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2 Sheets-Sheet 1

June 7, 1966

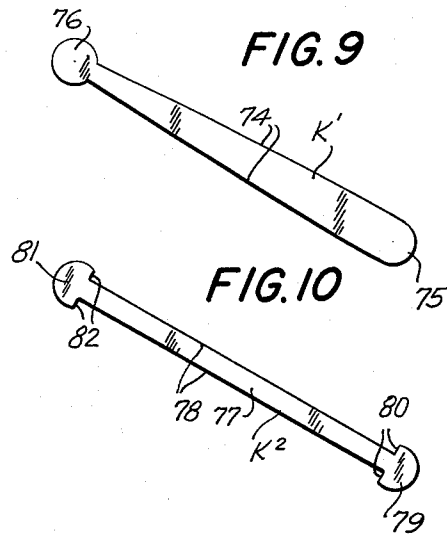
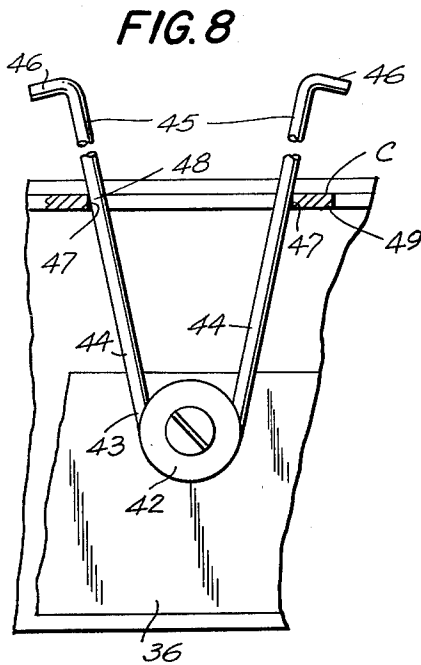
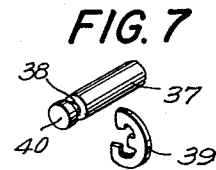
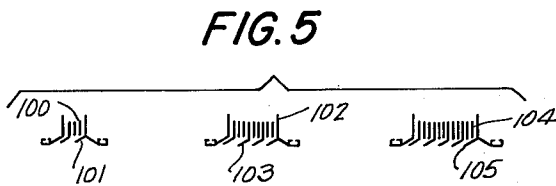
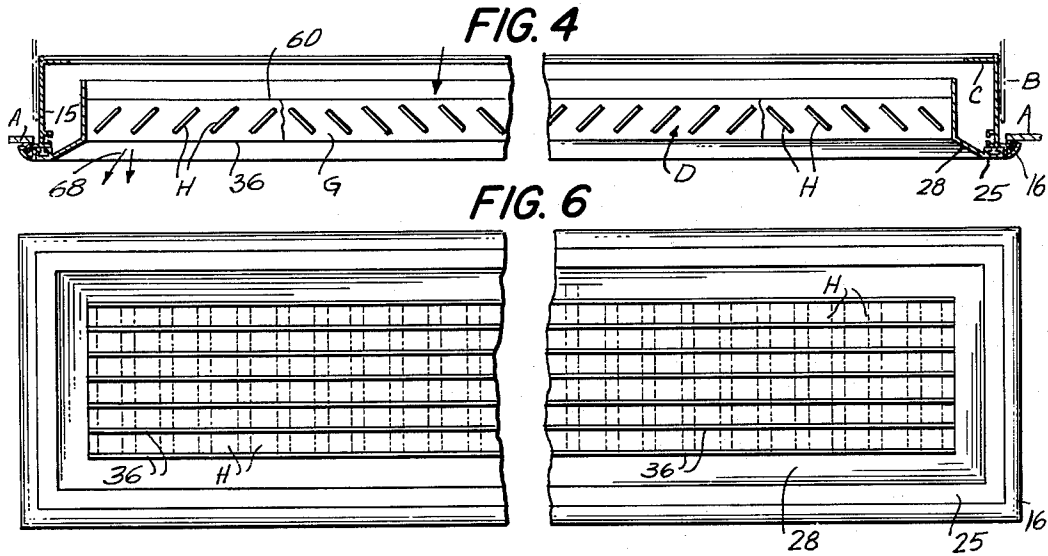
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ELONGATED RECTANGULAR AIR DIFFUSER

