

Aug. 23, 1960

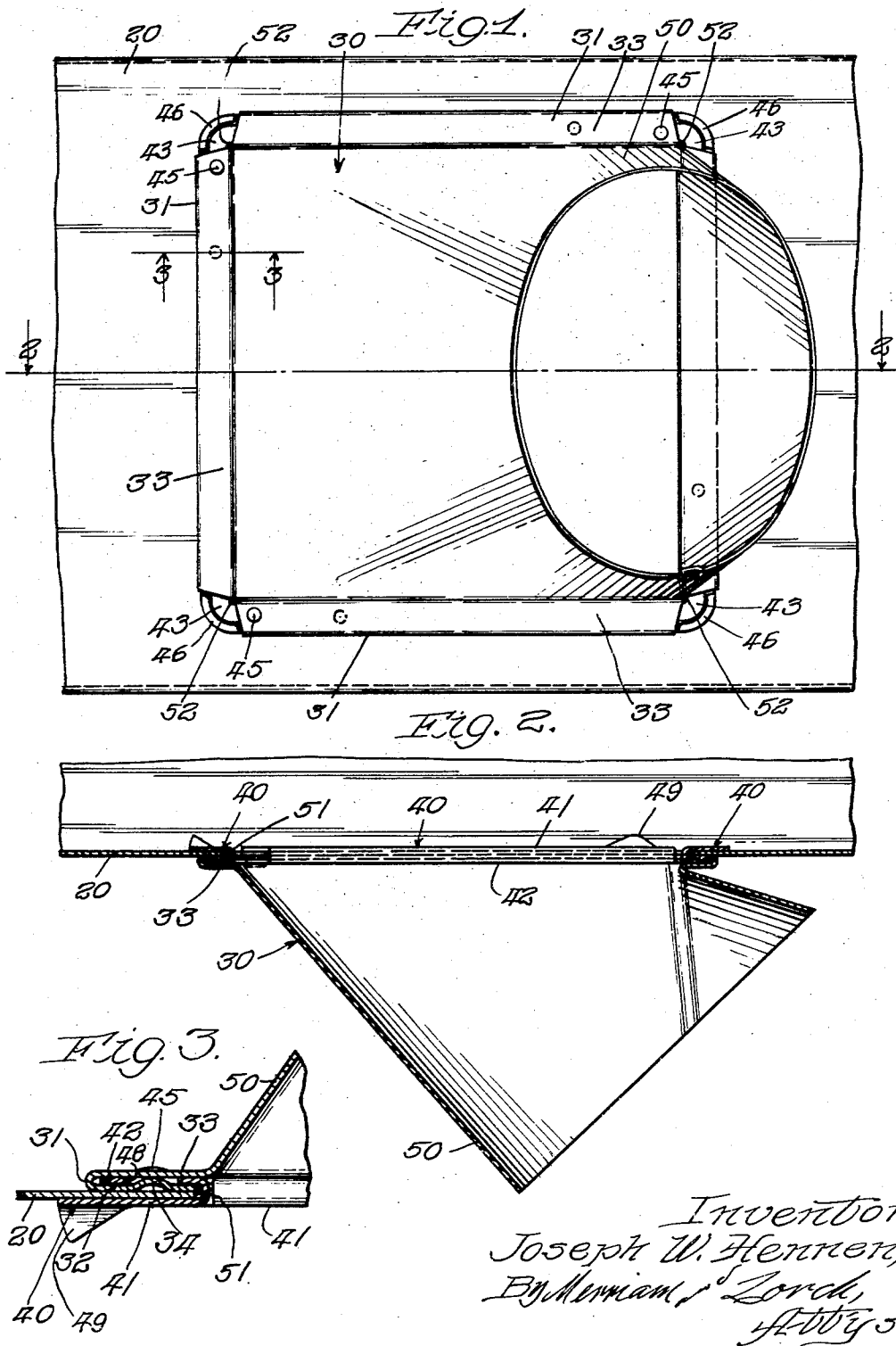
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2,950,131

