

Oct. 25, 1960

W. L. EDGAR
CELLULAR STEEL FLOOR

2,957,555

Filed Aug. 31, 1955

2 Sheets-Sheet 1

Fig. 1

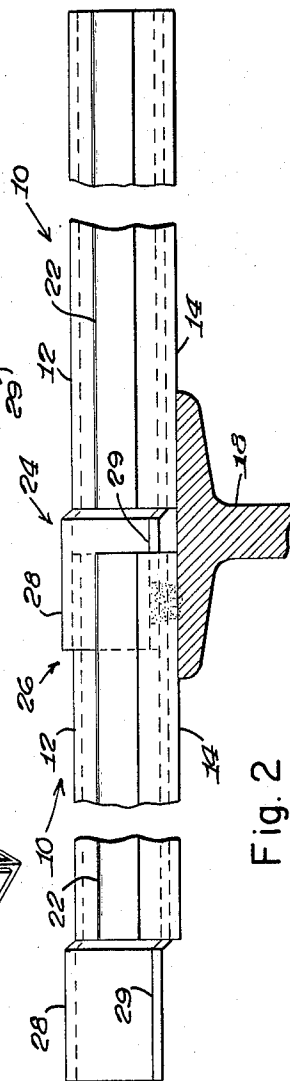
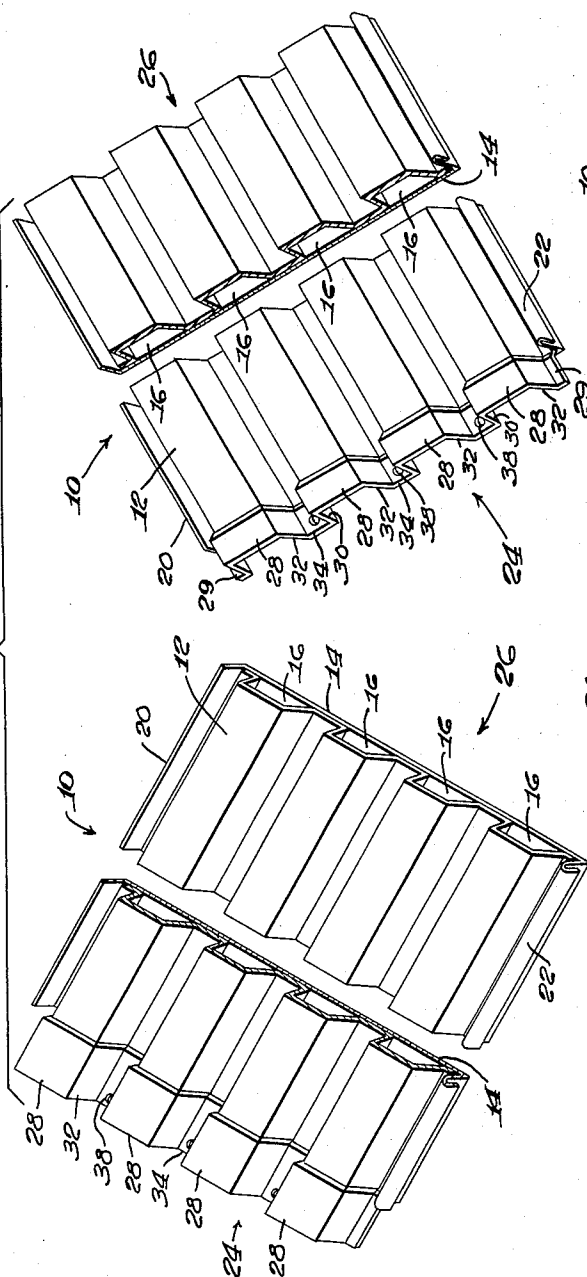


