Nov. 23, 1971 J. M. FEIGHERY ET AL 3,621,743

CARPET TILE CUTTING MACHINE

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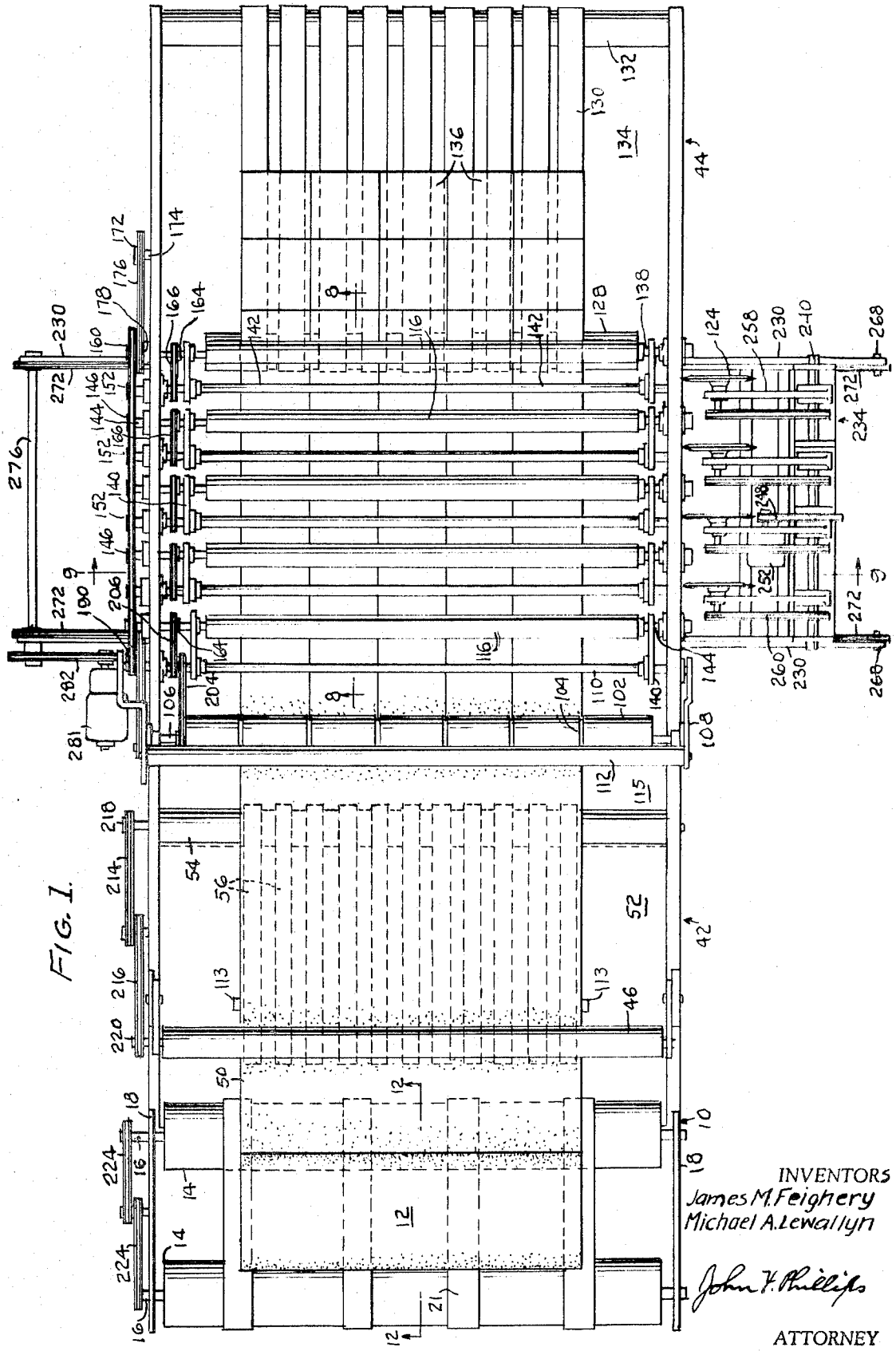

FIG. 1.

INVENTORS
James M. Feighery
Michael A. Lewallyn

John F. Phillips

ATTORNEY

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Filed May 5, 1970 5 Sheets-Sheet 2

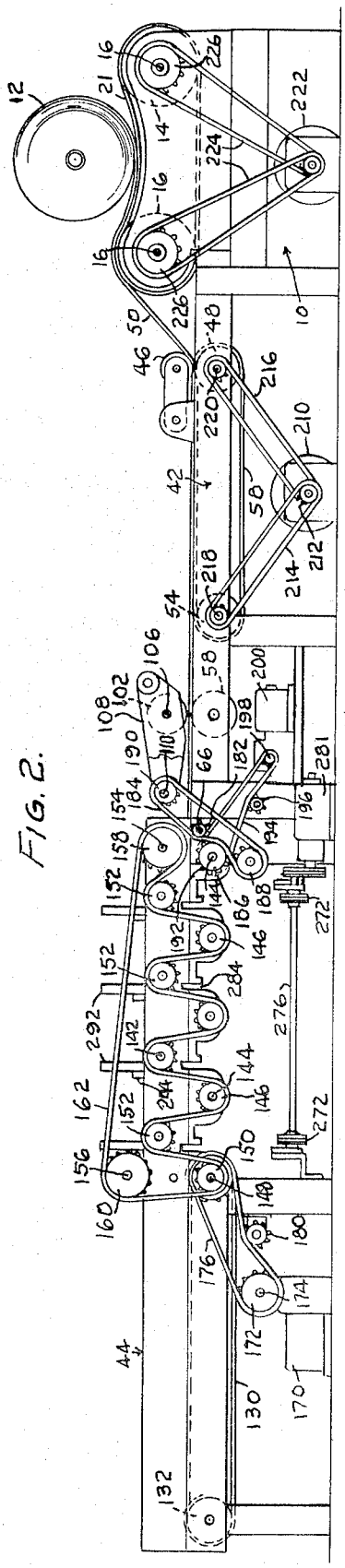

FIG. 2.