SHEET METAL ATTACHMENT MEANS

Filed Sept. 21, 1956

5 Sheets-Sheet 1



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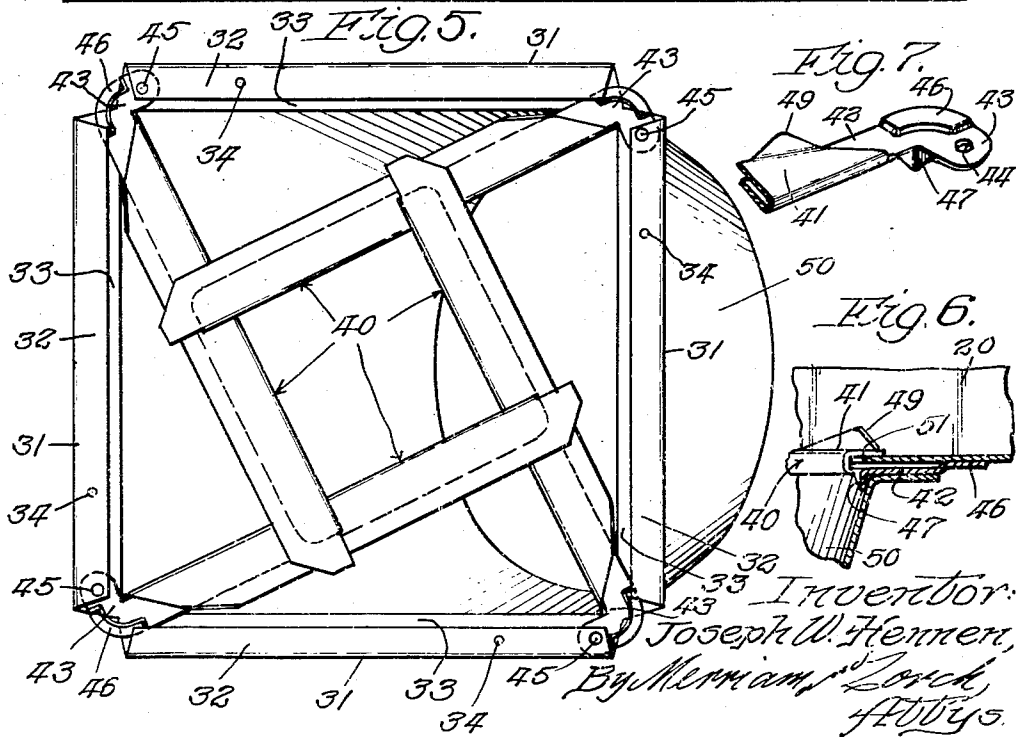
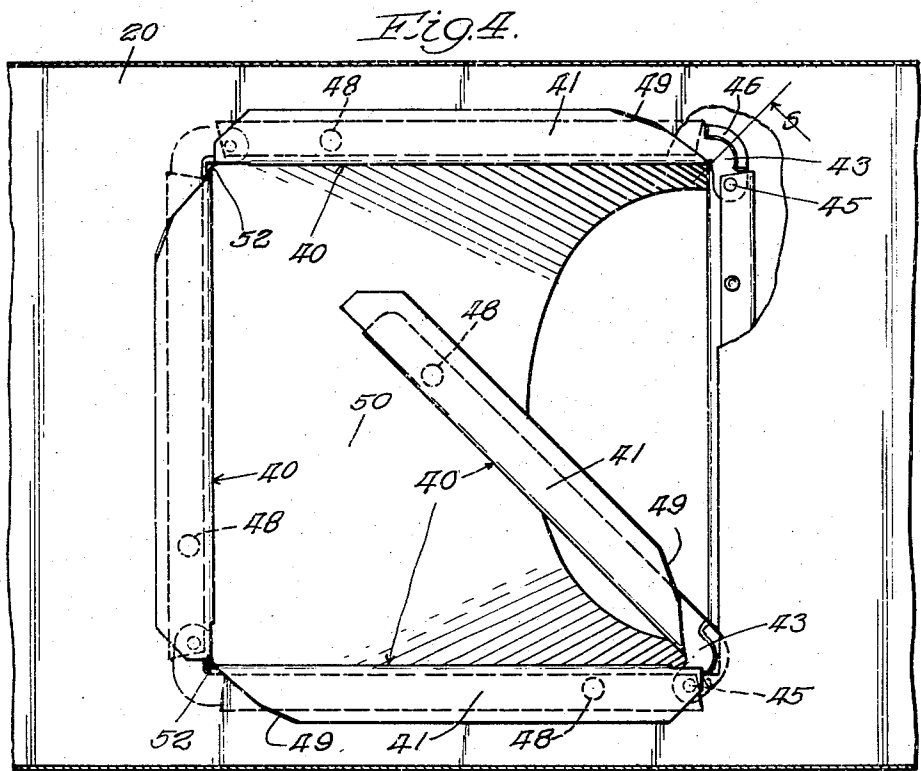
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SHEET METAL ATTACHMENT MEANS

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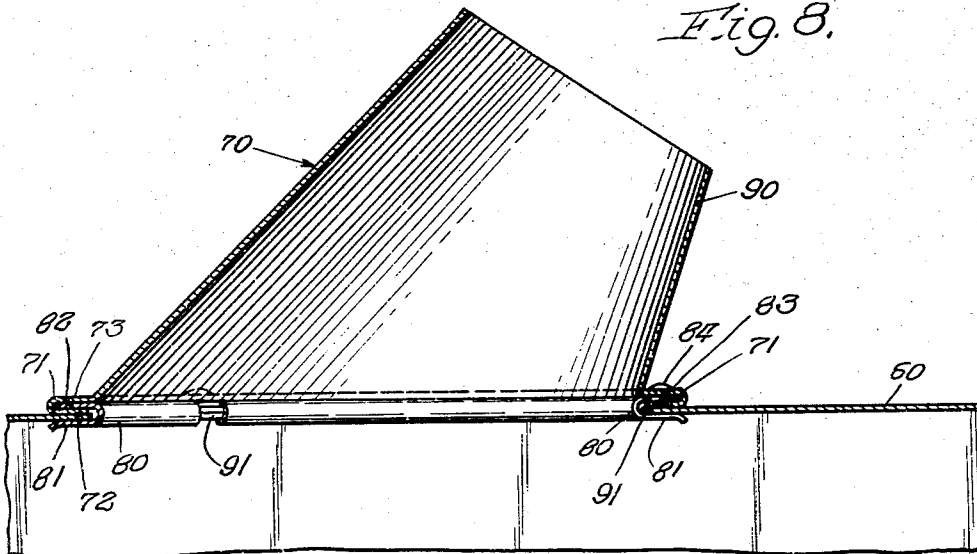


Fig. 9.

