Oct. 21, 1969 M. NUSBAUM 3,473,495

CARPET TILE OR FLOOR COVERING AND METHOD OF MAKING THE SAME

Filed Oct. 24, 1966 4 Sheets-Sheet 1

Fig 1

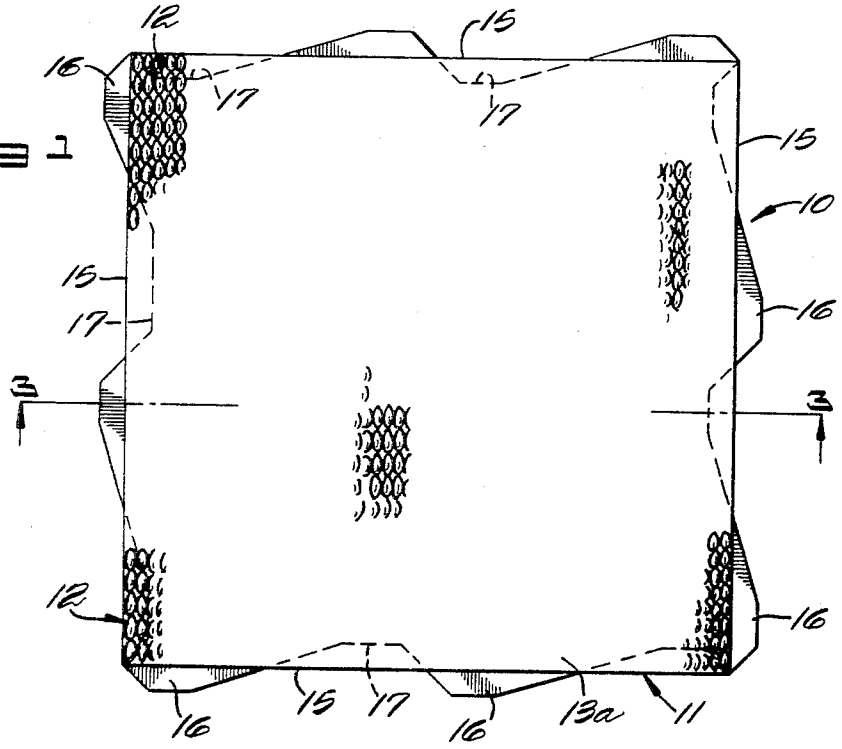



Fig 2

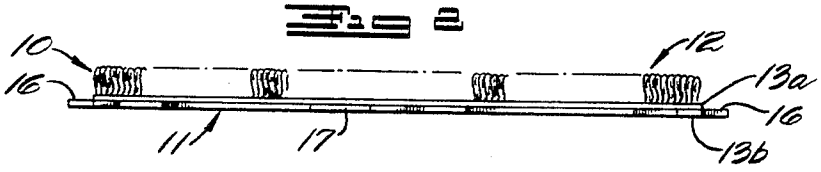
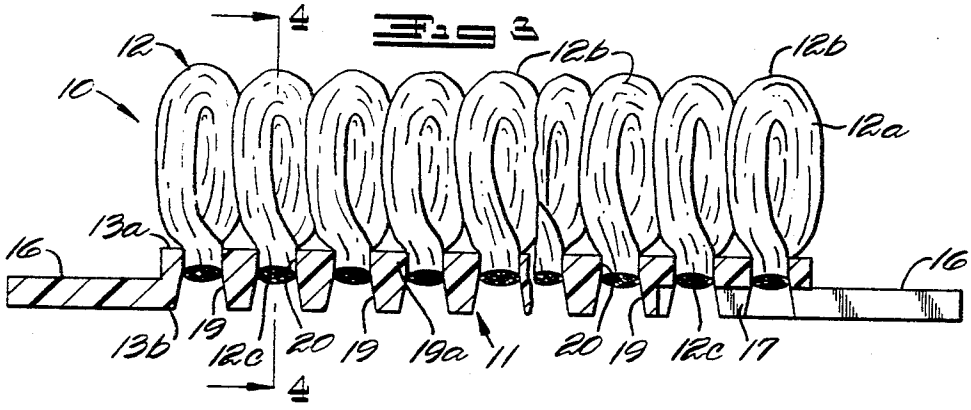



