Nov. 18, 1969 P. A. BOURQUIN 3,478,667

TOP DISCHARGE AIR DUCT SYSTEM AND AIR DUCTS THEREFOR

Filed Jan. 6, 1969 2 Sheets-Sheet 1

FIG. 1

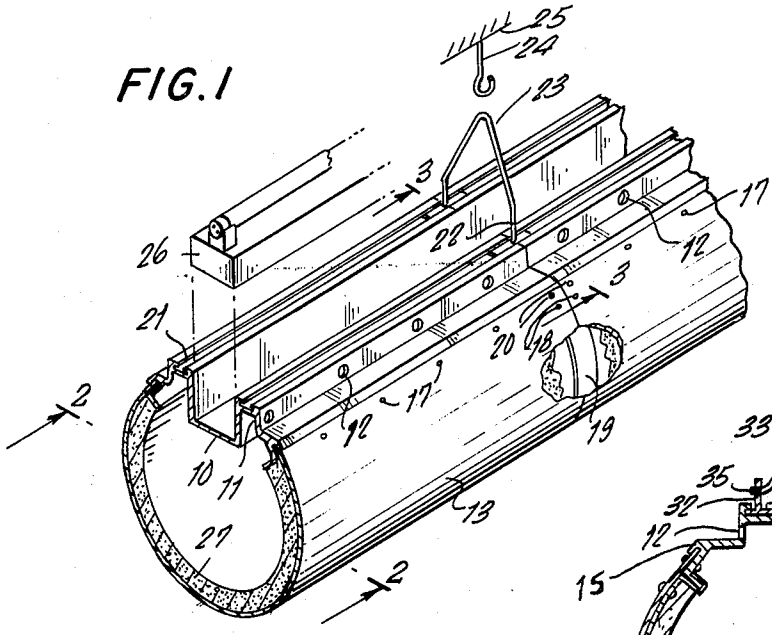


FIG. 3

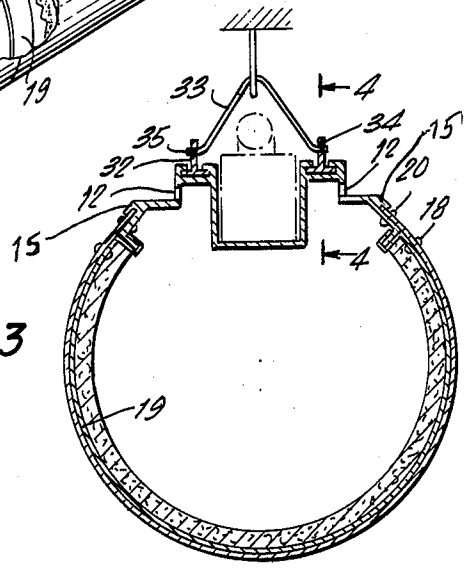
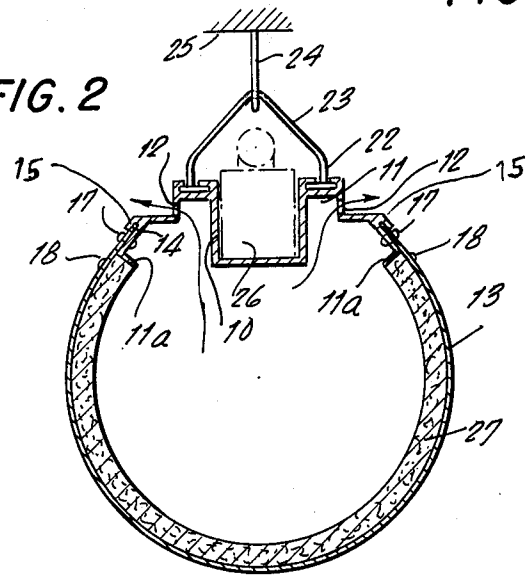


FIG. 2



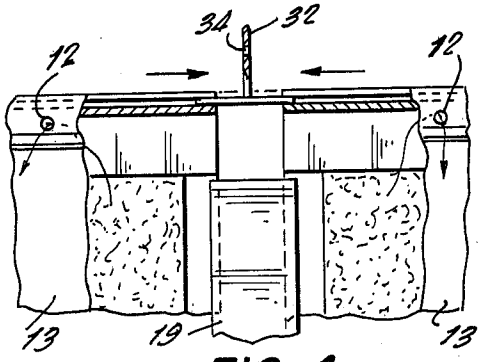
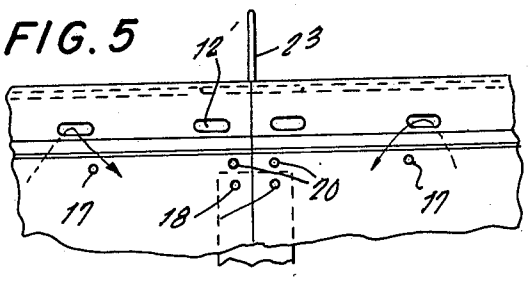