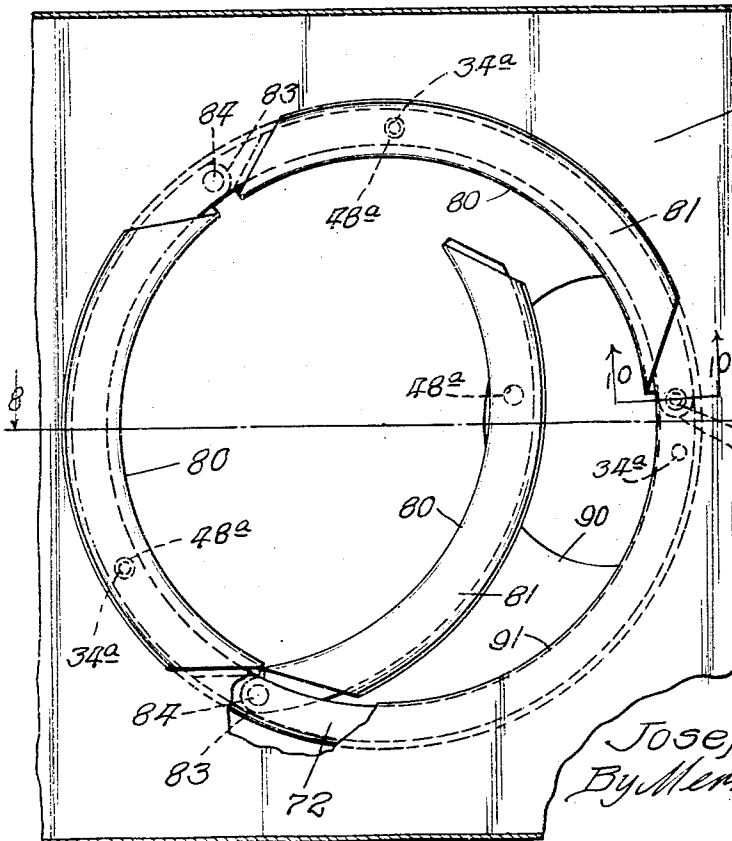


Fig. 10.

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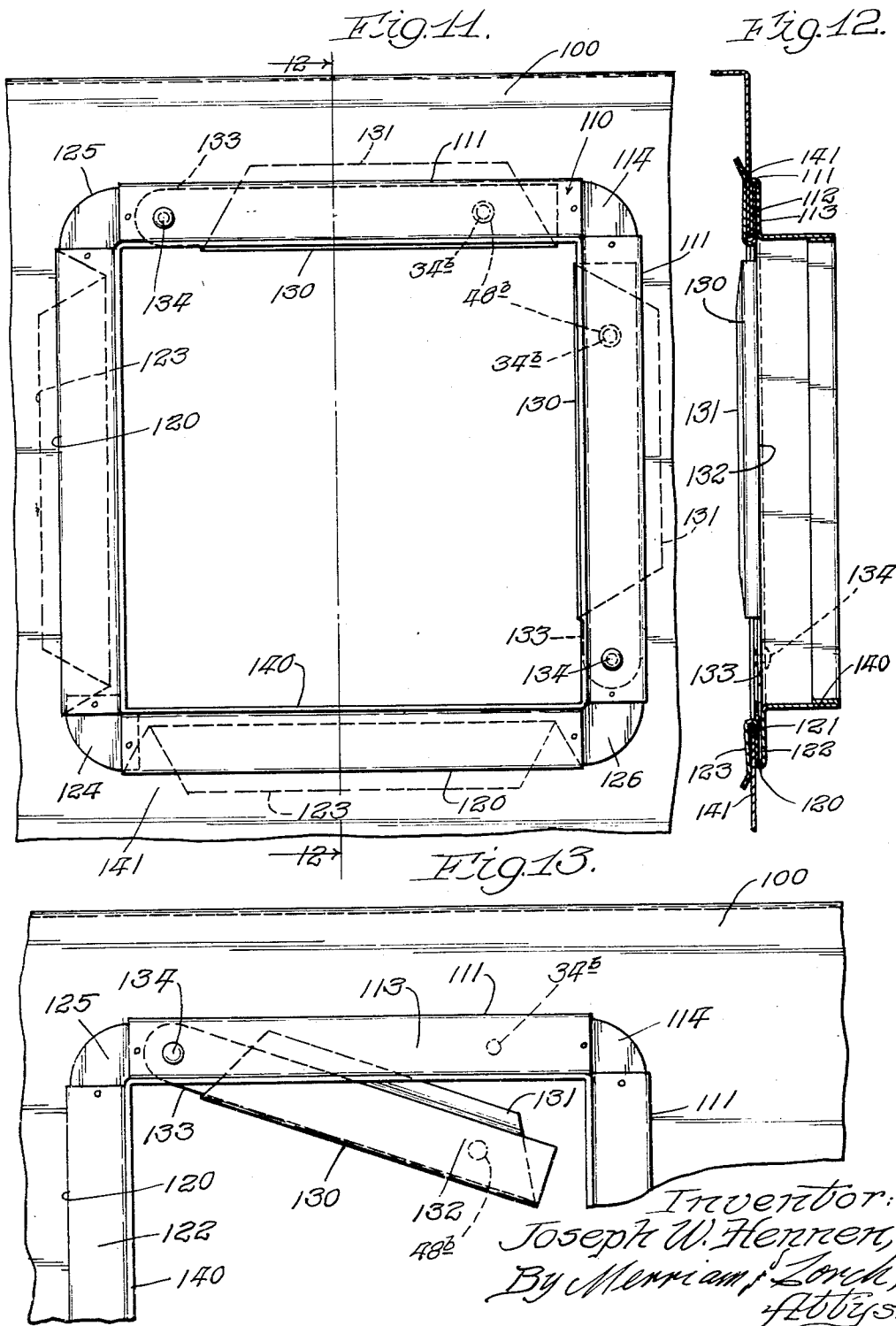
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Fig. 14.