Filed Oct. 25, 1963

2 Sheets-Sheet 2



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ELONGATED RECTANGULAR AIR DIFFUSER
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Filed Oct. 25, 1963, Ser. No. 318,867

7 Claims. (Cl. 98-40)

The present invention relates to an elongated rectangular air diffuser, and it particularly relates to an air diffuser for mounting closely adjacent to a ceiling, wall or window opening in which the stream of air may be directed across the adjacent spaces to give maximum turbulence and mixing.

Although not restricted thereto, the present invention may be particularly described in connection with a relatively high pressure, high flow elongated diffuser which is designed to supply air in a crisscross pattern into a space closely adjacent to a wall, or ceiling, and in which the crisscross pattern of air may be suitably diverted toward or away from the axis of the stream of air and toward or away from the wall, ceiling or partition structure as the case may be.

It is among the objects of the present invention to provide a novel air diffuser construction in which there may be maximum control of the direction of the air as it leaves the diffuser and in which it will be possible to accurately control the direction of flow with a minimum of adjustment.

Another object is to provide an air diffuser construction in which the air diffuser device may be readily mounted in a wall or ceiling and at the same time without giving a predetermined distribution and turbulence of the air will nevertheless permit ready control thereof to give a directional effect within the room or enclosure in which the diffuser is placed.

A further object is to provide an air diffuser construction in which the direction of incoming flow may be readily diverted or changed in direction at the option of the persons working in or located within the enclosure without difficulty and without the necessity of using tools and without requiring the employment of maintenance or service personnel.

Still further objects and advantages will appear in the more detailed description set forth below, it being understood, however, that this more detailed description is given by way of illustration and explanation only and not by way of limitation, since various changes therein may be made by those skilled in the art without departing from the scope and spirit of the present invention.

The present invention will be particularly described in its application to an elongated rectangular air diffuser of the type having a plurality of closely spaced elongated parallel partitions embedded in a ceiling or window frame structure desirably adjacent a side of the room or window so that the air which is projected into the room or enclosure will be projected in laminar fashion or in a series of closely spaced narrow parallel streams.

These parallel elongated plates or separators are desirably positioned substantially inside of the wall structure and are provided with an outwardly flaring chamber which is positioned between the outlet edges of the plates and the surface constituting the wall or ceiling opening.

It has been found most desirable that a crisscross pattern of incoming air be achieved so that there will be provided between each pair of parallel elongated plates a series of oblique jets which will be at different angles in various narrow parallel streams.

This crisscross jet pattern is designed to give a maximum turbulence to the incoming air and assure a thorough mixture of the incoming air with the room air with-

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out creating any drafts or concentrations of the incoming air where it would cause discomfort to the worker or person present in the room or enclosure.

With the foregoing and other objects in view, the invention consists of the novel construction, combination and arrangement of parts as hereinafter more specifically described and illustrated in the accompanying drawings, wherein is shown an embodiment of the invention, but it is to be understood that changes, variations and modifications can be resorted to which fall within the scope of the claims hereunto appended.

In the drawings wherein like reference characters denote corresponding parts throughout the several views:

FIG. 1 is a transverse vertical sectional view of one form of diffuser according to the present invention.

FIG. 2 is a fragmentary transverse perspective view illustrating a detail of construction of the diffuser to which the present invention is specifically directed upon an enlarged scale as compared to FIG. 1.

FIG. 3 is a transverse sectional view similar to FIG. 2 showing the hinging structure.

FIG. 4 is a side sectional view upon a reduced scale as compared to FIGS. 2 and 3 showing a longitudinal structure of the diffuser broken away to shorten the length thereof.

FIG. 5 is a diagrammatic sectional view upon a small scale as compared to FIGS. 1 to 4 indicating alternate patterns of the specific arrangements as shown in FIGS. 1 to 3.

FIG. 6 is a diagrammatic bottom plan view showing the outlet side of the diffuser.

FIG. 7 is a fragmentary separated perspective view showing the manner in which the parallel plates are held together in the diffuser construction.