Fig 3




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CARPET TILE OR FLOOR COVERING AND METHOD OF MAKING THE SAME

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Fig 4

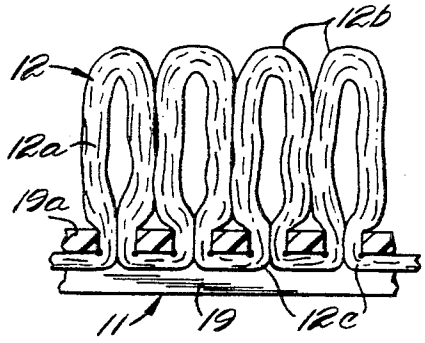



Fig 5

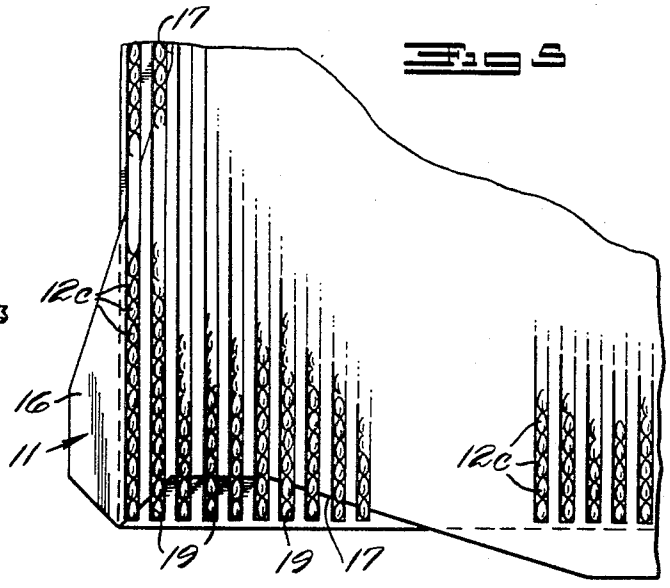
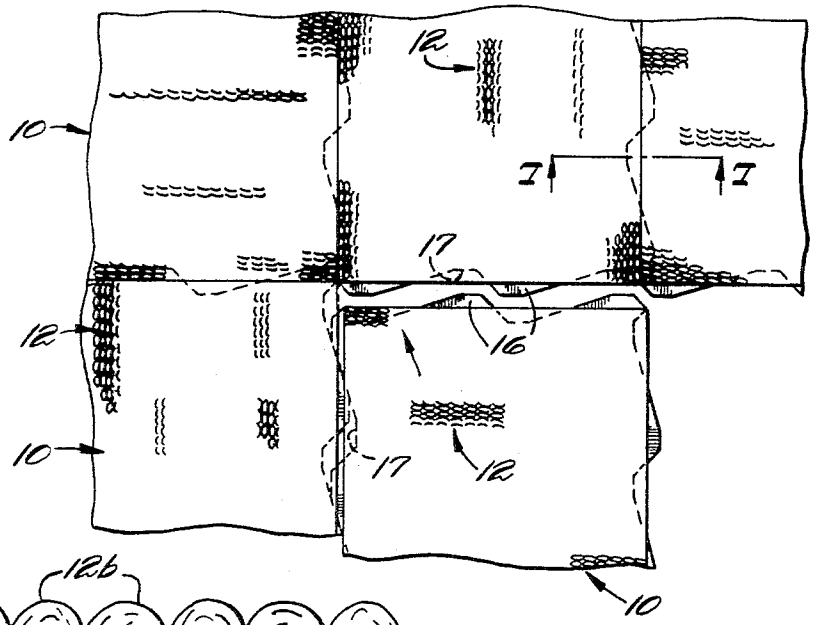



