Dec. 16, 1930. H. F. SCHMIDT 1,785,228

DISCHARGE LOUVER

Filed Feb. 5, 1930

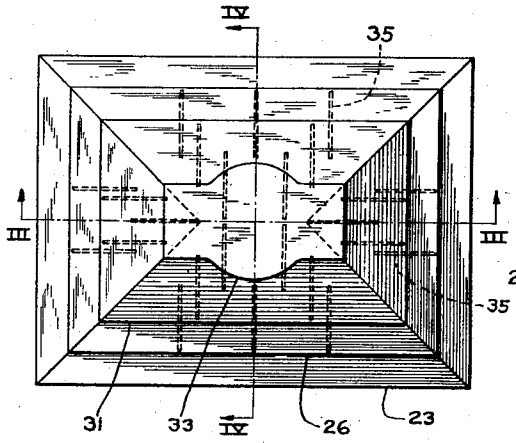


Fig. 2.

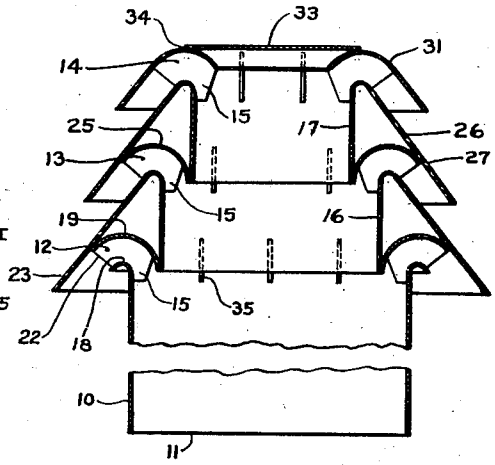


Fig. 3.

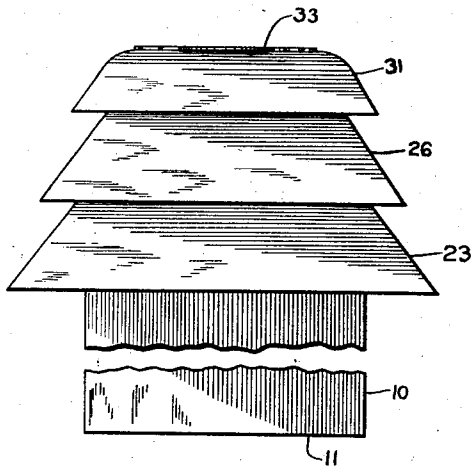


Fig. 1.

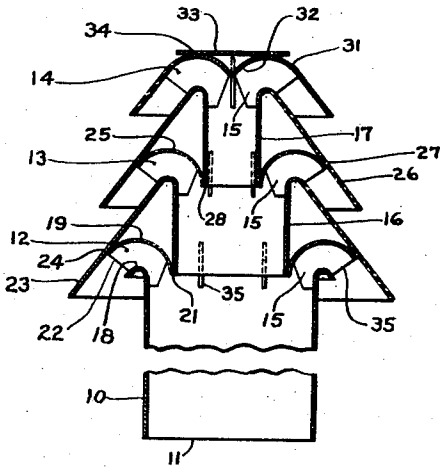


Fig. 4.

WITNESS
E. Lutz.

INVENTOR
H.F. Schmidt
BY
A. B. Rewis
ATTORNEY

Patented Dec. 16, 1930 1,785,228

UNITED STATES PATENT OFFICE

HENRY F. SCHMIDT, OF LANSDOWNE, PENNSYLVANIA, ASSIGNOR TO WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY, A CORPORATION OF PENNSYLVANIA

DISCHARGE LOUVER

Application filed February 5, 1930. Serial No. 426,144.

My invention relates to discharge louvers, for example, ventilating louvers such as used on the decks of ships for exhausting gaseous media from the compartments below to the outside atmosphere and it has for an object to provide apparatus of the character designated which shall offer less resistance to the flow of the gaseous media and which shall consequently operate with better efficiency than discharge louvers of the character heretofore provided.