FIG. 8 is a fragmentary diagrammatic transverse view showing the manner in which the diffuser is held in the frame.

FIG. 9 is a transverse sectional view showing an alternate form of adjustable louver.

FIG. 10 is a diagrammatic transverse sectional view showing still another form of an adjustable louver.

Referring to FIGS. 1 to 4, there is shown a wall structure A which, of course, will be in normally vertical position behind which is an internal conduit system B with which is associated a frame C which receives and carries the elongated diffuser core D.

The diffuser D will have the outside flange members E carrying the inside parallel mounting plates F and the inside partitions G which are separated by a series of oblique vanes H.

Certain of the inside parallel plates G desirably every second, third or fourth one is of extra weight or grade as indicated at J so as to carry the external adjustable louvers K which are hingedly mounted in position on the outer edge thereof and extend the full length thereof.

Referring to FIGS. 1 to 4, the wall A is provided with an opening 10 which is slightly wider than the width and length of the outside frame C of the diffuser.

The outside frame of the diffuser desirably has inwardly projecting side walls 11 which closely project inside of the walls 12 of the end B of the ducted collar and are held in position by means of the screws or other attachments 14.

The side walls 11 and end walls 15 of the frame C have the outside outwardly extending flange portions 16 which extend beyond the opening 10 and cover the adjacent portion 17 of the opening 10 in the wall structure.

The flanges as shown in FIG. 1 have a straight portion 18 which is parallel to the face of the wall edge portions 17, and they also have a rounded quarter circular edge 19 which projects away from the outer edge of the plate parallel portions 18 so as to form a recess 20.

The recess 20 is slotted as indicated at 21 so as to receive an elongated gasket which will have a foot portion 22 clamped against the face of the wall A and preventing escape of air around the periphery of the diffuser.

The gasket has an enlarged attachment portion 23 which is inside of the slot 21 and extends through the opening 20 and holds the gasket face or foot portion 22 in position.

The rounded edge or bead 19 then has an inside face 24 which forms a recess in respect to the straight portion 18 which receives the edge channeled portion 25.

The edge channeled portions 25 will be provided with gaskets 26 which seal on the straight flange 18 and which are held in position by means of the slot 27.

From the edge channels 25, the interior flange structure E has the oblique side wall portions 28 which extend inwardly sufficiently to form a well M.

At the bottom of this well are positioned the side support plates E upon which the actual diffuser structure is mounted.

As is shown best in FIG. 1, the diffuser structure itself consists of a series of parallel elongated plates G with intervening oblique vanes H which at intervals have the extra weight or thickness partition members J which in the structure shown may project at 35 slightly beyond the edges 36 of the basic parallel plates G.

The parallel plates G may be formed so as to constitute single units with the oblique vanes H, and they will be clamped together with the plates J and the side walls F by the through rods 37 which as shown in FIG. 7 have the end peripheral recesses 38 which receive the lock washers 39, and hold the assembly tightly together.

The ends 40 of the rods 37 will project on either side of the assembly as shown best in FIG. 1.

Adjacent the inside ends 41 of the mounting plates F are positioned the screws or studs 42 which in turn will carry the base 43 of the legs 44 of the spring members 45 having the outstanding portions 46 which serve to hold the interior diffuser structure G-H-J in position inside of the frame structure C.

These spring members 45 have the outstanding portions 46 which project through and beyond the ends 47 of the slot 48 in the flange 49.

It will be noted that the legs 44 are offset at 50 so as to allow sufficient space for the well M.

The vanes H themselves as best shown in FIG. 4 will terminate short of the upper and lower edges 36 and 60 of the plates G, and they desirably will alternate in each different channel indicated by the arrows 61, 62, 63, 64, 65 and 66 so as to be at right angles to each other and at 45 degrees to the direction of the main stream of air indicated at 67 passing through the duct or conduit B.

If desired, the narrow duct indicated by the arrows 61 to 63 may be arranged in groups of two, three or four with the vanes H alternating in obliquity in each successive passage indicated by the arrows 61, 62, 63.