Fig 6



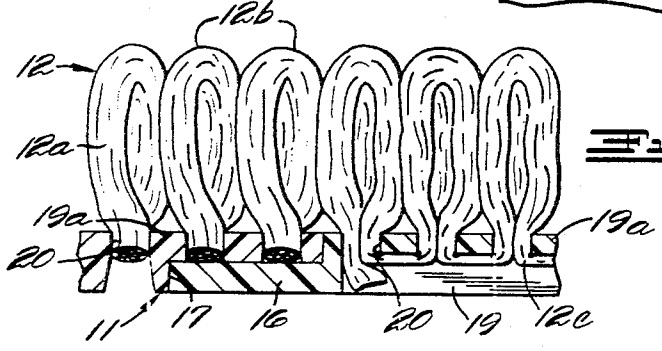




Fig 7

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CARPET TILE OR FLOOR COVERING AND METHOD OF MAKING THE SAME

Filed Oct. 24, 1966 4 Sheets-Sheet 3

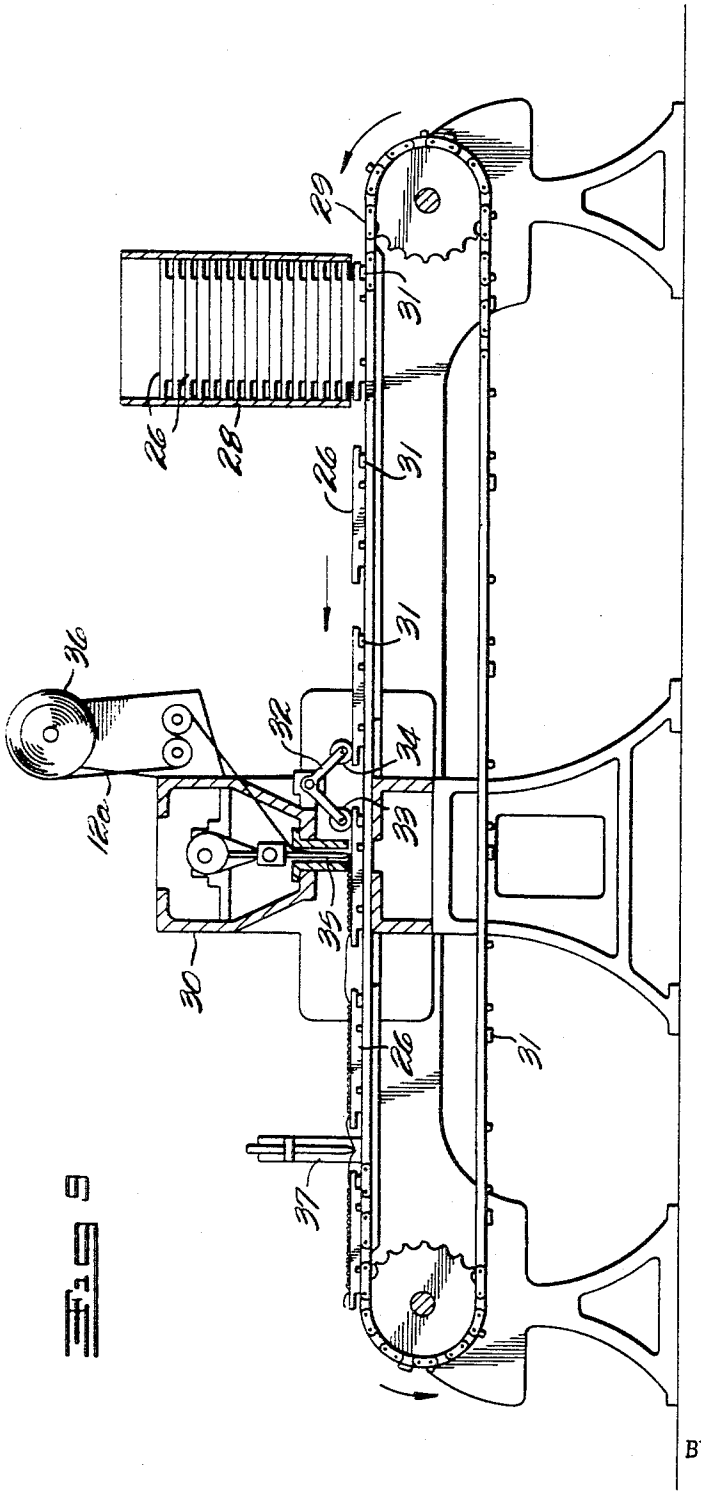



Fig 9

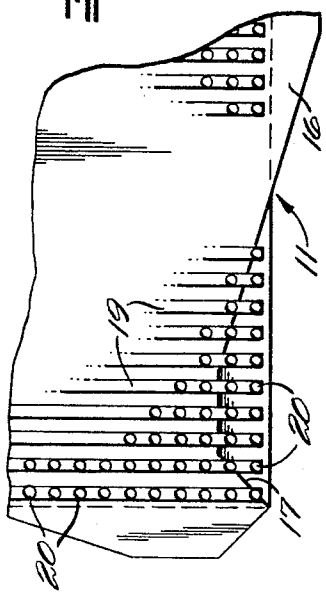



Fig 8

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CARPET TILE OR FLOOR COVERING AND METHOD OF MAKING THE SAME

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Fig 10

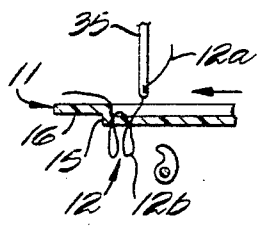



Fig 11

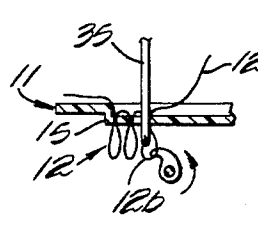



Fig 12

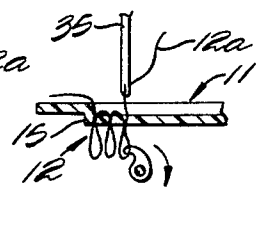



Fig 13

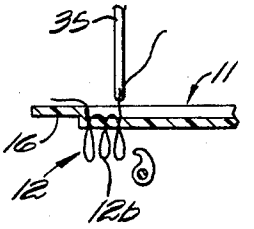



Fig 14

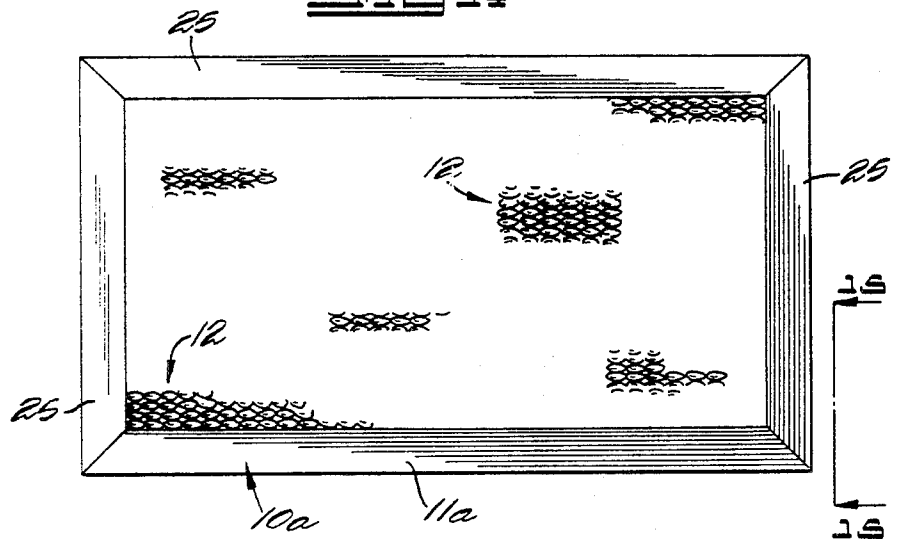
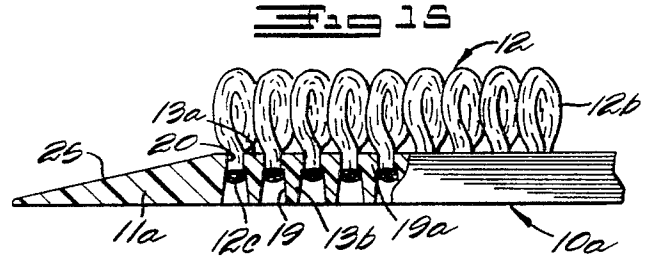



Fig 15



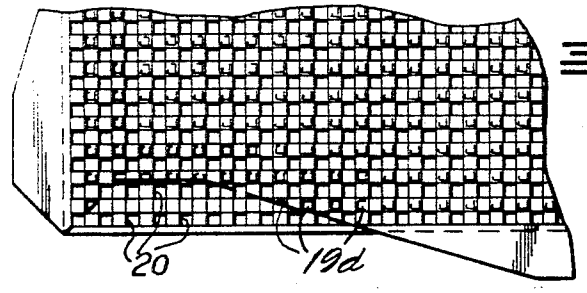




Fig 16

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United States Patent Office 3,473,495 Patented Oct. 21, 1969



3,473,495

# CARPET TILE OR FLOOR COVERING AND METHOD OF MAKING THE SAME

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Int. Cl. D05c 15/10, 15/14, 17/02
U.S. Cl. 112—79 15 Claims

## ABSTRACT OF THE DISCLOSURE

Method and means for making tile or like carpet floor covering material includes conveying succession of backing sheets, of rigid or semi-rigid material, each provided with laterally closely coextending series of penetrable locations; and progressively indexing sheets with respect to series of tufting needles progressively to pass same through penetrable locations from underside of flatwise supported sheets and form loops of continuous elements through and beyond top side of sheet, while binding continuous elements between penetrable locations anchoringly at underside of sheet. Tiles produced are so constituted as to retain given shape and may have straight side edges provided with attaching means, for attachment of similar tiles or members to each other on a floor without cementing or attaching to floor.