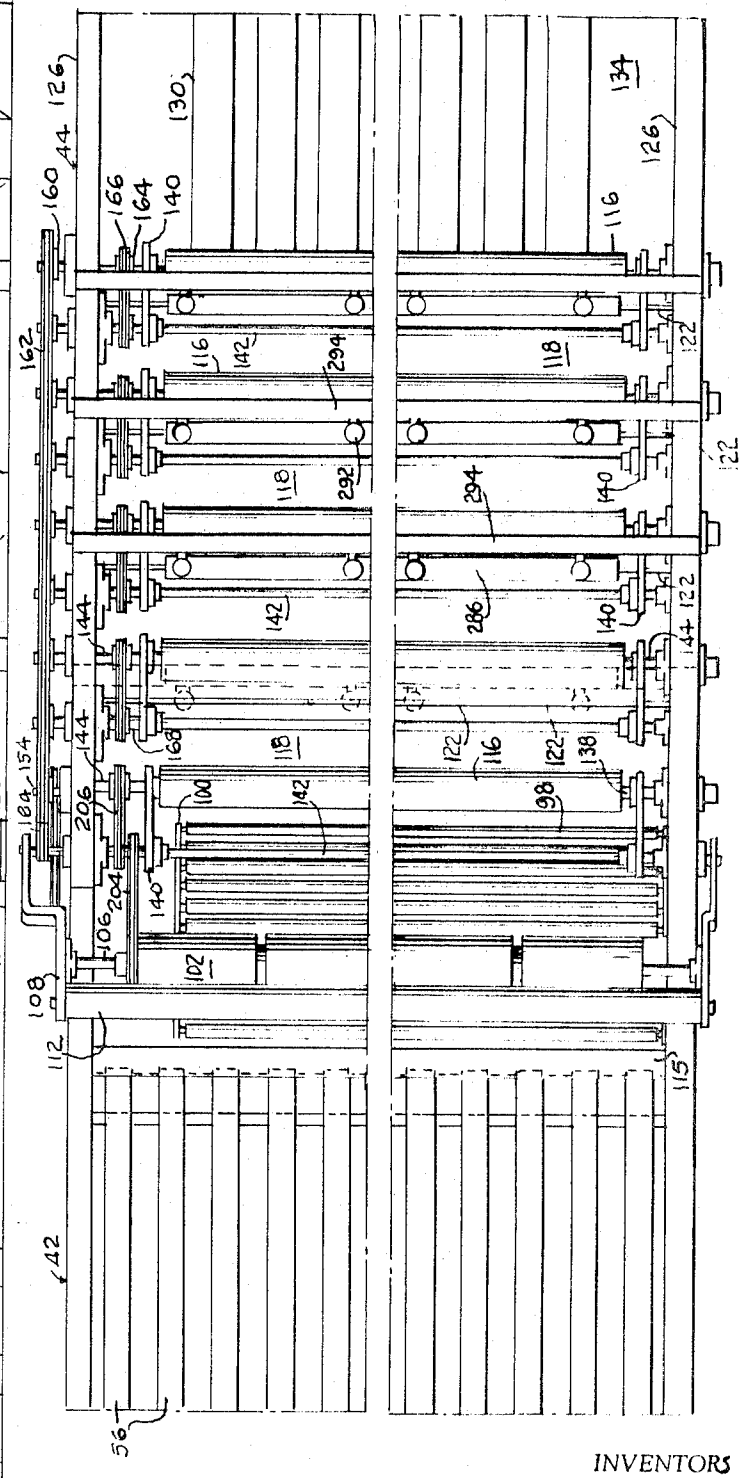

FIG. 3.

INVENTORS
James M. Feighery
Michael A. Lewallyn

BY John F. Phillips

ATTORNEY

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CARPET TILE CUTTING MACHINE

Filed May 5, 1970 5 Sheets-Sheet 3

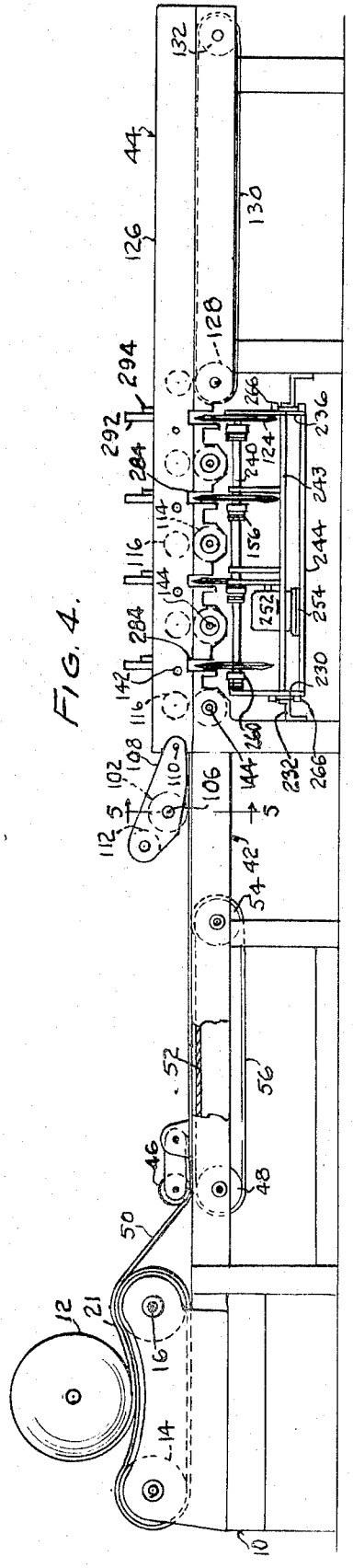

FIG. 4.

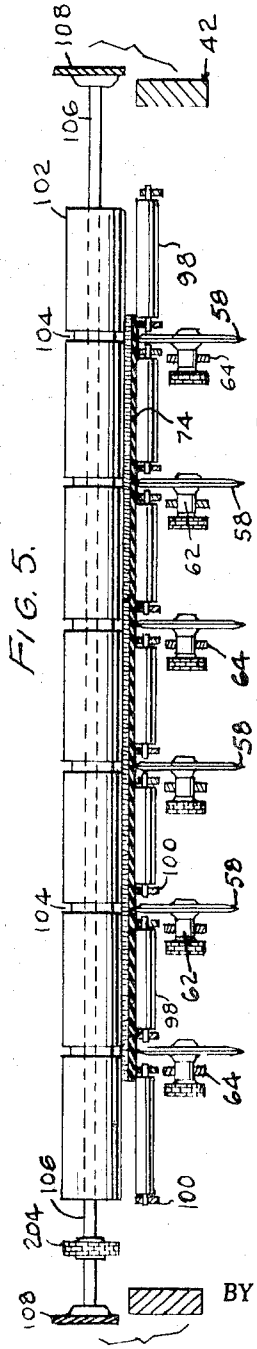

FIG. 5.

