Nov. 8, 1966 J. R. CARLTON 3,283,456

BUILDING STRUCTURE

Filed Jan. 25, 1963 2 Sheets-Sheet 1

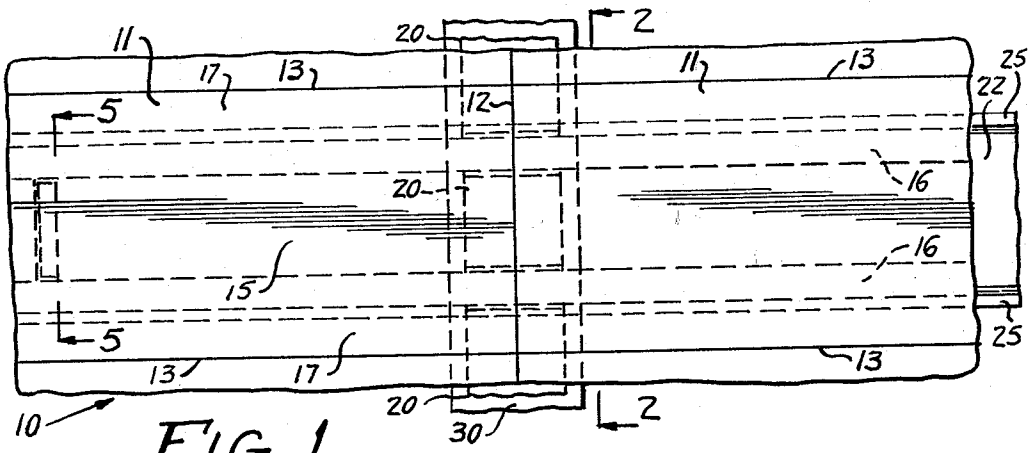


FIG. 1

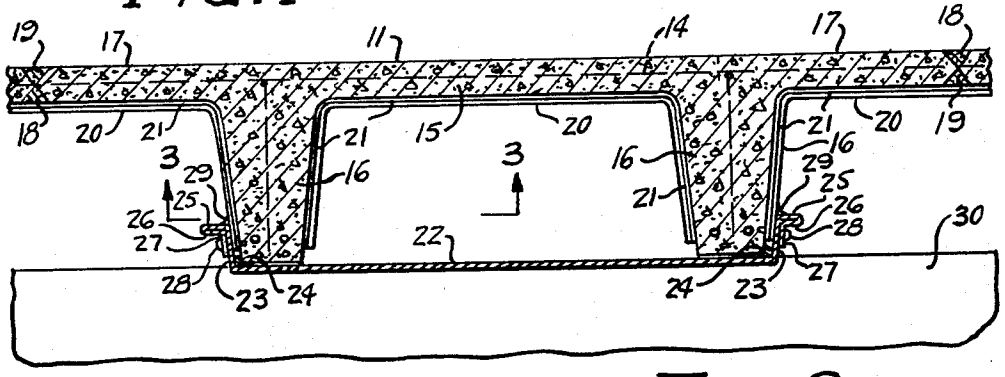


FIG. 2

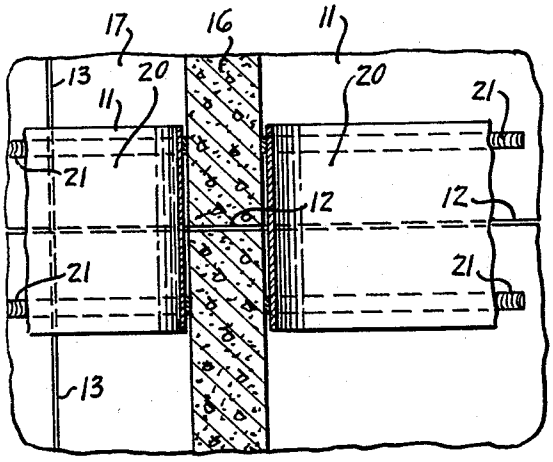


FIG. 3

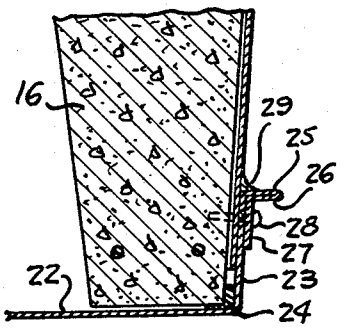


FIG. 4

INVENTOR.
JOHN R. CARLTON

BY Kimmel & Crowell
ATTORNEYS.