It has for another object to provide apparatus of the foregoing character which shall provide for maintaining a uniform velocity of the gaseous media in all portions of the louver so as to entirely avoid the creation of turbulence or eddy currents.

It has for still another object to provide apparatus of the character designated which shall be so formed as to effect a velocity pressure conversion of the gaseous media passing therethrough in order to obtain a better induction effect.

These and other objects are effected by my invention as will be apparent from the following description and claims, taken in connection with the accompanying drawing, forming a part of this application, in which:

Fig. 1 is a view, in elevation, of one form of louver arranged in accordance with my invention;

Fig. 2 is a plan view of the louver shown in Fig. 1; and,

Figs. 3 and 4 are transverse, sectional views taken on the lines III—III and IV—IV of Fig. 2, respectively.

Louvers of the discharge type, as heretofore provided, have, in an attempt to create an induction effect and also to make them rain-tight, been generally so formed as to divide the gaseous media into a plurality of strata, the structures employed necessitating several changes in the velocity of flow of the gases. Severe changes in the direction of flow are also necessitated. As a result, considerable turbulence is created and resistance to flow is set up in the louver. Furthermore, the louvers of the prior art are so constructed that a considerable portion of the gas is impinged against the upper or top surface of the louver and thence deflected through the outlets, which arrangement creates further turbulent effects.

I have, therefore, conceived the idea of so forming a discharge louver that the several divisional passageways have entrance areas, the total of which is approximately equal to the flow-area of the main ventilating duct. More particularly, I so arrange my louver that the velocity of flow is the same in the entrant portions of the several divisional passageways as in the main duct. Each divisional passageway radiates outwardly from the main duct in a course which contains but a single, smooth curve and the top of the duct forms the final divisional passageway so as to avoid gases being impinged against the top of the duct and thence deflected into one of the divisional passageways. In addition, I prefer to so arrange each divisional passageway so that its flow-area increases in the direction of flow in order that the velocity of flow of the gaseous media may be reduced and some of its kinetic energy transformed into static pressure. As a result, the static pressure prevailing at the exit end of each divisional passageway is somewhat greater than at the entrant portion and the flow of the gaseous media is thereby induced rather than resisted. I have found that such a duct offers a minimum amount of resistance to flow of the gases and consequently better operating efficiencies are obtainable.

Referring now to the drawing, I show a main or primary duct 10 having an entrant portion 11 for gases to be exhausted. As shown, the primary duct is of rectangular cross section but it may assume various other shapes in accordance with the character of the ventilating system with which it is asso-

ciated. Communicating with the primary duct 10 are a plurality, for example 3, divisional exhaust passageways 12, 13 and 14, all of which may radiate outwardly in all directions from the primary duct. As will be apparent from the drawing, each of the divisional passageways forms a closed polygonal or rectangular frame structure. In other words, in the present embodiment, each of the several divisional passageways extend completely about the axis of the louver, although, in other embodiments, they may not extend entirely around the louver. The total flow-area of the entrant portions 15 of the several divisional passageways is approximately equal to the flow-area of the primary duct 10. Preferably, as shown in Figs. 3 and 4, the widths of the respective divisional passageways are equal but it will be obvious that some passageways may be wider than others without departing from the spirit of my invention, the primary object being to make the total flow-area of the entrant portions of the several divisional passageways approximately equal to the flow-area of the primary duct.

The divisional passageways 12, 13 and 14 may be formed by various types of structures. In the present embodiment, I decrease the flow-area of the primary duct 10 by superposed secondary and tertiary ducts 16 and 17 having progressively decreasing flow-areas. The divisional passageway 12 connects between the primary duct 10 and the secondary duct 16 and the divisional passageway 13 connects between the secondary duct 16 and the tertiary duct 17 while the divisional passageway 14 connects solely with the terminus portion of the tertiary duct 17. As will be apparent, the flow-area of the entrant portion 15 of the divisional passageway 12 is equal to the difference in flow-areas between the primary duct 10 and the secondary duct 16. Likewise, the divisional passageway 13 has a flow-area at its entrant portion which is approximately equal to the difference in flow-areas between the secondary duct 16 and the tertiary duct 17, while the flow-area of the entrant portion of the divisional passageway 14 is approximately equal to the flow-area of the tertiary duct 17.