This invention relates to improved tile or like floor covering, and particularly relates to carpet tiles having rigid or semi-rigid backing members provided with means for interlocking like tiles arranged in a floor covering installation with corresponding straight side edges in mating engagement.

Prior U.S. Patent No. 3,082,488 shows interlocking floor tiles of the character described, wherein upper layers of carpet material were cemented to relatively rigid bases of square shape with or without incorporation of an intermediate layer of foam elastic cushioning material. While such assembled interlocking tiles provided a highly satisfactory floor covering, the process of cutting the carpet material into squares and cementing the same on the bases involved considerable labor and, consequently, the cost of the finished product was greater than the cost of the same carpet material sold by the square yard.

Moreover, in reducing broadloom carpet into nine-inch squares, for example, there was no practical way to cut through the carpet material without cutting through pile loops or threads along edges of the squares. When the pile loops or threads were cut in this way, pieces of the pile threads tended to become separated during or after installation on the floor tiles on a floor, or otherwise tended to show the outlines of individual squares.

A purpose of the present invention is to provide tufted pile carpet units of the character described for various floor covering uses, with or without interlocking edges on bases thereof, wherein the pile elements or threads are tufted directly into the bases, thereby to eliminate the prior art requirement for adhesively attaching pile fabric layers to the bases, and eliminating the need for an intermediate layer of cushioning material.