Nov. 8, 1966 J. R. CARLTON 3,283,456

BUILDING STRUCTURE

Filed Jan. 25, 1963 2 Sheets-Sheet 2

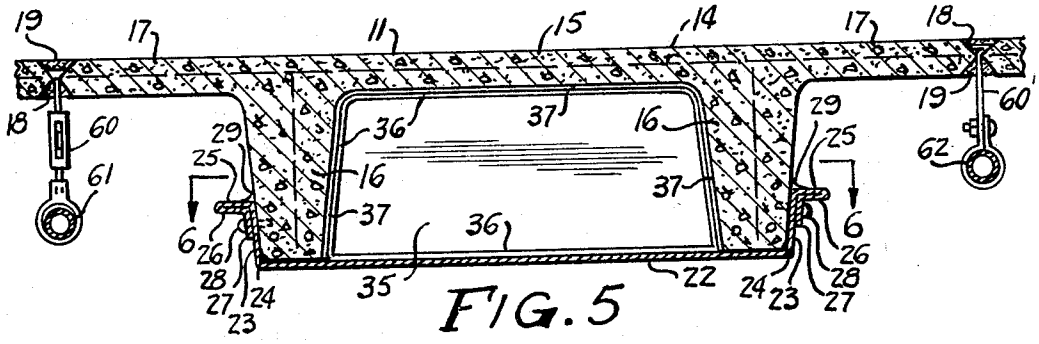


FIG. 5

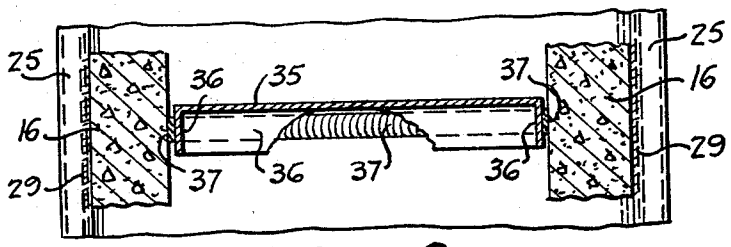


FIG. 6

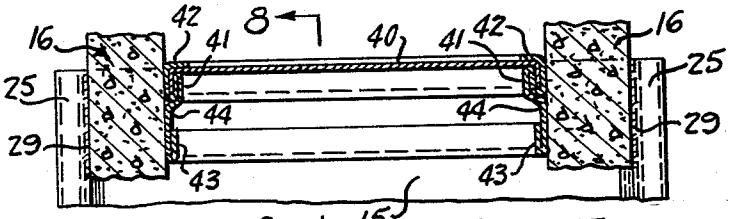


FIG. 7

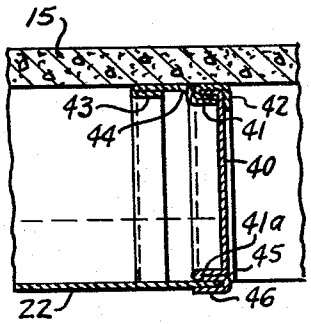


FIG. 8

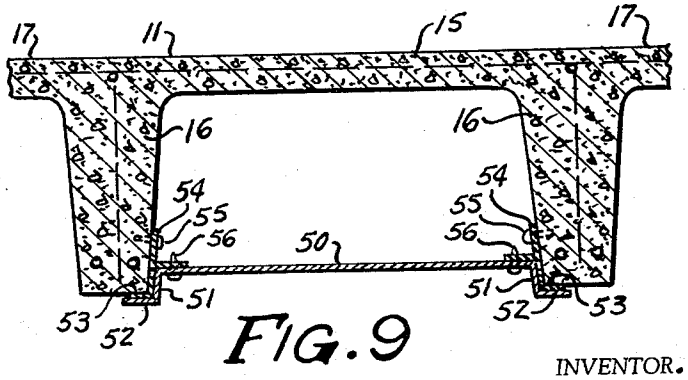


FIG. 9

INVENTOR.
JOHN R. CARLTON

BY Kimmel & Crowell
ATTORNEYS.

