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2,884,956

AIR GUIDE DEVICE

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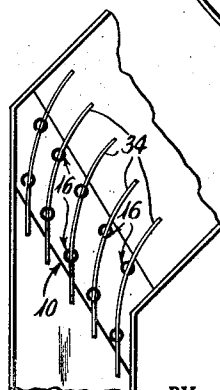
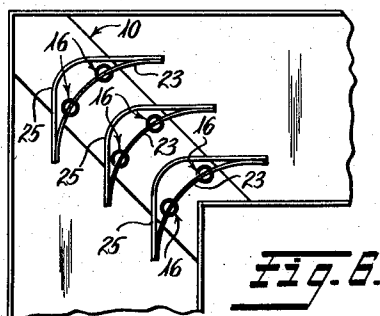
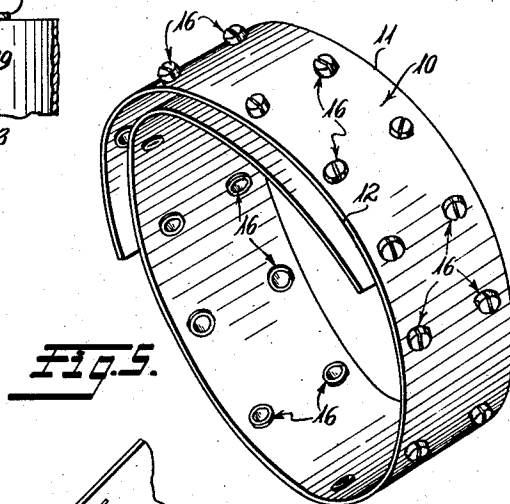
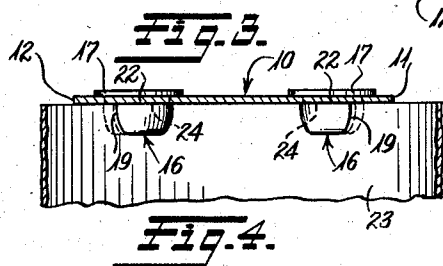
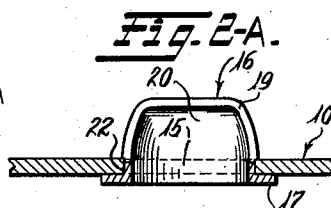
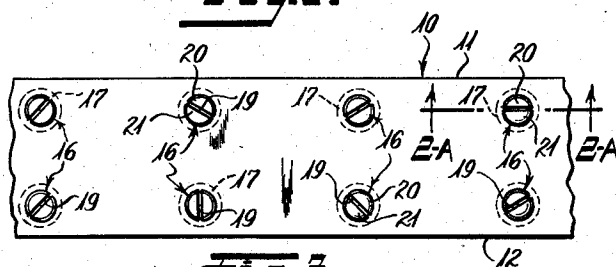
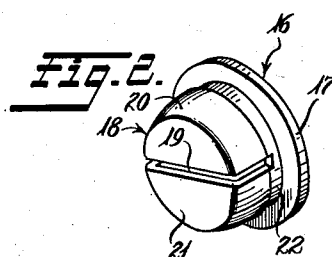
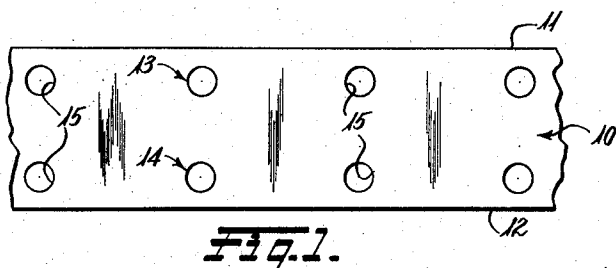


Fig. 8.

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1

2,884,956

AIR GUIDE DEVICE

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3 Claims. (Cl. 138—39)

The present invention relates to air turning devices of simplified construction and more particularly relates to the simplified assembly of air turning devices adapted for installation in an elbow or bend of a duct system in which a plurality of arcuate or curved blades are fixedly positioned in parallel relationship with respect to one another for the purpose of smoothly guiding the air flowing through the duct around the elbow or bend.

