United States Patent

Lov et al.

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[54] METHOD AND APPARATUS FOR FORMING CENTRIFUGAL FAN HOUSINGS

[72] Inventors: **William L. Lov**, McHenry; **Ned Blood**, Hoffman Estates, both of Ill.

[73] Assignee: **ILG Industries Inc.**, Chicago, Ill.

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[52] **U.S. Cl.** .....**29/243.52**, 29/156.8 CF, 113/22

[51] **Int. Cl.** **B21k 21/00**, B21d 51/16, B23p 19/04

[58] **Field of Search**.....29/243.5, 243.52, 156.8 CF; 113/22

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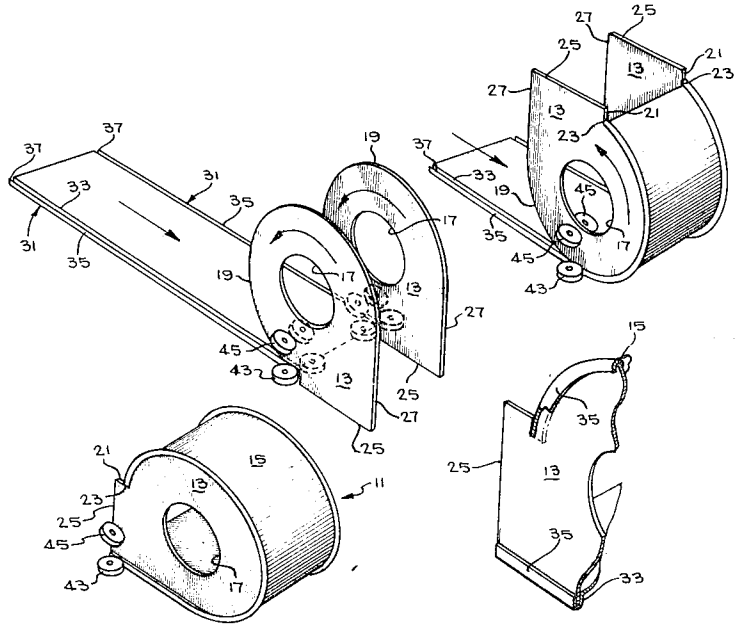
Primary Examiner—Wayne A. Morse, Jr.

Attorney—Anderson, Luedeka, Fitch, Even and Tabin

[57] **ABSTRACT**

An apparatus is provided for fabricating centrifugal fan housings. The apparatus described includes novel means for supporting pressure rolls engageable with opposite sides of a housing side plate, and novel means for supporting and guiding the components of the housing during its formation.

