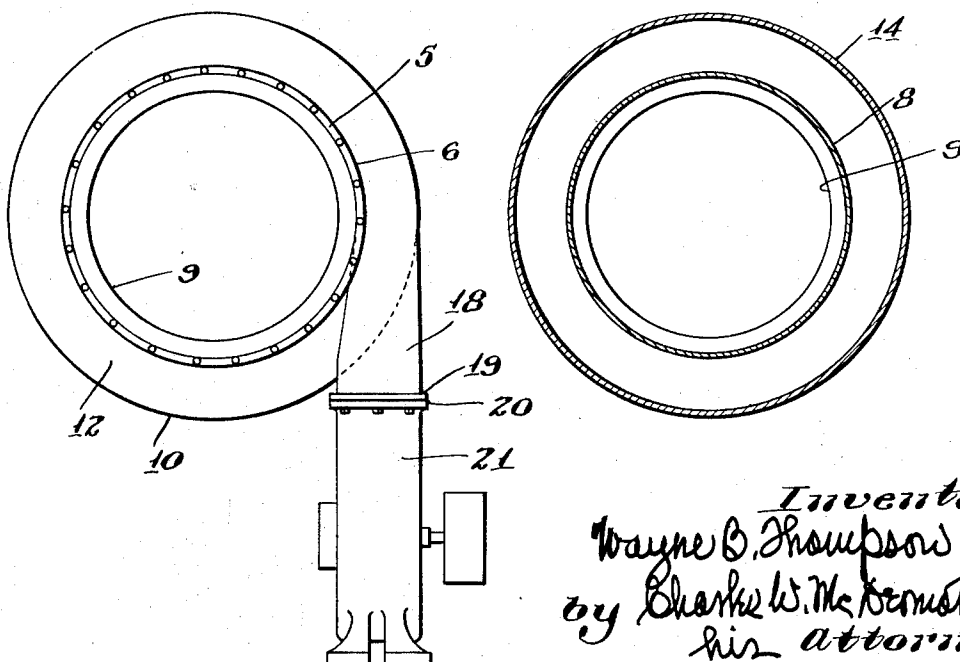


Fig. 2.

Fig. 3.



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INDUCED DRAFT UNIT FOR SPRAY
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2 Claims. (Cl. 230—95)

The present invention relates to induced draft units for spray booths which are used in industrial finishing to induce the fumes generated in the spray booths to flow therefrom.

5 Spray booths are used in industrial finishing to house the work during the spraying operation in which the work is coated with paint, lacquer or some other coating material. The fumes resulting from the spraying operation must be with-
10 drawn from the booth and discharged into the atmosphere outside the factory. Owing to the inflammable nature of the coating material content in the fumes their withdrawal presents a difficult problem in industrial finishing. The
15 withdrawal of the fumes from the booth by a blower acting directly on the booth either to blow or draw the fumes therefrom is not practicable except for spray booths of small capacity. Blowing the fumes out of the booth interferes with
20 the spraying operation and is disagreeable to the operative. Drawing the fumes out of the booth with a blower fouls the interior of the blower with the coating material content of the fumes and thus creates a fire hazard not tolerated
25 by the fire insurance underwriters. Two methods of inducing the fumes to flow out of the booth into the atmosphere have been proposed heretofore. In both methods the spray booth is connected to a conduit which conducts the fumes
30 out of the booth to the atmosphere outside the factory. In the first method the fumes are induced to flow through the conduit by a separate duct having one section arranged in the longitudinal axis of the conduit and connected by an
35 elbow to a second section at right angles to the first section, the second section being connected to a blower for blowing air through the duct. The section of the duct inside the conduit, particularly the elbow thereof, constitutes a baffle upon
40 which the coating material content of the fumes collects in a position impracticable to clean, thus, like the direct action blower, creating a fire hazard which precludes its use in industrial finishing. In the second method the conduit for
45 the fumes discharges into a casing partially enclosing the conduit and air is blown by a blower into the space between the conduit and the casing in order to convert air pressure input into air velocity output and thus create a draft to induce
50 the fumes in the spray booth to flow through the conduit. The second method, while safe, has a low efficiency as the air enters the casing in a direction normal to the longitudinal axis of the conduit and therefore is split up by the conduit
55 into eddies. These eddies resist the entrance of

the air into the duct and consequently impede the conversion of air pressure input into air velocity output resulting in a loss of efficiency.

The principal object of the present invention is to produce an induced draft unit for spray booths by which the fumes may be induced to flow from the spray booths both in a safe and an efficient manner.

To the accomplishment of this object, and such others as may hereinafter appear, the various features of the present invention consist in certain devices, combinations and arrangements of parts fully set forth hereinafter the advantages of which will be readily understood by those skilled in the art.