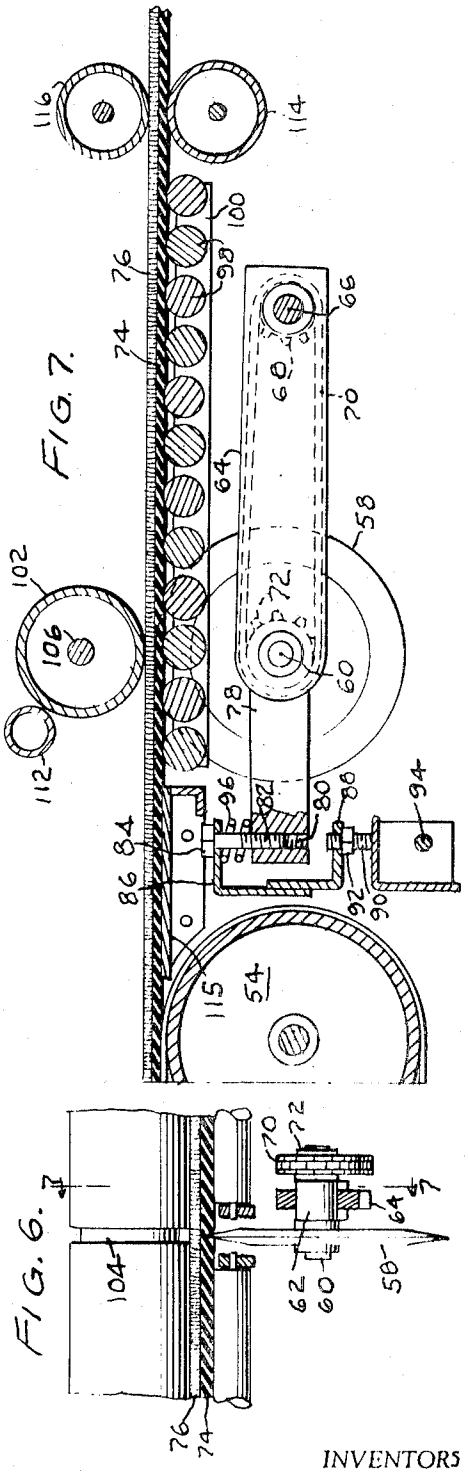

FIG. 7.

FIG. 6.

INVENTORS
James M. Feighery
Michael A. Lewallyn

BY John H. Phillips

ATTORNEY

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CARPET TILE CUTTING MACHINE

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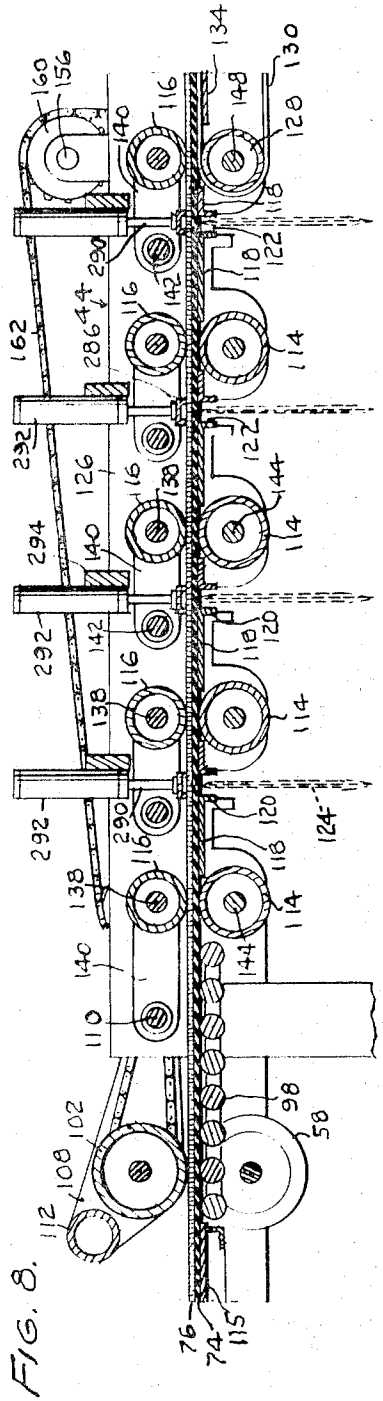

FIG. 8.

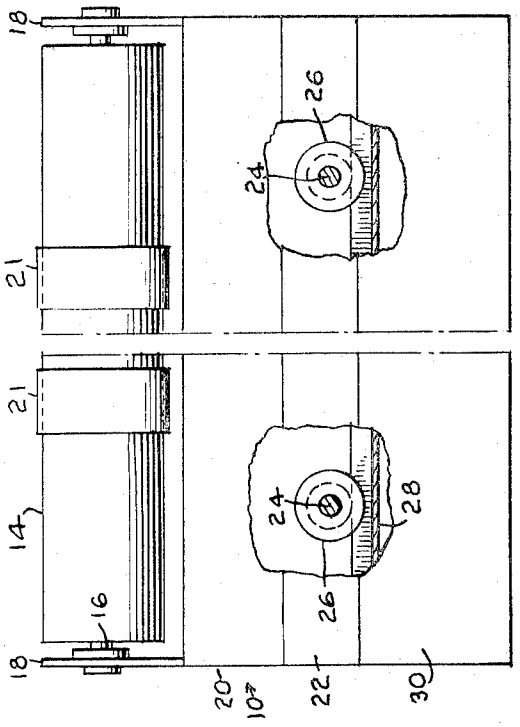

FIG. 13.

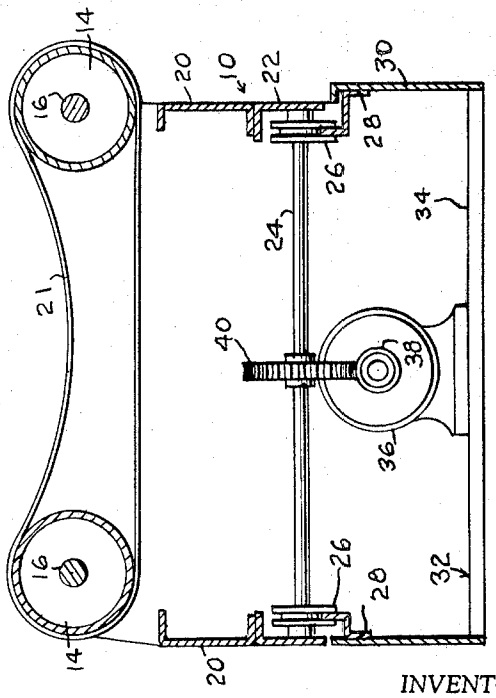

FIG. 12.

