

May 8, 1962

H. L. KLEIN

3,033,739

TILE POSITIONING MACHINE

Filed Sept. 15, 1958

6 Sheets-Sheet 2

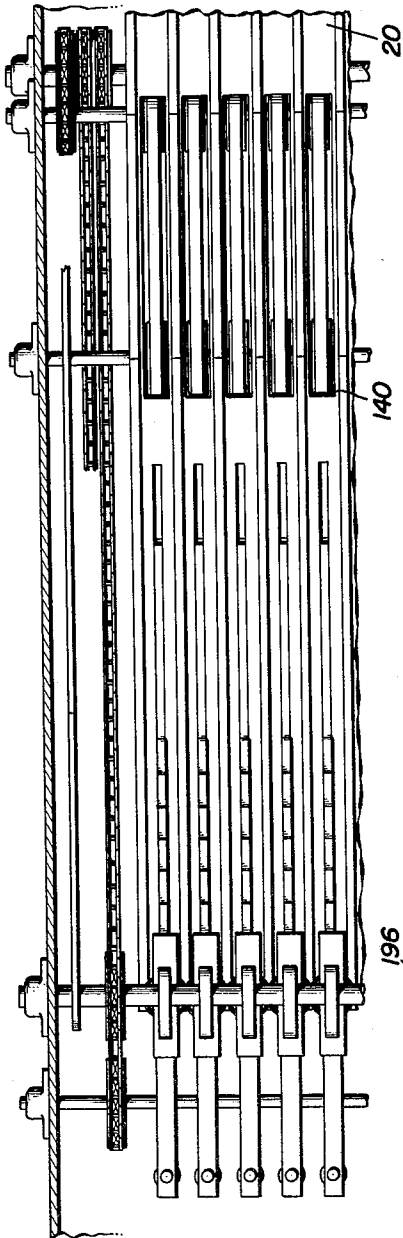


Fig. 3

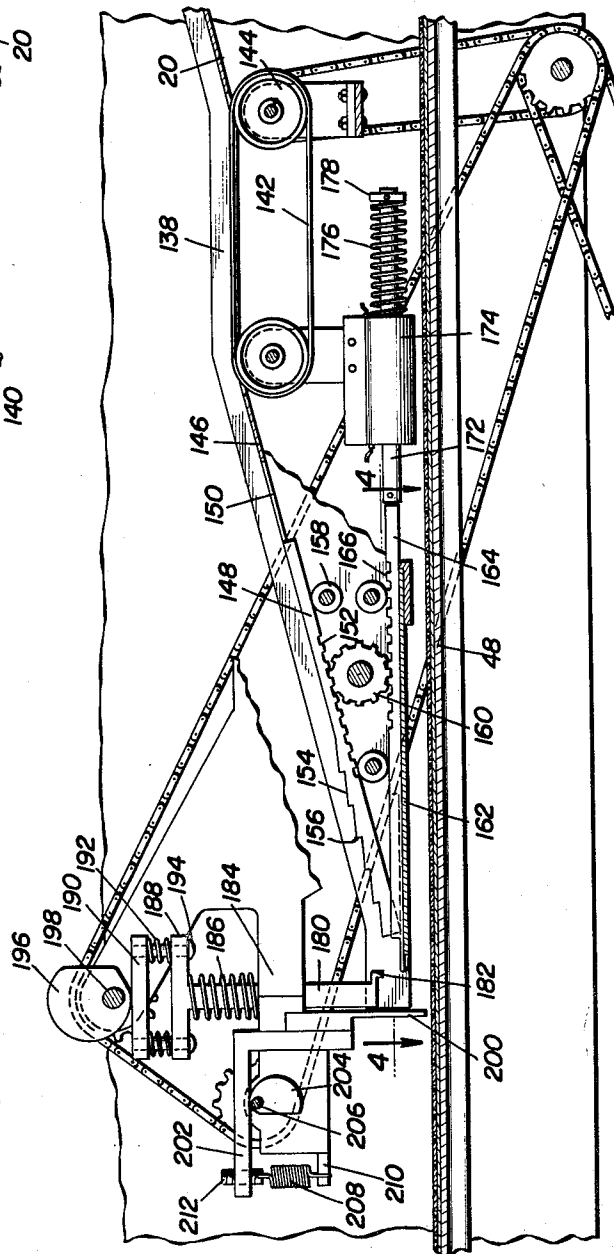


Fig. 2