Although the angle of 45 degrees is preferred, it is possible to have the angles arranged at 60 degrees but desirably, the angles should be between 45 degrees and fifty degrees so that the flow will be in a crisscross pattern from adjacent narrow passageway as indicated by the crisscross stream 68 in FIG. 4.

The air in flowing out of the ducts then in the crisscross pattern of 68 is desirably deflected as it passes through the well M before it reaches the face of the wall A and passes out into the room.

This is achieved by means of the adjustable louvers K which may be turned at suitable angles in respect to the outcoming stream.

Desirably, these external louvers K are positioned so that they will have the same angle or obliquity as the side walls 28 of the well and at an angle of about 30 to 40 degrees to the face of the wall.

However, their positions may be varied so as to turn

the crisscross streams 68 at different angles and so the such streams will pass either toward one side or the other side of the elongated diffuser structure.

In this way, a most satisfactory distribution of the incoming turbulent air may be achieved to cause it to more closely approach the wall or ceiling or to diverge slightly or to diverge from said wall or ceiling with some of the narrow crisscross streams being more divergent or convergent than others.

In achieving this, the partitions J which act as the heavy partitions are desirably extruded and provided with an elongated end recess 69 into which may be snapped or slid the rounded base 70 of the swinging louver K.

Desirably, the external positions of the louver are laminated by means of the edge or stop faces 71 of the recess 69.

Desirably, the swinging louvers K are turned against the stop position 71 so that they will be all parallel to one another and parallel to one of the sides of the well M.

The tightness with which they are held in the recess 69 will assure that they will stay in adjusted position, and they may be readily turned in either direction by the occupants of the room or enclosure to give the desired distribution and directional effect to the incoming turbulent air.

It will be noted that the louvers K at their outer ends 72 will project somewhat beyond the faces 25 of the diffuser when they are in the normal adjusted position, and in the form shown, they will desirably have straight sides 73.

Terminal louvers K as indicated in FIG. 11 will be stopped as indicated at 84 against the corner 85 of the oblique side 28 of the well M.

However, if desired, these adjustable vanes may take other cross sections such as is indicated in FIGS. 9 and 10.

In FIG. 9, the vane is shown as having divergent sides 74 terminating in a rounded end 75, and a cylindrical pivotal connection 76.

This will cause the streams of air on the opposite sides thereof to diverge slightly and will have the effect of slightly laterally compressing the crisscross streams so that they will be separated from one another as they leave the diffuser.

In the alternate form shown in FIG. 10, the main portion 77 of the louver will have the parallel sides 78 but will have a half cylindrical head 79 with the shoulders 80 which will cause an additional turbulence in the outflowing streams between the groups of narrow crisscross streams.

In the form shown in FIG. 10, the base pivotal portion 81 is also formed with the shoulders 83 which will enable the louvers of FIG. 10 to be reversible and the semi-cylindrical portion 81 will be sufficient to give necessary pivotal mounting in the recess 83 of the enlarged pivot mount portions 35 at the end of the heavy plate members J.

By the type of arrangement shown, the applicant will enable a desired distribution of the air pattern into the room or enclosure, and will permit the person in the room to control such distribution in accordance with his desires.

Under special circumstances, the louvers K may be turned at other angles than shown in FIG. 1 so that they will project in line with the support plates J or at varying angles to one another so that the form of the streams passing through the slot indicated by the arrows 60 to 66 will be divergent in one direction and the other streams will be divergent in opposite directions.

In the patterns as shown in FIG. 5, 100 illustrates a single group of three narrow passageways with two adjustable louvers 101.

102 indicates three groups of three parallel passageways with four adjustable louvers 103.

104 indicates four groups of four parallel passageways with five adjustable louvers 105.

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Other arrangements, of course, may be employed, and is desired, the louvers K may be split so that part of the louvers may be turned independently of one another as for example in FIG. 2 with the solid lines at K indicating one direction and the dot and dash line at 106 indicating the other direction.

As many changes could be made in the above elongated rectangular air diffuser, and many different embodiments of this invention could be made without departing from the scope of the claims, it is intended that all matter contained in the above description shall be interpreted as illustrative and not in a limiting sense.