INVENTORS

James M. Feighery

Michael A. Lewallyn

BY John F. Phillips

ATTORNEY

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CARPET TILE CUTTING MACHINE

Filed May 5, 1970 5 Sheets-Sheet 5

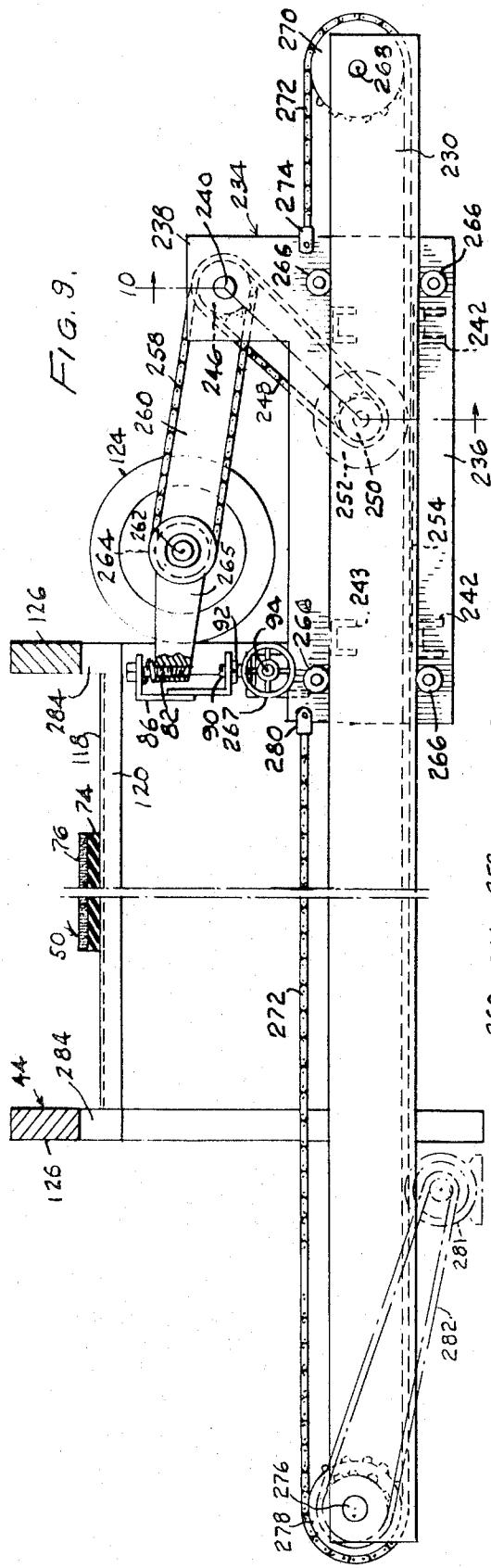

FIG. 9.

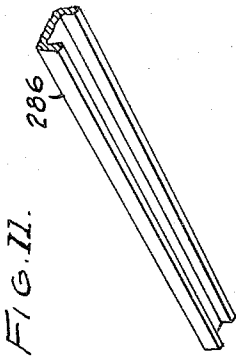

FIG. 11.

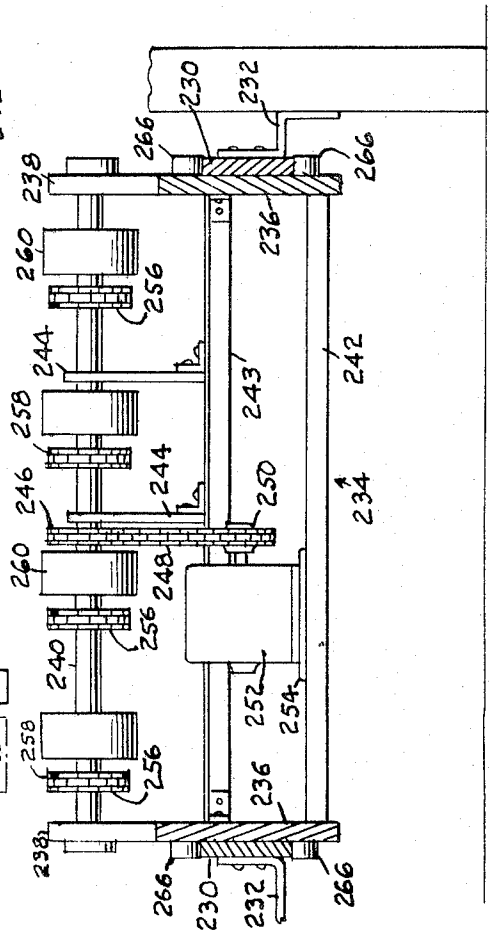

FIG. 10.

INVENTORS

James M. Feighery

Michael A. Lewallyn

BY John F. Phillips

ATTORNEY

United States Patent Office 3,621,743
Patented Nov. 23, 1971

3,621,743

CARPET TILE CUTTING MACHINE

James M. Feighery and Michael A. Lewallyn, Dalton, Ga., assignors to Tex-Del Corporation, Dalton, Ga.

Filed May 5, 1970, Ser. No. 34,773
Int. Cl. B26d 11/00
U.S. Cl. 83—408 15 Claims

ABSTRACT OF THE DISCLOSURE

A cradle supports a roll of carpet for the pulling therefrom of the end of the carpet over horizontal work tables having a first section in which the carpet is cut longitudinally in strips during movement of the carpet and a second section in which the carpet is cut transversely while stationary to form tiles, the cutting taking place from beneath the carpet and only through the backing thereof and not through the pile.

BACKGROUND OF THE INVENTION

The use of carpet tiles is becoming increasingly popular. These tiles are usually cut from carpet through the top thereof, the cutting means passing through the pile and through the backing of the carpet. Since the pile usually leans in one direction, the cutting of the tile from the top thereof cust one edge perfectly squarely, severing some of the pile which leans towards such edge. When a tile is laid, therefore, the edge referred to will show a gap in the pile between it and the pile of the next adjacent tile, which, of course, is objectionable.

SUMMARY OF THE INVENTION

Carpet tiles are usually made with rubber or similar backs to which the pile is adhered on the top face thereof. with the present construction, rotary cutters are arranged beneath the path of carpet moving over end-to-end tables having coplanar tops, the first table having a series of transversely spaced rotary cutters or slitters arranged below the plane of the carpet. These cutters or slitters are so adjusted that as the carpet moves longitudinally over the table, the rubber or similar backing is cut through precisely and no cutting of the pile takes place. The advancing carpet then passes to the second table where its movement is arrested and a carriage carrying longitudinally spaced transverse rotary slitters is moved transversely beneath the table to slit through the backing only of the stationary carpet. This carpet having been previously longitudinally slit, the transverse slitters will cut the strips of carpet to form separate accurately square tiles. When the carriage for the transverse slitters reaches the opposite side of the table, its movement is arrested pending an additional longitudinal movement of the carpet to a position for the next transverse slitting operation, whereupon movement of the carpet is stopped and the carriage moves back beneath the table to the first side thereof to again transversely slit the carpet into tiles.

A cradle supports the roll of carpet, and this cradle comprises rollers spaced apart and having endless bands or belts passing therearound and the carpet roll is supported by such bands between the rollers. These rollers are driven to rotate the carpet roll and feed the end thereof to the first table to be gripped between rollers to be fed along the first table. Since rugs are never prefectly rolled, the cradle structure is transversely movable to keep the longitudinal edges of the carpet perfectly placed for the straight accurate cutting of the carpet.

The longitudinal slitters are arranged beneath the path of travel of the carpet and beneath a transverse hold-down roll which engages the top face of the carpet to hold it in snug engagement with the longitudinal slitters so that the

latter accurately cut through the carpet backing. These longitudinal slitters are carried by individual arms and driven by chains or other endless driving means. All of the arms for such slitters are simultaneously adjustable to maintain the accuracy of the cutting operation. Such simultaneous adjusting means includes elements for the individual adjustment of the slitters in the event one or more of the slitters should wear faster than the others and require slight upward adjustment.