8 Claims, 11 Drawing Figures



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SHEET 1 OF 4

FIG.1

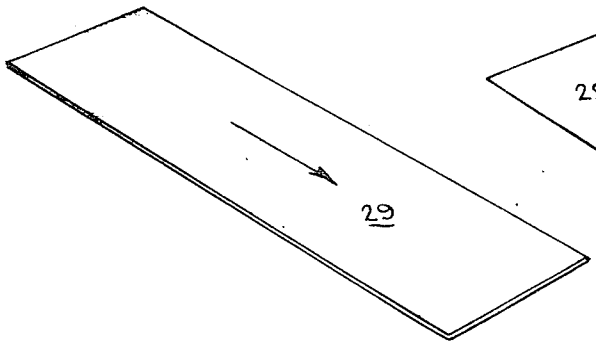


FIG.2

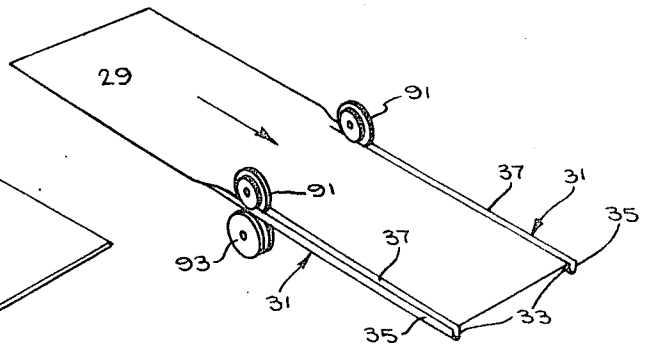


FIG.3

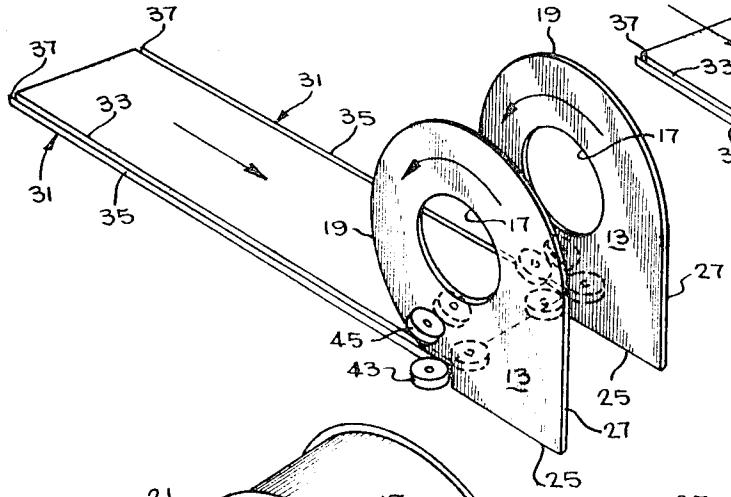


FIG.4

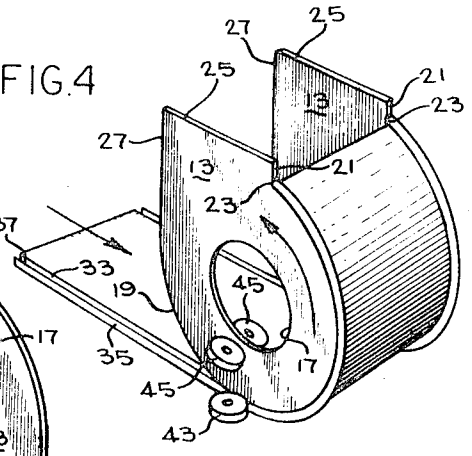


FIG.5

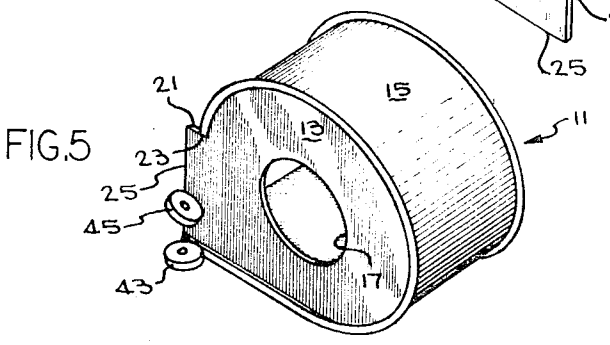
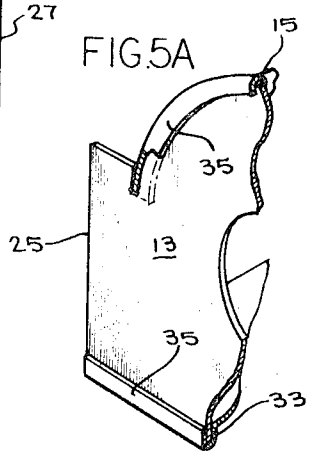


FIG.5A



INVENTORS
WILLIAM L. LOV
NED BLOOD
Anderson, Luedeka, Fitch, Even & Tabin
ATTYS.

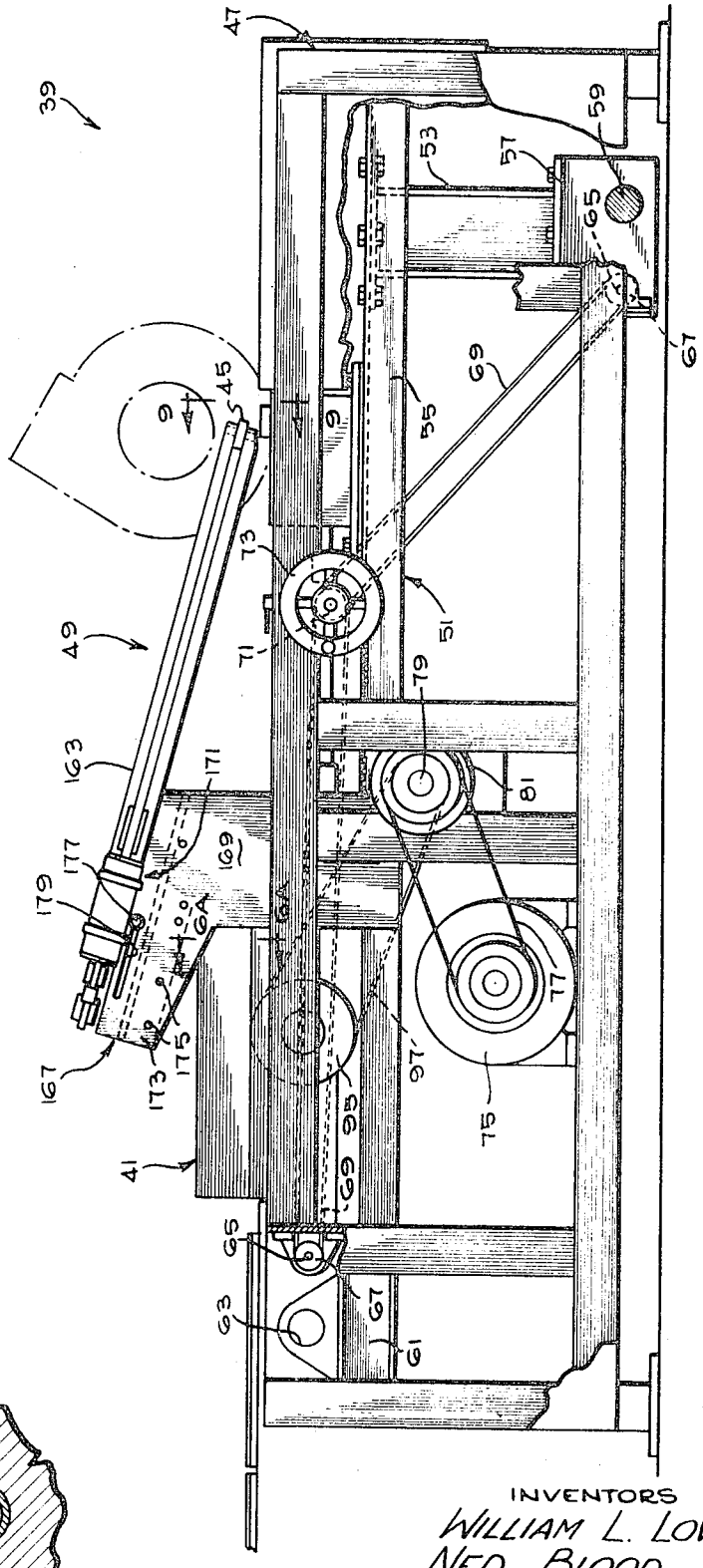


FIG. 6

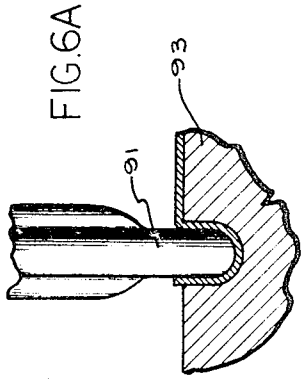


FIG. 6A

INVENTORS
WILLIAM L. LOV
NED BLOOD
Anderson, Luedeka, Fitch, Even & Tabin
ATTYS.