Having now particularly described and ascertained the nature of the invention, and in what manner the same is to be performed, what is claimed is:

1. In an elongated rectangular diffuser structure to distribute air at high velocity and with turbulence from an interior duct system of the type fitted into an elongated wall opening to distribute incoming conditioning and ventilating air in a laminar flow pattern with crisscross air jets in the layers forming the laminar flow pattern causing a desired turbulence in the air pattern, said diffuser having an outside frame positioned in said wall opening and connected to the interior duct system, an inside frame lodged in outside frame, a plurality of parallel closely elongated partitions carried by said inside frame and a plurality of oblique vanes positioned between and separating said elongated partitions to cause the air to flow outwardly in a series of elongated narrow streams in crisscross oblique fashion and a plurality of louvers positioned on the outside ends of the partitions to cause the narrow streams to be diverted to one side of the diffuser, said partitions having inside inlet edges and outside outlet edges terminating inside of the inside edge and the outside edge of the inside frame and said oblique vanes terminating inside of the inside edges and the outside edges of said elongated partitions and said louvers having their inside edges substantially inside of the inside frame and having their outer edges extending to and about the outside surface of said outside frame.

2. In an elongated rectangular diffuser structure to distribute air at high velocity and with turbulence from an interior duct system of the type fitted into an elongated wall opening to distribute incoming conditioning and ventilating air in a laminar flow pattern with crisscross air jets in the layers forming the laminar flow pattern causing a desired turbulence in the air pattern, said diffuser having an outside frame positioned in said wall opening and connected to the interior duct system, an inside frame lodged in outside frame, a plurality of parallel closely elongated partitions carried by said inside frame and a plurality of oblique vanes positioned between and separating said elongated partitions to cause the air to flow outwardly in a series of elongated narrow streams in crisscross oblique fashion and a plurality of louvers positioned on the outside ends of the partitions to cause the narrow streams to be diverted to one side of the diffuser, said louvers being pivotally mounted on spaced partitions so as to permit adjustment of the amount of angular diversion, said partitions having inside inlet edges and outside outlet edges terminating inside of the inside edge and the outside edge of the inside frame and said oblique vanes terminating inside of the inside edges and the outside edges of said elongated partitions and said louvers having their inside edges substantially inside of the inside frame and having their outer edges extending to and about the outside surface of said outside frame.

3. In an elongated rectangular diffuser structure to distribute air at high velocity and with turbulence from an interior duct system of the type fitted into an elongated wall opening to distribute incoming conditioning and ventilating air in a laminar flow pattern with crisscross air jets in the layers forming the laminar flow pattern causing a desired turbulence in the air pattern, said diffuser having an outside frame positioned in said wall opening

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and connected to the interior duct system, an inside frame lodged in outside frame, a plurality of parallel closely elongated partitions carried by said inside frame and a plurality of oblique vanes positioned between and separating said elongated partitions to cause the air to flow outwardly in a series of elongated narrow streams in crisscross oblique fashion and a plurality of louvers positioned on the outside ends of the partitions to cause the narrow streams to be diverted to one side of the diffuser, said partitions being positioned inside of the face of the wall so as to form a well between the wall and the outer edges of the partitions and said oblique vanes terminating short of the outside edges of the partitions, said partitions having inside inlet edges and outside outlet edges terminating inside of the inside edge and the outside edge of the inside frame and said oblique vanes terminating inside of the inside edges and the outside edges of said elongated partitions and said louvers having their inside edges substantially inside of the inside frame and having their outer edges extending to and about the outside surface of said outside frame.

4. In an elongated rectangular diffuser structure to distribute air at high velocity and with turbulence from an interior duct system of the type fitted into an elongated wall opening to distribute incoming conditioning and ventilating air in a laminar flow pattern with crisscross air jets in the layers forming the laminar flow pattern causing a desired turbulence in the air pattern, said diffuser having an outside frame positioned in said wall opening and connected to the interior duct system, an inside frame lodged in outside frame, a plurality of parallel closely elongated partitions carried by said inside frame and a plurality of oblique vanes positioned between and separating said elongated partitions to cause the air to flow outwardly in a series of elongated narrow streams in crisscross oblique fashion and a plurality of louvers positioned on the outside ends of the partitions to cause the narrow streams to be diverted to one side of the diffuser, said partitions being grouped in arrangements of three with relatively heavy partitions separating each group of three and said relatively heavy partition having slightly upwardly projecting pivoted mount members to carry said louvers and permit them to be moved at various angles in respect to the elongated partitions, said partitions having inside inlet edges and outside outlet edges terminating inside of the inside edge and the outside edge of the inside frame and said oblique vanes terminating inside of the inside edges and the outside edges of said elongated partitions and said louvers having their inside edges substantially inside of the inside frame and having their outer edges extending to and about the outside surface of said outside frame.