FIG. 4

FIG. 5



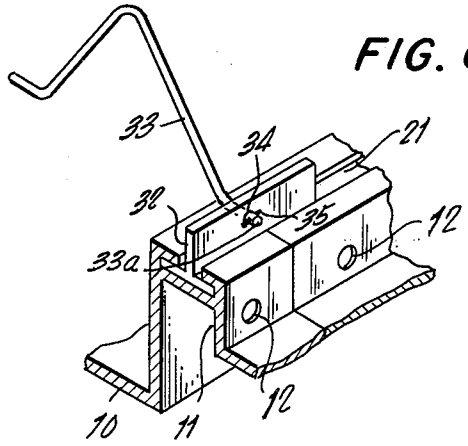
INVENTOR.
PAUL A. BOURQUIN
BY Jacobs & Jacobs
ATTORNEYS

Nov. 18, 1969 P. A. BOURQUIN 3,478,667

TOP DISCHARGE AIR DUCT SYSTEM AND AIR DUCTS THEREFOR

Filed Jan. 6, 1969 2 Sheets-Sheet 2

FIG. 6



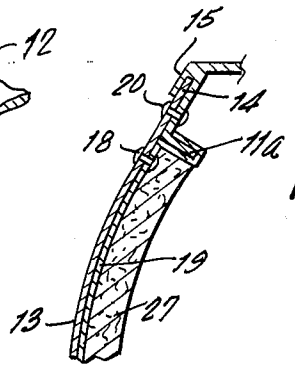


FIG. 7

FIG. 8

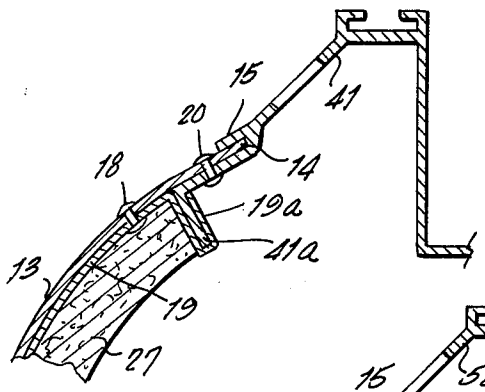
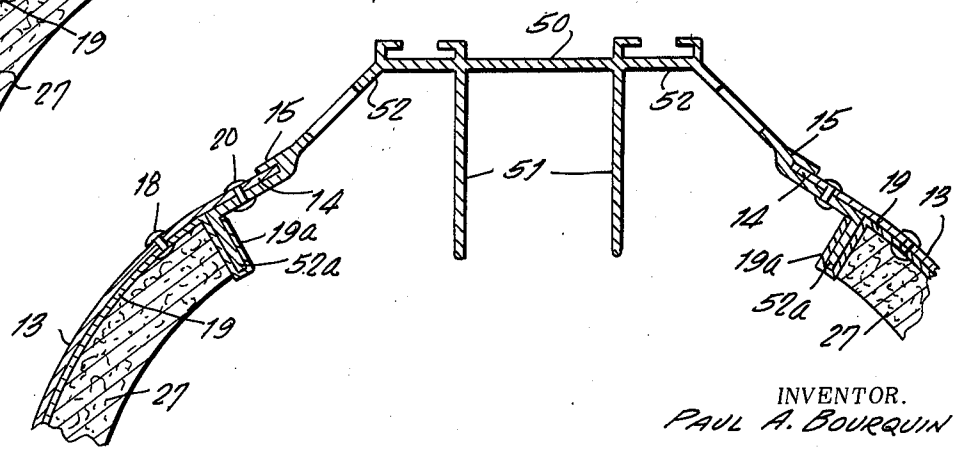


FIG. 9



INVENTOR.
PAUL A. BOURQUIN

BY Jacobs & Jacobs

ATTORNEYS

United States Patent Office 3,478,667 Patented Nov. 18, 1969

3,478,667

TOP DISCHARGE AIR DUCT SYSTEM AND AIR DUCTS THEREFOR

Paul A. Bourquin, Pleasantville, N.Y., assignor to Wolff & Munier, Inc., New York, N.Y.