Another object of the invention is to provide carpet tiles or other carpeting articles of the character described in which the tufted covers are consistently uniform in spacing and depth.

Another object of the invention is to provide carpet tiles of the character described in which the pile tufts are uniformly formed and spaced, including the tufts along the marginal edges of the bases, whereby a floor covering installation of such tiles has the appearance of continuous carpet material.



Another object of the invention is to provide hard-backed, interlocking carpet squares of the character described, which can be sold in the retail trade on a yardage basis at prices favorably comparable with broadloom carpeting of substantially the same pile tufting qualities, and which are also adapted for easy floor covering installation on a do-it-yourself basis with substantially no waste in material in fitting the carpeting to the walls of carpeted rooms.

A further object of the invention is to provide improved methods and apparatus for efficiently and economically producing carpet tiles or like articles of the character described.

Other objects of the invention will be manifest from the following brief description and the accompanying drawings.

Of the accompanying drawings:

FIGURE 1 is a top plan view of a self-locking carpet tile embodying the features of the invention.

FIGURE 2 is a front edge view of FIGURE 1.

FIGURE 3 is a greatly enlarged cross-section, partly broken away, as viewed substantially on the line 3, 3 of FIGURE 1.

FIGURE 4 is a fragmentary cross-section taken substantially on the line 4, 4 of FIGURE 3, and on the same scale.

FIGURE 5 is a fragmentary bottom view of the lower right-hand corner of the tile shown in FIGURE 1.

FIGURE 6 is a fragmentary top plan view, on a reduced scale, illustrating a plurality of the tiles of FIGURE 1, assembled in interlocking relationship on a floor.

FIGURE 7 is an enlarged fragmentary cross-section taken substantially on the line 7, 7 of FIGURE 6, illustrating the interlocking relationship of tongues and recesses of mating tiles without interference with stitching of the pile elements in rows of the same adjacent corresponding edges of the interlocked bases.

FIGURE 8 is a top plan view corresponding to FIGURE 6, but showing the improved interlocking base of the tile before the pile tufting has been added.

FIGURE 9 is a vertical cross-section through a carpet tufting apparatus including the various means for performing various steps of the improved method of pile tufting the tile bases in accordance with the invention herein.

FIGURES 10 to 13 are diagrammatic views illustrating a series of steps in the operation of a tufting machine needle to form the third pile loop in a series thereof in a grooved tile base.

FIGURE 14 is a top plan view of a tufted door mat or area rug produced in accordance with the present invention.

FIGURE 15 is an enlarged fragmentary edge view, partly broken away and in section, as viewed substantially on the line 15, 15 of FIGURE 14.

FIGURE 16 is a fragmentary bottom view of a carpet tile base, corresponding to FIGURE 8, that is, without the carpet tile tufts incorporated therein as exemplified in FIGURES 1 to 7 generally.

Referring to FIGURES 1 to 7 in general, and to FIGURES 1 to 3 in particular, there is illustrated a tile unit 10 of the general type refererd to above in connection with said prior Patent No. 3,082,488. In the present invention, however, the tile 10 comprises a thin, solid backing sheet or plate 11 onto which a tufted pile covering 12 is directly woven.

To this end, the backing sheet or base 11 may be of precision molded material, such as hard polyvinyl chloride, hard rubber, high-impact polystyrene or polyethylene, to have an upper strata 13*a* of quadrilateral shape, such as a square defined by four straight side edges 15, 15. A lower strata 13*b* of the base 11 may be

formed in the molding process to have undulations defining alternate tongues **16, 16** and recesses **17, 17** inwardly and outwardly, respectively, with reference to each straight edge **15**, as shown, for interlocking mating engagement with like tongues and recesses of similarly molded backing sheets arranged in a floor covering installation to have corresponding side edges **15** thereof in mating engagement, as shown in FIGURES 6 and 7. As in the aforesaid patent, a plurality of these tiles may be laid on a floor in this manner without use of adhesives, nails, or other attaching means, and for this purpose the complementally arranged tongues and recesses (see FIGURES 6 and 7), may utilize the advantageous sliding-plane, interengaging principle of the patent for assembling the tiles in interlocking relationship.

On each tile base **11**, pile cover **12** may comprise tufted pile fabric elements or threads **12*a*** which are secured directly to the base in a way which not only obviates objectionable cementing of laminations together, but also eliminates presence of loose or partially formed loops along the edges of the tiles. The present improvement also contemplates elimination of one vexing problem of prior art carpeting, wherein loosening of a pile element at an edge of the tile base or at an edge of a piece of carpet could result in unravelling a number of pile tufts to expose an unsightly bare spot.