Fig. 2

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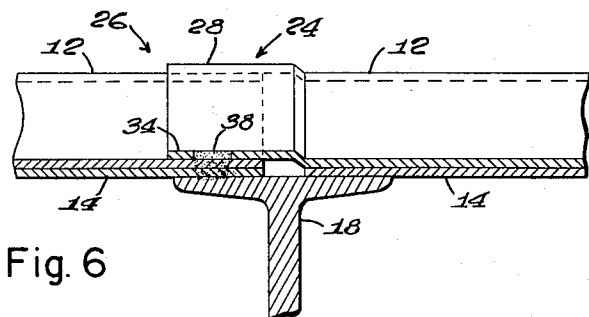
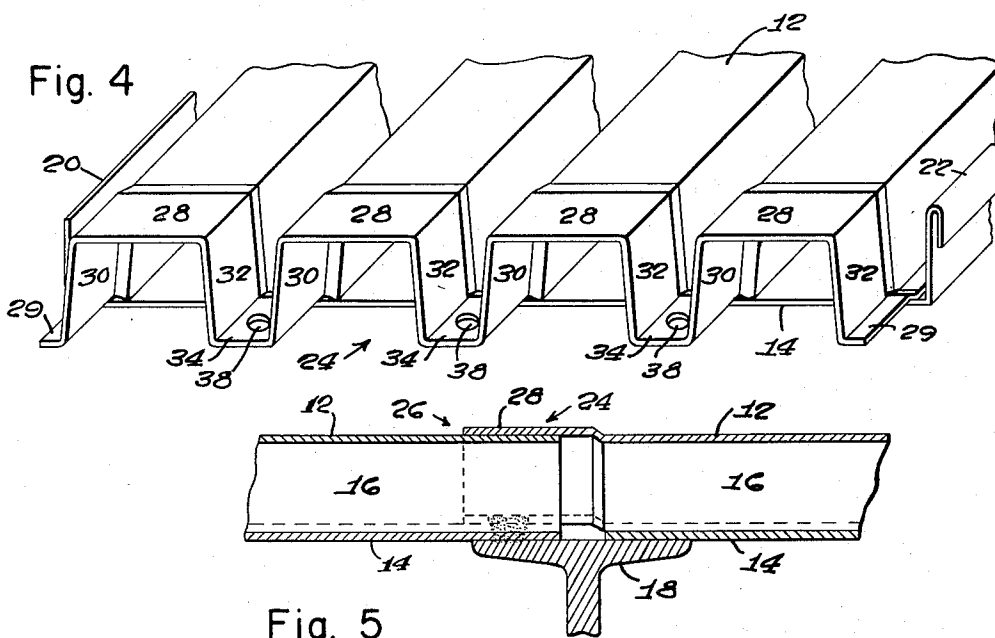
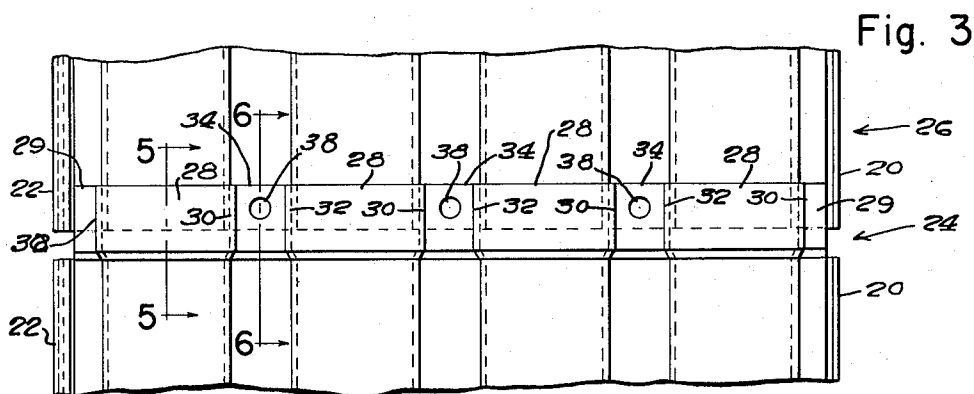
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1 Claim. (Cl. 189—34)

This invention relates to a building construction and more particularly to a cellular steel floor.

The invention has for an object to provide a novel and improved cellular steel floor embodying multi-cellular floor units having a plurality of spaced and longitudinally extended cells forming potential wire distributing cells and in which provision is made for connecting the units end to end in a novel, simple, economical and efficient manner.

A further and more specific object of the invention is to provide a novel and improved cellular steel floor of the character specified having end joints assuring positive alignment of the cells of connected units and which are adapted to permit longitudinal adjustment of the units relative to each other whereby to accommodate irregularities in the lengths of the units and to compensate for minor variations in field conditions during the erection of the flooring.

With these general objects in view and such others as may hereinafter appear, the invention consists in the cellular steel floor hereinafter described and particularly defined in the claims at the end of this specification.

In the drawings illustrating the preferred embodiment of the invention:

Fig. 1 is a perspective view of two cellular floor units shown disconnected and illustrating the present end joints;

Fig. 2 is a side elevation of the cellular floor units shown in assembled relation;

Fig. 3 is a plan view of the connected end joints shown in Fig. 2;

Fig. 4 is a perspective view of a floor unit showing the connecting joint structure at one end of the unit; and

Figs. 5 and 6 are cross sectional views taken on the lines 5—5 and 6—6 respectively of Fig. 3.