Filed Jan. 6, 1969, Ser. No. 789,280
Int. Cl. F24f 13/02; F16l 3/00; F21v 29/00
U.S. Cl. 98—40 14 Claims

ABSTRACT OF THE DISCLOSURE

A top discharge air duct system is constructed from a plurality of ducts which ducts and system are suited for hanging from a ceiling or sub-ceiling, each air duct comprising a U-shaped member having flanged portions extending therefrom and having spaced holes or slots therethrough, a wrapper cylindrically curved, the ends of which terminate at the flanged portions, means for securing the ends of the wrapper to the flanged portions and means for joining adjacent air duct sections together and hanging said sections from the ceiling. When so hung from a ceiling, the air is discharged from the top and is not readily or easily visible from below. If desired, a lighting fixture may be disposed along the top of the duct in which event the U-shaped member is in the form of a right side up U.

The present invention is concerned with top discharge air duct systems and the individual duct sections which make up the system. Various types of air discharge systems are known in the art, but all of such systems are made up of one or more sections of an air duct which discharges the air either at the bottom, that is, the portion facing the room beneath, or from a lateral side portion of the duct. Such systems require complicated and expensive interior systems comprising valves, vanes, protrusions and the like in order to break up the pattern of air flow and decrease air velocity through the duct to permit proper discharge or emission of the air from the duct out into the room. Such additional valves, vanes and the like as are used in the prior art structures not only appreciably increase the manufacturing costs but also provide additional service and maintenance problems and the placement of such vanes, valves and the like inside the ducts makes reaching them for proper cleaning and maintenance extremely difficult and expensive.

According to the present invention, a top discharge air duct system has been constructed which emits the air from the uppermost portion of the duct, that is, that portion closest to the ceiling and not only provides a simple construction which does not require the complicated vanes, valves and the like of the prior art systems but also provides a more esthetically pleasing air duct system. The points of air emission cannot be easily or readily seen by one standing in the room below, and this coupled with greatly diminished construction costs, ease of maintenance and simplicity of hanging have resulted in a new type of air duct system substantially superior to all hitherto known systems.

More particularly, according to the present invention, an air duct system is constructed from one or more air ducts, such system being constructed to be easily hung from a ceiling and each of said ducts comprising a U-shaped member having flanged portions extending therefrom and having circular or slot-shaped holes therethrough for air emission and a wrapper cylindrically curved, the ends of said wrapper terminating at the flanged portions, means for securing the ends of the wrapper to the flanged portions and means for joining adjacent sections of the duct together and hanging said sections from the ceiling. A part of the present invention includes the hanging means

which accomplishes the dual feature of assisting securing adjacent sections together while at the same time providing a means for hanging the ducts from the ceiling. According to the structure of the present invention, the hanging and joining means are at the juncture of two adjacent sections and it is generally found in the prior art that any type of hanging means is placed intermediate of the end of juncture points of two adjacent ducts.

The following drawings more clearly illustrate the present invention wherein:

FIG. 1 is a sectional perspective view of two ducts according to the present invention, including a breakaway showing an interior band used to join the adjacent ducts;

FIG. 2 is a section taken along line 2—2 of FIG. 1;

FIG. 3 is a section taken along line 3—3 of FIG. 1 and also shows a modified hanging means;

FIG. 4 is an enlarged section taken along line 4—4 of FIG. 3 showing the lower portion of the hanging means, which means joins adjacent sections together and also shows the joining band;

FIG. 5 shows a variation in the air emission holes, these being of a slotted configuration;

FIG. 6 shows a modification of the hanging and joining means;

FIG. 7 shows an enlarged view illustrating the band used to join two adjacent duct sections;

FIG. 8 shows a variation in the flanged structure; and

FIG. 9 shows a variation in the U-shaped member, the U-shaped member being an inverted U rather than an upright U as shown in FIGS. 1–8.