To solve this and similar problems, the backing base **11** may have molded in the underside or lower strata **13*b*** thereof a series of parallel, closely spaced recesses or grooves **19, 19** which are also parallel to two oppositely disposed parallel sides **15** of the upper strata **13*a***. Thin, elongated web portions **19*d*, 19*d*** in said upper strata, defined by said grooves **19**, may have therethrough a series of uniformly spaced apertures **20, 20** or other prelocated easily penetrable areas. By a method and means to be described later, the tufted pile covering **12** may be in the form of closely spaced tufts or loops **12*b*, 12*b*** formed and projected to predetermined extent or depth through said apertured web portions by continuous thread-stitching of the elements **12*a*** along the respective grooves **19**, the adjacent loops of the series being anchored to the base by a tight, frictional binding action of the connecting portions **12*c*, 12*c*** of adjacent loops **12*b***, applied around web portions **19*a*** between the adjacent apertures **20**. The construction is such that the apertures and the loops **12*b*** so anchored therein may extend uniformly closely to each of the side edges **15** of the tile that full loops **12*b*** along adjacent edges of any two interlocking tiles assembled on a floor will have the same uniform spacing as in the other areas of the tiles. Moreover, the tile structure described makes it possible to produce a carpeting material for wall-to-wall carpeting, in which the pile tufting will have a pleasing uniformly smooth and continuous appearance.

The side edges **15** of the bases or sheets **11** are of predetermined lengths, as shown in FIGURES 1 and 6, and the lengths of the tongues and recesses **16** and **17**, as shown, are of a predetermined unit length which is one of equal increments of the lengths of the respective side edges.

In use of the improved tiles for covering the floor of a room, mating tile units **10** may be variously arranged and interlocked in aligned relation as shown in FIGURE 6, or in staggered relation. In addition, the tiles may be arranged to obtain a parqueted effect by alternating the direction of the rows of pile tufts or loops **12*b***. It has been found practical to install the tiles by starting at one corner of a room, to lay a row of tiles along one wall, and then to progress across the room similarly adding a row at a time. When the last row is reached next to a wall the successive tiles may be tilted slightly with reference to the floor to facilitate insertion with respect to previously laid cornering tiles, and engaging the tongues **16** of the forward edge **15** within corresponding recesses **17** of another tile while the adjacent cornering sides are about the width of a tongue apart. Because of the nature of the sliding plane relationship of the engaged tongues and recesses, the tile thus inserted can be dropped into flat engagement with the floor and then pushed into interlocking engagement with the side edge of the other, previously laid, covering tile. The same operation is possible whether or not the tiles are trimmed to fit into spaces at the wall, less than the full width of the tile. To facilitate the tile laying procedure as a whole, the molded backing sheets **11** may be made of a semi-rigid plastic resin which is somewhat flexible, so that any inserted tile may be flexed, bent or twisted in such a way that the two cornering edges thereof could be interlocked in full, flat mating relationship with two cornering tiles already in place, without necessarily using the aforesaid sliding-plane feature. This flexible feature makes it possible to provide the base with much wider tongues and wider range of overall sizes and shapes of the same. It also makes it easier to remove single tiles **10** from anywhere in the floor installation, as by insertion of a suitable pointed blade to flex up four such tiles at one point where they all corner, whereby one of the cornering tiles easily may be twisted out of interlocking relation with the others. If this is done to remove a stained or damaged tile, the same can be replaced by a new tile, or cleaned and returned to position by first returning all but one tile approximately to original position, and then replacing the last tile by a procedure more or less the reverse of the aforesaid tile removing operation. It should be understood, however, that when once the tiles **10** of the invention are fully installed in accordance with the previously described procedure, they have the appearance of a continuous, or one-piece floor covering, and individual tiles cannot be removed accidentally, or without considerable deliberate effort.

When the base **11** is of flexible, semi-hard plastic material, such as polyethylene, the limited resilience of the same is enhanced by the grooved and ribbed formation of the lower strata **13*b***. That is, the resilient nature of tile-supporting ribs **19** then serves as a cushion means for improved floor covering material. This cushioning effect can be increased, as by making the ribs **19** discontinuous, or by otherwise forming resilient studs **19*d*, 19*d***, as shown in FIGURE 16, which substantially corresponds to FIGURE 5.

Area rugs, automobile floor mats, and similar single unit carpet type flooring articles may be produced as described above in connection with FIGURES 1 to 8, and 16, except that the interlocking tongues and recesses are omitted. FIGURES 14 and 15 show a door mat or area rug **10*a*** which corresponds substantially to the tile unit **10** exemplified in FIGURES 1 to 5, except that the interlocking tongues and recesses are replaced by an integral chamfered marginal edge portion **25** all around the plastic base **11*a***. Like parts, therefore, are designated by like numerals unless otherwise noted.