In the heating and ventilating field, sheet metal contractors are frequently called upon to install air turning devices in the elbows of duct systems. These elbows are of various size and shape in that the duct may be of various dimensions, the elbow may be a right angle elbow or traverse some different angle, and the duct before and after the elbow may have the same or different dimensions. As a result, each air turning device must be designed and constructed for the particular elbow situation at hand. Because of the difficulty of constructing these air turning devices, some manufacturers have merchandized pre-formed units. These pre-formed units have been of small value because the pre-formed unit rarely fitted the problem at hand. Other manufacturers have merchandized specially formed side plates into which pre-formed blades of desired length could be accurately fitted. This permitted the length and the width of the air turning device to be regulated by the sheet metal contractor but the resulting unit was only well adapted to serve the situation in which the elbow was a right angle elbow and in which there was no change in size before and after the turn. A further disadvantage was the expense of purchasing the pre-formed blades since simple rolled rectangular blades formed from scrap were poorly adapted for the accurate fit required.

The first successful solution to the problem of the present invention was presented in the application of Bruno Speiser S.N. 280,094 filed April 2, 1952 now United States Patent No. 2,826,221. However, despite the very considerable acceptance and utility of the air turning device construction of the said Speiser application, this construction was not adapted to permit a single side plate to accommodate blades of different curvature in order to allow variation in blade curvature to more fully satisfy the most rigorous possible standards in certain air turning situations where it might be desired to utilize gradually curving blades instead of or in combination with more sharply curved blades.

The present invention provides a side plate construction for an air turning device in which blades of varying curvature may be accommodated. Accordingly, the present application is an improvement over the previously referred to air turning device construction of the Speiser application. The invention includes the complete air turning device as well as the novel side plate which permits its construction.

In accordance with the present invention, a side plate for an air turning device is provided in which two rows of laterally spaced apart, swivelly mounted, flanged cup-

2

shaped members are rotatably mounted in openings in a side plate. These flanged cup-shaped members are constituted by a laterally projecting flange carrying a depending and preferably centrally positioned cup-shaped portion having a slot extending across the same. All of the cup-shaped members project through the openings in the side plate in the same direction. The curved air turning blades or vanes are positioned at approximately a right angle to the plane of the side plate with two laterally spaced apart portions of one margin of the blade inserted through the slots of two of the cup-shaped members to extend into the cup-shaped interior of the cup-shaped portions where these projecting portions of the blade are deformed to key the blade to the cup-shaped members and thereby lock the blade in fixed position to the side plate. This same procedure can then be followed on the opposite margin of the blade to form the completed air turning device which is then mounted by fastening the side plates to the interior of the duct at the elbow thereof.

Since the flanged cup-shaped members are swivelly mounted for rotation in the plane of the plate on which they are mounted, the slots can be pivoted into alignment with the curvature of the blade which is employed. The blade may accordingly possess any desired curvature, and, if desired, the various blades in the same turning device may have different curvature, this constituting a particularly preferred form of the present invention.

The side plates are preferably constituted by an elongated strip of metal having parallel side edges since, in this manner, the side plates may be cut to any desired length. The side plates are preferably supplied in the form of a continuous coiled strip having uniformly spaced parallel rows of juxtaposed openings therein. These side plates may, in accordance with preferred practice of the invention, be provided with flanged cup-shaped members permanently, though rotatably, secured thereto, the said members being formed for this purpose with a circular depression adjacent the flange so that the cup-shaped portion can be snapped into the openings in the side plates and in this manner permanently secured thereto to be ready for immediate use without prior assembly by those using the side plates.

The side plates may, if desired, be formed with shallow preferably circular depressions surrounding the openings therein, said depressions being sufficiently deep and large to receive the thin flange of the cup-shaped members so that the flat outer surface of the side plates can be maintained.

The invention will now be more fully described in conjunction with the accompanying drawings in which:

Fig. 1 is a top plan view of an elongated strip of metal in accordance with the invention;

Fig. 2 is a perspective view of a flanged cup-shaped member constructed in accordance with the invention;

Fig. 2A is a cross-section taken on the line 2A—2A of Fig. 3 to show the interior of the flanged cup-shaped member of Fig. 2 and the mounting of this member in the openings of the strip of Fig. 1;

Fig. 3 is a bottom view of the strip shown in Fig. 1 with flanged cup-shaped members, such as is shown in Fig. 2, rotatably mounted in the openings of the strip;

Fig. 4 is a partial sectional view taken across the width of one of the side plates in a completed air turning device constructed in accordance with the invention;

Fig. 5 is a perspective view showing the strip of Fig. 3 wound about itself to form a coil with the flanged cup-shaped members forming a permanent part of the product

Fig. 6 is a diagrammatic plan view showing a side plate in accordance with the invention utilized to form an air turning unit using double blades in conventional

3

manner in a right angle elbow in which the duct size on both sides of the elbow is the same;

Fig. 7 is a diagrammatic plan view showing a side plate in accordance with the invention utilized to form an air turning unit using single blades of different curvature in a right angle elbow of the same type as in Fig. 6; and

Fig. 8 is a diagrammatic plan view showing a side plate in accordance with the invention utilized to form an air turning unit using single blades in a duct elbow of small angle.

