May 29, 1945. W. Y. COCKEN, JR 2,377,211

FLOOR STRUCTURE

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Fig. 1.

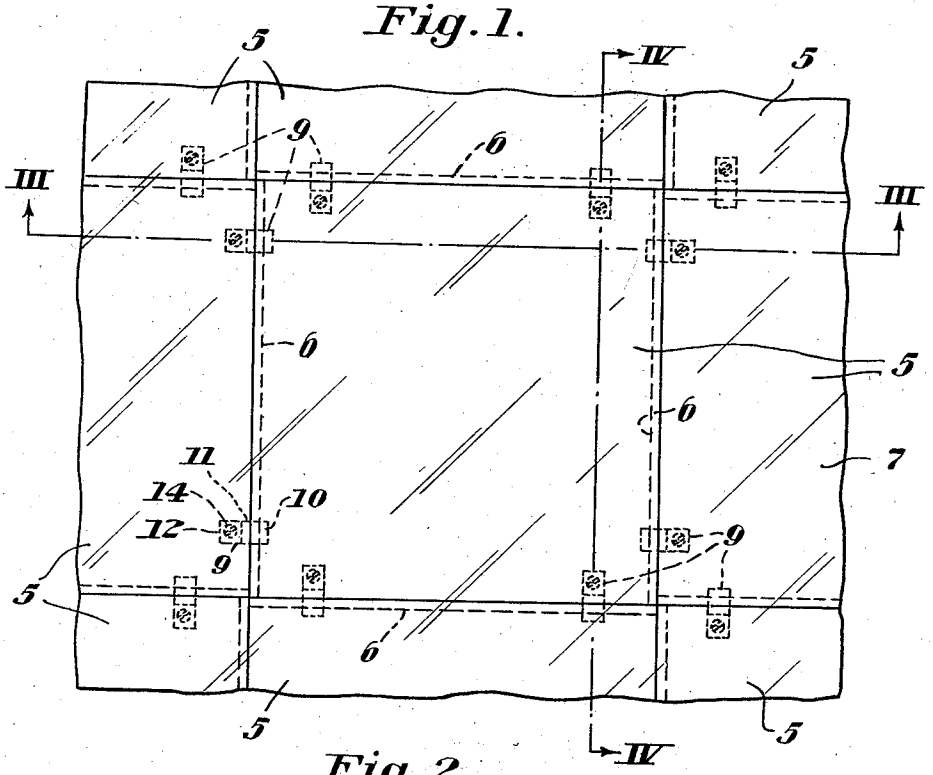

Fig. 2.

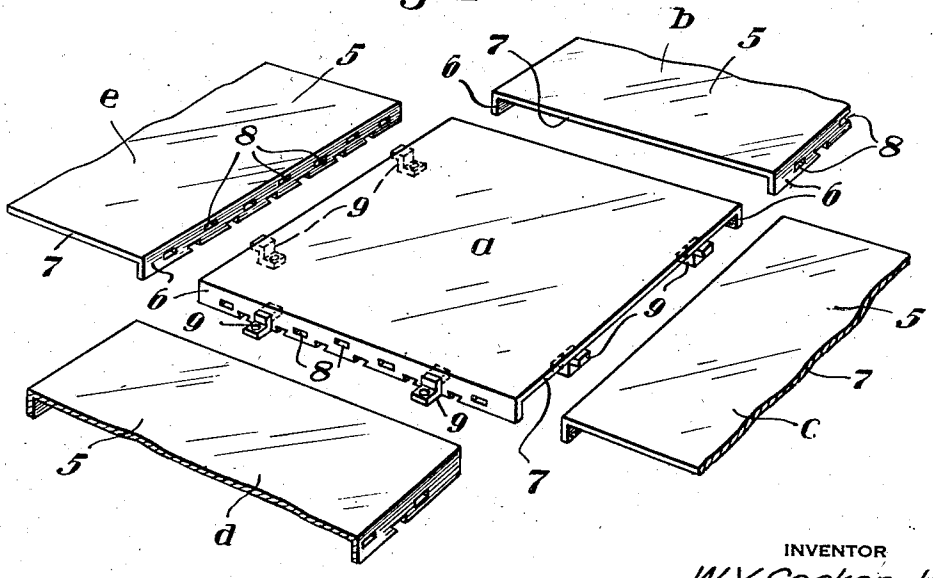

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Fig. 3.