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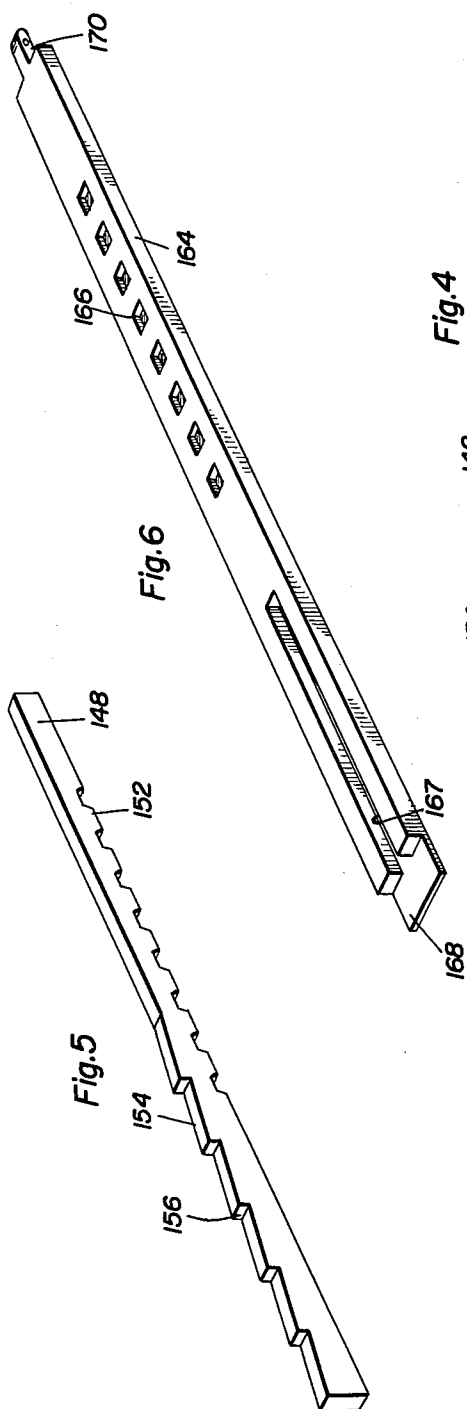
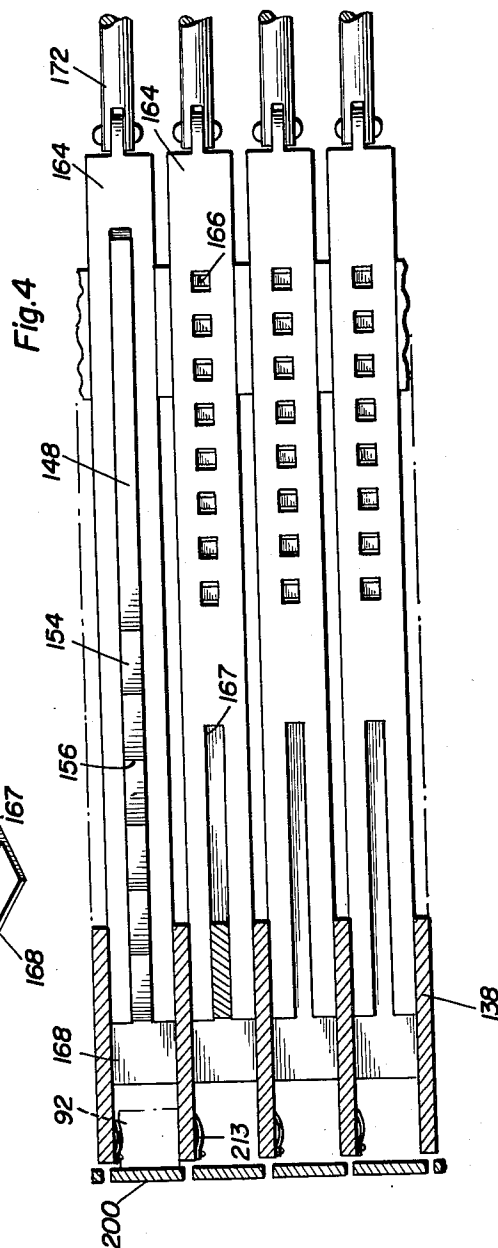
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6 Sheets-Sheet 3