The second table is provided with transverse supporting rollers over which the longitudinally slit carpet passes and each of these rollers is positively driven together with upper hold-down rollers associated individually therewith. The transverse slitters are mounted on a carriage supported for movement transversely of the second table and the slitters operate between the rollers last referred to and the hold-down rollers associated therewith. The rollers of the second table have their movement arrested at the proper point for the accurate final cutting of the tiles. Between the lower rollers of the second table are arranged plates over which the carpet passes and such plates have spaced edges for the movement therebetween of the transverse slitters. During the transverse slitting operation, the stationary carpet is held down with respect to the transverse slits by transverse bars of inverted U-shape and these bars are urged downwardly by air cylinders which operate to lift the bars when the plurality of tiles has been cut to allow for the free movement of the cut tiles to a take-off conveyor. The transverse slitters are also carried by arms adjustable in the same manner as the arms of the longitiudinal slitters so that the backing of the carpet will always be accurately cut therethrough. The transverse slitter carriage is pulled back and forth across the table during each operation thereof by chains supported by the track structure along which the carriage operates from side to side of the second table.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a plan view of the apparatus, parts being omitted;

FIG. 2 is a side elevation of the back side of the apparatus showing the drive means therefor;

FIG. 3 is an enlarged plan view of a portion of the apparatus partly showing the second table, some elements being omitted;

FIG. 4 is a side elevation of the front of the apparatus;

FIG. 5 is a transverse section on line 5—5 of FIG. 4;

FIG. 6 is an enlarged fragmentary sectional view of a portion of the apparatus shown in FIG. 5;

FIG. 7 is a fragmentary section on line 7—7 of FIG. 6;

FIG. 8 is a section on line 8—8 of FIG. 1;

FIG. 9 is a section on line 9—9 of FIG. 1, parts being omitted;

FIG. 10 is a section on line 10—10 of FIG. 9;

FIG. 11 is a detailed sectional perspective of a hold-down bar;

FIG. 12 is a section on line 12—12 of FIG. 1; and

FIG. 13 is an end elevation of the carpet roll supporting cradle parts being broken away.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIGS. 1, 4, 12 and 13, the numeral 10 designates a supporting cradle as a whole for a roll of carpet 12. This cradle comprises a pair of rollers 14 mounted on shaft 16 journalled in end plates 18 carried by beam frames 20. The carpet roll is supported by endless belts 21 passing around the rollers 14. The beam frames carry angle irons 22 rotatably supporting spaced shafts 24 (FIG. 13) carrying grooved wheels 26 adapted to roll on rails 28 carried by walls 30 of a supporting structure indicated as a whole by the numeral 32. This

structure includes suitable bracing including a transverse structure **34** on which is mounted a motor **36** (FIG. 12), the shaft of which carries a worm **38** meshing with a wheel **40** on one of the shafts **24**. The motor **36** is reversible to rotate its shaft **24** in either direction to adjust the cradle **10** transversely of the apparatus for a purpose to be described. Transverse movement of the cradle will be relatively slight, and the worm **38** is of sufficient length for its intended purpose.

The main parts of the apparatus comprise a first table **42** and a second table **44**. The table **42** rotatably supports upper and lower rollers **46** and **48** adjacent the cradle **10** and between which the web **50** of the carpet is adapted to pass, the rollers **48** and the cradle rollers **14** being positively driven in a manner to be described. Beyond the rollers **46** and **48**, that is, remote from the cradle **10**, the table **42** is provided with a bed **52** extending from the roller **48** to another roller **54**, and spaced endless belts **56** (FIG. 3) pass around the rollers **48** and **54** to feed the carpet toward the right in FIGS. 1 and 4.

Adjacent the end of the table **42** remote from the cradle, a plurality of transversely spaced rotary cutting blades **58** are arranged to longitudinally slit the carpet passing thereover. Each of these blades is individually supported by a shaft **60** journalled in a bearing **62** carried by one end of an arm **64** (FIGS. 6 and 7), and the opposite ends of these arms receive therethrough a transverse shaft **66** which rotates within the latter ends of the arms **64**. The shaft **66** is driven in a manner to be described and is provided with a plurality of sprockets **68** each associated with one of the arms **64**. A chain or flexible element **70** passes around each sprocket **68** and around a sprocket **72** carried by the associated shaft **60**. It will be apparent therefore that the longitudinal slitters **58** are simultaneously driven by their chains **70** to slit the carpet longitudinally as it passes over the blades, as further described below.

Referring to FIG. 6, it will be noted that the carpet includes a rubber or similar backing **74** and a top pile **76**, and the cutting edge of each blade **58** extends exactly through the backing **74** during the cutting operation. Accordingly, the pile **76** is not disturbed during the cutting operation.

The slitters **58** are vertically adjustable by the means shown in FIG. 7. Each arm **64** is provided with a projection **78** having an opening **80** threaded in the end thereof to receive a screw **82** having a head **84** engaging the top flange of an angle iron **86** welded or otherwise secured to a lower angle iron **88** through which projects a screw **90**. The angle iron **88** carries a nut **92** welded thereto and obviously the turning of the screw **90** will elevate the angle iron **88** and the elements connected thereto. A lower stationary angle iron **94** carries a conventional speed reducing gearing **92** operated by a shaft **94** having an operating wheel (not shown) whereby the turning of the shaft **94** will rotate the screw **90** and lift the structure including the angle irons **86** and **88**. Between the upper flange of the angle iron **86** and the arm **78** is arranged a relatively strong spring **96**. Vertical movement of the angle irons **86** and **88** moves all of the projections **78** to move the slitters upwardly as wear takes place. In the event one of these slitters wears somewhat faster than another, the screw head **84** may be turned individually to adjust the associated projection **78** to move the slitter **58** upwardly independently of the remaining slitters so that it will cut accurately just through the backing **74**. The rug passing over the slitters **58** is supported by small transverse parallel rollers **98** rotatably supported at their ends by plates **100** which in turn are supported in any suitable manner by the table **42**.

Above the slitters **58** and rollers **98** is arranged a relatively large transverse roller **192** extending from side to side of the apparatus and provided with spaced grooves **104** coinciding with the planes of the respective slitters **58**. These grooves are provided so that if any slitters become substantially maladjusted, they will not bear against the body of the roller **102**. The roller **102** is provided with a shaft **106** journalled in pivoted plates **108** each of which is journalled at one end on a shaft **110**, further referred to below. The plates **108** extend to the side of the roller **102** opposite the shaft **110** to support a tie bar **112** to fix the plates **108** in position. The plates **108** provide for upward and downward movement of the roller **102** according to whether the carpet is passing thereunder, and to adjust the roller **102** to varying thicknesses of carpet.