United States Patent Office

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1

3,283,456

BUILDING STRUCTURE

John R. Carlton, 1618 Altamont Ave., Richmond, Va.

Filed Jan. 25, 1963, Ser. No. 253,857
3 Claims. (Cl. 52—223)

This invention relates to a building structure and comprises a continuation-in-part of my co-pending application Serial No. 851,628 filed November 9, 1959, entitled "Building Structure" and now abandoned.

This invention relates to building structures and more particularly to building structures wherein the roofs or ceilings are formed of preformed, pre-stressed, reinforced concrete slabs, the slabs having depending flanges or leg portions, positioned intermediately of the slab and in spaced relation therewith so that when several slabs are arranged in the usual parallel relation to form a roof, floor, or ceiling, the depending flanges form, in conjunction with each other and with the adjacent flanges of adjacent slabs, a plurality of parallel rows of longitudinal or transverse channels of equal width, relative to the interior of the building.

A primary object of this invention is the provision of means for utilizing the otherwise wasted space embodied in these channels, and thereby not only to increase the usable space interiorly of the building, but to reduce construction costs, which would necessarily be involved in providing sufficient height from the floor to the roof of the interior of the building structure for the necessary servicing circuits such as, for example, cooling, lighting, sprinkles, water mains, air or gas lines, and the like.

A further object of the invention is the provision of an improved means for closing or sealing off certain channels to provide air ducts for high velocity air at a high output to provide ventilation, heating, cooling or other similar functions.

An additional object of the invention is the provision of an improved means associated with the flanges or legs of the concrete slabs, to facilitate the attachment of partioning members which enclose not only the bottoms of certain channels, but also the ends thereof, if desired.

Still other objects reside in the combinations of elements, arragements of parts, and features of construction, all as will be pointed out hereinafter as the description of the invention proceeds and shown in the accompanying drawings wherein:

FIGURE 1 is a fragmentary top plan view showing a portion of a ceiling constructed in accordance with the instant invention, with a longitudinal duct formed at the bottom thereof by the addition of a base plate or closure.

FIGURE 2 is a sectional view taken substantially along the line 2—2 of FIGURE 1 as viewed in the direction indicated by the arrows.

FIGURE 3 is a sectional view taken substantially along the line 3—3 of FIGURE 2 as viewed in the direction indicated by the arrows.

FIGURE 4 is a fragmentary enlarged detail view of a portion of the construction disclosed in FIGURE 2.

FIGURE 5 is a view similar to FIGURE 2 but showing an end panel in position in the central channel, and additional apparatus which may be employed in the channels disposed on opposite sides of the panel.

FIGURE 6 is a sectional view taken substantially along the line 6—6 of FIGURE 5.

FIGURE 7 is a view similar to FIGURE 6, but showing a modified form of panel construction.

2

FIGURE 8 is a sectional view taken substantially along the line 8—8 of FIGURE 7 as viewed in the direction indicated by the arrows; and

FIGURE 9 is a fragmentary sectional view similar to FIGURE 2, but showing a modified form of bottom panel support.

Similar reference characters refer to similar parts throughout the several views of the drawing.

Having reference now to the drawing in detail, and more particularly to FIGURE 1, there is generally indicated at **10** a floor or ceiling construction comprised of a plurality of panels **11**, which are juxtaposed as indicated at **12** longitudinally, and positioned in side by side relation as indicated at **13**.

As best shown in FIGURE 2, each of the panels **11** is comprised of reinforced concrete, precast and prestressed, containing reinforcement wire, or rods **14**. Each panel **11** consists of a central portion **15** having a pair of depending tapered flanges or legs **16** and a pair of horizontally extending aligned flanges **17**. The central portion **15** and flanges **17** comprise a plain top or floor surface as desired, and it is to be pointed out that the central portion **15** is of a dimension, from the center line of the depending flanges **16**, approximately equal to twice that of the horizontal flanges **17**, when taken from the center line of the depending flanges **16** so that when a pair of slabs **11** are aligned in parallel relation with the flanges **16** extending in parallelism, the distance between the flange **16** of one panel and the flange **16** of an adjacent panel is substantially equal to the distance between the two depending flanges **16** of the single panel.