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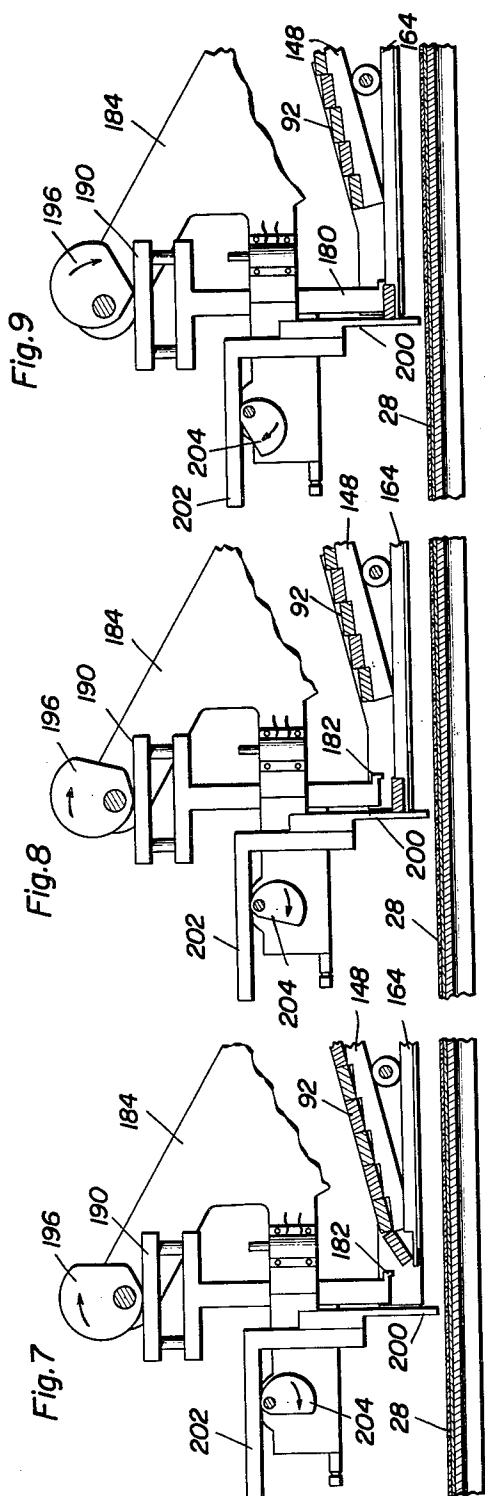
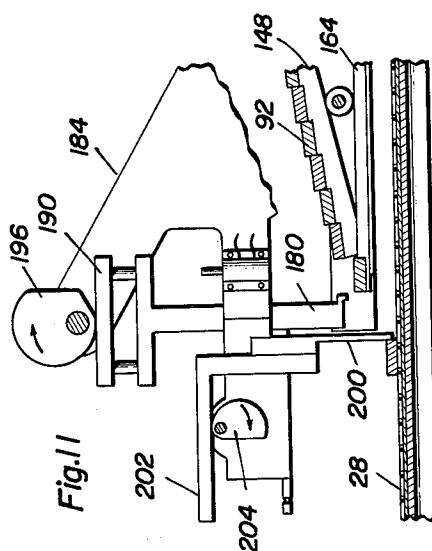
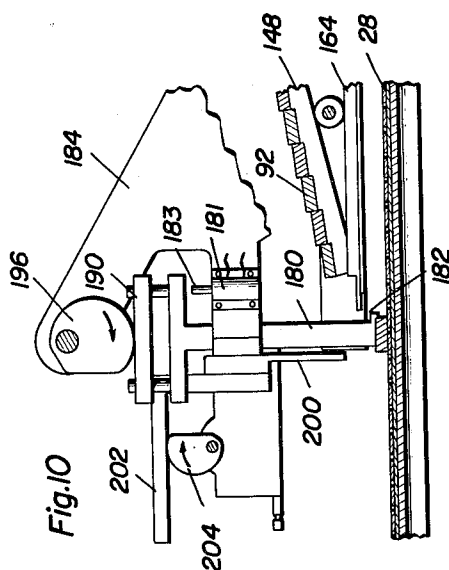
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6 Sheets-Sheet 4