In general the present invention contemplates a cellular metal floor unit for use in the erection of a load supporting and wire distributing floor of the type illustrated in the United States Patents Nos. 1,855,082 and 1,867,433, and in particular comprises an improvement in the cellular steel floor illustrated and described in the United States patent to Crafton, No. 2,694,475. During the erection of such floors the units are laid end to end, preferably being supported upon steel structural members, such as girders, so that the joints between the ends of adjacent units come over the girders and so that the cells of one unit cooperate with and form extensions of the cells of a second unit to provide a plurality of continuous ducts or conduits extending across the building and through which wiring for electrical service of various sorts may be drawn.

In the erection of such prior cellular metal floors it has been the practice to lay successive flooring units end to end in substantially abutting relation. Such practice required that the component sheets be subjected to a resquaring operation in the manufacture thereof after the rolling operation forming the corrugations therein. The resquaring operation was effected by a transverse shear at each end of the corrugated sheet in order that the ends be perfectly square to provide a substantially tight seam between the abutting ends of the flooring units when erected. Such resquaring practice resulted in a substantial waste of material in the form of scrap

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and also required the services of several workers in handling the sheets and in controlling the shearing operation.

In accordance with the present invention provision is made for joining the ends of the cellular metal units in nesting and overlapping relation in a manner such that no portions of the ends of the units are required to be in abutting engagement and whereby the units may be adjusted longitudinally relative to each other during the erection thereof to accommodate slight variations in the length of the units and to compensate for minor variations in field conditions. Thus, in practice the afore-said resquaring operation may be eliminated resulting in substantial savings in material and labor in the production of the units and also eliminating the need for maintaining exact tolerances in the lengths of the units. The novel structure of the end joints of the present cellular metal floor is also such as to maintain substantially the full cross sectional area of metal at the joints so as to maintain the load bearing properties unimpaired at the ends of the units and also serves to stiffen the joints against accidental damage in transit or by handling during the erection of the floor. The present structure also insures positive alignment of the individual cells of the units and provides substantially smooth internal surfaces at the joints to facilitate their use as raceways for wire pulling.

Referring now to the drawings, 10 represents one type of cellular metal floor unit which comprises a multi-cellular unit formed by assembling and uniting together, preferably by welding, an upper corrugated sheet 12 and a lower flat sheet 14 to provide a unit having in effect a series of closely spaced parallel hollow beams or cells 16. In erecting the floor the individual building units extend between the structural steel supporting elements of the building with the ends of the units resting on and preferably welded to the same, and as herein shown, these structural elements comprise girders 18, a plurality of units being laid end to end forming continuous elongated cells particularly useful as potential wiring cells. Adjacent units may be laid side by side and connected in interlocking relation by the cooperation of marginal lip portions 20, 22 formed on opposite sides of the lower flat sheet 14, as shown in Fig. 1.

In accordance with the present invention the leading and trailing ends 24, 26 of the floor units are particularly designed for interconnection with corresponding end portions of adjacent units, preferably in a manner such that the leading end portion 24 of one unit may be fitted into nesting and overlapping relation with the trailing end portion 26 of the endwise adjacent unit to assure positive alignment of the individual cells of the units and in a manner such as to permit longitudinal adjustment of one floor unit relative to the other during the erection thereof.

In the illustrated embodiment of the invention the walls of the corrugations forming the cells 16 at the leading end 24 are preferably offset or expanded to receive the non-offset and preferably straight wall portions of the corrugated sheet at the trailing end 26 of an adjacent unit. Thus, the upper walls 28 of the cells at the leading end 24 are offset upwardly, and the side walls 30, 32 of the cells are offset outwardly, the lower walls or connecting flanges 34 between the corrugations being also offset upwardly, the offsets preferably being substantially equal to or slightly more than the thickness of the metal and extending a substantial distance back from the leading end. The lower flat sheet 14 is cut back at the leading end 24 a distance substantially equal to the length of the offset portions as shown. The corrugated sheet 12 at the trailing end 26 of each unit is preferably free of offset portions, and the lower flat sheet

14 is substantially flush with the end of the corrugated sheet at the trailing end.

With this construction it will be seen that in erecting the floor the leading end 24 of one unit may be placed into position over the straight or non-offset trailing end 26 in nesting and overlapping relation, the upper and lower walls 28 and 34 respectively of the corrugations at the leading end resting on top of the corresponding walls of the trailing end, and the offset side walls 30, 32 of the corrugations at the leading end embracing the corresponding non-offset walls of the trailing end, and with the set back end of the lower flat sheet 14 of the leading end spaced from the lower flat sheet at the trailing end. It will be observed that the laterally extended marginal edge portions 29 of the upper corrugated sheet are also upwardly offset at the leading end 24 to fit over the corresponding straight portions of the trailing end of an adjacent sheet. Thus, in practice no portion of the ends of connected units are in abutting relation so that the transverse edges of the units are not required to be cut square but may be slightly irregular, clearance being provided to accommodate such irregularity. As illustrated in Figs. 2 and 3, in practice it is preferred to maintain the nominal length of the units such as to provide a nominal amount of overlap, herein shown as about 1½ inches overlap, and the length of the offset portions are preferably such as to provide substantial clearance between the end of one unit and the point where the offset starts in the cooperating unit, such clearance being preferably about ½ inch. Thus, any irregularities in the transverse edges of the units may be accommodated by such clearances, and any minor variations in the length of the sheets or minor variations in field conditions may be compensated for during the erection of the floor by longitudinal adjustment of one unit relative to the other within the limits of such clearances.