Referring more particularly to the drawings, Fig. 1 shows a planar strip which is preferably constituted by a strip of sheet metal. This strip is identified by the numeral 10 and is formed with parallel side edges 11 and 12. Formed in the strip 10 are two longitudinal rows 13 and 14 of generally circular openings 15. It will be seen that the rows 13 and 14 are laterally spaced apart and are parallel with one another and also with the side edges 11 and 12. The rows 13 and 14 are positioned closely adjacent opposite side edges 11 and 12 of the strip 10.

The flanged cup-shaped members 16 of the invention are shown in Figs. 2 and 2A where it can be seen that an outwardly extending flange 17, which is preferably circular in outline, is provided with a preferably centrally positioned depending cup-shaped portion 18. The cup-shaped portion 18 is formed with a transverse slot 19 which extends approximately entirely across the cup-shaped portion 18 to divide the same into approximately equal side portions 20 and 21 which together define the U-shaped slot 19 which extends at right angles to the plane of the flange 17.

The cup-shaped portion 18 preferably includes a circular depression 22 which is positioned adjacent the flange 17. The cup-shaped portions 18 are dimensioned to have a maximum diameter which is slightly larger than the diameter of the openings 15 in the strip 10. At the same time, the diameter of the circular depression 22 is slightly smaller than the diameter of the openings 15. Accordingly, the cup-shaped portion 18 can be snapped into the opening 15 to permanently secure or mount the flanged cup-shaped member 16 in the opening 15 for rotational or swivel movement in the plane of the strip 10.

The flanged cup-shaped members 16 need not include the circular depression 22 in which case the members 16 are supplied separate from the strip 10 and these members 16 are inserted as needed in the openings 15. When the air turning device is constructed, the blades are secured to the members 16 and this securement is effective to lock the members 16 to the strip.

Fig. 3 shows the strip 10 with the flanged cup-shaped members 16 mounted in the openings 15. As can be seen, all of the cup-shaped portions 18 project through the strip 10 in the same direction. Because of the swivel mounting of the members 16, the slots 19 may assume any angular position to conform with the positioning and the curvature of the blades in the air turning device which is constructed.

In Fig. 4 the interconnection between a blade or vane 23 and two flanged cup-shaped members 16 is illustrated. As can be seen, the blade 23 is curved and is positioned at a right angle to the strip 10 with two laterally spaced portions of one margin projecting through the slots 19. The projecting portions are identified by the numeral 24 and these are deformed to key the blade 23 to the flanged cup-shaped members 16 and to thereby fixedly position the blade 23 with respect to the strip 10.

The slot 19 is preferably sufficiently deep to permit the blade 23 to be inserted deeply enough to abut the inner surface of the strip 10.

As will be evident, side plates constituted by a pair of opposed strips 10 with inwardly directed flanged cup-

4

shaped members 16 are employed to secure opposite marginal portions of the air turning blades or vanes. These blades or vanes are simple rectangular pieces of sheet metal which are easily cut to size and rolled to desired shape so that they can be easily produced from scrap. Either single or double blades may be accommodated in conventional fashion. An advantage of the invention is the fact that the efficiency of single blade construction is substantially enhanced due to the ability of the side plates of the invention to accommodate blades of varying curvature and to receive these blades either in laterally juxtaposed slots 19 or in slots 19 which are not laterally juxtaposed.

As will be appreciated, the strips 10 must be severed to size and suitably configured at the leading and trailing ends to form a side plate for installation in a duct elbow. Since the length of strip required cannot be predicted in advance, it is desirable to supply the strip in very long lengths for purposes of economy. The invention includes the winding of strip 10 about itself to form a coil containing the flanged cup-shaped members 16 permanently secured thereto, e.g. snapped in place in the openings 15. The coiled product is pictured in Fig. 5.

Fig. 6 diagrammatically illustrates a simple right angle elbow equipped with an air turning device extending at a 45° angle across the elbow. The blades 23 are all identical in curvature and each blade 23 carries a second blade 25. The blades 23 are secured to the flanged cup-shaped members 16 whereas the blades 25 are not secured in any way to the strips 10. The construction shown in Fig. 6 is conventional and illustrates how the side plates of the invention are well adapted for use in conventional manner. The blades 25 can be eliminated to simplify construction, but the cross-sectional area at the elbow will then be greater than the area of the duct at either side of the elbow leading to less efficient and less desirable flow of air through the duct system.