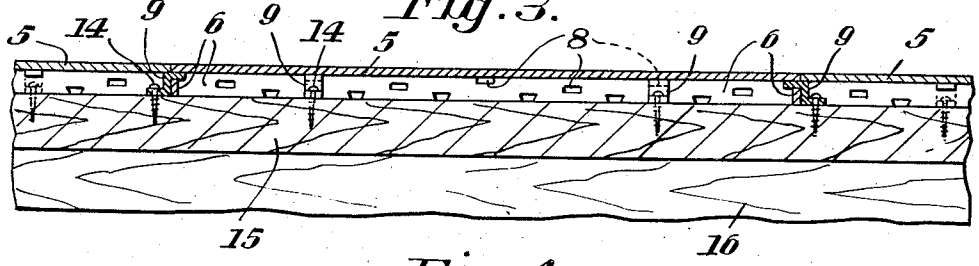


Fig. 4.

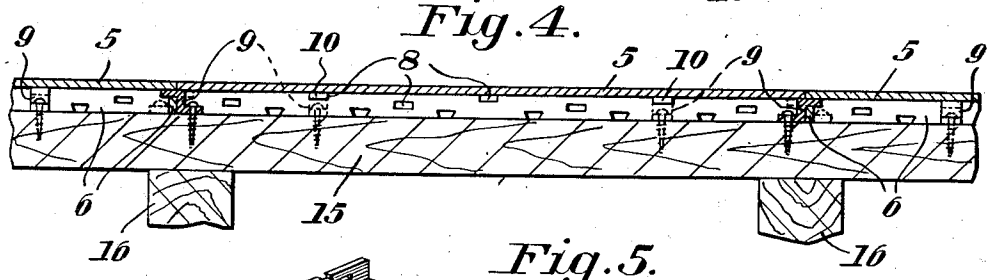


Fig. 5.

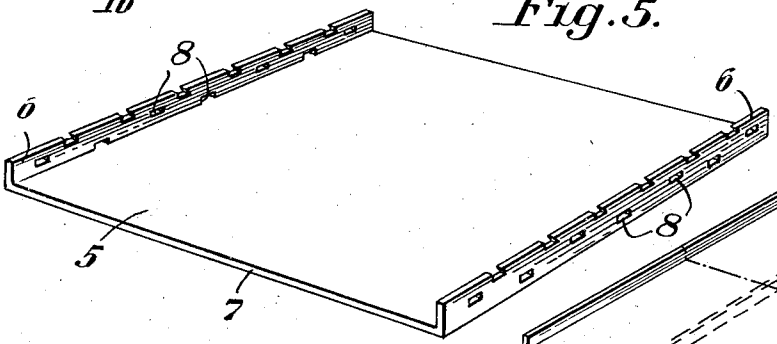
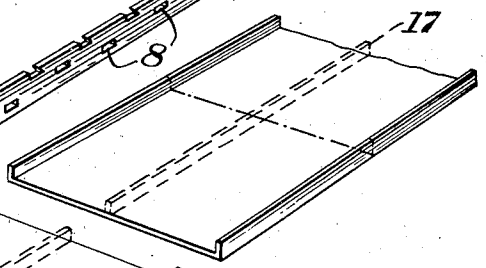


Fig. 6.