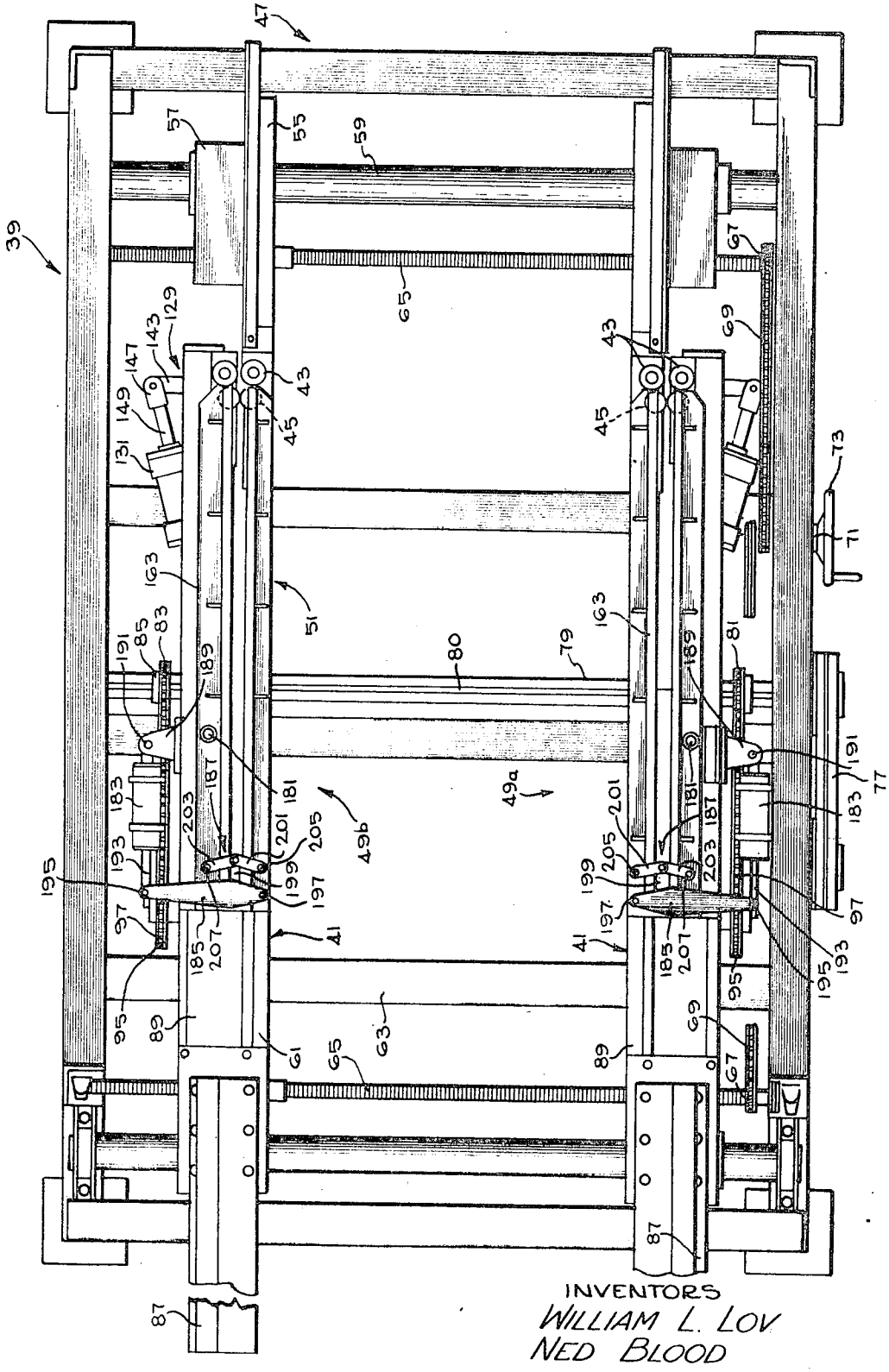


FIG.7

INVENTORS
WILLIAM L. LOV
NED BLOOD

Anderson, Luedeka, Fitch, Even & Tabin
ATTYS.