For the accurate straight cutting of the rugs by the slitters **58**, it is important that the rug be accurately fed to the slitters **58**. It is for this reason that the cradle **10** is movable laterally of the machine by the means described above. At the side of the roller **46** opposite the cradle, the bed **52** carries a pair of sensors **113**. These devices sense any deviation of the carpet incident to the uneven rolling of the rug on the cradle, which is inevitable. In actual practice the sensors **113** are microswitches, the operation of either of which will energize the motor **36** (FIG. 9) to shift the cradle. The specific means operable by the sensors **113** form no part per se of the present invention. For the purposes of the present application, the elements **113** may be considered to be indicators to the operator who may control the motor **36** manually.

It will be apparent that the rug fed to the table **44** will have been slit longitudinally along parallel lines and from FIG. 5 it will be apparent that the rug backing **74** will be trimmed along its edges so that these edges and the slits formed by the remaining slitters **58** will be perfectly parallel. Incidentally, it will be noted in FIG. 5 that five strips of carpet will be cut, but this is merely illustrative. In practice, 13 of the slitters **58** are employed to cut twelve strips, thus increasing the rate of production of the machine and producing the tiles more economically.

Referring to FIG. 8, it will be noted that the carpet is supported on the beds of small rollers **98** and these rollers project into the inlet end of the second table **44** to a point just preceding the first of a series of lower rollers **114**. Ahead of the rollers **98** the rug will be supported by a plate **115** (FIGS. 7 and 8) as the rug passes from the roller **54**. The advancing longitudinally slit rug proceeds over the rollers **114** and beneath corresponding upper rollers directly thereabove indicated at **116**. The rug will be pinched between these pairs of rollers to be positively fed across the second table. Between the pairs of rollers **114** and engaging the bottom of the rug is a plurality of horizontal plates **118** and the adjacent edges of each pair of these plates, between each adjacent pair of rollers, is turned downwardly as at **120** to form a flange, the adjacent flanges being spaced to form slits **122** (FIGS. 3 and 8) extending from side to side of the table for the passage therebetween of transverse slitters **124** further referred to below. The plates **118** and their flanges **120** are fixed to the side frames **126** of the second table **44**. Two of the plates **118** are arranged beyond the last set of slits **124** as shown in FIG. 8, adjacent a roller **128**, similar to the rollers **114** except that it forms a pulley for belts **130**, the opposite ends of which pass around a roller **132** (FIG. 1) at the outlet end of the table. The upper runs of these belts pass over a bed **134** and constitute a conveyor for carrying to the discharge end of the second table **44** the finished tiles as cut in the manner to be described and as indicated by the numeral **136** in FIG. 1. Usually the slitters **124** will be spaced apart the same distance as the slitters **58** to provide square tiles. The slitters **124** as in the previous case cut only through the rug backing **74**.

Each roller **114** is mounted on a fixed axis, as described below, and journalled in the side walls **126** of the second table. The rollers **116** are mounted for vertical movement to drop down between gaps in the carpet when the tiles

are moved off in the manner to be described and to accommodate rugs of different thicknesses. To this end, each roller 116 has its shaft 138 journalled at its ends in arms 140 (FIGS. 3 and 8) and these arms are pivoted on transverse shafts 142 journalled at their ends in the side walls 126 of the second table, except that the first set of arms 140 is journalled on the shaft 110, previously described.

Each lower roller 114 is mounted on a shaft 144 journalled in the side walls of the second table 216, and at one side of such table (FIG. 2) each shaft 144 is provided with a sprocket 146 (FIG. 2). The conveyor roller 128 is also mounted on a similar shaft 148 provided adjacent the same side of the table with a sprocket 150.

Obviously, one of the rollers 116 and its associated arms 140 are arranged over the conveyor roller 128 and is also provided with a transverse shaft 142 as described. These shafts extend entirely across the machine as shown in FIG. 3 and are journalled in the side walls 126. In the common plane of the sprockets 146 and 150, each shaft 142 is provided with a sprocket 152 and these sprockets are arranged above the sprockets just described and in staggered relation thereto.

Beyond the opposite ends of the series of upper sprockets 152, shafts 154 and 156 are journalled with respect to the adjacent side wall of the second table and respectively carry sprockets 158 and 160.

Referring to FIG. 2, a chain 162 passes beneath the sprocket 150, upwardly over the next adjacent sprocket 152, thence down around the adjacent sprocket 146. This chain passes back and forth around the lower and upper sprockets and from the sprocket 152 to the right in FIG. 2, the chain passes around the sprocket 158, thence to the left around sprocket 160 and downwardly around the sprocket 150 as previously described. Thus a single chain drives all of the operating sprockets for the rollers except the first rollers 114 and 116, which are driven as described below.

Inwardly of the side wall 126 adjacent which the outer sprockets previously described are arranged, each upper roller 116 has its shaft 138 provided with a sprocket 164, and a chain 166 passes around each such sprocket and around a sprocket 168 carried by the adjacent end of the adjacent shaft 142 and by the shaft 110. Thus it will be apparent that all of the outside sprockets except as noted below are driven by the chain 162 and these chains directly drive the lower shafts 144 of the lower rollers 114. The upper rollers 116 are driven by the chains 166 from the sprockets 168.

Referring to FIG. 2 the numeral 170 designates a motor-speed reduction unit carrying a sprocket 172 mounted on a drive shaft 174. A chain 176 passes around sprocket 172 and around a sprocket 178 on the adjacent shaft 148, the chain passing around a suitably mounted idler sprocket 180. Thus the motor unit 170 drives the adjacent shaft 148 to transmit power to all of the rollers of the second table except the first rollers 114 and 116.

The shaft 66 previously described (FIGS. 2 and 7) is provided at one end with a sprocket 182 driven by a chain 184. This sprocket passes partly around a sprocket 186 (FIG. 2) on the adjacent shaft 144 of the associated roller 114, thence around an idler sprocket 188, thence upwardly around a sprocket 190 on the shaft 110.

The shaft 144 just referred to, that is, at the entrance end of the second table, is provided with a sprocket 192 (FIG. 1) about which passes a chain 194, and this chain passes over an idler sprocket 196, thence around a sprocket 198 on the output shaft of a motor-speed reducer unit 200. It will be apparent that the driving of the chain 194 drives the associated shaft 144 and its sprocket 186, thus driving the shaft 66 (FIGS. 2 and 7). The chain 194 which drives the sprocket 192 also drives the sprocket 190 on the shaft 110. The driving of the shaft 66 (FIG. 7) through chains 70 drives the individual slitters 58 to slit the backing of a rug passing thereover. The driving of the shaft 110 transmits power through a chain 204 (FIG. 1) to drive the shaft 106 and thus drive the grooved roller 102. This roller effects movement of the rug over the slitters 58 to feed the rug over the second table.