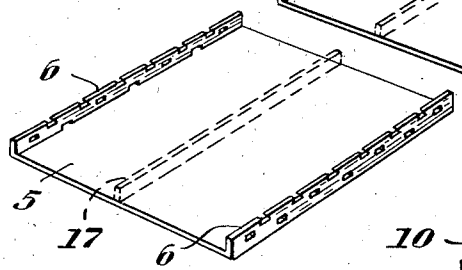
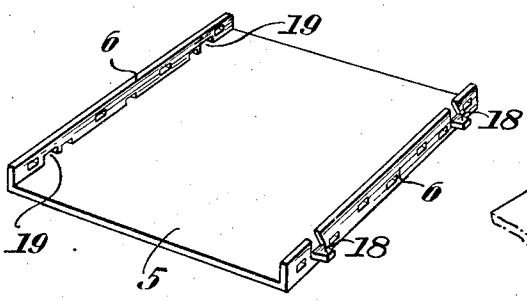
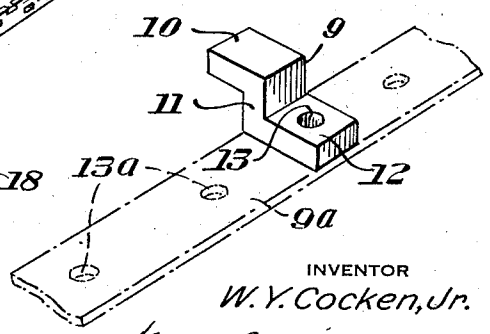


Fig. 8.

Fig. 7.





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FLOOR STRUCTURE

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Application December 10, 1942, Serial No. 468,452

10 Claims. (Cl. 94—13)

This invention relates to improvements in flooring and method of assembly and forming of parts thereof, said parts may be made of any material or materials suitable for forming plates or tiles and associated elements entering into the flooring.

More specifically the invention relates to metallic flooring structures preferably embodying preformed units or plates, as rolled steel channel members or the like, of a character constituting when assembled interlocking or integrating reciprocal floor plates or members, and preformed supporting and interlocking means associated with the plates, said plates and the supporting and interlocking means being assembled to produce a strong load supporting floor of a character which may be economically erected.

In the accompanying drawings which illustrate applications of my invention:

Fig. 1 is a plan view showing a part of a flooring embodying my invention;

Fig. 2, a perspective view of the portion of flooring shown in Fig. 1, in spaced apart relationship;

Fig. 3, a cross sectional view on the line III—III of Fig. 1;

Fig. 4, a transverse sectional view on the line IV—IV of Fig. 1;

Fig. 5, a perspective view of a channel member in inverted position;

Fig. 6, a perspective view showing the manner in which the material may be rolled and punched;

Fig. 7, a perspective view showing a modified channel element; and

Fig. 8, a perspective view showing a Z-clip and strip.

Referring to the drawings, the floor structure as illustrated and as preferred includes any desired number of units, tiles or plates 5, preferably formed of rolled steel channel members cut to the desired size, said tiles or plates have flanges 6 and web portions 7, the latter being designed to be positioned in a horizontal plane so as to form a flat even surface, constituting, if desired, a wear surface of the flooring.

As shown, each flange is formed with one or more series of openings or slots 8 arranged in different elevations in the flanges and designed to receive locking and supporting elements of any preferred and suitable form. The said locking and supporting elements as shown in one embodiment of the floor structure consist of Z-clips or cleats designated generally 9 and including a horizontal portion 10 adapted to be inserted into an opening or slot 8, a vertically extending portion 11, and a horizontal apertured portion 12. The aperture 13 of portion 12 is designed to receive an anchoring screw or other anchoring device 14. If preferred the Z-clips may be fixedly or adjustably mounted on a relatively thin metal strip 9a having, if desired, predetermined spaced apart apertures 13a that register with the apertures of the Z-clips 9 when the latter are applied to the strip, see Figure 8.

It will be noted that after inserting the horizontal portion 10 of the element 9 into a slot or opening in a flange of the plate a part of the vertical portion 11 extends outwardly from the flange to provide a shoulder. This part or shoulder is designed when an adjacent unit or member 5 is positioned relative to the first unit in the act of assembling the members, to come into contact with the under surface of the web of the said unit to support an edge thereof. It will thus be noted that the combination of elements arranged as described will coact to function as an anchoring and supporting means for adjoining members 5.