With particular reference to the drawings above set forth, **10** indicates the U-shaped member shown in FIGS. 1–8 as an upright U having flanged portions **11** terminating in a sleeve **15**. Holes **12** of a circular configuration or **12'** of a slotted configuration are disposed through the flanged portion. These are conveniently placed at desired distances to provide sufficient air flow for the room beneath. An outer wrapper or membrane **13** of a cylindrically curved configuration is joined to the flanged portions such as by inserting the end **14** thereof into sleeve **15**. At one end of the air duct a band **19** is secured to the interior portion of the wrapper by screws or rivets **18** and **20** and by bending the end portion around the flange portion **11***a*, for the purpose of joining adjacent duct sections together. The band may be suitably secured to the interior of the adjacent duct by similar securing means such as screws or rivets **18** and **20**. Additional screws or rivets **17** may be placed along the surface of the wrapper **13** as shown for the purpose of securing the outer wrapper to the flange portion **11**. The end **19***a* of interior band may be curved around flange **11***a* as above indicated and if desired may be given additional strength by clamping end **19***a* around the flange **11***a* to give added strength to the construction. A suitable insulating material may be placed around the interior of the duct and this has been generally indicated at **27**. The band **19** is first secured in place on one duct by one of securing means **18** and **20**. Hanging means comprising an inverted V **23** having an inverted T (⊥) portion **22** at the extremities thereof, combines the function of a hanging means and a joining means by working in conjunction with slots **21** which are formed along the flange **11**. As the two duct sections are placed together, the inverted T sections **22** are placed in the slots **21** and as the sections are brought together and second screws or rivets **18** and **29** are set in place in the duct section to be joined. The inverted T holds the sections together and enables the duct system to be hung from a suitable ceiling hook such as **24** shown suspended from a ceiling or sub-ceiling **25**.

If desired, a light **26** may be inserted along the top of the air duct and when such is desired, upright U-shaped member **10** is used and the light **26** is set in the U-shaped member as best shown in FIGS. 2 and 3. FIGS. 3 and 6 show a modification of the inverted V and T-shaped members which is of simpler construction than the unit inverted V with the inverted T members, best shown in FIGS. 1 and 2. As shown in FIGS. 3 and 6, an inverted V-shaped member **33** has ends **33***a* which are bent outward. These ends **33***a* pass through holes **34** at the upper portion of inverted T members **32**. Ends **33***a* may be secured in place by suitable means, such as cotter pin **35**, or the like. This alternate construction is particularly advantageous because it permits the inverted T to be set in place as the adjacent duct sections are placed together and the hanging means **33** can be joined later at the time the duct system is actually to be hung. It has been found to be advantageous to make the head of the inverted T-shaped member approximately 8 to 10 inches long. However, it is possible to make the head of a greater or lesser size although it would generally not be preferred to reduce the size much below 8 inches because of the dual function it performs, that is, both a hanging means and a means for joining adjacent duct sections.

FIG. 7 shows an enlarged section which more clearly shows the manner in which the end **19***a* of band **19** may be clamped around flange **11***a* in order to provide a more secure structure. It has been found that the pressure exerted by the wrapper **13** on the band **19**, together with securing means **18** and **20**, is sufficient to hold the band rigidly in place and that in conjunction with inverted T members **22** or **32** placed in recesses **21** sufficient joining means is provided a secure connection of adjacent ducts and a secure hanging means **23** or **33** which permits the duct system to be suspended at the juncture points of adjacent duct sections from a ceiling or sub-ceiling.

FIG. 8 shows a variation in the flange **11**. The U-shaped member **10** has flanges **41** which terminate in portions **41***a* around which the end **19***a* of band **19** is wrapped securely in place and may, if desired, be clamped at one side.

FIG. 9 shows a variation in the U-shaped member wherein U-shaped member **50** is an inverted U having sides **51** and flanges **52** which terminate in flange portions **52***a*.

It has been found, according to the present invention, that both the upright U configuration and the inverted U-shaped configuration of FIG. 9 cause a disruption in the air flow pattern thus assisting in channeling the air out circular holes **12** or slotted holes **12'**. The two U-shaped configurations provide a good air angle which, upon testing, has provided a substantially uniform distribution of air out of the duct system. Thus, the upright and inverted U-shaped configurations, together with the flanges **11**, **41**, **52** and flanged portions **11***a*, **41***a* and **52***a*, provide a pocket which slows down the air velocity and eliminates the necessity for valves, vanes, complicated baffles and the like, all of which are required according to the prior art structures. At the same time, the air duct system and the individual air ducts according to the present invention may be injection molded which is very advantageous from a commercial standpoint. Such injection molding was generally not possible with any of the prior art structures. In addition, the present structure is virtually maintenance free.

It is to be appreciated that in addition to being advantageously produced by injection molding, the air duct system and air ducts of the present invention may be produced out of any suitable or desirable materials, such as any metal or alloy, plastic, homopolymer or copolymer or any other suitable or similar material. The only requirements are sufficient tensile strength to withstand the pressure resulting from the air velocity and to provide sufficient structural strength to prevent deflection or deformity of shape.

Other and further uses and modifications of the foregoing will be appreciated by those skilled in the art.