It will be observed that the gap between the end of the set back portion of the lower flat sheet 14 at the leading end 24 and the corresponding sheet 14 of the trailing end of an adjacent unit permits longitudinal adjustment of the units relative to each other and that such gap will be concealed in the erected floor by the width of the bearing flange of the structural steel girder 18 upon which the joint rests. It will also be observed that the corrugated sheets 12 of each unit are maintained at their full cross sectional area throughout their length, and since practically all of the load bearing strength of the illustrated floor unit is contributed by the section modulus of the corrugated sheet, the load bearing properties of the unit are practically unimpaired.

As illustrated in Fig. 2, in erecting the flooring the ends of the units are arranged to rest upon the structural supporting girders 18 so that the joints occur above the girders and are welded to the girders during the progress of the erection. As herein shown, in order to facilitate welding of the overlapping portions of the bottom walls of the joint to the girder 18, the exposed overlying offset bottom wall or flange portions 34 may and preferably will be provided with welding openings 38 whereby the underlying thicknesses of the straight bottom walls of the trailing end and the flat lower sheet 14 may be welded to the girder through the openings 38 and then the edges defining the opening may be welded to the underlying wall to secure the ends in place.

The resulting joint formed by the nesting arrangement of the offset and aligned portions of cooperating units provides substantially obstruction-free interior surfaces of the cells through which the wires may be drawn, the raw transverse edges of the side walls and upper wall of the trailing end being recessed within the outwardly offset side walls 30, 32 and upper wall 28 respectively of the leading end, the flat sheets 14 forming the bottom walls of the cells of adjacent units being in slightly spaced and aligned relation.

From the above description it will be observed that the present structure of end joint for connecting the ends

of adjacent cellular metal floor units of the type disclosed results in the maintenance of the full cross sectional area of the corrugated sheets of the units at the joints whereby the load bearing properties of the units at the joints are not substantially impaired. Also, the overlapping and longitudinally adjustable feature of the end joints permits the use of cellular floor units and of components thereof which are not required to be resquared or transversely sheared to an exact predetermined length during the production of the units, thereby resulting in substantial savings in material and labor in the manufacture of the units.

While the preferred embodiment of the invention has been herein illustrated and described, it will be understood that the invention may be embodied in other forms within the scope of the following claim.

Having thus described the invention, what is claimed is:

In a building construction, a flooring structure comprising a plurality of multicellular flooring units and a supporting framework, said units being erected side by side and in end-to-end relation upon the supporting framework to form the flooring, each of the flooring units comprising an upper metal sheet having corrugations and a lower flat metal sheet welded thereto and forming transversely spaced and longitudinally extended cells comprising potential wiring ducts, said corrugations each comprising an upper wall, a lower wall, and side walls, the transverse marginal edges defining the ends of the sheets being irregular, a first end only of the corrugated sheet of each unit being extended longitudinally beyond the corresponding end of the flat sheet thereof, the extended end portion of each corrugated sheet being provided with outwardly expanded offset portions in the side walls thereof and upwardly expanded offset portions in the upper and lower walls thereof, respectively, projecting in a direction away from the lower flat sheet thereof, the beginning portion of said extended offset portions being aligned with the adjacent end of the lower flat sheet, the corrugations at the second end of each unit being unmodified, the corrugations at the second end of one unit being fitted in nesting and contacting, overlapping relation within the extended portion formed by the outwardly and upwardly offset portions of the corrugations at said first end of an endwise adjacent unit, with the flat lower sheets of the units longitudinally spaced to provide a gap therebetween and arranged in the same horizontal plane and resting on the supporting framework, and with the corrugations of the extended end portion bridging the gap between the ends of the flat lower sheets of said adjacent units, the lower walls of the corrugations of said extended end portion resting upon and being welded to the lower walls of the corrugations of the adjacent unit and to the underlying flat sheet and to said supporting framework, thereby forming an overlapping and non-abutting connecting joint between endwise adjacent units adapted to accommodate the irregular transverse edges of the sheets and to permit longitudinal endwise adjustment of the units to compensate for slight variations in the lengths of the units, during the erection of the floor.

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