It should be borne in mind that the last three sets of rollers 114 and 116 (FIG. 8) are driven by the chain 162 (FIG. 2) while the first rollers 114 and 116 at the entrance end of the second table, that is, the left hand rollers 114 and 116 of FIG. 8 are driven through the chain 184. In this connection (FIG. 1) it will be noted that the drive from the shaft 110 is transmitted through a chain 206 to drive the first upper roller 116. The purpose of these separate drives for the sets of rollers 114 and 116 will be referred to below.

The rollers 14 and 16 of the cradle 10 and the rollers 48 and 54 for the conveyor belts 58 may be driven in any suitable manner. In FIG. 2 a motor-speed reducer 210 is provided with sprockets 212 driving chains 214 and 216 passing around sprockets on the ends of the shafts 218 and 220 of the rollers 54 and 48. A similar motor-speed reducer 222 drives chains 224 passing around sprockets 226 on the shafts 16 of the cradle rollers. The motor units 200, 210 and 222 will be synchronized so that the peripheral speeds of the rollers driven thereby in engagement with the rug will be uniform.

Means are provided for driving the transverse slitters 124 and for moving them bodily beneath the second table 44 to slit the rug backing after the rug has been slit longitudinally and remains stationary. Referring particularly to FIGS. 4, 8 and 9, the numeral 230 designates a pair of spaced parallel rail or guide members projecting transversely of the second table 44 therebeneath. The rails 230 may be supported in any suitable manner, for example, by brackets 232 (FIG. 4) secured to legs of the second table 44. A carriage indicated as a whole by the numeral 234 is mounted between the rails 230. This carriage comprises end plates 236 each arranged adjacent and inwardly of one of the rails 230 and provided at their right hand ends, as viewed in FIG. 9, with upstanding portions 238 having bearing means for supporting a drive shaft 240. The plates 236 have bracing frame members including braces 242 and 243 from the latter of which supporting arms 244 extend upwardly to provide bearings for the shaft 240 spaced from each other and from the end plates 236. The shaft 240 has a sprocket 246 around which passes a chain 248 and this chain in turn passes around a sprocket 250 driven by the shaft of a motor 252 supported on a plate 254 supported by the members 242.

The shaft 240 is provided with a plurality of sprockets 256 around each of which passes a chain 258. Four of the slitters 124 are employed in the illustrated embodiment of the invention, and one of the chains 258 drives each of these slitters. Each slitter is carried by an arm 260 pivoted at one end on the shaft 240 and provided at its other end with a shaft 262 carrying a sprocket 264 around which the associated chain 258 passes. Thus, all of the slitters 124 will be driven from the shaft 240. Each arm 260 is provided with an extension 265 connected to adjusting means which may be identical with the adjusting means for the slitters 58 (FIG. 7) and the parts are indicated by the same reference numerals. The shaft 94 in FIG. 9 is provided with an operating hand wheel 267 and a similar wheel will be mounted on the shaft 94 in FIG. 7.

As the slitters 124 are rotated, the carriage 234 is moved transversely of the second table 44 to slit only through the backing 74 of the carpet. Rollers 266 are carried by the end plates 236 and engage the upper and lower edges of the rails 230 to guide the carriage 234 for its transverse movement referred to. At the right hand ends of the rails 230, as viewed in FIG. 9, a transverse shaft 268 is rotatably supported and carries sprockets 270 around which pass chains 272, each connected at one end as at 274 to one end of the adjacent end plates 236.

At their other ends, the rails 230 support opposite ends of a rotary shaft 276 carrying sprockets 278 in the

planes of the respective sprockets **270**. The chains **272** pass around the respective sprockets **278** and are connected at **280** to the left hand ends of the end plates **236** as viewed in FIG. 6.

A suitably mounted motor **281** is connected by a chain drive **282** to drive the shaft **276** and sprockets **278**. The motor **281** is reversible and rotation of its shaft in one direction pulls the lower run of the chains **72** to move the carriage **274** to the right in FIG. 9. Reverse rotation of the motor **281** pulls the upper run of the chains **272** to transmit force to the connections **280** to move the carriage **234** to the left.

Since the slitters **124** must move entirely across the second table **44**, lower portions of opposite sides thereof are cut away as at **284** to provide clearance for the slitters **124** in passing beneath the second table.

As previously stated, the transverse slitters **124** move transversely of the apparatus between the spaced ends of the plates **118** (FIG. 8) that is, through the slits **122** to slit only through the rug backing **74**. This operation takes place with the rug remaining stationary after having passed through the longitudinal slitters **58**. While the rug thus remains stationary, it is desirable to hold it positively in engagement with the plates **118** so that the rug will not flex upwardly as the slitters **124** operate across the machine. To this end, a transverse bar **286** of inverted U-shaped cross section, as shown in FIGS. 8 and 11, is adapted to engage the pile **76** to hold the rug down over the path of each of the slitters **124**. These bars **286** are carried by the lower piston rods **290** of air cylinders **292** (FIGS. 3 and 8) and these air cylinders in turn are supported by transverse bars **294** supported by the sides **126** of the second table **44**. Three of the four bars **286** have been shown in solid lines in FIG. 3 together with their air cylinders and supporting bars **294**. The fourth assembly of these units has been shown in dotted lines in FIG. 3 to disclose more clearly one of the slits **122** extending entirely across the table.

OPERATION

The rug roll to be cut into tiles is supported on the belts **21** of the cradle **10**, as shown in FIGS. 1, 2 and 4. The free end of the rug is pulled out and fed beneath the roller **46**. Rotation of the cradle rollers **14** and the conveyor rollers **48** and **54** by the means described above feed the rug toward the right in FIGS. 1, 3 and 4. The roller **102** is positively driven as the rug passes over the longitudinal slitters **58** to slit solely through the backing of the rug **74** without disturbing the pile. This cutting is usually done from the top of the rug with the result that the pile will be cut straight down through that edge of the tile toward which the pile leans, thus leaving a gap between such edge of that tile and the edge of the next adjacent tile when the tiles are laid. By cutting solely through the backing **74**, this disadvantage is wholly eliminated and the nature of the machine is such that its production rate is relatively rapid.

As previously stated, the sensors **113** in practice operate microswitches to control the direction of rotation of the shaft of the motor **36** to shift the rug roll to compensate for inaccuracies in the rolling of the rug. For the purpose of the present invention, as disclosed, it may be assumed that the motor **36** is manually controlled in accordance with indications of edge irregularities in the rug as provided by the sensors **113**.

After the rug has been longitudinally slit, the forward end thereof feeds between successive pairs of rollers **114** and **116** (FIG. 8) and in practice an electric eye associated with a light sensitive element will control the rate of movement of the rug by slowing it down and then stopping it at the proper place for the operation of the transverse slitters. For the purpose of the present application, as disclosed and claimed, it may be assumed that the motors are all manually arrested with the leading edge of the rug at the proper point. The motor **252** (FIG. 9 and 10) is operated to drive the transverse slitters **124** and the motor **281** is energized to move the carriage **234** to the left in FIG. 9 until the slitters **124** clear the opposite side of the second table **44**. The motor **281** is then stopped, and the slitters **124** remain at the left side of the table **44** until the next transverse slitting operation is to be performed. When the carriage **234** has been moved across the table **44** as described, the rug will be cut completely thereacross to provide the individual tiles **136** (FIG. 1).