The depending flanges **15** extend the full length of the panels and provide continuous unobstructed channels having open ends. When the panels are arranged in juxtaposed position with the channels aligned, as shown in FIG. 1, the channels form continuous, unobstructed ducts extending substantially the entire length or width of the building structure, in accordance with the direction in which the slabs are laid. These ducts may be employed for a wide variety of purposes.

The precast, prestressed concrete panels, known as double T's, extend substantially the entire length of the building.

As best shown in FIGURE 2, the ends of flanges **17** are beveled or tapered as at **18** to provide for mastic or other sealant **19** therebetween.

FIGURE 3 discloses particularly the junction **12** between two adjacent longitudinally aligned panels **11**, the junction being normally closed by means of a sheet metal strip **20** of generally U-shaped configuration which corresponds to the interior configuration of the channel formed between adjacent flanges **16**, and which is provided along its edges with a sealing bead **21** of mastic, forming a substantially airtight seal at the longitudinal juncture of the aligned slabs.

In one embodiment of the invention when it is desired to employ a channel for the transmission of air under pressure, or the like, a bottom plate **22** of any desired length is applied transversely between adjacent depending flanges **16**. The edge of the bottom plate **22** is upturned as at **23**, and a mastic bead **24** is applied along the corner thereof adjacent its juncture with the depending flange or leg **16**, prior to the attachment of the plate or pan to the flanges. In the construction as disclosed in FIGS. 1 to 4, the vertical flange **23** is bent outwardly as at **25**, and thence inwardly as at **26** and downwardly as at **27**, to pro-

vide a double thickness of metal, which is fastened to the adjacent reinforced concrete flange by means of pin fasteners **28**. A suitable mastic filler bead **29** may subsequently be applied after the installation of the pans along the desired length of the beam.

The floor or ceiling assembly may be supported in any desired manner as by transversely extending beams **30** which may be of either preformed, pre-stressed concrete, or steel I-beams or other desired construction.

The ends of panels **22** may be connected in any desired manner, with the portions **23** being overlapped, and a suitable bar slip connection being provided for the portions **22**, the assembly being sealed by mastic in any desired manner.

When it is desired to divide the ducts extending longitudinally of the slabs, a suitable sealed end panel may be provided as indicated at **35**, the panel being of a configuration as shown in FIGURES 5 and 6 completely to close the channel, and being provided with a peripheral flange **36** about its entire periphery, the flange **36** having a mastic bead **37** applied to its outer surface to adhere the same to the depending flanges **16**, and top panel **15**.

A modified form of end panel is disclosed in FIGURES 7 and 8, and takes the form of a sheet **40** dimensioned to fit between the bottom plates **22**, the bottom of a top panel **15** and the adjacent depending flanges **16**. Panel **40** is provided with an internally extending flange **41**, which is engaged by a double S lock seam, the ends of which are indicated at **42** and **43** in the central portion at **44**. The lock seams are provided for adjusting the length of end plates to adjust to variance in the width of the legs or flanges **16**, such as may occur during manufacture. As best shown in FIGURE 8, the bottom flange **41***a* is provided with a reverted portion **45** which is re-reverted as at **46** to overlap the edge of the adjacent panel **22**.

FIGURE 9 shows a modified form of bottom panel construction which includes a plate **50** having a depending flange **51** and an outwardly extending flange **52**, the flange **52** engaging one side of an adhesive coated sponge rubber gasket **53** positioned along the bottom of the adjacent leg **16**.

A pair of aligned parallel angle iron members **54** extend along the sides of adjacent leg **16**, and are secured as by means of pins **55** shot into the concrete of the legs or flanges **16**. Self-tapping metal screws **56** are employed in the connection of the panels **50** to the opposed inwardly extending flanges of the angle iron members **54**.

It will be obvious that the ducts formed by panels **50** closing the bottoms of the channels may be suitably apertured to permit the ingress and exit of air, either heated or cooled, and either under normal pressure or forced draft in accordance with the requirements to which the device may be put. It will be equally apparent that the longitudinal channels may be divided by transverse end panels at requisite points, and that as many or as few of the longitudinally extending channels of a ceiling or floor as desired may be employed as air ducts.