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6 Sheets-Sheet 5

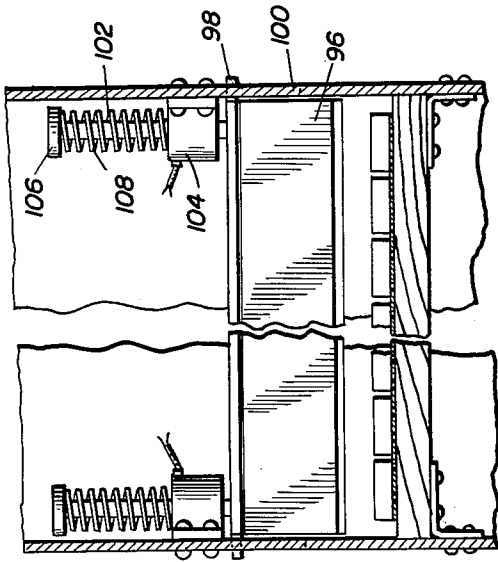


Fig. 12

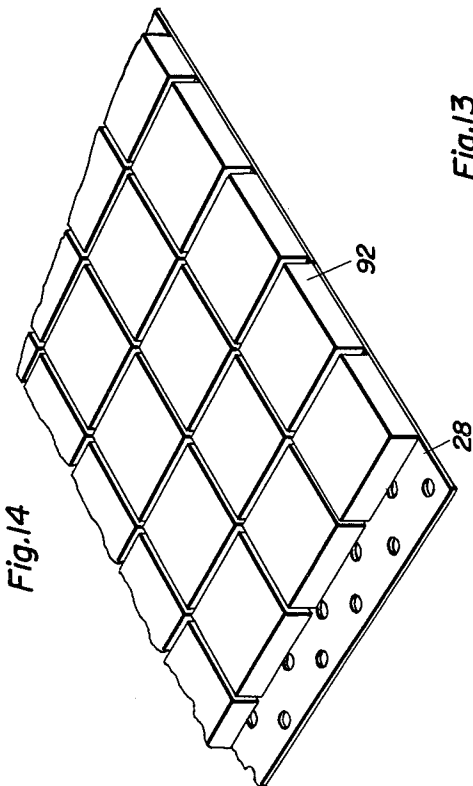
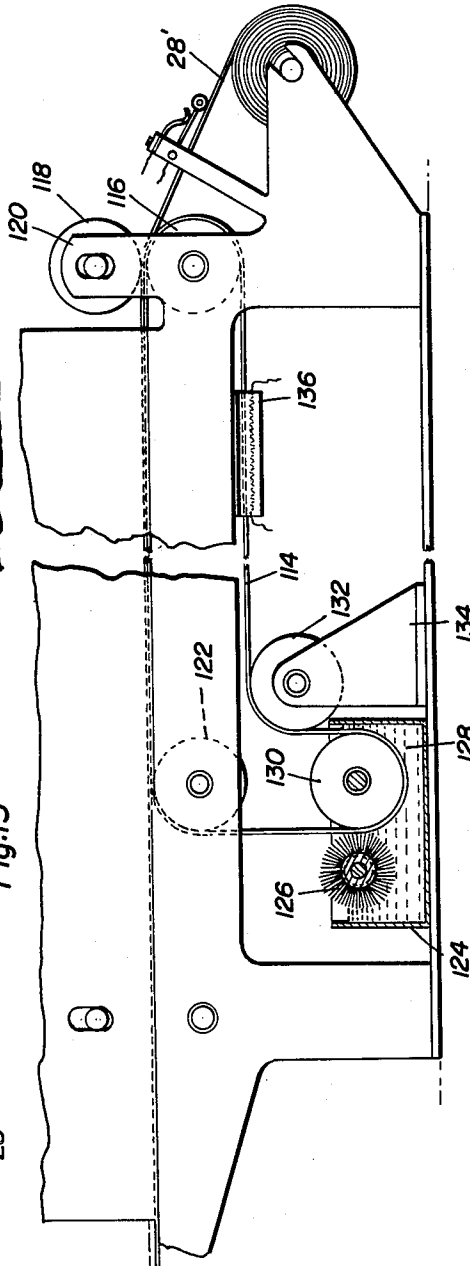


Fig. 14

Fig. 13



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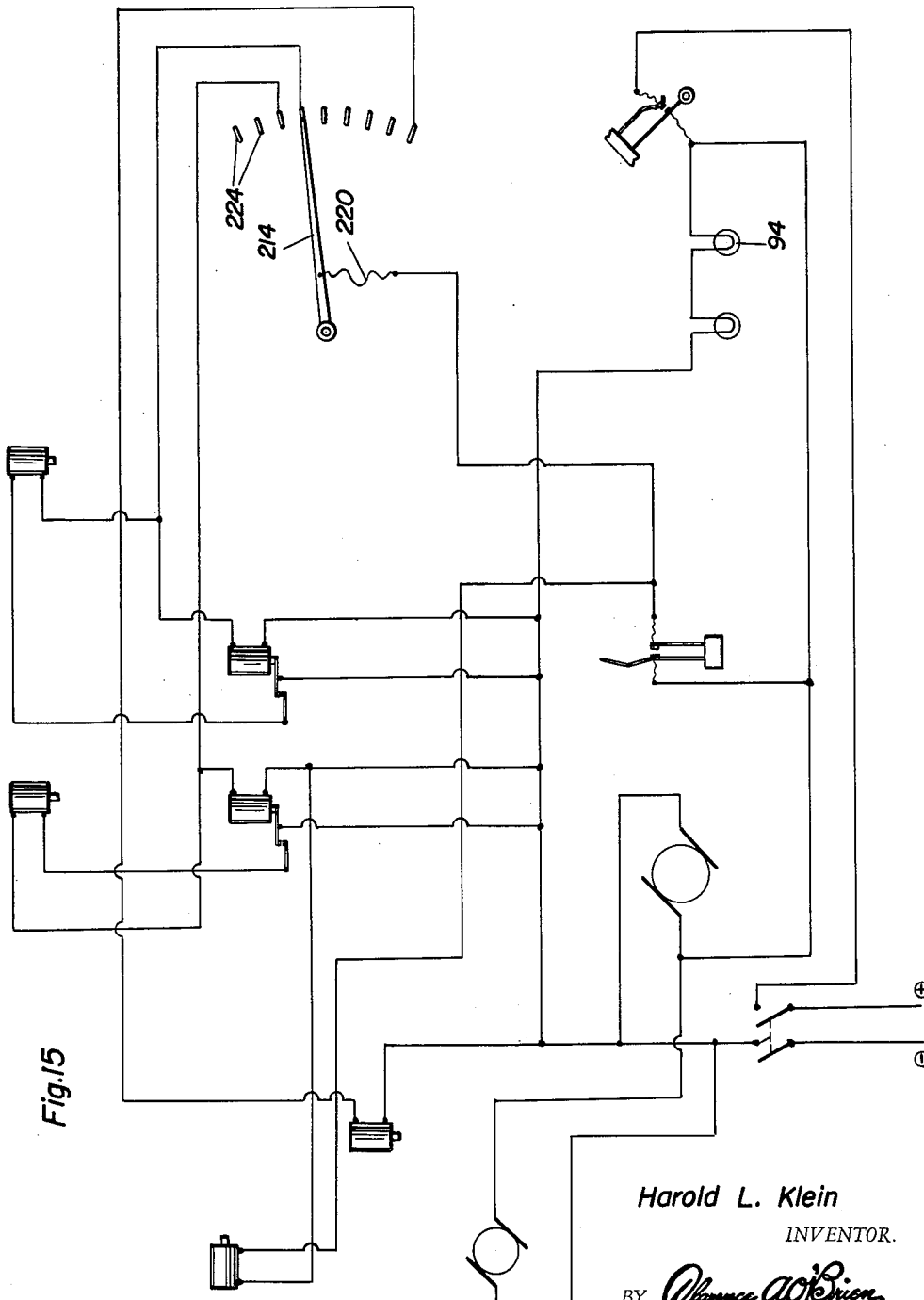
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TILE POSITIONING MACHINE