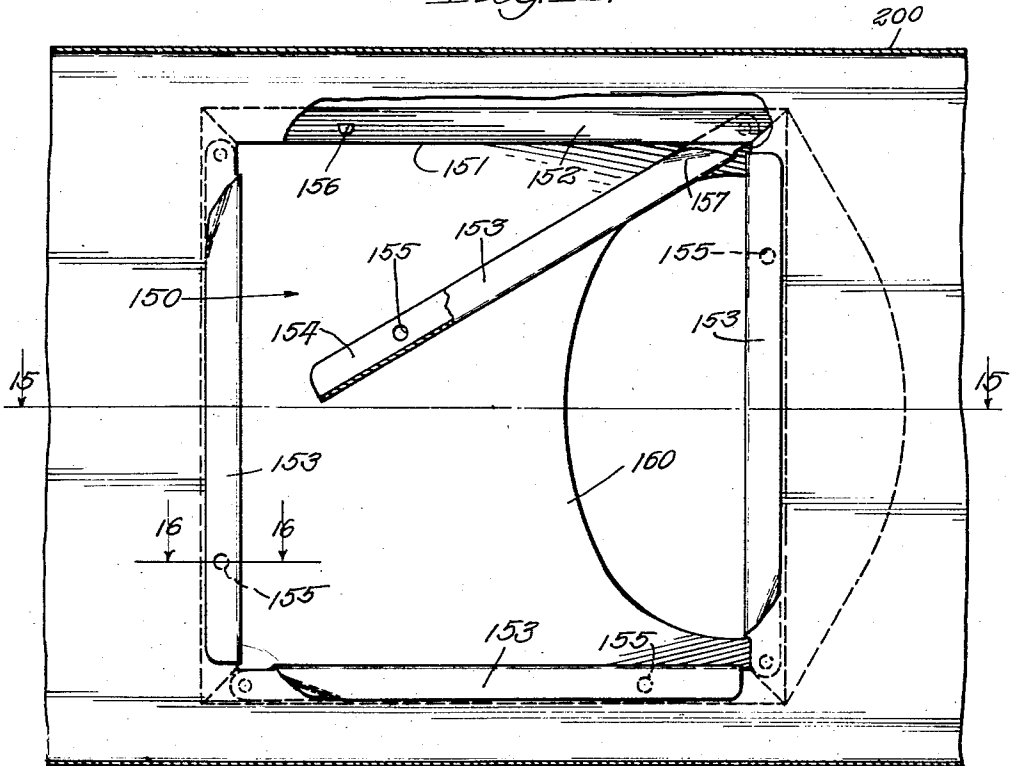


Fig. 15.

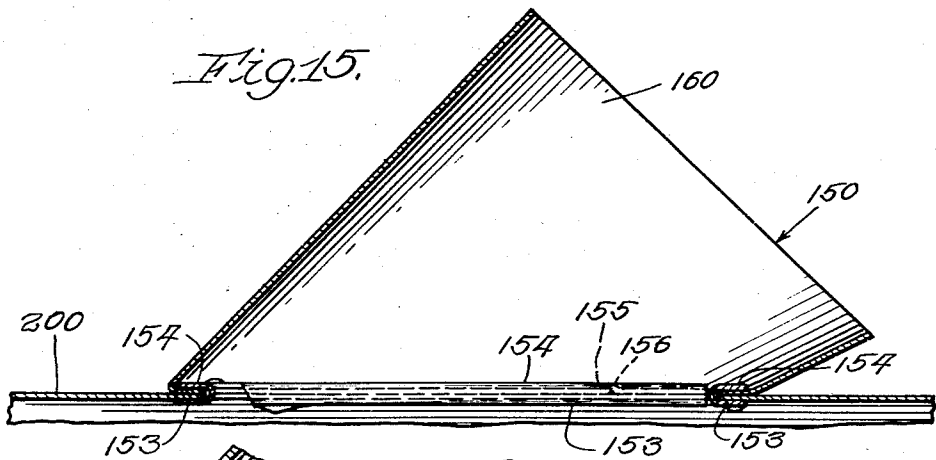
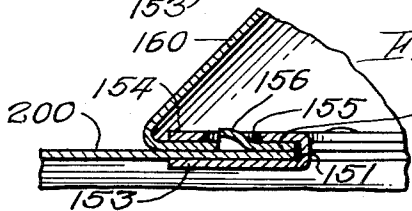


Fig. 16.



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SHEET METAL ATTACHMENT MEANS

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8 Claims. (Cl. 285—189)

This invention relates to duct attachment means which may be selectively secured to marginal edge portions of a duct opening or plenum, or similar device in air transmission systems hereafter referred to as ducts.