The divisional passageway 12 may be formed by flanging the upper end of the primary duct 10 outwardly, as at 18, and by mounting above the flange portion 18 a rectangular or frame-shaped deflector 19 having, as shown in Figs. 3 and 4, an arcuate cross-section. The deflector 19 is joined, as by welding, to the entrant portion of the secondary duct 16, as at 21, and the flange 18 and the deflector 19 may, if desired, have radii of curvature which are both struck from the same point. In this way, the width of the divisional passageway 12 is made uniform from its entrant portion 15 to its terminus portion 22. The secondary duct 16 is provided at its upper end with an outwardly projecting, frusto-pyramidal flange 23 secured to the deflector 19, as at 24, and projecting beyond the terminus portion 22 of the divisional passageway 12 in order to provide a protecting hood for the same.

A deflector 25, formed in a manner similar to the deflector 19, cooperates with the secondary duct 16, and its flange portion 23 to form the divisional passageway 13. The tertiary duct 17, like secondary duct 16, has a projecting flange 26 connecting with the deflector 25, as at 27, and projecting beyond the point 25 to provide a hood for the divisional passageway 13. The deflector 25 is joined to the tertiary duct 17 at 28.

Superposed upon the top of the louver is a deflector 31 which cooperates with the tertiary duct 17 and its flange 26 to provide the divisional passageway 14. As shown in Fig. 4, the deflector 31 has a cuspidated portion 32 extending along the major axis of the rectangle and dividing the tertiary duct 15 into portions communicating, respectively, with the oppositely-disposed portions of the divisional passageway 14. It will, therefore, be apparent that my improved louver is so constructed that the entrant area of the divisional passageway 14 is equivalent to the flow-area of the tertiary duct 17 so that the gaseous media passing through the tertiary duct 17 is conveyed out of the louver directly by the passageway 14, there being no top plate or dead end against which the air can be impinged before being deflected into the divisional passageway. The top of the louver is preferably fitted with a finishing plate 33 which is made water tight at 34 to prevent the accumulation of moisture in the converging portion of the deflector 31. In order to lend additional rigidity to the entire structure, numerous reinforcing plates 35 having their major axes extending in the direction of flow, are provided in various portions of the several divisional passageways.

From the foregoing, it will be apparent that I have devised a form of ventilating louver wherein the gases pass through the entire louver with a uniform velocity and with only such slight changes in direction of flow as will render the device rain-tight. In this way, creation of turbulence as well as eddy currents is entirely avoided, and consequently no resistance to flow is offered by the louver. Inasmuch as the several divisional passageways extend outwardly and entirely around the louver, their flow-areas increase in the direction of flow. Consequently, the velocity of flow of the gaseous media decreases as the gases pass through the divisional passageways. In this way, some of the kinetic energy of the gaseous media is transformed into static pressure, the pressure at the exit end 22 of each divisional passageway being slightly greater than at the entrant end 15.

As the exit end 22 communicates with the atmosphere, the pressure at the entrant portion 15 will be slightly below atmospheric pressure and consequently an induction effect is obtained. I have found that exhaust louvers constructed in accordance with the foregoing principles operate with more effectiveness and higher efficiency than the types of exhaust louvers heretofore provided. While, in the foregoing description, I associate my louver, by way of example, with ventilating systems, it is to be understood that its use is not solely confined to such systems but that it may be employed with any form or type of duct or conduit from which it is desired to liberate gaseous media of any nature.

While I have shown my invention in but one form, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various changes and modifications without departing from the spirit thereof, and I desire, therefore, that only such limitations shall be placed thereupon as are imposed by the prior art or as are specifically set forth in the appended claims.