Filed Sept. 15, 1958

6 Sheets-Sheet 6



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3,033,739

TILE POSITIONING MACHINE

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6 Claims. (Cl. 156—561)

This invention generally relates to a tile positioning machine for the purpose of forming or making a mat of various colored tile to a definite color design or pattern which is normally used in ceramic tile arrangement.

Ceramic tile mats, of course, are known and at present, there are several methods of forming these mats which include the hand placing of tile in pockets that are formed by placing sheet metal strips in a board of the desired pattern as to the size of the tile pieces and the location thereof. The various colors that are used for the color design or pattern are hand placed in proper location. After the tiles are in position, a piece of paper is pasted over the top face of the tile to hold the pieces in place when they are removed from the board. When the tiles are installed in the desired position, the sheets are installed with the tiles and hold the tiles in this position and the tiles are cemented to the floor or the wall with the paper thereon. After this, the paper is then removed by wetting and scrubbing off of the paper. This conventional method is generally known as the wash off paper method. Another method which is used and generally referred to as the "Swift" method includes a board onto which the tiles are placed after they have been sorted for color and chipped tile. Another board is placed over the top and the unit is turned over so that the bottom is actually facing upwardly. A perforated paper is then glued onto the actual bottom surfaces which are facing upwardly with waterproof glue and placed in permanent position on the tiles. These mats including the perforated paper are then cemented to the floor or wall with the paper left in place. In the present invention, it is the primary object to provide a method and an apparatus for making a mat of various colored tile to a definite color design which includes in its construction several conveying channels and stacks each having a color assigned to its mounted to allow the tiles to drop in position with a master board having various height blocks thereon being employed to control operation of the tile positioning machine with the present invention incorporating an arrangement resulting in a mat equivalent to that formed in the "Swift" method.

Another object of the present invention is to provide a tile positioning machine for automatically forming mats of a particular color design that have the perforated paper permanently secured to the bottom surfaces thereof whereby the paper and tiles may be installed in the desired manner with the tiles being retained in proper spaced relation by the backing paper with the perforated backing paper also providing adhesion areas for securing the same to a wall or floor.

A further object of the present invention is to provide a tile positioning machine including a control mechanism for controlling the operation in accordance with a master board with the machine providing the perforated paper with the permanent adhesive bonding the tiles thereto after which the adhesive is dried and then the perforated paper with the tiles thereon is cut into the desired length.

A further important object of the present invention is to provide a tile positioning machine which will automatically provide a mat having tile thereon arranged in a predetermined color design and cut off at the desired length.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter

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described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIGURE 1 is a side elevation of the machine with parts of the housing broken away for illustrating the structure therein;

FIGURE 2 is a detailed side elevation of the tile feeding and ejecting mechanism;

FIGURE 3 is a plan view of the construction of FIGURE 2;

FIGURE 4 is a longitudinal, plan sectional view taken substantially upon a plane passing along section line 4—4 of FIGURE 2;

FIGURE 5 is a perspective view of the notched bar for feeding the tile to the ejecting or placing mechanism;

FIGURE 6 is a perspective view of the rack bar operated by the solenoid for positioning the tile;

FIGURE 7 is a schematic view illustrating the initial tile being positioned for ejection by the ejector;

FIGURE 8 is a schematic view illustrating the tile in position for engagement by the ejector;

FIGURE 9 is a view similar to FIGURE 8 illustrating the ejector contacting the tile;

FIGURE 10 is a view similar to FIGURE 9 illustrating the ejector positioning the tile onto the perforated paper;

FIGURE 11 is a view similar to FIGURE 10 illustrating the ejector in raised position with the feeding mechanism moving another tile into the machine for ejection by the ejecting mechanism;

FIGURE 12 is a sectional view taken substantially upon a plane passing along section line 12—12 of FIGURE 1 illustrating the details of the cutter mechanism;

FIGURE 13 is a schematic side elevational view illustrating a slightly modified form of the invention;

FIGURE 14 is a corner perspective view of a completed mat; and

FIGURE 15 is a diagrammatic circuit employed in the present device.