FIG.8

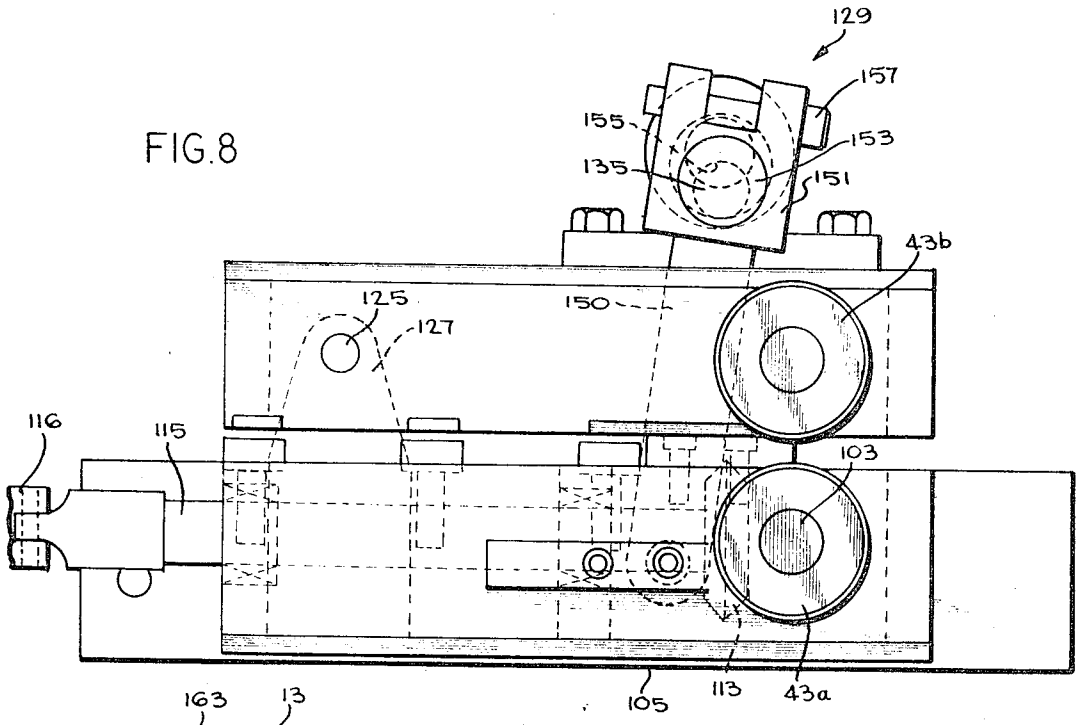
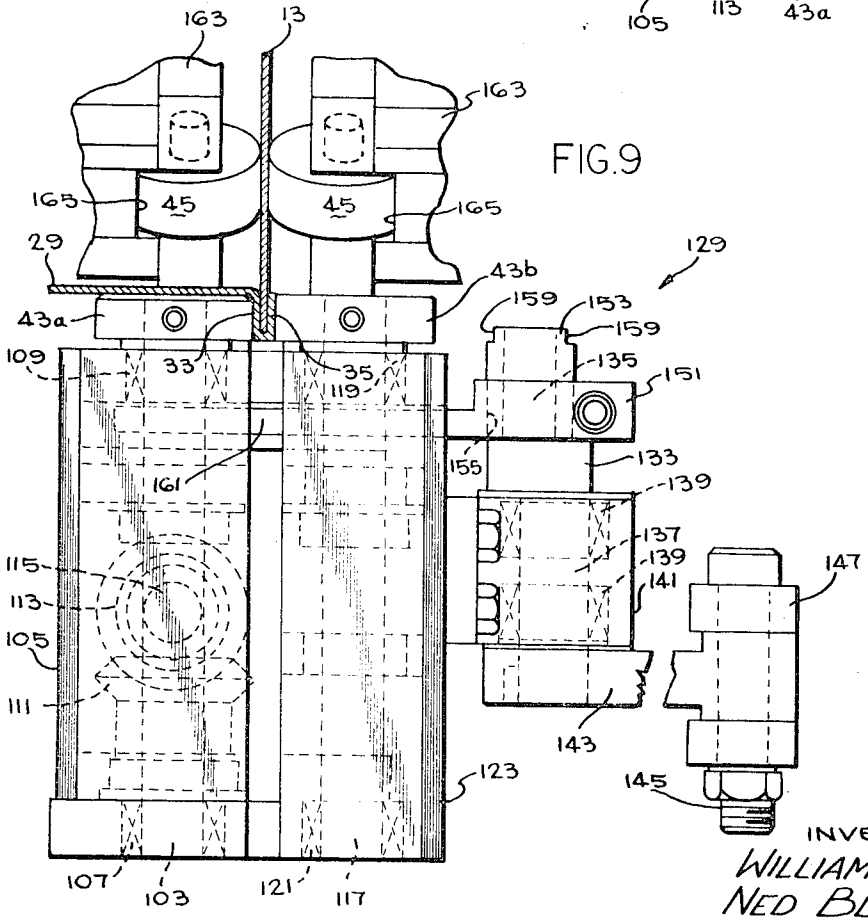


FIG.9



INVENTORS
WILLIAM L. LOV
NED BLOOD
Anderson, Luedeka, Fitch, Even & Tabin
ATTYS.

METHOD AND APPARATUS FOR FORMING CENTRIFUGAL FAN HOUSINGS

The present invention relates to a method of and an apparatus for fabricating centrifugal fan housings.

A commonly used form of centrifugal fan housing includes a pair of parallel side walls or plates having curved peripheral edges joined by a scroll or inner wall. Such housings may be formed by welding the outer peripheral edges of each of the housing side plates to the scroll, but such a method of fabrication is relatively expensive because of the labor involved. It has been found that the joinder of the side walls and scroll can be accomplished in a relatively fast, efficient and low cost manner, and without sacrifice in rigidity and durability, by providing a channel defining a groove along each of the longitudinal side edges of a band to be formed into the scroll, placing the edges of the side walls into the grooves, and then clinching the walls of the channel to the peripheral edges of the side walls. Methods and apparatus for performing this operation have been devised and used.

The principal object of the present invention, therefore, is to provide an improved method and apparatus for performing this clinching operation in a more expeditious and efficient manner.

Other objects and advantages of the invention will become apparent from the detailed description taken in connection with the accompanying drawings in which:

FIG. 1 is a view of a flat band which is to be formed into a curved housing wall or scroll;

FIG. 2 is a diagrammatic view illustrating the formation of grooves along edges of the band of FIG. 1;

FIGS. 3, 4 and 5 are diagrammatic illustrations of steps employed in the preferred method of fabricating the centrifugal fan housing;

FIG. 5A is an enlarged fragmentary view illustrating a modification of the housing construction illustrated in FIG. 5;

FIG. 6 is a side elevational view of an apparatus for carrying out the preferred method of fabricating a centrifugal fan housing;

FIG. 6A is an enlarged, fragmentary cross-sectional view taken substantially along the line 6A—6A of FIG. 6;

FIG. 7 is a plan view of the apparatus of FIG. 6;

FIG. 8 is an enlarged fragmentary plan view of a portion of the apparatus shown in FIG. 6; and

FIG. 9 is an enlarged fragmentary end view looking in the direction of the arrows 9—9 of FIG. 6.