5. In an elongated rectangular diffuser structure to distribute air at high velocity and with turbulence from an interior duct system of the type fitting into an elongated wall opening to distribute incoming conditioning and ventilating air in a laminar flow pattern with crisscross air jets in the layers forming the laminar flow pattern causing a desired turbulence in the air pattern, said diffuser having an outside frame positioned in said wall opening and connected to the interior duct system, and inside frame lodged in outside frame, a plurality of parallel closely elongated partitions carried by said inside frame and a plurality of oblique vanes positioned between and separating said elongated partitions to cause the air to flow outwardly in a series of elongated narrow streams in crisscross oblique fashion and a plurality of louvers positioned on the outside ends of the partitions to cause the narrow streams to be diverted to one side of the diffuser, said louvers extending from the outer edges of the partitions and having slightly divergent sides so as to cause a compression and narrowing of the streams between said louvers, said partitions having inside inlet edges and outside outlet edges terminating inside of the inside edge and the outside edge of the inside frame and said oblique vanes terminating in-

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side of the inside edges and the outside edges of said elongated partitions and said louvers having their inside edges substantially inside of the inside frame and having their outer edges extending to and about the outside surface of said outside frame.

6. In an elongated rectangular diffuser structure to distribute air at high velocity and with turbulence from an interior duct system of the type fitting into an elongated wall opening to distribute incoming conditioning and ventilating air in a laminar flow pattern with crisscross air jets in the layers forming the laminar flow pattern causing a desired turbulence in the air pattern, said diffuser having an outside frame positioned in said wall opening and connected to the interior duct system, and inside frame lodged in outside frame, a plurality of parallel closely elongated partitions carried by said inside frame and a plurality of oblique vanes positioned between and separating said elongated partitions to cause the air to flow outwardly in a series of elongated narrow streams in crisscross oblique fashion and a plurality of louvers positioned on the outside ends of the partitions to cause the narrow streams to be diverted to one side of the diffuser, said louvers having enlarged outer edge portions to form baffles to increase the turbulence of the stream as it passes beyond the louvers, said partitions having inside inlet edges and outside outlet edges terminating inside of the inside edge and the outside edge of the inside frame and said oblique vanes terminating inside of the inside edges and the outside edges of said elongated partitions and said louvers having their inside edges substantially inside of the inside frame and having their outer edges extending to and about the outside surface of said outside frame.

7. In an elongated rectangular air diffuser of the type to be fitted into an elongated recess in a wall or ceiling, said diffuser having an outside rectangular frame with outwardly extending flanges fitting against the wall adjacent

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and around said recess and having a box-like enclosure extending inwardly from said outwardly extending flanges through and inside of the wall along the sides of said elongated recess and a plurality of elongated rectangular plates and partitions, parallel to each other and spaced equally apart and extending longitudinally of the recess inside of and parallel to the elongated walls of the box-like enclosure and transverse to the wall and said partitions and plates having inside edges adjacent the inside edge of the enclosure and having outside edges adjacent the outside of the enclosure, and said outside outlet edges terminating substantially inside of said flanges to form a well and recess inside of the outwardly extending flanges, and a plurality of obliquely extending vanes positioned between and terminating substantially short of the inside and outside edges of said plates and partitions and having their side edges between said terminating portions closely contacting and against the side surfaces of said plates and partitions and a plurality of elongated oblique louvers extending obliquely and longitudinally between the sides of the outside frame and having their inner edges mounted upon the outside edges of said plates and partitions to deflect the outgoing flow of air toward one side and having their outside edges terminating substantially in the plane of said outwardly extending flanges.

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