Referring now specifically to the drawings, the numeral 10 generally designates the tile positioning machine of the present invention which includes a supporting platform or base 12 with upstanding support frame members 14 and an enclosing casing 16 as shown in FIGURE 1 which has parts thereof broken away and shown in section for illustrating the structure disposed therein. One end of the casing 16 is provided with an opening 18 for receiving a tile conveyor 20 and the other end of the casing 16 is provided with an opening 22 for discharge of the finished product.

Mounted at one end of the support members 14 is a supply roll of paper 24 which is of the disposable type and which is carried by suitable bearing supports for the shaft 26. Also carried by the support members 14 is a supply roll of perforated paper 28 having a shaft 30 journaled in open ended sockets or bearings 32. An idler roller 34 supported as designated by the numeral 36 for rotation is mounted above the supply rolls and in the direction of movement of the paper 24 and the paper 28 with the paper 24 and paper 28 passing thereover so that the paper 24 and 28 will be in contact with each other whereby the solid and continuous paper 24 will form a temporary backing for the perforated paper 28.

Mounted on a suitable bracket 38 is a feeler roller 40 having a switch contact element 42 associated therewith for breaking a circuit in the event the supply of paper 28 is exhausted. The same type of roller 44 and switch 46 is provided for the paper 24 so that the machine will be promptly stopped in the event either supply of paper becomes exhausted.

The perforated paper and the underlying solid or continuous paper enters the casing 16 under the lower edge thereof and proceeds along the upper surface of a sup-

porting runway or shelf-like member designated by the numeral 48. Mounted in overlying relation to the horizontal support member 48 is a supply tank 50 for a permanent adhesive having a pick-up roller 52 extending thereacross and journaled for rotation with the pick-up roller being in surface contact with an idler roller 54 which in turn is in surface contact with an applying roller 56 which contacts the upper surface of the perforated paper 28 thus applying the waterproof permanent adhesive or glue to the surface of the perforated paper 28 with the two strips of paper now entering the tile positioning and applying apparatus. After the two pieces of paper pass the tile applying apparatus, the paper 24 extends downwardly as indicated by the numeral 58 and is rolled into a roll 60 supported on supporting brackets 62 whereby the roll of paper 60 having adhesive thereon may be disposed of. The roll 60 is driven by a drive roll 64 mounted on an upstanding swing arm 66 supported pivotally by a lug 68 and provided with a drive sprocket 70 for engagement with a drive chain 72 for driving the roller or roll of paper 60 in direct ratio to the remainder of the machine for retaining the underlying paper in taut condition. The chain 72 is driven from a shaft 74 having the driven member 76 of a Geneva movement mechanism which also includes the member 78. A switch 80 is engaged by the member 78 for controlling energization of a control device to be described hereinafter. The shaft 74 also drives through a chain 81, chain 82 and idler sprockets mounted on shaft 84 for rotating a shaft 86 having a drum 88 thereon which has a master board disposed on the outer surface thereof and including a series of circumferentially arranged blocks 90 which are of varying heights which will determine the color tile blocks for assembly onto the mat.

The tile blocks to be positioned on the paper 28 are designated by the numeral 92 and drying lamps 94 are disposed above and below the path of movement of the just completed mat for drying the adhesive. Also provided adjacent the end of the casing 16 is a cutter 96 in the form of a blade having projecting ends 98 riding in a slot 100 with the blade also having an upstanding rod 102 passing through a solenoid 104. The rod 102 is provided with an abutment 106 on the upper end thereof and a coil spring 108 disposed therebetween whereby the coil spring 108 would return the blade or cutter 96 to an elevated position. When the blade 96 is depressed by the solenoids 104, the perforated paper 28 will be severed transversely so that the mat does not become extremely heavy and is cut at the desired length.

Mounted above the path of movement of the tiles 92 along with the paper 28 is a presser roller 110 mounted in a slot 112 whereby the roller 110 may move vertically and may be provided with a spring for holding the same resiliently in contact with the tiles 92 for securing the tiles 92 securely on the perforated paper 28.

FIGURE 13 illustrates a modified form of the invention in which the backing member is in the form of a reusable flexible strip 114 which passes over idler roller 116 having a pressure roller 118 mounted adjustably in brackets 120 above the idler roller 116. A take-off roller 122 is provided in alignment with the idler roller 116 at which place the reusable flexible strip 114 is separated from the perforated paper 28. Disposed below the roller or pulley 122 is a tank 124 having a driven rotatable brush 126 therein which is immersed in a cleaning solution 128. The strip 114 passes downwardly and under a roller 130 for disposing the strip 114 in the cleaning solution 128. The strip 114 is thus cleaned and passes over an idler roller 128 carried by a bracket 130 and thence through a heating and drying device 136 and thus around the roller 116.