In all of the forms of the invention described above, there are no laminated layers. Specifically, there are no adhesively applied carpet layers to become separated or damaged at the edges, as by narrow or sharp heels on ladies' shoes.

Referring to FIGURE 9, there is illustrated, semi-diagrammatically, suitable apparatus for practicing the method of the invention, economically to produce the carpet tiles **10** of FIGURES 1 to 6, and 16 in quantity. According to the method, suitable holders or frames **26**, each containing a molded base **11**, are stacked in a hopper **28** mounted to straddle a conveyor **29**, progressively to feed the frames onto a conveyor for movement in predeterminately spaced and timed relation with reference to a multiple-needle weaving machine **30**. Cooperating means **31, 31** on the conveyor and on the frames **26** assure accurately timed movement and positioning of the frames with reference to an indexing device **32** on the machine **30**. Spaced indexing wheels **33** and **34** on the device **32** are always in positive toothed connections with at least one of two adjacent frames in a manner to align a series

of closely spaced weaving needles **35** with the transversely spaced parallel series of apertures **20**, **20** on the bases **11**. The bases **11** are supported in inverted position for this purpose, to present grooved bottom sides up as shown in FIGURE 8. Accordingly, as the bases **11** pass under the battery of weaving needles **35**, each needle weaves a longitudinal row of looped pile tufts **12***b* of suitable carpeting yarn elements **12***a*, continuously supplied from a battery of supply rolls **36** above the weaving unit. FIGURES 10 to 13 illustrate semi-diagrammatically the full cycle of operation for forming a single loop **12***b* which constitutes a pile tuft, with each momentary pause of the conveyor as it is intermittently but very rapidly moved by power-operated driving and timing means of known type (not shown). With equipment of the character described, a nine-inch square tile base **11**, having forty closely spaced rows of apertures **20** and forty such apertures in each row, would have a pile tufted cover **12** applied thereto as exemplified in FIGURES 1 to 3, in a matter of several seconds. After the tile holders **26** pass beyond the weaving unit **30**, series of pile tufting elements **12***a* connecting the spaced frames **26** are severed by a suitable cutting device **37** operated by trip means (not shown).

After the carpet bases have been tufted or stitched and the pile tufting elements **12***a* have been severed, the bottom or underside of the carpet bases may be treated with a sizing or adhesive compound which will fill the grooves and stiffen the fibers so that the loops on the topside cannot be removed or pulled out. If a thermoplastic yarn such as polypropylene or nylon is used for the carpet pile face, then the underside yarn may be heat-sealed to bind the tufts into the base instead of using a sizing compound.

If a carpeted floor is desired that is less than the wall-to-wall room size, standard threshold moldings of wood, metal or plastic are available, and can be fastened to the floor with fasteners (screws or nails) or cemented down to retain the tiles in the same manner as described above for a wall-to-wall installation.

What is claimed is:

**1.** A method of making a tile or like carpet floor covering article, comprising the steps of: providing a backing sheet of generally substantially inflexible, solid material of quadrilateral shape defined by straight side edges and having laterally closely coextending series of transversely closely spaced apertured web portions; and progressively indexing said sheet transversely under a plurality of laterally closely spaced stitching needles of a tufting machine having loop-forming means, progressively to pass the laterally spaced needles through the laterally spaced apertured web portions from the underside of the sheet to form loops of continuous tufting elements, through and beyond the web portions, while binding the continuous elements between the apertured web portions to anchor the protruding loops to the sheet, and including the steps of progressively conveying a succession of said backing sheets to said tufting machine, and progressively indexing each conveyed sheet to correlate the apertured web portions with timed reciprocatory movemetnt of said needles for successive pile tufting operations on each sheet.

**2.** A method of making a tile or like carpet floor covering article, comprising the steps of providing a backing sheet of generally substantially inflexible solid material provided with laterally closely coextending series of transversely spaced penetrable locations at least over a given broad lateral area of the sheet; and progressively indexing said sheet transversely under a plurality of laterally closely spaced stitching needles of a tufting machine having loop-forming means, progressively to pass the laterally spaced series of needles through the laterally spaced penetrable locations from the underside of the sheet to project loops of continuous tufting elements through and beyond the top side of the sheet while binding the continuous elements between the penetrable locations at the underside of the sheet, and thereby anchor the loops to the sheet; and including the steps of progressively conveying a succession of said backing sheets to said tufting machine, and progressively indexing each conveyed sheet to correlate said penetrable locations with timed reciprocatory movement of said needles for successive pile tufting operations on each sheet.