What I claim is:

1. In a ventilating louver for gaseous media, the combination of a main duct and a plurality of branch ducts for exhausting gaseous media therefrom, said branch ducts having their entrant portions facing in the direction of flow of the gaseous media through the main duct and their discharge portions extending outwardly and about the entire periphery of the main duct, the total flow-area of the entrant portions of said branch ducts being approximately equal to the flow-area of the main duct.

2. In a discharge louver for gaseous media, the combination of a main duct and a plurality of superposed, concentric branch ducts for exhausting gaseous media therefrom, said branch ducts having their entrant portions facing in the direction of the flow of the gaseous media through the main duct and their discharge portions curving outwardly and downwardly from the main duct, the total flow-area of the entrant portions of the branch ducts being approximately equal to the flow-area of the main duct.

3. In a discharge louver for gaseous media, the combination of a main duct and a plurality of branch ducts for exhausting gaseous media therefrom, said branch ducts having their entrant portions facing in the direction of flow of the gaseous media through the main duct and their discharge portions extending outwardly from the main duct and said branch ducts increasing in flow-area in a direction from their entrant portions toward their discharge portions so as to effect a velocity-pressure conversion of the gaseous media passing therethrough.

4. In a discharge louver for gaseous media, the combination of a main duct and a plurality of exhaust branch passageways having their entrant portions facing in the direction of the flow of the gaseous media through the main duct and having their discharge portions curving outwardly with respect to the main duct, the total flow-area of the entrant portions of all of the branch passageways being approximately equal to the flow-area of the main duct so as to provide uniform velocity of flow in both the main duct and the entrant portions of the branch passageways.

5. In a discharge louver for gaseous media, the combination of a duct, means disposed near one end of the duct for dividing the gaseous media therein into a stratum of relatively smaller flow-area than the duct as well as additional surrounding stratum or strata, and independent passageway means connecting with the respective strata and extending outwardly of the duct for exhausting the gaseous media therefrom, the total flow-area of the strata, the flow-area of the duct and the total flow-area of the entrant portions of the exhaust passageways being approximately equal to each other so as to provide a uniform velocity of flow of the gaseous media through these portions of the louver.

6. In a discharge louver for gaseous media, the combination of a duct, means disposed near the outlet end of the duct for dividing the gaseous media therein into a plurality of concentric strata, and concentric independent passageways connecting with the respective strata and extending in the direction of the flow of the gaseous media and thence outwardly and backwardly as well as entirely about the duct for exhausting gaseous media from the latter.

7. In a discharge louver for gaseous media, the combination of a duct, means disposed near the outlet end of the duct for dividing the latter into a plurality of concentric strata of progressively decreasing flow-areas, and superposed passageways having their entrant portions extending in the direction of flow and connecting, respectively, with the reduced portions of the duct and with the terminus portion of the duct for exhausting gaseous media therefrom, said passageways having their discharge portions projecting outwardly from the duct.

8. In a discharge louver for gaseous media, the combination of a main vertical duct, a secondary duct of relatively smaller flow-area disposed in communication with the upper portion of the main duct, a branch passageway connecting with the entire area intervening between the main duct and the secondary duct for exhausting gaseous media therefrom and a second branch passageway connecting with the entire area of the upper portion of the secondary duct for exhausting

gaseous media therefrom, both said first and second branch passageways projecting radially outwardly from their associated ducts.

9. In a discharge louver for gaseous media, the combination of a main vertical duct, a second vertical duct of relatively smaller flow-area disposed near the upper end of the main duct and communicating therewith, an exhaust passageway connected between the upper end of the main duct and the lower end of the secondary duct and a second discharge passageway connecting with the upper portion of the secondary duct, both said first and second discharge passageways radiating outwardly and downwardly from their associated ducts.

10. In a discharge louver for gaseous media, the combination of a duct for transmiting gaseous media upwardly and including a series of duct portions of progressively decreasing flow-areas superposed upon and communicating with each other so as to provide a duct having progressively decreasing flow-areas in the direction of flow, and exhaust passageways connecting, respectively, with the entire areas intervening between the upper outlet and the lower inlet ends of adjacent duct portions, said exhaust passageways curving outwardly from the duct.