My invention contemplates the construction of an attachment means or takeoff assembly which may be readily and firmly secured to openings in such systems (ducts), which need not be previously prepared with precisely cut openings. This attachment embodies: a frame means substantially conforming to the marginal edge portions of an opening in a duct to which it is to be secured and supporting a takeoff transition starter, straight starter, starting collar, or the like, to the duct opening; and clamping means capable of receiving marginal edge portions of the duct opening and the frame. Preferably the clamping means has elongated (for example, arcuate or linear) clamping portions and is capable of being moved into juxtaposition with at least a portion of said frame and clamp against marginal edge portions of the duct opening.

If desired, a portion of the frame may have fixed, U-shaped clamping portions capable of receiving and retaining marginal edge portions of the duct opening without the assistance of complementary clamping means.

One of the outstanding features of my attachment means involves the use of a frame with a take off projecting therefrom and a clamping assembly having clamping means or members which enable the frame to be readily and firmly secured to marginal edge portions of the duct opening.

After the frame is firmly secured to the marginal edge portions of the duct opening, the outwardly projecting portion or takeoff may be secured to a connecting duct, tube, pipe, or the like.

The component parts of the attachment means may be constructed of sheet metal formed of galvanized iron, steel, aluminum, plastics, or the like.

In the accompanying drawings:

Figure 1 is a front view showing one embodiment of my attachment means secured to a duct;

Figure 2 is a sectional view taken on the line 2—2 of Figure 1;

Figure 3 is a detailed sectional view taken on the line 3—3 of Figure 1;

Figure 4 is a rear view of the embodiment shown in Figure 1 with a portion of the duct broken away; one pivoted U-shaped clamping member being shown pivotally removed from its complementary inverted U-shaped socket, i.e. in released position;

Figure 5 is a view, similar to Figure 4, with the duct removed and with the four pivoted U-shaped clamping members removed from their respective complementary sockets;

Figure 6 is a detailed sectional view taken on the line 6—6 of Figure 4;

Figure 7 is a detailed perspective view of the pivoted end portion of a U-shaped clamping member;

Figure 8 is a sectional view on the line 8—8 of Figure

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9 showing a second embodiment of my attachment means secured to a duct;

Figure 9 is a rear view, similar to Figure 4, of the modification of Figure 8;

Figure 10 is a detailed sectional view taken on the line 10—10 of Figure 9;

Figure 11 is a front view showing a third embodiment of my attachment means secured to a duct;

Figure 12 is a sectional view taken on the line 12—12 of Figure 11;

Figure 13 is a view, similar to Figure 11, wherein a pivoted U-shaped clamping means is shown pivotally removed from its complementary, inverted U-shaped socket;

Figure 14 is a view similar to Figure 4, illustrating a further and simplified embodiment of this invention;

Figure 15 is a section on line 15—15 of Figure 14; and

Figure 16 is an enlarged detailed section on line 16—16 of Figure 14.

Figures 1—7 are directed to an attachment means 30, capable of being securely fastened to marginal edge portions 51 of an opening in duct 20. The attachment means comprises a flanged frame, which generally conforms to the marginal edge portions 51 of the duct opening, and in the illustrated form the frame is a right-angled parallelogram. The frame has four sides or flanges each of which is reversely bent to provide four adjoining elongated, inverted U-shaped sockets 31 joined to each other at the corners 52. Each socket has an inner and outer leg 32 and 33, respectively. The takeoff 50 projects preferably integrally from the outer leg 33 of said sockets or flanges as shown in Figures 2 and 3. Obviously, the takeoff could be a transition starter, straight starter, starting collar or the like and the term is so employed. Four pivoted, elongated, U-shaped clamping means or members 40 extend substantially the entire length of their respective complementary sockets 31 and have inner and outer legs 41 and 42, respectively. The outer leg 42 of each clamping member terminates at one end in an arcuate extension 43, as illustrated in Figure 7, having an opening 44 adapted to receive a rivet 45. Each extension is pivotally secured by the rivet 45 between the legs 32 and 33 of cooperating or frame socket adjacent to the cooperating or complementary socket for said clamping member thus permitting each clamping member 40 to be pivoted into enveloping or straddling relationship with the inner leg 32 of its complementary side. Thus, the outer leg 42 of each clamping member 40 may be moved into position between the inner and outer legs 32 and 33 of its respective complementary side or socket, while its inner leg 41 is free of the complementary socket. The free, inner leg 41, of each clamping member 40 and inner leg 32 of its complementary socket 31 provide clamping surfaces therebetween for receiving and retaining a marginal edge portion 51 of the duct opening, as shown in Figures 3 and 6, when the clamping member is moved about its pivot into straddling or clamping relationship with its complementary side.

As shown in Figures 1 and 4—6, each U-shaped clamping member 40 has its arcuate extension 43 projecting from its outer leg 42. Each arcuate extension has a raised sealing portion 46 which lies in substantially the same plane as the adjacent inner legs 32 of adjoining sockets 31. In addition, each extension has an outwardly projecting or down-turned portion 47 (Figs. 6 and 7).

The raised portion 46 serves to provide a sealing surface which lies in substantially the same plane as the inner legs 32 of adjoining sockets and is contiguous with the adjoining ends of adjacent, adjoining sockets when the clamping means straddles the inner leg 32 of its complementary socket, as shown in Figure 1. Thus, the inner legs of the sockets and raised portions of the ex-

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tension 43 provide a continuous surface which may be positioned against the outside marginal edge portions of the duct opening.