**3.** A method of making a tile or like carpet floor covering article, comprising the steps of: providing a backing sheet of solid material of quadrilateral shape defined by straight side edges and having laterally closely coextending series of transversely closely spaced apertured web portions; and progressively indexing said sheet transversely under a plurality of laterally closely spaced stitching needles of a tufting machine having loop-forming means, progressively to pass the laterally spaced needles through the laterally spaced apertured web portions from the underside of the sheet to form loops of continuous tufting elements, through and beyond the web portions, while binding the continuous elements between the apertured web portions to anchor the protruding loops to the sheet, and including the steps of progressively conveying a succession of said backing sheets to said tufting machine, and progressively indexing each conveyed sheet to correlate the apertured web portions with timed reciprocatory movement of said needles for successive pile tufting operations on each sheet.

**4.** A tile or like carpet floor covering article, comprising: a backing sheet having therein a multiplicity of closely spaced apertures and having a tufted pile covering on the upper surface thereof composed of pile tufts extending from said apertures and anchored in the sheet; said pile tufts being formed of flexible elements which are anchored to the sheet at the underside thereof by interlacing portions of the elements between adjacent said apertures; said closely spaced apertures being in coextending series thereof, and the pile elements being continuously thread-stitched along the respective series of apertures; and said backing sheet being of solid material provided with recessed portions on the underside thereof within which the thread-stitched portions of said pile elements are received.

**5.** A floor covering article as in claim **4**, said recessed portions defining unobstructed coplanar surface areas on the underside of the sheet for supporting the same flatwise on a floor.

**6.** A floor covering article as in claim **5**, said series of apertures extending in rows thereof in substantial parallelism across the sheet, and said recessed portions being coextensive with the same to define web portions of reduced thickness in the sheet portions through which said apertures extend.

**7.** A floor covering article as in claim **6**, said backing sheet having an upper strata of generally quadrilateral shape defined by straight side edges, and a lower strata provided with undulations defining tongues and recesses along said straight side edges for interlocking engagement with like tongues and recesses of similar backing sheets arranged in a floor covering installation with corresponding said straight side edges thereof in mating engagement.

**8.** A tile or like carpet floor covering article, comprising: a backing sheet of solid material having an upper strata of geneallly quadrilateral shape defined by straight side edges, and a lower strata provided with undulations defining tongues and recesses therein along said straight side edges for interlocking engagement with like tongues and recesses of similar backing sheets arranged in a floor covering installation with corresponding said straight side edges thereof in mating engagement; said sheet having closely spaced recessed portions on the underside thereof defining unobstructed portions for supporting the sheet flatwise on a floor; and also defining parallel web portions in said upper strata, which are closely spaced with

reference to each other and to one pair of opposite said side edges, and the web portions extending to closely spaced adjacency of the opposite ends thereof to the other pair of said side edges; said sheet having a tufted pile cover on the upper surface thereof composed of pile tufts formed of flexible elements continuously thread-stitched through the respective parallel web portions.

**9.** A tile or like carpet floor covering article, as in claim **8**, wherein said flexible elements are thread-stitched through closely spaced apertures in the web portions and anchored between adjacent said apertured web portions by interlaced portions of the elements.

**10.** A tile or like carpet floor covering article as in claim **9**, wherein said tongue-receiving recesses are shallower than said recessed portions for free reception of the tongues in the mating recesses therefor without substantial interfering engagement with interlaced portion of said elements.

**11.** A tile or like carpet floor covering article as in claim **8**, wherein said backing sheet is of synthetic resin plastic material.

**12.** A tile or like carpet floor covering article, comprising: a backing sheet having therein a multiplicity of closely spaced apertures and having a tufted pile covering on the upper surface thereof composed of pile tufts extending from said apertures and anchored in the sheet, said backing sheet being of resilient plastic material provided with recessed portions on the underside thereof within which the thread-stitched portions of said pile elements are received, and defining protuberances having unobstructed coplanar surface areas on the underside of the sheet for supporting the same flatwise on a floor.

**13.** Apparatus for making tufted pile carpet tile or like carpet floor covering articles having a tile backing base of solid material having formed therein longitudinally closely spaced penetrable areas, comprising: reciprocable needle means and associated loop-holder means; means for supplying at least one continuous pile tufting thread to said needle means; conveyor means for progressively moving a backing sheet longitudinally past said needle means in timed relation to reciprocation of the needle means momentarily to project a loop of said pile thread through successive penetrable areas in the backing base to form a succession of longitudinally closely spaced loops of pile tufting thread outwardly of the base while said loop-holder means momentarily restrains each loop in outwardly protruding condition for loop anchoring for withdrawal of the needle means, said conveyor means including means for progressively conveying a plurality of said backing bases in spaced relation; means being provided for progressively indexing successive said spaced bases on the conveyor to automatically align the penetrable areas of the respective bases with the needle means.



**14.** Apparatus as in claim **13**, said needle means including a plurality of transversely closely spaced needles which are simultaneously reciprocable to tuft a plurality of closely spaced rows of said successively formed loops.

**15.** Apparatus as in claim **14**, including means for severing the pile tufting threads connecting between the successive pile tufted backing bases.


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