For placing the tile pieces 92 on the perforated paper 28 there is provided a series of ejecting mechanisms and feed mechanisms for the ejectors. There is an ejector and feeding mechanism for each longitudinal row of tile

pieces and the feeding mechanism incorporates a channel-shaped slide or conveyor 20 which receives a continuous supply of sorted tiles which have been arranged in a predetermined color sequences by a color pre-selector which does not constitute a part of the present invention. Initially, the tiles are arranged and fed into the channel-shaped slides 20 in a pre-selected color sequence. At the lower end of the channels 20 there is provided a horizontal guide trough 138 having a slot 140 in the lower surface thereof for receiving the upper run of a conveyor belt 142 arranged over oppositely disposed pulleys 144 and driven by a chain drive. Forwardly of the belt conveyors 142 there is a depending inclined slide 146 having a pusher bar 148 slidable in a slot 150 therein. The pusher bar 148 is provided with gear teeth 152 on the undersurface thereof and a series of inclined projections 154 on the upper surface thereof defining a plurality of longitudinally spaced abutments 156. A pair of spaced rollers 158 is provided for supporting the bar 148 and a gear 160 is in meshing engagement with the teeth 152. Slidably mounted on a plate 162 is a retaining bar 164 having teeth 166 defined in the upper surface thereof in meshing engagement with the gear 160 and provided with a groove 166 in the outer upper surface thereof for slidably receiving the lower end of the pusher bar 148 for guiding the relative movement therebetween. A horizontally and longitudinally extending lip 168 is provided on the retaining bar 164 for receiving a tile from the pusher bar 148 and retaining the same in position for movement by the ejector. The other end of the retaining bar 164 is reduced as indicated by the numeral 170 and is attached to the plunger 172 of a solenoid 174 which plunger is provided with a return spring 176 and a collar 178 thereon.

Disposed longitudinally forwardly of the feeding mechanism is a vertically reciprocable plunger 180 having a depending lip 182 on the rear edge thereof. The plunger 180 extends upwardly through a vertical support 184 and is spring urged upwardly by spring 186 which is disposed between the support 184 and a transverse head 188 on the upper end of the plunger 180. A transverse member 190 is connected to the transverse member 180 through springs 192 and fastening members 194. A cam 196 rotatable with a transverse shaft 198 is engaged with the upper transverse member 190 whereby rotation of the cam 196 will cause reciprocation of the members 190, 192, 188 and 180. A limit switch 181 having a plunger 183 is mounted on the frame 184 with the plunger 183 disposed in the path of movement of part of the plunger 180 for stopping the machine in the event the plunger does not engage a tile and moves below the lower limit and stopping the machine when the supply of tile in the placement head is exhausted.

Also slidable on the support 184 is a plate 200 having a laterally extending arm 202 overlying a cam 204 carried by a shaft 206. A spring 208 extends between a projection 210 on the support 184 and the arm 202 and is connected thereto by a screw threaded member 212 for varying the tension on the spring 208. Thus, as the cam 204 rotates, the plate 200 will be reciprocated. The plate 200 and lip 182 accurately position the tile in two directions of movement and a flat spring 213 is provided on one side wall of each channel shaped member 138 whose side walls extend to the plates 200 as shown in FIGURE 4 for holding the tiles 92 against the opposite side wall thereby providing accurate tile tolerances.

Mounted above the casing is an arm 214 supported by shaft 216 and including a roller follower 218 engageable with the blocks 90 on the drum 88. Connected to the arm 214 is an electric lead or wire 220 and mounted on a plate 222 is a series of contact elements 224 for engagement by the free end of the arm 214 for completing a circuit between the wire 220 and one of the contacts 224. The arm 214 is spring urged by a spring 226 for retaining the cam follower 218 against the various height blocks 90 on the drum 88 which is in the form of a master board

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or control board for controlling the orientation of the arm 214 in relation to the contact 224.

The arm 214 also controls the preselector for assuring that the tile pieces will be supplied in the proper color sequence to the chutes or conveyors 20. The feeding and ejector mechanism as well, as the various rollers are operated in timed relation to each other for accurately positioning the tile pieces in proper spaced relation.