The down-turned sealing portion 47 serves to seal the attachment means at the junctions 52 of the sockets when the U-shaped clamping means from which said arcuate extension projects is in straddling position with its complementary, inverted U-shaped socket. The down-turned portion of each clamping means contacts the takeoff 50, when each clamping member straddles the inner leg 32 of its complementary socket adjacent the junction 52 of adjoining sockets and takeoff as shown in Figures 1 and 4 so that the takeoff will be firmly secured to the frame at the corners of the frame. In addition, the down-turned portion serves as a stop so as to restrict the pivoting movement of the U-shaped clamping member and thus prevents the U-shaped clamping member from being completely pivoted from between the ends of the inner and outer legs of its complementary socket.

Figure 7 shows an up-turned lip 49 which projects from an end portion of the inner leg 41 of each of the clamping members. This lip serves as a guide which enables the inner leg 41 of the clamping member to freely enter into its clamping position. If desired, this lip may be co-extensive with the top edge of the clamping member 40 as shown in the modification of Figs. 8, 9, and 10.

Each U-shaped clamping member 40 has an opening 48 in its outer leg 42 which receives an outward protuberance 34 which extends from the inner leg 32 of its complementary socket when the clamping member 40 is in straddling relationship with said inner leg 32, as shown in detail in Fig. 16. This enables each clamping member to be clicked or snapped into place, such as shown in Figure 3, and thus prevents the clamping members from being released unintentionally. Obviously, all clamping members need not be pivoted, one or more may be fixed, and one or more pivoted or completely removable. If completely removable, more than one protruding or struck up locking lug 34 is employed.

Figures 8-10 are directed to a second embodiment of my attachment means. This assembly 70 is particularly suitable for being securely fastened to marginal edge portions 91 of a substantially circular duct opening in a duct 60. In this embodiment the frame has a continuous, substantially circular, inverted U-shaped socket 71 with inner and outer legs 72 and 73, respectively. The socket substantially conforms to the circular marginal edge portions 91 of the duct opening in the duct 60. A takeoff 90 is secured at one of its ends to, and projects from the outer leg or flange 73 of the socket 71. Three arcuate U-shaped clamping means or members 80 having inner and outer legs 81 and 82, respectively, are pivotally secured at one of their ends by a rivet 84 which secures a semi-circular end extension 83 of the outer leg 82 between the legs 72 and 73 of the socket, as shown in Figure 10. Accordingly, a substantial length, i.e., the major portion, of each U-shaped clamping member may be pivoted into straddling relationship with the inner leg 72 of the socket 71, thus enabling the outer leg 82 of each clamping member to be positioned between the legs 72 and 73 of the socket while leaving the inner leg 81 of each clamping member free of the socket. The inner leg 81 of each clamping member and complementary inner leg 72 of the socket provides clamping surfaces therebetween for receiving and retaining the marginal edge portions 91 of the duct opening, as shown in Figure 10, when the clamping members are pivoted into straddling relationship with the inner leg 72 of the socket. As in the previous embodiment of this invention a lug 34a and an opening 48a are provided to prevent unintentional release of the attachment.

Assemblies 30 and 70 may be readily and firmly secured to their respective duct openings by pivoting each, U-shaped clamping member away from its complemen-

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tary socket, positioning the inner legs of the sockets against outside marginal edge portions of the duct opening so that the takeoffs project outwardly therefrom, and pivoting each U-shaped clamping member into straddling relationship with the inner leg of its complementary socket so that marginal edge portions of the duct openings are securely received and retained by the clamping surfaces provided between the inner legs of each clamping member and complementary socket.

Other variations of the complementary, arcuate socket means and arcuate clamping means obviously may be used since any number of arcuate U-shaped clamping members of the same length or varying lengths may provide satisfactory results. For example, one arcuate segment may be about 160° and two arcuate segments may be about 100°, or one segment may be fixed and one pivoted, or completely removable.

Figures 11-13 are directed to a third embodiment of my attachment means or assembly which has two fixed clamping means and two movable (such as pivoted) clamping means. This assembly 110 is firmly secured to the marginal edge portions 141 of the duct opening in the duct 100. In this embodiment the flanged frame generally conforms to a right-angled parallelogram conforming to the marginal edge portions 141 of the duct opening. Two sides of the frame are formed by two adjoining, elongated, inverted U-shaped sockets 111 having inner and outer legs 112 and 113, respectively. The outer legs 113 have an arcuate corner sealing means 114 positioned in substantially the same plane as said outer legs. The two other frame sides are formed by two adjoining, elongated, inverted U-shaped means 120; said latter inverted U-shaped means having inner and outer legs or flanges 121 and 122, respectively, which are in substantial contact with each other, as shown in Figure 12. Each of said inner legs 121 of the inverted, U-shaped means has an outwardly-turned leg or flange 123 which constitutes a fixed, U-shaped clamping means with the inner leg 121. The fixed clamping means are capable of receiving and retaining the marginal edge portions 141 of the duct opening without the assistance of complementary clamping means. An arcuate corner sealing means 124 is secured between inner and outer legs 121 and 122 of adjoining, inverted U-shaped means 120 and arcuate sealing means 125 and 126 are each secured between the legs 121 and 122 of inverted U-shaped means 120 and between the legs 112 and 113 of adjoining inverted U-shaped sockets 111. A takeoff 140 is secured at one of its ends to, and projects from the frame.