The various features of the invention will be readily understood from an inspection of the accompanying drawing illustrating the best form of the invention at present known to the inventor, in which,

Figure 1 is a view in side elevation of the induced draft unit connected to a spray booth, the spray booth being indicated and the conduit connected to the spray booth and the casing into which the conduit enters, being shown broken away and partly in section.

Fig. 2 is a view in end elevation, the conduit being disconnected from the spray booth, and

Fig. 3 is a view in sectional elevation on the line 3—3, Fig. 1.

In the illustrated embodiment of the invention a spray booth 4 in which the industrial finishing operation is performed is connected by rivets to a flange 5 on one end of a conduit 6. The conduit 6 is provided with a cylindrical portion 7, a frusto-conical portion 8 and an open end 9.

In order to induce the fumes generated in the booth 4 to flow through the conduit 6 it is partially enclosed by a casing 10 provided with an open end 11, a closed end 12, a cylindrical portion 13 into which the conduit 6 discharges its fumes, a frusto-conical portion 14 spaced from the frusto-conical portion 8 of the conduit 6, and a cylindrical portion 15 spaced from the cylindrical portion 7 of the conduit.

As shown in Fig. 1 the closed end 12 is wrapped around the cylindrical portion 7 of the conduit in a helical path. The closed end 12 is provided with a lateral flange 16 secured by rivets 17 to the cylindrical portion 7 of the conduit. The closed end 12 of the casing is integral and coterminous with a rectangular duct 18, the free end of which extends downwardly and is provided with a flange 19 which is bolted to a flange 20 on the discharge outlet of a blower 21.

The blower 21 supports the casing 10, the rivets 17 being used to form an air-tight joint between the closed end 12 of the casing and the cylindrical portion 7 of the conduit and to support the conduit 6 from the casing 10. The blower 21, the conduit 6 and the casing 10 comprise a self-contained unit.

As shown in Fig. 2 the air under pressure enters the casing from the duct 18 in a direction substantially normal to the direction the air takes in passing through the outlet 11 and substantially tangential to both the peripheries of the cylindrical portions 7 and 15 of the conduit and the casing, respectively. With this construction the entering air under pressure is given a whirling motion. This whirling air at least during its first whirl flows along the helical wall formed by the closed end 12 of the casing which causes the whirling air to travel towards the outlet 11 in a helical path. As shown in Fig. 1 no part of the whirling air traveling in a helical path collides with any of the air entering the casing 10 from the duct 18. In consequence no eddies are formed in the whirling air tending to impede the entrance of air into the casing under the action of the blower.

As shown in Fig. 1 the frusto-conical portions 8 and 14 of the conduit and casing, respectively, are tapered differentially so that as the whirling air approaches the open end of the conduit its velocity is increased, the maximum velocity being attained as the air flows substantially at atmospheric pressure by the open end of the conduit.

With the construction described, air pressure input is converted into air velocity output with no loss of efficiency due to air impedance.

It will be apparent to those skilled in this art that the whirling air in the space between the conduit and the casing could be directed to travel in a helical path by means of a partition arranged in a helical path in said space. In order to reduce friction and to permit the air to exit from the space around the open end 9 in a uniform manner the partition should only direct the travel

of the whirling air during its first whirl. The wall 12, which is the full equivalent of such a partition, is provided in order to save the material for the partition and to reduce the amount of material in the casing.

Nothing herein explained is to be interpreted as limiting the invention in the scope of its application to use in connection with the particular apparatus or the particular mode of operation or both selected for purposes of illustration and explanation. While the particulars of construction herein set forth are well suited to one mechanical form of the invention, it is not limited to these details of construction, nor to the conjoint use of all its features, nor is it to be understood that these particulars are essential since they may be variously modified within the skill of the artisan without departing from the true scope of the actual invention, characterizing features of which are set forth in the following claims by the intentional use of generic terms and expressions inclusive of various modifications.

What is claimed as new, is:

1. In an induced draft unit for spray booths the combination with a conduit connected to the spray booth for conducting fumes therefrom, a casing into which the conduit enters, a blower for forcing air through the space between the conduit and the casing, and means for subjecting the air in the casing to a whirling motion, of means for causing the whirling air at least during its first whirl to travel in a helical path.

2. In an induced draft unit for spray booths the combination with a conduit connected to the spray booth for conducting fumes therefrom, of a casing into which the conduit enters provided with an outlet at one end, a helical wall on the end adjacent the spray booth and an inlet for causing air to enter the casing in a direction normal to the direction the air takes in passing out of the outlet and substantially tangential to the periphery of the casing and to flow over the helical wall.

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