A centrifugal fan housing 11 of the type formed in accordance with the present invention is shown in FIG. 5 and includes a pair of parallel side plates 13 joined along their peripheral edges to a curved scroll 15. Each side plate in the embodiment shown includes a circular inlet opening 17 and a curved edge 19 (FIG. 1) which constitutes a portion of an archimedian spiral. Each side plate also includes a flat shoulder 21 which projects outwardly from the point of origin 23 of the curved edge 19, and a flat edge 25 which extends from the outer end of the shoulder 21 to an extension 27 of the curved edge 19, which extension is parallel to the shoulder 21.

The scroll 15 is initially a flat rectangular band 29. It is formed, however, in accordance with the present method and apparatus, to include a channel 31 along each of its longitudinal side edges. Each channel 31 has a pair of side walls 33 and 35 and defines a longitudinally extending groove 37 which receives the curved edge 19 and the extension 27 thereof of a side plate 13.

Briefly, in the preferred method of fabricating the housing 11, a channel 31 defining a groove 37 is first provided adjacent each longitudinally extending side edge of the band 29 which ultimately becomes the scroll 15 (FIG. 1). An edge 19 of a side plate 13 is then inserted into each of the respective grooves 37 and positioned in proper attitude with the locating plates, with one end edge of the band abutting the shoulder 21 of each end plate at point 23. The band is secured to the end plates at approximately that point by welding or other suitable means hereinafter disclosed. The band 29 is then advanced. As the band moves forward, the side plates 15 are rotated to

progressively place the edges 19 of the side plates into the respective grooves 37 (FIG. 4), while urging the side plates into the grooves and while clinching the walls 33 and 35 of each channel 31 of each grove 37 tightly against the edges of the side plates.

A preferred apparatus 39 for fabricating the housing 11 in accordance with the preferred method is shown in FIGS. 6-9. It includes a pair of formers 41 which form the channels 31 and grooves 37 along the opposing side edges of the band 29. In addition, it includes for each channel and, consequently, for each end plate to be secured therein, a pair of clinching rolls 43 which close the channel walls 33 and 35 onto the edge of the side plate, and a pair of pressure rolls 45 which are disposed at an inclination to the plane defined by the axes of the clinch rolls and which apply a downward component of force to the side plate 13, thereby urging its edge into the groove 37.

Referring now to FIGS. 6–9, the apparatus 39 includes a frame 47 which is stationary and which supports the various operating components hereinafter described. Since the apparatus forms a pair of channels 31 in the band 29, and since a pair of side plates 15 are clinched within grooves 37 simultaneously, the apparatus is provided with two very similar operating mechanisms 49 spaced horizontally from each other, with each including a groove former 41, a set of clinch rolls 43, and a set of pressure rolls 45. Since the mechanisms are similar, portions of the following description which refer to one apply to both and each will not necessarily be described separately.

In order to render the apparatus 39 capable of accommodating and fabricating fan housings of different widths, one of the operating mechanisms 49*a*, the lower one as the apparatus is shown in plan in FIG. 7, is fixed to the frame 47 and, as a whole, is stationary relative thereto. The remaining operating mechanism 49*b*, however, is mounted on a carriage 51 which includes an upright standard 53 adjacent the front of the frame (the right end as viewed in FIG. 6) and a beam 55 which extends rearwardly from the upper end of the standard.

The standard 53 is supported on a ball bushing 57 which, in turn, is carried by a transverse rail 59 located adjacent the lower portion of the frame. The rearward end of the beam 55 is suspended from a similar ball bushing 61 carried by a second transverse rail 63 located adjacent the upper portion of the frame. A screw shaft 65 passes through each of the ball bushings 57 and 61 and the two shafts are effective, when rotated simultaneously, to cause movement of the ball bushings and, hence, the carriage, along the rails 59 and 63. Each screw shaft carries a sprocket 67 which connects it by means of a chain 69 to a shaft 71 provided with a handle 73 by means of which its rotation may be manually effected to cause transverse movement of the carriage.

Motive power for each of the operating mechanisms 49, both the stationary mechanism and that which is mounted on the carriage 51, is supplied by a motor 75 which is connected by belts 77 to a main drive shaft 79. The shaft 79 is provided with a pair of longitudinally extending, diametrically opposed keyways 80. A sprocket 81 is fixed to the shaft 79 and provides the takeoff for the stationary, operating mechanism 49*a*. A second sprocket 83 is carried by a bearing 85 so as to be slideable along the shaft as the carriage is moved along the rails 59 and 63, and is also keyed to the shaft so as to rotate therewith. Thus, the sprocket 83 delivers power to the mechanism 49*b* from the main drive shaft 79 regardless of the position of the carriage 51 on the transverse rails 59 and 63.