Two pivoting, elongated, U-shaped clamping means or members 130 cooperate with the two first mentioned sides having sockets 111. Clamping members 130 extend substantially the entire length of their respective complementary sockets 111 and have inner and outer legs 131 and 132, respectively. The outer leg 132 of each clamping member has an end extension 133 pivotally secured by a rivet 134 between the legs 112 and 113 of its complementary socket 111 so that the substantial length of each clamping member 130 may be pivoted into straddling or enveloping relationship with the inner leg 112 of its complementary socket 111, thus enabling the outer leg 132 of each clamping member to be positioned between the legs 112 and 113 of its complementary socket while leaving its inner leg 131 free of its complementary socket. The free, inner leg 131 of each clamping member 130 and inner leg 112 of its complementary socket 111 provides clamping surfaces therebetween for receiving and retaining the marginal edge portion 141 of the duct opening, as shown in Figure 12, when the clamping means 130 is moved into straddling relationship with its complementary socket. Thus the legs of each fixed, U-shaped clamping means and the pivoting clamping means 130 receive and retain the four marginal edge portions of the duct opening.

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As described heretofore a lug 34b and an opening 48b are provided to prevent unintentional release of the pivoted clamping members and therefore of the assembly. Furthermore, the pivoted clamping members may be completely removable instead of pivoted, if desired.

The complete assembly 110 may be readily and firmly secured to the duct opening by moving, i.e. pivoting each of the two pivoted U-shaped clamping means away from its complementary socket, as illustrated in Figure 13, inserting two marginal edge portions of the duct opening into each fixed, U-shaped clamping means, positioning the remaining inner legs of the two sockets against the outside marginal edge portions of the duct opening, and moving, the two pivoted U-shaped clamping means into straddling relationship with the inner leg of its complementary socket so that marginal edge portions of the duct opening are received and retained by the clamping surfaces provided between the inner legs 112 and 131 of each complementary socket and pivoting clamping means, respectively. The arcuate sealing means 114, 124, 125, and 126 will be firmly positioned against the outside marginal edge portions of the duct opening along with the legs 112 of sockets 111 and legs 121 of inverted U-shaped means 120 so as to enable the frame to be securely positioned against the outside marginal edge portions of the duct opening.

If desired, one or more of the sides of the assembly 30 shown in Figures 1-7 and/or one or more segments of the substantially circular frame shown in assembly 70 in Figures 8-10 may be modified so as to generally conform with the fixed or stationary, U-shaped clamping means formed by the legs 121 and 123 shown in Figure 12. Furthermore, the clamping members need not be pivoted to the frame but may be separate elements simply moved into clamping position and retained by one or more projections or lugs.

A further simplification of the present invention is to omit the inverted U-shaped sockets on the frame and instead let the frame terminate in an intumed flange to be held against the marginal portions of the opening through the duct by the clamping means. This is illustrated in Figures 14 and 15; although it will be understood that the same construction is applicable to a circular takeoff as well as a rectangular one.

In this embodiment the assembly 150 is firmly secured to the marginal edge portions 151 of the duct opening in a duct 200. The illustrated frame has four sides formed by adjoining, inwardly turned and mitered flanges 152, to conform in shape to the marginal edge portions 151 of a square duct opening as is clearly shown in Figure 14. Adjacent one end of each flange is pivotally secured a U-shaped clamping means or member comprising: inner and outer legs 153 and 154 arranged to straddle and envelop the intumed frame flange to which it is secured, and one marginal flange of the opening of the duct. In other words, the two legs of the U-shaped clamping means provide two clamping surfaces between which are held the intumed flange of the frame and the marginal edge or flange of the duct opening. Each clamping member may be provided with an opening 155 adjacent its free end for the reception of a projection 156 for retaining the clamping member in clamped position. Obviously, if preferred, the U-shaped clamping member may be completely removable instead of being pivotally movable.

It will also be apparent that instead of having all four clamping members pivoted or movable, one or two only need be movable, so that the assembly may be slid into locking position against one, two, or three fixed U-shaped clamping members and the assembly finally locked by one, two, or three movable members, as the case may be. As in the prior embodiments, a takeoff 160 projects outwardly from the marginal edge portions 151 of the assembly 150.

The legs 153 are provided with flared lips 157 at their

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ends adjacent the pivot to facilitate moving the clamping member into locking position. Obviously, this lip may be extended the full length of the edge as is done with the pivoted clamps 80 of the modification of Figs. 8 and 10 if desired for further guiding effect.

What is claimed is:

1. An article of manufacture comprising a sheet metal take-off member for connecting into an opening in a plenum duct comprising a base portion having an inner peripheral configuration approximating that of the duct opening and an outer peripheral dimension larger than the duct opening, the said base terminating in a substantially continuous inwardly directed flange and being free of wall and edge openings between the body of the take-off member and the flanges, the said flanges extending inwardly from the base periphery in a direction substantially coplanar with respect to the plenum duct wall to which the connector is to be secured, the inner edges of the flange forming an inlet opening into the said take-off member, the said flange being adapted to seat on the plenum duct wall and to surround the opening therein, a plurality of elongated clips each having a substantially U-shaped portion and being of peripheral shape corresponding to selected sections of the inwardly extending flange, the said clips being arranged in tandem and the combined collective length being in substantial correspondence to that of the inner periphery of the inwardly turned flanges of the take-off member, fastening means to secure one end of each of the said U-shaped clips to the inwardly turned flange section of the take-off member with the open end of the said clip faced toward the flange and the wall of the U-shaped clip substantially parallel thereto, the said fastening means being spaced from each other with the fastening point of each clip to the flange being at the trailing end of each clip and so located that each clip when brought into overlapping engagement with the flange must be turned in the same angular direction to bring the leading end of each clip adjacent to the fastened end of the adjacent tandemly mounted clip, and when disengaged from the flange must be turned in the opposite angular direction, the said clips being limited to turning in a plane corresponding to that of the flange to be overlapped and having the bight of each of the elongated U-shaped portions of said clips adapted to overlies the free edge of the duct opening and each clip having one leg thereof adapted to overlies the inwardly turned flange and the other leg adapted to overlies the plenum chamber wall so that the clips, when moved to overlap the inwardly turned flange and the chamber wall, establish clamped engagement with the flange and the chamber wall over substantially the complete peripheral extent of the said wall opening and the inwardly turned flange length, at least two adjacent clips being pivotally mounted with respect to their connecting points on the inwardly turned flange so as to permit the take-off member to be positioned adjacent to and in clamping engagement with the duct opening and to secure clampingly the take-off member to the duct when the pivoted clips are turned in the same angular direction to overlap the inwardly turned flange and the duct wall and bring said flange and wall into face-to-face relation.

2. The article of manufacture claimed in claim 1 wherein the pivoted clip has the inward leg of the U-shaped member nearest the point of connection to the flange turned inwardly to provide ready access to overlap the flange member.

3. The article claimed in claim 1 comprising, in addition, means to lock the U-shaped clip to the inwardly turned flange in overlapped relationship with respect thereto when said clip is in a position to overlap the flange.

4. The article of manufacture claimed in claim 1 wherein the free end of each clip has the inward wall of the U-shaped section inwardly turned to provide ready

access to overlap the flange to which it is secured when the said clip is rotated about its fastening point to overlapping relationship relative to the flange and comprising, in addition, means to lock the U-shaped clip to the inwardly turned flange when said clip and flange are placed in overlapping relationship with respect to each other.

5. An article of manufacture comprising a sheet metal take-off member for connecting into a polygonally-shaped opening in a plenum duct comprising a base portion of a peripheral configuration approximating that of the duct opening and of a larger outer peripheral dimension than the duct opening, the said base terminating along each polygonal side in a substantially continuous inwardly directed flange and being free of wall and edge openings between the body of the take-off member and the flanges, the said flanges extending inwardly from the base periphery in a direction substantially coplanar with respect to the plenum duct wall with which it is to connect, the inner edges of the flange forming an inlet opening into the said take-off member, the said flange being adapted to seat on the plenum duct wall and to surround the opening therein, a plurality of elongated clips each having a substantially U-shaped portion and of a peripheral shape substantially corresponding to the peripheral shape of the flange, fastening means to secure one end of each of the said clips to the inwardly turned flange sections of the take-off member in a position such that the open portion of the U faces the flange, the said clips being of lengths such that when sequentially connected the collective length is substantially that of the inner periphery of the inturned flanges and the individual clip lengths are substantially equal to the length of the individual flange sections to which they are secured, the fastening means being spaced with the fastening point of each successive clip about the flange periphery being adjacent to the free end of the next peripherally spaced clip so that each clip when brought into overlapping engagement with the flange must be turned in the same clockwise or counter-clockwise direction and when disengaged from the flange must be turned in the opposite counter-clockwise or clockwise direction, the said clips being limited to turning in a plane corresponding substantially to that of the flange to be overlapped and the bight of each of the elongated U-shaped clips being adapted to overlie the free edge of the duct opening and each clip having one leg thereof adapted to overlie the inwardly turned flange and the other leg adapted to overlie the plenum chamber wall so that the clips, when moved to overlap the inwardly turned flange and the chamber wall, establish clamping engagement between the flange and the chamber wall over substantially the

complete peripheral extent of the said wall opening and the inwardly turned flange length, at least two adjacent elongated clips being pivotally mounted for movement in a plane parallel to the duct wall with respect to the connecting point on the inwardly turned flange so as to permit the take-off member to be positioned adjacent to and in clamping engagement with the duct opening and to secure clampingly the take-off member to the duct when the pivoted clips are turned in the same angular direction to overlap the inwardly turned flange and the duct wall to establish the said clamping engagement.

6. The article of manufacture claimed in claim 5 wherein the pivoted clip has the inward leg of the U-shaped member nearest the point of connection to the flange turned inwardly to provide ready access to overlap the flange member.

7. The article claimed in claim 5 comprising, in addition, means to lock the U-shaped clip to the inwardly turned flange in overlapped relationship with respect thereto when said clip is in a position to overlap the flange.

8. The article of manufacture claimed in claim 5 wherein the free end of each clip has a portion of the inward wall of the U-shaped section inwardly turned to provide ready access to overlap the flange to which it is secured when the said clip is rotated about its fastening point to overlapping relationship relative to the flange and comprising, in addition, means to lock the U-shaped clip to the inwardly turned flange when said clip and flange are placed in overlapping relationship with respect to each other.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 2,950,131

August 23, 1960

Joseph W. Hennen

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 2, lines 42 and 43, strike out -- cooperating or --; same line 43, before "frame" insert -- the --; column 4, line 60, for "damping" read -- clamping --.

Signed and sealed this 10th day of October 1961.

(SEAL)

Attest:

ERNEST W. SWIDER

Attesting Officer

DAVID L. LADD

Commissioner of Patents

USCOMM-DC