What is claimed is:

1. A top discharge air duct system constructed to be hung from a ceiling which comprises a plurality of air ducts, each air duct comprising a U-shaped member forming the top portion of said duct having flanged portions extending therefrom and having spaced air passage holes therethrough, a wrapper cylindrically curved, the ends of said wrapper terminating on the flanged portions, means for securing the ends of the wrapper to the flanged portions and means for joining two adjacent sections of said duct together and hanging said sections from the ceiling, whereby when said duct system is hung from a ceiling, the air is discharged from the top portion of the air duct through said spaced holes.

2. A top discharge air duct system according to claim **1** wherein the U-shaped member is of an inverted U configuration, and the flanged portions extend from the base of the inverted U.

3. A top discharge air duct system according to claim **1** wherein the U-shaped member is in the form of an upright U and which further comprises a light disposed in the U portion.

4. A top discharge air duct system according to claim **3** wherein said joining and hanging means comprises a V-shaped member, the two ends of which terminate in T-shaped members and a mating portion in the top of said flanges shaped to receive the head of the T, one mating member being disposed on each side of said U-shaped member juncture of the air duct sections so that when two adjacent sections are fitted to one another the mating members fit to form a mating unit.

5. A top discharge air duct system according to claim **4** wherein said wrapper terminates below the holes in said flanged members.

6. A top discharge air duct system according to claim **5** wherein the flanged portions overlap the wrapper.

7. A top discharge air duct system according to claim **5** wherein said flanged portion has a sleeve within which the end of the wrapper is received.

8. A top discharge duct system according to claim **6** further comprises an insulating material disposed within said air duct covering the inner surface of the wrapper.

9. A top discharge air duct system according to claim **6** wherein said holes are substantially circular.

10. A top discharge air duct system according to claim **6** wherein said holes are in the shape of slots.

11. A top discharge air duct system according to claim **1** wherein the joining and hanging means comprises an inverted V-shaped member, the ends of which are flanged outward and an inverted T-shaped member having a hole through the upper portion of the shaft sized to fit the flanged portions of the inverted V-shaped member and means for securing the flanged portion of the inverted V-shaped member in place through the holes of the shaft of the inverted T-shaped member.

12. A section of a top discharge air duct system constructed to be hung from a ceiling which comprises an air duct comprising a U-shaped member forming the top portion of said duct having flanged portions extending from the top of the U and having spaced air passage holes through the flanged portions for air emission, a wrapper cylindrically curved the ends of which overlap the flanged portions, means for securing the ends to the flanged portions and means attached to the U-shaped member for hanging said section from the ceiling.

13. A section of a top discharge air duct system according to claim **12** wherein the U-shaped member is of an inverted U configuration and the flanged portions extend from the base of the inverted U.

14. A top discharge air duct system constructed to be hung from a ceiling or sub-ceiling which comprises:

(a) a plurality of air ducts, each duct comprising:

(1) a U-shaped member having flanged portions

extending from the top of the U and having spaced holes therealong;

(2) a wrapper of curved cylindrical configuration overlapping a portion of said flanged portion and the ends thereof terminating below the holes;

(3) means for securing the ends of the wrapper to the flanged portions; and

(4) insulating material disposed around the inner surface of the wrapper;

(b) a light disposed in the U portion of the U-shaped members;

(c) means for joining adjacent sections of the air duct together and hanging them from the ceiling which comprises:

(1) an inverted V-shaped member, the ends of which terminate in an inverted T-shaped member;

(2) means for joining adjacent wrappers; and

(3) mating means constructed to receive the heads of the T-shaped members in slots, said mating means being paired on each air duct, one on each side of the U-shaped member at

the ends of each air duct so that as adjacent air ducts are fitted together to form a unit which has a slot within which the head of each T is held,

whereby, the ducts are thereby hung from suitable means extending down from the ceiling which means engage the apex of the inverted V-shaped member thereby holding the ducts in a position such that the holes for air emission are not readily visible from below the air ducts.

References Cited

UNITED STATES PATENTS

2,221,001	11/1940	Lucius	98—40 X
2,859,681	11/1958	Rachlin	98—40
3,088,392	5/1963	Egan	98—40
3,357,088	12/1967	Hoffman et al.	29—432

WILLIAM E. WAYNER, Primary Examiner

U.S. Cl. X.R.

138—107; 240—47

Notice of Adverse Decisions in Interferences

In Interference No. 97,807 involving Patent No. 3,478,667, P. A. Bourquin, TOP DISCHARGE AIR DUCT SYSTEM AND AIR DUCTS THEREFOR, final judgment adverse to the patentee was rendered Jan. 16, 1973, as to claims 1, 3 and 13.

[*Official Gazette March 27, 1973.*]