Fig. 7 illustrates an air turning device using single blades which constitutes an improvement over the construction of Fig. 6 in the identical duct elbow situation. As can be seen, the blades 30, 31, and 32 are of different curvature and length, the blade 30 being long and slightly curved, the blade 32 being short and sharply curved and the blade 31 being of intermediate length and curvature. It will be observed that the portion 33 in the far corner of the elbow has been removed from the air stream and the air can now flow smoothly being guided around the full length of the elbow without being sharply expanded and contracted by change in duct area at the elbow.

In Fig. 8, all of the single blades 34 are substantially identical and the change in direction over the elbow is slight. The blades 34 are mounted in the slots of members 16 which are not laterally juxtaposed, the members 16 rotating to permit this non-conventional blade mounting.

It will now be apparent that the invention is characterized by the combination of simplicity in construction and unparalleled adaptability for both conventional and unusual air turning device construction and that the utilization of single blades is greatly enhanced without requiring expensive and time consuming assembling operation for the blades are simply positioned in the slots of the members 16 until all the blades are in place and the portions of the blades which project through the slots are then deformed as by hammering, snipping or chiseling to form the completed air turning device which is then secured to the duct in conventional manner.

I claim:

1. In an air turning device, a pair of spaced apart parallel juxtaposed side plates and curved blades positioned at a right angle with respect to said side plates, said blades being single rectangular blades of different

curvature and being fixedly secured to each of said side plates at a pair of laterally spaced points positioned at opposite side margins of said plates, said side plates having generally circular openings at each of said spaced points, a plurality of flanged cup-shaped members having a sidewardly extending flange and a cup-shaped portion depending from said flange, said cup-shaped portion having a slot extending across the same, said flanged cup-shaped members being mounted for rotation in the plane of said side plates in the openings thereof with the said cup-shaped portions all projecting through said openings toward said blades, said blades being fixedly secured to each of said side plates by having a side marginal portion of said blades projecting through said slots and into the interior of said cup-shaped portions, the portions of said blades projecting into said cup-shaped portions being deformed to lock said blades to said flanged cup-shaped members and hence to said side plates, said side plates being constituted by elongated strips having parallel side edges and parallel laterally spaced rows of longitudinal spaced laterally juxtaposed generally circular openings formed therein.

2. In an air turning device, a pair of spaced apart parallel juxtaposed side plates and curved blades positioned at a right angle with respect to said side plates, said blades being fixedly secured to each of said side plates at a pair of laterally spaced points positioned at opposite side margins of said plates, said blades being single rectangular blades, the blades at one end of said air turning device being short and sharply curved, the blades at the other end of said device being long and slightly curved and the blades in the middle of said device being of intermediate width and curvature, said side plates having generally circular openings at each of said spaced points, a plurality of flanged cup-shaped members having a sidewardly extending flange and a cup-shaped portion depending from said flange, said cup-shaped portion having a slot extending across the same, said flanged cup-shaped members being mounted for rotation in the plane of said side plates in the openings thereof with the said cup-shaped portions all projecting through said openings toward said blades, said blades being fixedly secured to each of said side plates by having a side marginal portion of said blades projecting through said slots and into the interior of said cup-shaped portions, the portions of said blades projecting into said cup-shaped portions being deformed to

lock said blades to said flanged cup-shaped members and hence to said side plates, said side plates being constituted by elongated strips having parallel side edges and parallel laterally spaced rows of longitudinal spaced laterally juxtaposed generally circular openings formed therein.

3. In an air turning device, a pair of spaced apart parallel juxtaposed side plates and curved blades positioned at a right angle with respect to said side plates, said blades being fixedly secured to each of said side plates at a pair of laterally spaced points positioned at opposite side margins of said plates, said side plates having generally circular openings at each of said spaced points, a plurality of flanged cup-shaped members having a sidewardly extending flange and a cup-shaped portion depending from said flange, said cup-shaped portion having a slot extending across the same, said flanged cup-shaped members being mounted for rotation in the plane of said side plates in the openings thereof with the said cup-shaped portions all projecting through said openings toward said blades, said blades being fixedly secured to each of said side plates by having a side marginal portion of said blades projecting through said slots and into the interior of said cup-shaped portions, the portions of said blades projecting into said cup-shaped portions being deformed to lock said blades to said flanged cup-shaped members and hence to said side plates, said side plates being constituted by elongated strips having parallel side edges and two parallel, laterally spaced straight rows of longitudinally spaced laterally juxtaposed generally circular openings formed therein, said blades being mounted in non-laterally juxtaposed slots of the flanged cup-shaped members.

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