Fig. 2 shows members 5 and the cleats or clips 9, which are to constitute adjoining members of the flooring, spaced apart. A reference to this figure will show that a member 5, here designated *a*, has its flanges 6 extending in one direction and that the other members, here designated *b*, *c*, *d* and *e*, all have their flanges extending in the same direction and at right angles to the flanges of the member *a*.

Various methods of assembling the plates or tiles together with the clips or cleats on the supporting structure may be followed. As a method of assembling, and referring to Fig. 2, it will be seen that when the said members are brought together or assembled the clips 9 or portions thereof associated with one flange of member *a* will cooperate with the unflanged edge of a member *d* to support an edge of the web portion 7 of said member *d*, while said clips being secured to a supporting structure will hold down the member *a*; and the clips, not shown, on the opposite end of member *a* will function in a similar manner for supporting the unflanged web portion of member *b*. The clips that are entered in the slots of the flange of member *e* are designed to fasten said member to the supporting structure and to cooperate with the unflanged portion of member *a* for supporting an edge of the web portion of *a*. Similarly the clips entered in and extending from the flange of member *c* cooperate in the same manner as just described in relation

to members *a* and *e*, that is to say to hold down member *c* and support the other unflanged portion of member *a*. The assembled flooring thus includes, interlocking or integrating reciprocal floor plates or tiles.

The members 5 are of such construction that they may be readily fabricated, transported and disposed in position upon any suitable supporting structure, as for example, in the manner shown by Figs. 3 and 4, in which 15 and 16 designate parts of a wood sub-floor. It is evident, in some instances the members 5 may be reinforced by a reinforcing element as 17, see Fig. 6, and may have its flanges slotted as at 8 and one of the flanges formed with integral projections 18, while its other flange is provided with slots 19, see Fig. 7.

It is contemplated that the web portions of the channel members may be utilized as the tread or wearing surfaces of the flooring, and further, that the interlocking or integrating reciprocal floor plates may be preformed and stocked in several grades. Such as, one grade for floors for warehouses, sidewalks, and other constructions in which hard usage is contemplated; a grade for monumental or public buildings having perhaps an inlaid or special surface or appearance; and a grade particularly adapted for domestic use.

It will be understood that the floor units, owing to the configuration of the said units and the manner of assembly permits them to be installed as an integral part of a cement, mastic or plastic support, or they may be disposed on the top of old existing metal or wood floors or other supporting structures. It will be further noted that the combination of the said units and the arrangement thereof, together with the interlocking and supporting elements is of such character, that in the event the floor is to be repaired, any one or more plates may be removed and new plates installed in the place of the said removed units. Attention is called to the further fact that the flanges of the channel units are provided with staggered openings whereby the interlocking and supporting elements or clips may be entered therein in order to bring the wearing surfaces of the said channel units into a horizontal plane. This construction permits of flexibility, expansion and contraction and a construction that would prevent buckling of the floor.

As illustrated it will be seen that the adjoining plates are positioned in abutting relationship and that the clips, cleats or other fastening means employed are concealed from view as all portions thereof are below the upper surfaces of the assembled plates.

What I claim is:

1. In a flooring for buildings and the like, a plurality of members each having a web and flanges depending therefrom along two opposite edges thereof and an under space between said flanges open at the other sides of the members, said members arranged so that the flanges run at right angles to each other in adjacent members, and locking and supporting means interengaged with the flanges and crossing the junction lines with adjacent members and disposed in the under spaces in supporting relation with the webs of adjacent members.

2. In a flooring for buildings and the like, a plurality of members each having a web and flanges depending therefrom along two opposite edges thereof and an under space between said flanges open at the other sides of the members, said members arranged so that the flanges run at right angles to each other in adjacent members, and locking and supporting means projecting from the flanges across the junction lines with adjacent members and disposed in the under spaces in supporting relation with the webs of adjacent members.