The cutter bar for separation will preferably pass between two spaced parallel ledger plates for serving and removing a section of the backing paper thereby eliminating any possible paper interference at installation. Also, in some designs the arrangement of the cutter bar or blade may be zig-zag in shape to conform to the staggered design. Also, this machine could take various sizes and colors as well as all of the same size tile of various colors by adding sufficient heads necessary which, of course, would be of the dimensions required to handle the tile. Also any pattern can be made by providing sufficient heads to handle the tile.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly, all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. In a tile assembling machine, means for intermittently feeding a continuous web tile receiver along a longitudinal path, said receiver having a plurality of longitudinally extending zones, an individual tile supply mechanism mounted above said longitudinal path for intermittently moving individual tiles of pre-selected color and size in timed relation with said receiver feeding means along a path leading to a release position relating to one of said zones onto which zone the tiles moved by said mechanism are to be placed in pre-selected frequency and spacing, a tile-spacing stop mounted for reciprocation in a plane normal to said receiver and above said longitudinal path adjacent said release position, said stop extending transversely across said zone, mechanism for cyclically moving said stop during the feeding of said receiver, said mechanism being operable to move said stop in said normal plane between an upper region in its plane of reciprocation in which its lower edge is spaced above said receiver more than the thickness of one of said tiles and a lower region in such path in which its lower edge is spaced above said receiver less than the thickness of one of said tiles, means for shifting individual tiles from said release position and into contact with said stop at a point spaced above said receiver, tile placing means mounted above said longitudinal path adjacent said stop, means for reciprocating said tile placing means along a path substantially normal to said receiver, said tile placing means being operable to move said tile downwardly while maintaining contact of said tile with said stop into contact with the surface of said tile receiver in said zone thereof and over an area thereof determined by the position of said stop and by the timing of actuation of said tile placing means relative to the longitudinal movement of said receiver, said stop moving mechanism being operable to move said stop to the upper region of said path after contact of said tile with said receiver and before said tile placing means is moved out of contact with said tile.

2. In a tile assembling machine according to claim 1, means for intermittently feeding said continuous web tile receiver a modular distance relative to said tile spacing stop during each period between the positioning of tiles thereon.

3. A tile assembling machine comprising means for longitudinally feeding a continuous web tile receiver along a first path, an individual tile supply mechanism mounted above said first path for intermittently moving individual

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tiles in timed relation with said receiver feeding means along a second path angularly disposed to said first path, said second path leading to a release position above said tile receiver, a tile-spacing stop mounted above said first path adjacent said release position and extending transversely across said tile receiver, mechanism for cyclically moving said stop along a third path normal to said first path between an upper position and a lower position during movement of said tile receiver, means for shifting individual tiles from said release position to a position in contact with said stop while said stop is in the lower position, tile placing means mounted above said first path for moving said tile from said last named position while contacting said stop and for continuing to move said tile downwardly beyond said stop into contact with the surface of said tile receiver over an area thereof determined by the position of said stop and by the timing of actuation of said tile placing means relative to the longitudinal movement of said tile receiver.

4. In combination with a tile positioning machine of the type comprising a mechanism for feeding a web of tile receiving material along a longitudinal path and a mechanism for moving individual tiles to a position above the web, the improvement comprising a stop mounted above the path of said web, means for moving said stop in timed relation with the feeding of said web from a lower position to an upper position, a longitudinally reciprocating arm for engaging a tile in the position above said web and moving said tile into engagement with said stop when said stop is in said lower position, a vertically reciprocating member for engaging said tile while in engagement with said stop, and means for moving said member toward said web as said stop moves to said upper position whereby said tile is moved out of engagement with said stop and into engagement with said web.

5. A machine for producing a mat of tile pieces with a paper backing adhered thereto, comprising a supporting frame with drive means thereon, an elongated plate mounted on said frame, a supply roll for said paper backing at one end of the plate, means for feeding said paper backing onto and across said plate, means supported on said frame in overlying relation to said paper backing for placing tile pieces in a plurality of longitudinal rows on said paper backing, means supported on said frame in overlying relation to said paper backing with said tiles thereon for pressing said tiles onto said paper backing, means for actuating said feeding means, said placing means and said pressing means in sequential order, a rotatable drum having a master board mounted thereon, said board having various height blocks thereon indicating the colors and sizes of related tile pieces, a follower riding on said drum for controlling the machine, and means for rotating said drum, said means being operatively connected to said feeding means for simultaneous operation therewith.

6. In a tile assembling machine, means for intermittently feeding a continuous web tile receiver along a longitudinal path, said receiver having a plurality of longitudinally extending zones, an individual tile supply mechanism mounted above said longitudinal path for intermittently moving individual tiles of pre-selected color and size in timed relation with said receiver feeding means along a path leading to a release position relating to one of said zones onto which zone the tiles moved by said mechanism are to be placed in pre-selected frequency and spacing, a tile spacing stop mounted above said longitudinal path and adjacent said release position for reciprocal movement, mechanism for cyclically moving said stop between a region in its path of reciprocation in which its face extends transversely across said zone and its lower edge is positioned above said receiver a distance less than the thickness of one of said tiles for engagement with a tile positioned on said receiver and a region in such path in which its lower edge is removed from engagement with a tile on said receiver, means for shifting individual tiles from said release position and into contact with the face

of said stop while said face extends transversely across said zone, tile placing means mounted above said longitudinal path adjacent said stop, means for reciprocating said tile placing means along a path substantially normal to said receiver, said tile placing means being operable to move said tile downwardly while maintaining contact of said tile with the face of said stop, said tile placing means being further operable for continuing to move said tile downwardly into contact with the surface of said tile receiver in said zone thereof and over an area thereof determined by the position of said stop and by the timing of actuation of said tile placing means relative to the longitudinal movement of said receiver, said stop moving

mechanism being operable to move said stop to the upper region of said path after contact of said tile with said receiver and before said tile placing means is moved out of contact with said tile.

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