As previously mentioned, the band 29 which is ultimately formed into the scroll 15 is initially in the form of a flat rectangular sheet. It is fed into the formers 41 past side edge guides 87, the feeding being accomplished manually at first but, after the formers have gripped the band, by the action of the formers themselves. Each of the formers includes a housing 89 which contains a horizontally extending row of flanged rolls 91 which cooperate with a horizontally extending row of grooved rolls 93 located beneath the row of flanged rolls 91. A

single flanged roll **91** and a single grooved roll **93** are shown in FIG. 6A. The flanged rolls **91** and the grooved rolls **93** are mounted on horizontal shafts, each of which carries a spur gear (not shown). The spur gears of all of the shafts intermesh to form a gear train (not shown) so that the shafts thus rotate in unison. One of the roll shafts projects outwardly from the former housing and carries a sprocket **95** which is connected by means of a chain **97** to one of the sprockets **81** or **83** carried by the main drive shaft **79** and transmits the rotary motion thus received to the remaining roller shafts. In a previous construction, one of the sprockets **95** was located between the mechanisms **49***a* and **49***b* and placed a limitation on how close the mechanisms could be moved together. In the illustrated embodiment, both of these sprockets are located on the outer sides of the mechanisms **49**, thus eliminating this limitation.

While the formers **41** are shown as part of the whole apparatus **39**, it is, of course, within the purview of the present invention that the bands **29** be pre-formed with the grooves **37** therein at a remote location and merely fed into the present apparatus for the clinching operation.

After formation of the grooves **37** in the leading end of the band **29**, and while the grooves are still being formed in the trailing portion of the band, the leading end reaches the nip of the two sets of clinch rolls **43**, these sets being disposed in horizontally spaced relation to receive the two previously formed channels **31** of the band. The movement of the band is then halted and the respective side plates **13** are positioned by an operator, substantially as shown in FIG. **3**, with the shoulder **21** of the side plates abutting the leading end of the band **29** and with the initial portion of the curved edge **19** extending from the point of origin **23** disposed in the groove **37**. The leading end of the band **29** is then secured to each of the housing side plates to prevent slippage therebetween during the clinching operation. This may be accomplished by means of a spot weld, or may be accomplished by inserting the leading edges of the channels **31** into notches which extend inwardly from the point **23** of each of the side plates **13** in a line continuing the curve **19** of the side plate.

With the side plates **13** thus attached to the band **29**, the clinching operation can begin. In the illustrated embodiment of the invention, each set of clinch rolls **43** includes a driven roll mounted for rotation about a stationary vertical axis and an idler roll which is also mounted for rotation about a vertical axis but which is movable toward and away from the driven roll.

More particularly, the driven clinch roll **43a** of each set is mounted adjacent the upper end of a vertically disposed shaft **103** carried in a housing **105** mounted on the frame **47** for the stationary operating mechanism **49a** and on the carriage **51** for the movable operating mechanism **49***b*. The clinch rolls for the latter mechanism are shown in FIG. **9** wherein it will be seen that the shaft **103** is supported by upper and lower bearings **107** and **109** and carries a bevel gear **111**. The bevel gear **111** meshes with a bevel gear **113** mounted on a shaft **115** connected through universal joints **116** to the output shaft (not shown) of a gear box (not shown) which receives its power from the main drive shaft **79**.

The idler clinch roll **43***b* is supported adjacent the upper end of a vertically disposed shaft **117** carried by upper and lower bearings **119** and **121** mounted within a movable housing **123**, which itself is mounted for pivotal movement about a vertically extending hinge pin **125**, as best seen in FIG. **8**. The hinge pin **125** is supported adjacent one end by an elongated bracket **127**, the opposite end of which is fastened to the stationary housing **105** of the driven clinch roll **43***a*.

Each idler clinch roll is movable between a clinching position, in which the idler roll **43***b* is closely adjacent the driven roll **43***a* (FIG. **9**), and a spaced release position, in which the two rolls are separated to a sufficient extent to permit insertion of an unclinched channel **31**, by means of eccentric cam actuator **129** driven by a pneumatic cylinder **131**. The eccentric cam actuator **129** (FIGS. **7**, **8** and **9**) comprises a vertically disposed cam shaft **133** which includes upper and lower cylindrical portions **135** and **137**, respectively, the longitudinal axes of which are offset relative to each other. The lower portion **137** of the cam shaft **133** is journaled in a pair of vertically spaced bearings **139** supported in a cam shaft housing **141** suitably fastened to a wall of the movable housing **123** of the idler clinch roll **43***b*.

The lower portion **137** of the cam shaft **133** is keyed to one end of a throw lever **143**; the opposite end of the throw lever is connected to a pin **145** and clevis **147**. The clevis **147** is threaded to the outer free end of a piston rod **149** (FIG. **7**) of the pneumatic cylinder **131**.

The upper portion **135** of the cam shaft **133** is journaled within an opening provided in one end of an arm **150** which is fixed relative to the stationary housing **105**. Thus, when the piston rod **149** is extended or retracted to displace the throw lever **143**, the lower portion **137** of the cam shaft **133** orbits about the longitudinal axis of the upper portion **135** by virtue of its eccentric relation thereto, causing shifting movement of the cam shaft housing **141** and the housing **123** of the idler clinch roll shaft to which it is secured.

The spacing between the clinch rolls **43***a* and **43***b* at the release position is preferably adjustable and, in the illustrated embodiment, the extent of pivotal movement of the housing **123** relative to the stationary housing **105** is controlled by displacing the axis of rotation of the cam shaft **133**. More specifically, the arm **149** is provided with a fork **151** at its outer end and within the fork is carried an eccentric sleeve **153** which has an eccentric bore **155** therein to receive in telescoping relationship the upper end **135** of the cam shaft **133**. A screw **157** extends across the ends of the fork and when tightened, clamps the fork **151** to hold the eccentric sleeve **153** against turning as the upper end **135** of the cam shaft rotates in the bore **155**.

As best seen in FIG. **9**, flats **159** are disposed on the upper sides of the eccentric sleeve **153** to be engaged by a wrench for turning the eccentric sleeve within the bore **155** in the fork **151** to change the position of the bore relative to the arm **150** and the housing **105** to which the arm is attached. Displacement of the bore **155** also displaces the upper portion **135** of the cam shaft **133** relative to the arm **150** and the fixed housing **105**. The eccentric sleeve **153** may be rotated to provide a fine adjustment of the amount of throw of the movable housing **123**.