3. In a flooring for buildings and the like, a plurality of members each having a web and flanges depending therefrom along two edges thereof, said members arranged so that the flanges run at right angles to each other in adjacent members, said flanges having openings, and means disposed in the openings crossing the junction of adjacent members and in directly supporting relation with the under surfaces of the webs of said members on opposite sides of said junction.

4. In a flooring for buildings and the like, a plurality of members each having a web and flanges depending therefrom along two edges thereof, said members arranged so that the flanges run at right angles to each other in adjacent members and their webs are in one and the same plane when so assembled, said flanged members being combined with a plurality of locking and supporting elements for attaching the members to a supporting structure, said flanges each having an opening therein to receive a locking and supporting element, said locking and supporting element comprising a plurality of Z-clips having portions entered in the openings and portions engaging edges of the webs.

5. In combination with a floor member, a depending supporting flange thereon provided with an opening therethrough, said member having an under space open at an edge at an angle to said flange, a clip having a securing portion outwardly of said flange for attachment within the under space of an adjacent floor member to a support, a portion rising from said portion abutting said flange and terminating below the top of the first-mentioned floor member in supporting relation to said adjacent floor member, and a portion on the second-mentioned portion extending in the opposite direction to and above the first-mentioned portion and entered in said opening.

6. In a flooring for buildings and the like, a plurality of four-edged members each having a web and flanges depending therefrom along two opposite edges thereof, said members having an under surface open at the other two edges thereof, said members arranged so that the flanges run at right-angles to each other in adjacent members and their webs are in one and the same plane when so assembled, said flanged members being combined with a plurality of locking and supporting elements crossing the lines of junction between adjacent members and in supporting relation to the members at said flanges and in the under spaces of adjacent members for abutment against and attaching the members to a supporting structure.

7. In a flooring for buildings and the like, a plurality of four-edged members each having a web and flanges depending therefrom along two opposite edges thereof, said members having an under surface open at the other two edges thereof, said members arranged so that the flanges run at right-angles to each other in adjacent members and their webs are in one and the same plane when so assembled, said flanged members being combined with a plurality of locking and supporting elements for attaching the members to a supporting structure, said flanges each having an opening therein, the locking and supporting ele-

ments being entered in said openings and in supporting relation with the under surfaces of adjacent members in the under spaces on opposite sides of their junction lines.

8. In a flooring for buildings and the like, a plurality of members having four edges of similar dimension, each consisting of a web and flanges depending therefrom along two opposite edges thereof, said members having an under surface open at the other two edges thereof, said flanges each having an opening formed therein, said members arranged so that the flanges run at right-angles to each other in adjacent members and their webs are in one and the same plane forming an even upper surface of the flooring when so assembled, and locking and supporting means coacting with the flanges of the members and with the under surfaces of the webs of adjacent members in said under spaces whereby to attach said members to a supporting structure.

9. In a metal flooring for buildings and the like, a plurality of rolled channel four-edged members each having a web and flanges depending therefrom along two opposite edges thereof provided with openings disposed in a plane intermediate the top and bottom of a flange, said members having an under space open at the other two edges thereof, said members arranged so that the flanges run at right-angles to each other in adjacent members and their webs are in one and the same plane forming the upper surface of the flooring when so assembled, and locking and supporting means associated with the members interlocked with adjacent flanges and extending under and across the junction with the adjacent members for attaching the members to a supporting structure, said locking and supporting means being interlocked with said flanges and in said under spaces being in supporting relation to the webs.

10. In a flooring, a plurality of rectangular members each having four equal edges, said members each consisting of a main portion and depending flanges along two parallel edges thereof, each member having an under space open at the remaining two edges, said members being arranged with the flanges of each member disposed opposite to open edges of adjacent members, and a locking and supporting means for attachment to a support, portions of said locking and supporting means being located in said under spaces crossing the junction line of adjacent members and interengaged in the adjacent flanges.

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