The motor **170** is then operated to drive all of the rollers **114** and **116** except the first set at the left in FIG. 8, whereupon the severed tiles will be fed from the machine to the conveyor belts **130** to be collected as desired. With the motor **170** still running, the motors **200**, **210** and **222** will again be started to feed the rug to the right in FIG. 8. The first set of rollers **114** and **116** will now be again operated together with the remaining such rollers, and the longitudinally slit rug will again be fed to the proper point for the transverse slitting of the rug to form the individual tiles.

While the feed rollers **114** and **116**, except for the first set of such rollers, are operating to move the rug, the air cylinders **292** will be energized to lift the bars **286** from the rug to allow the latter to move freely. When movement of the rug is arrested, air pressure in the air cylinders **292** is reversed to exert a downward force on the bars **286** to hold the longitudinally slit portions of the rug firmly in position on the plates **218** for the transverse slitting of the rug.

In the commercial machine all of the foregoing operations are automatically coordinated to take place in proper relative timed relation. The automatic system forms per se no part of the present invention and it is assumed that all of the various operations are manually controlled.

From the foregoing it will be apparent that the present apparatus is highly practicable for the cutting of carpet tiles which have become very popular. The machine is efficient and rapid in its operation with the longitudinal and transverse slitting taking place sequentially and rapidly and the cutting operation takes place solely through the backing **74** of the rug without disturbing the pile. It will be understood, of course, that it is not necessary after one transverse slitting operation to return the carriage **234** to the position shown in FIG. 9. After one slitting operation, the slitters **124** remain to the left of the table **44** and when the next transverse slitting operation is to take place, the motor **281** is reversed to move the carriage **234** back to its position shown in FIG. 9. The longitudinal slitting operation takes place continuously while the rug is moving, and each transverse slitting operation is performed while the rug remains stationary for a very short period of time.

We claim:

1. Apparatus for cutting tiles from rugs having a backing and a pile on the top thereof, comprising means for moving the leading edge of the rug over a horizontal plane, means beneath said plane for slitting the rug along parallel lines horizontally thereof and upwardly from the bottom of the rug solely through the backing thereof, and means beyond said slitting means arranged below the level of the rug and movable transversely thereof while the rug remains stationary for slitting solely through the backing of the rug to separate the longitudinally slit rug into tile units.

2. Apparatus according to claim **1** wherein said horizontal plane is a table top, said slitters comprising rotary blades transversely spaced from each other across the width of said table top, and means for simultaneously driving said rotary blades.

3. Apparatus according to claim **1** wherein said means for transversely slitting the rug comprises a carriage, means for mounting said carriage for transverse movement beneath said rug, said means for transversely slitting the rug comprising a plurality of rotary cutting blades

mounted on said carriage, and means for simultaneously rotating said cutting blades.

4. Apparatus according to claim 1 wherein said horizontal plane is a table top, said slitters comprising rotary blades transversely spaced from each other across the width of said table top, means for simultaneously driving said rotary blades, said means for cutting the rug transversely thereof comprising a carriage beneath the level of said plane, means for mounting said carriage for movement transversely of the rug, said means for transversely cutting the rug comprising a plurality of rotary cutting blades, and means mounted on said carriage for simultaneously driving said last-named blades.

5. Apparatus according to claim 2 wherein each of said rotary blades for longitudinally slitting the backing of the rug is provided with an arm rotatably supporting the associated blade at one end of such arms, a driven shaft rotatably supported and on which the other ends of said arms are pivoted, means for driving said shaft, and means connected between said shaft and each blade for driving the latter.

6. Apparatus according to claim 5 provided with means associated with the first-named ends of said blades for simultaneously adjusting them vertically to compensate for wear on the peripheral cutting edge provided on each blade.

7. Apparatus according to claim 6 wherein said simultaneous adjusting means includes auxiliary adjusting means associated with each arm to individually adjust any blade vertically to compensate for differences in the wearing of the blades.

8. Apparatus according to claim 3 wherein said means for transversely cutting the rug comprises a carriage, guide rails for said carriage extending transversely with respect to the rug for guiding said carriage for movement whereby when said carriage is moved, the rug will be cut transversely through the backing thereof, a driven shaft rotatably supported by said carriage, a plurality of arms each rotatably supporting one of said blades adjacent one end of such arm, a motor supported by said carriage and connected to drive said shaft, and drive means connected between said shaft and each of said blades for simultaneously rotating said blades during rotation of said shaft.

9. Apparatus in accordance with claim 8 wherein said guide rails are stationary, sprockets carried by opposite ends of said guide rails, chains passing around said sprockets and having ends connected to opposite ends of said carriage, and means for driving said sprockets to move said carriage transversely to cut through the rug backing.

10. Apparatus according to claim 9 provided with means connected between said carriage and all of said arms for simultaneously adjusting the latter to vertically

adjust said blades to compensate for wear, said simultaneous adjusting means including elements associated with each arm for individually adjusting the latter whereby any blade can be individually vertically adjusted to compensate for uneven wear of said blades.

11. Apparatus for cutting tiles from a rug having a backing and pile on the top thereof, comprising a first table and a second table having coplanar surfaces, means for supporting a rug roll with respect to said first table, means for feeding the rug from the roll longitudinally on said first table, means for slitting the rug along parallel lines as it passes over said first table, pinch rolls associated with said second table for moving a rug thereover and for arresting a rug at a predetermined point, and means operative while movement of the rug is arrested on said second table for slitting the rug transversely to form tiles, the slitting means for both tables being arranged beneath the tops thereof and adapted to cut solely through said backing of the rug.

12. Apparatus according to claim 11 wherein said slitting means for both tables comprises rotary cutting blades, and means associated with each table for driving the blades thereof.

13. Apparatus according to claim 12 wherein said second table is provided with a carriage mounted for transverse movement beneath said second table, the slitting means for said second table being supported by said carriage, and means carried by said carriage for driving the slitting means supported thereby.

14. Apparatus according to claim 13 wherein said pinch rolls are in pairs one above the other and between which the rug passes, and plates supporting the rugs between said pairs of rolls and provided with slits from side to side of said second table through which the cutting blades of said second table move when said carriage is moved transversely of said second table.

15. Apparatus according to claim 13 wherein the means for moving the rug over said first table includes the first pair of said pinch rolls, and power means for rotating the remaining pairs of said rolls independently of said first pair.

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FRANK T. YOST, Primary Examiner

U.S. Cl. X.R.

83—422, 431, 433, 513, 925 R