11. In a discharge louver for gaseous media, the combination of a duct portion for transmitting gaseous media upwardly and including a series of open-ended duct portions of progressively decreasing flow-areas arranged in step relation so as to provide a duct having progressively decreasing flow-areas in the direction of flow, exhaust passages having entrant portions connecting, respectively, between the upper outlet and the lower inlet ends of adjacent duct portions, and an additional passageway connecting with the upper end of the top duct portion, the entrant portions of all of said exhaust passageways having a total flow-area approximately equal to the flow-area of the largest duct portion.

12. In a discharge louver, the combination of a plurality of coaxial, tubular elements of different sizes disposed at successively higher elevations with the smallest tubular element disposed uppermost, said tubular elements having their outer terminal portions curved outwardly, deflectors cooperating with the curved terminal portions to provide peripheral discharge passages, and means for supporting successively smaller tubular elements from preceding tubular elements.

13. A louver for a discharge conduit comprising one or more tubular elements, the conduit and the tubular elements being arranged in telescopic relation so as to provide successively smaller flow-areas and the outer terminal portions thereof being arranged at successively higher elevations with the smallest uppermost, said outer terminal portions being curved outwardly, and deflectors cooperating with said curved portions to provide discharge passages.

14. In a discharge louver for gaseous media, the combination of a main duct portion for transmitting gaseous media upwardly and having its upper edge portion flanged outwardly, a secondary duct portion of relatively smaller flow-area superposed upon the main duct portion and freely communicating therewith, a deflector joined at the lower portion of the secondary duct portion and projecting outwardly therefrom, said deflector forming with the flange portion of the main duct portion an exhaust passageway curving upwardly and thence outwardly and downwardly from the duct portions, a frusto-pyramidal flange depending from the upper portion of the secondary duct portion and projecting outwardly over said exhaust passageway to form a hood thereover, and a second deflector disposed above the secondary duct portion and forming with said flange of the secondary duct portion a second exhaust passageway curving upwardly and thence outwardly and downwardly from the secondary duct portion.

15. In a discharge louver for gaseous media, the combination of a main duct portion for transmitting gaseous media upwardly, a plurality of secondary duct portions of progressively decreasing flow-areas superposed upon the main duct portion and freely communicating with the main duct portion and with each other, a flange projecting outwardly from the upper edges of the duct portions including the main duct portion, a deflector joined to the lower edges of each of the secondary duct portions and projecting outwardly therefrom, said deflectors forming, with their lower adjacent flanges, exhaust passageways curving upwardly and thence downwardly and outwardly beneath their upper adjacent flanges, and an additional deflector superposed upon the top secondary duct portion and forming with the flange projecting from the upper edge of said last-mentioned duct portion an additional exhaust passageway curving upwardly and thence outwardly and downwardly.

16. In a discharge louver for gaseous media, the combination of a main duct portion for transmitting gaseous media upwardly, a plurality of secondary duct portions of progressively decreasing flow-areas superposed upon the main duct portion and freely communicating with the main duct portion and with each other, a flange projecting outwardly from the upper edges of the duct portions including the main duct portion, a deflector joined to the lower edges of each of the secondary duct portions and projecting outwardly therefrom, said deflectors forming, with their lower adjacent flanges, exhaust passageways curving upwardly and thence downwardly and outwardly beneath

their adjacent upper flanges, and an additional deflector superposed upon the top secondary duct portions and forming with the flange projecting from the upper edge thereof an additional exhaust passageway curving upwardly and thence outwardly and downwardly, said last-named deflector having a cuspidated portion disposed centrally of the top secondary duct portion for dividing the flow of the gaseous media to opposing portions of said last-mentioned passageway.

In testimony whereof, I have hereunto subscribed my name this 4th day of February, 1930.

HENRY F. SCHMIDT.