The amount of pressure exerted by the clinch rolls **43** to close the channel walls **33** and **35** is determined by the fluid pressure within the respective pneumatic cylinders **131**, which pressure is controlled by suitable pressure valves (not shown). A gauge block **161** fastened to the fixed housing **105** acts as a stop to fix the minimum spacing between the rolls if the housing **123** is pivoted so as to move the roll **43***b* in the direction of the roll **43***a* without the band **29** or the side plates **13** present. That is, before the clinch rolls **43** engage each other, a vertical side of the gauge block **161** abuts a surface of the movable housing **123** to limit its movement.

The two gauge blocks **161**, one for each set of clinch rolls, are fastened to the fixed housings **105** at positions which limit downward insertion of the channels **31** of the band **29** as a result of the downward forces being applied to the side plates **13** by the drive rolls **45**, hereinafter described. The gauge blocks **161** also help to support the weight of the side walls **13** and limit the size of the seams formed by clinching the channels **31**. Finally, the gauge blocks serve to properly position the leading edge of the scroll band **29** and the point **23** of the side plates **13** with respect to each other.

The pressure rolls **45** are mounted for rotation about parallel axes which are inclined to the vertical to exert a downward component of force on the respective side plates **13**. These rolls are formed of metal and, in an earlier construction, were knurled. However, it has been found that a more uniform path of contact is provided when the rolls are not knurled and, in a preferred embodiment, they are not.

More specifically, each of the pressure rolls of each of two sets is mounted on the lower free end of an inclined yoke arm

163 (FIGS. 6 and 7). Two yoke arms are provided for each operating mechanism 49, and each is provided with a longitudinally extending slot 165 adjacent its lower end, as best seen in FIG. 9, to receive a pressure roll. The upper ends of the inclined yoke arms are mounted on a stand 167 (FIG. 6) which includes a downwardly extending mounting plate 169 which is fastened at its lower end to either the frame 47 or the carriage 51, depending upon which operating mechanism it forms a part of.

In order to make it possible to shift the plane defined by the axes of rotation of the pressure rolls 45 toward or away from the clinch rolls 43 with changes in size of the side plates 13 being used, the yoke arms 163 of each operating mechanism are extensibly and retractably mounted on the stands 167. More specifically, the yoke arms are fastened adjacent Their upper ends to a slide plate assembly 171 (FIG. 6) which is slideable along a fixed bracket 173 fastened by bolts 175 to the plate 169 along an inclined path parallel to the direction in which the arms 163 extend.

The position of the slide plate assembly 171 is controlled by a lock screw 177 (FIG. 6) which is threaded through a slot 179 in the upstanding plate 169 into the slide plate assembly. Tightening of the head of the lock screw 177 against the plate 169 locks the slide plate assembly 171 in its adjusted position thereon. When the lock screw 177 is loosened, the slide plate assembly may be shifted along the stationary bracket 173 with the shank of the lock screw 177 remaining in the slot 179; and, at the adjusted position, the lock screw 177 is tightened to secure the slide plate assembly 171 in the desired position.

Like the clinch rolls 43 of each set, the pressure rolls 45 are movable between an operative side plate-engaging position and an open, release position for facilitating insertion or removal of a side plate 13 therebetween. In a previous construction, the yoke arms of each pair were pivotally interconnected for a scissorlike action which moved the pressure rolls toward and away from each other. This arrangement was not completely satisfactory since the rollers did not necessarily contact the side plates in the same plane consistently. Accordingly, in the illustrated embodiment, only one of the yoke arms 163 (the outer arm of each operating mechanism) is pivotally mounted intermediate its ends on an upstanding pivot pin 181 (FIG. 7) fixed to the slide plate assembly 171, the other arm being stationary relative to the fixed clinch roll. To swing the yoke arm of each operating mechanism, there is provided a pneumatic cylinder 183 for pivoting a throw lever 185 to operate a linkage 187 to pivot the movable yoke arm 163 about the pivot pin 181. More specifically, the pneumatic cylinder 183 of each operating mechanism 49 is supported and pivotally mounted at one end by a pivot pin 191 mounted in a horizontally extending bracket 189, which is fastened to the slide plate assembly 171. An extensible and retractable piston rod 193 extends from the opposite end of the pneumatic cylinder 183 and is connected by a pin 195 to one end of the throw lever 185. The opposite end of the throw lever 185 is pivoted on a pin 197 which is upstanding from the fixed yoke arm 163. Thus, an extension or retraction of the piston rod 193 swings the lever 175 about the pivot pin 197.

The linkage 187, operable by the throw lever 185, includes a connecting link 199 which is pinned at one end to the throw lever 185 and at its opposite end to the end of each of a pair of toggle links 201 and 203. The toggle link 201 is pivoted at its opposite end by a pivot pin 205 mounted on the fixed yoke arm 163 to swing about an axis through the pin 205 in response to fore or aft movement of the connecting link 199. The toggle link 185 is fastened at a pin 207 to one end of the outer movable yoke arm 163 to swing the rearward end thereof about the axis through the pivot pin 181.

To shift the movable pressure roll 45 to a position in which both rolls are in engagement with the side plates 13, the pneumatic cylinder 183 is operated to extend the piston rod 193 and shift the throw lever 185, thereby shifting the connecting link 199 rearward and swinging the links 201 and 203 from a pronounced angular relationship to almost an aligned relationship with one another. On the other hand, a retraction of the piston rod 193 pivots the throw lever 185 and moves the connecting link 199 forward causing the angular relationship between the links 201 and 203 to become more pronounced, which causes the pivot pin 205 on the movable yoke arm to swing towards the fixed yoke arm while the other and opposite lower end of the movable yoke arm pivots outwardly from the lower end of the fixed yoke arm to space the pressure rolls 45. The pneumatic cylinders 183 are provided with suitable flexible lines and are operated by suitable controls (not shown) to swing the movable pressure roll between the clamping position and the release position.