Intervening spaces, as disclosed in FIGURE 5, may contain hangers **60** for water pipes **61**, or electric conduit **62**, for sprinkler systems, electrical wiring, or any other piping which may be necessary.

From the foregoing it will now be seen that there is herein provided an improved building structure which accomplishes all the objects of this invention, and others, including many advantages of great practical utility and commercial importance.

As many embodiments may be made of this inventive concept, and as many modifications may be made in the various embodiments hereinbefore shown and described, it is to be understood that all matter herein is to be interpreted merely as illustrative, and not in a limiting sense.

I claim:

1. In a building construction, the combination comprising a plurality of precast, pre-stressed, generally rectangular joined slabs, each of said slabs including a top, integral downwardly extending spaced parallel flanges and integral marginal extensions along two edges thereof adjacent said flanges, said top and parallel flanges defining an elongated channel, said marginal extensions each having a transverse dimension equal to one-half the transverse dimension of said top, the marginal extensions and adjacent flanges of adjacent joined slabs each defining a channel of equal dimension to the dimension of the channel defined by said top and integral spaced parallel flange of each slab, means extending between said adjacent flanges and removably secured thereto to enclose said channels, said last-mentioned means including bottom plates having upturned flanges along their edges, said flanges having outwardly and thence inwardly extending top portions with reverted reinforcing strips depending from the inwardly extending portions, and pins extending through said reinforcing strips and upturned flanges engaged in the concrete of the adjacent parallel flange of the slab.

2. In a building construction, the combination comprising a plurality of precast, pre-stressed, generally rectangular joined slabs, each of said slabs including a top, integral downwardly extending spaced parallel flanges and integral marginal extensions along two edges thereof adjacent said flanges, said top and parallel flanges defining an elongated channel, said marginal extensions each having a transverse dimension equal to one-half the transverse dimension of said top, the marginal extensions and adjacent flanges of adjacent joined slabs each defining a channel of equal dimension to the dimension of the channel defined by said top and integral spaced parallel flange of each slab, means extending between said adjacent flanges and removably secured thereto to enclose said channels, said last-mentioned means including bottom plates having upturned flanges along their edges, said flanges having outwardly and thence inwardly extending top portions with reverted reinforcing strips depending from the inwardly extending portions, pins extending through said reinforcing strips and upturned flanges engaged in the concrete of the adjacent parallel flange of the slab,

and end closure means including a flanged end plate extending transversely across a channel and mastic sealing beads interposed between the adjacent concrete flanges and the underside of the adjacent slab and the flange of the end plate.

3. In a building construction, the combination comprising a plurality of precast, pre-stressed, generally rectangular joined slabs, each of said slabs including a top, integral downwardly extending spaced parallel flanges and integral marginal extensions along two edges thereof adjacent said flanges, said top and parallel flanges defining an elongated channel, said marginal extensions each having a transverse dimension equal to one-half the transverse dimension of said top, the marginal extensions and adjacent flanges of adjacent joined slabs each defining a channel of equal dimension to the dimension of the channel defined by said top and integral spaced parallel flange of each slab, means extending between said adjacent flanges and removably secured thereto to enclose said channels, said last-mentioned means including bottom plates having upturned flanges along their edges, said flanges having outwardly and thence inwardly extending top portions with reverted reinforcing strips depending from the inwardly extending portions, pins extending through said reinforcing strips and upturned flanges engaged in the concrete of the adjacent parallel flange of the slab, and end closure means including a flanged end plate extending transversely across a channel and mastic sealing beads interposed between the adjacent concrete flanges and the underside of the adjacent slab and the flange of the end plate, mastic sealing beads along the marginal edges of said upturned flanges and additional mastic sealing beads interposed between said concrete

flanges and said bottom plates at the juncture of said plates and their upturned flanges with the adjacent edge of the concrete flange.

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RICHARD W. COOKE, JR., *Primary Examiner.*

HENRY C. SUTHERLAND, FRANK L. ABBOTT, *Examiners.*

J. L. RIDGILL, *Assistant Examiner.*