In the operation of the apparatus and performance of the preferred method of the invention, the scroll band 29 is fed into the formers 41 which provide the channels 31 defining the grooves 37. The band is fed forwardly until it reaches a position adjacent the clinch rolls 43. At this time, the clinch rolls are in their retracted positions to facilitate passage of the channels between the rolls. The respective side plates 13 are then positioned above the band with the shoulder 21 of the side plates abutting the leading end of the band and with the peripheral edge 19 of the side walls inserted into the grooves 37. The leading end of the band 29 is then attached to the side plates 13 by welding or by inserting the leading edge of the band into suitable notches, as previously mentioned.

With the band 37 attached to the side plates 13, the pneumatic cylinders 183 for the outer yoke arms are operated to swing the outer pressure rolls 45 against the outer sides of the side plates 13 to grip the side plates between the pressure rolls. By operation of another suitable control, the pneumatic cylinders 131 for the outer clinch rolls 43 are actuated to cause their piston rods to extend and operate the throw levers 143 to rotate the cam shafts 133 which cause the clinch rolls 43*b* to engage and close the channel side walls 33 and 35 on the peripheral edges 19 of the side plates. The clinching progresses in a continuous manner with rotation of the side plates 13, as seen in FIGS. 3 and 4, until the ends of the edges 19 are aligned with the trailing end of the scroll band 29, which is now formed into a curved scroll housing wall 15. The controls may then be operated to release the pressure rolls and clinch rolls to permit removal of the housing from the apparatus.

From the foregoing, it will be seen that there is provided an apparatus and method by which clinches seams are formed between the side plates 13 and the band 29. With this method and apparatus, it is possible to handle various sizes of fan housings and to interconnect the curved outer housing wall with the side walls in a simple, fast and economical manner.

Various features of the invention are set forth in the following claims.

What is claimed is:

1. In an apparatus for fabricating a centrifugal fan housing from a pair of side plates and an elongated band having walls defining two longitudinally extending grooves, one adjacent each of two opposite side edges thereof, each of said two grooves being adapted to receive a portion of the periphery of one of said side plates, which apparatus includes a frame, a separate means for each of said side plates mounted on said frame for clinching the groove-defining walls of said band to the periphery of a side plate while urging the side plate into the groove, said separate means each including a pair of clinch rolls adapted to engage the groove-defining walls along one edge of said band and to clinch said walls to the peripheral portion of a side plate located in the groove while feeding the band in a predetermined direction, one of said clinch rolls being stationary in that it is mounted for rotation about a fixed axis and the other of said clinch rolls being mounted for rotation about an axis parallel to the axis of rotation of said one roll but being movable toward and away from said one roll, means for moving said movable clinch roll in the direction of said stationary clinch roll to effect pressure engagement between said clinch rolls and the groove-defining walls of said band and for moving said movable clinch roll away from said

stationary clinch roll to provide sufficient space therebetween to facilitate insertion between said clinch rolls of a groove-defining portion of the band, means coupled to one or the other of said clinch rolls to effect driving rotation thereof, a pair of pressure rolls mounted adjacent said clinch rolls adapted to receive therebetween and to contact opposite surfaces of a housing side wall disposed in the groove of the portion of the band being clinched by said clinch rolls and for exerting forces on said side wall to urge the peripheral edges thereof into said groove and to guide said side plate for turning movement as the band is progressively crimped to the side plate, said pressure rolls being mounted for rotation about parallel axes lying in a plane transverse to the plane defined by the axes of said clinch rolls, the improvement which comprises

A. means mounting that pressure roll which is in closest proximity to said stationary clinch roll in a stationary manner also for rotation about an axis which is fixed during the use of said apparatus,

B. means mounting the other of said pressure rolls so as to render it movable toward and away from said stationary pressure roll,

C. and means for moving said movable pressure roll in the direction of said stationary pressure roll to a position wherein said pressure rolls are in pressure engagement with opposite surfaces of said side plate and for moving said movable pressure roll away from said stationary pressure roll to a position in which there is sufficient space between said pressure rolls to permit unobstructed insertion of a side plate between said rolls.

2. An apparatus in accordance with claim 1, wherein said movable pressure roll is carried for rotation adjacent one end of a pivotally mounted arm, and wherein means are provided to pivot said arm.

3. An apparatus in accordance with claim 1, wherein each of said pressure rolls is carried on means shiftably mounted on said frame so as to permit the operating position of said pressure rolls to be shifted relative to the operating position of said clinch rolls.

4. An apparatus in accordance with claim 3, wherein each of said pressure rolls is carried adjacent one end of an arm, and wherein said arms are shiftably mounted on said frame.

5. An apparatus in accordance with claim 1, wherein smooth outer surfaces are provided on said pressure rolls for engagement with said side plates.

6. An apparatus in accordance with claim 1, wherein means are provided for mounting the set of clinch rolls and pressure rolls for one of said side plates for movement toward and away from the set of clinch rolls and pressure rolls for the other of said side plates.

7. An apparatus in accordance with claim 1, wherein a gauge block is disposed adjacent each set of clinch rolls adapted to be engaged by a portion of said band during the clinching operation to limit the extent of movement of said band into the space between said clinch rolls and to locate the leading edge of the band relative to the side plates.

8. An apparatus in accordance with claim 7, wherein said gauge block is positioned beneath the gap defined by said clinch rolls.

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