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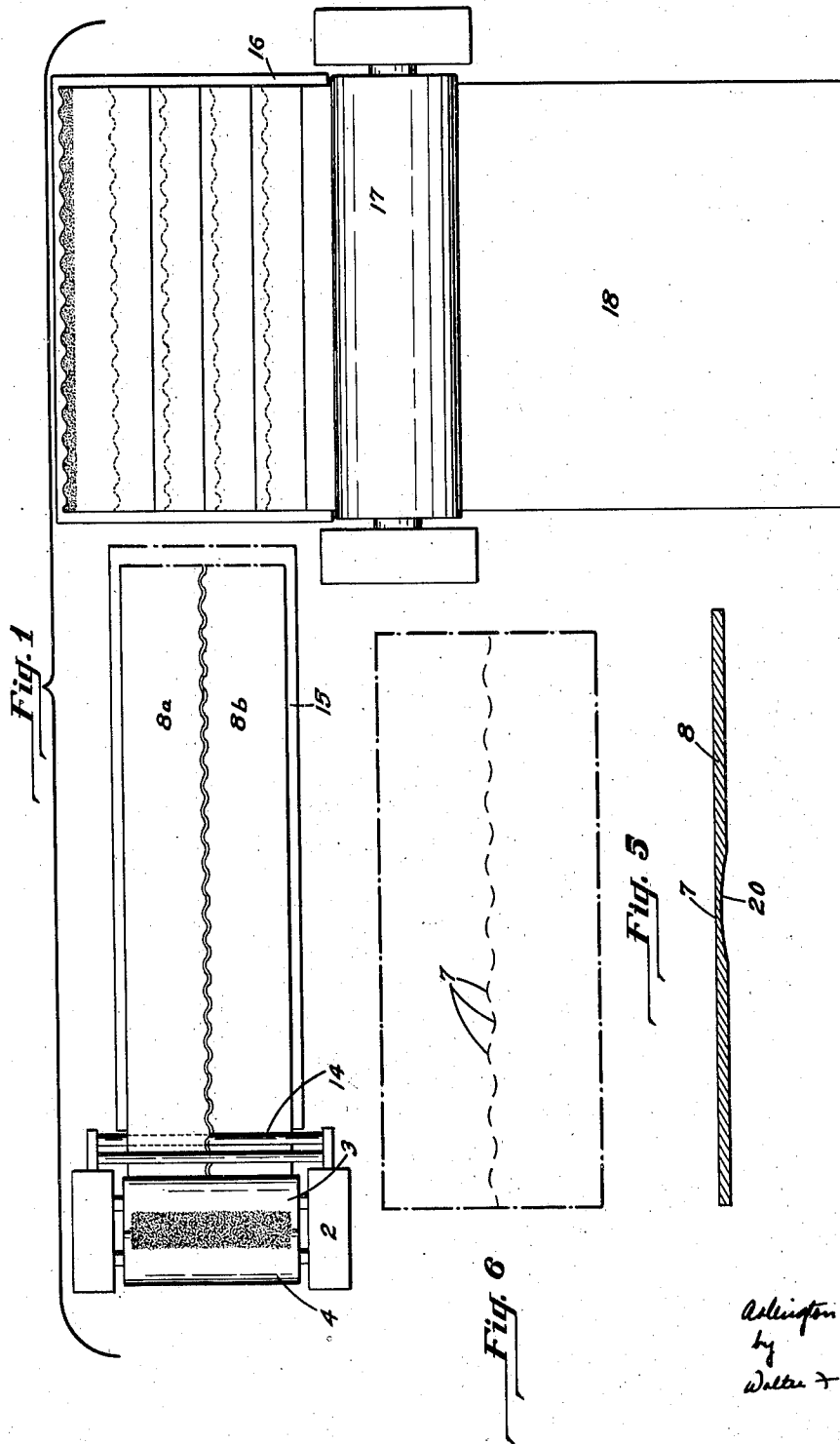
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2,374,496

APPARATUS FOR MAKING VARIEGATED HARD SURFACE COVERING

Original Filed Oct. 3, 1940

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

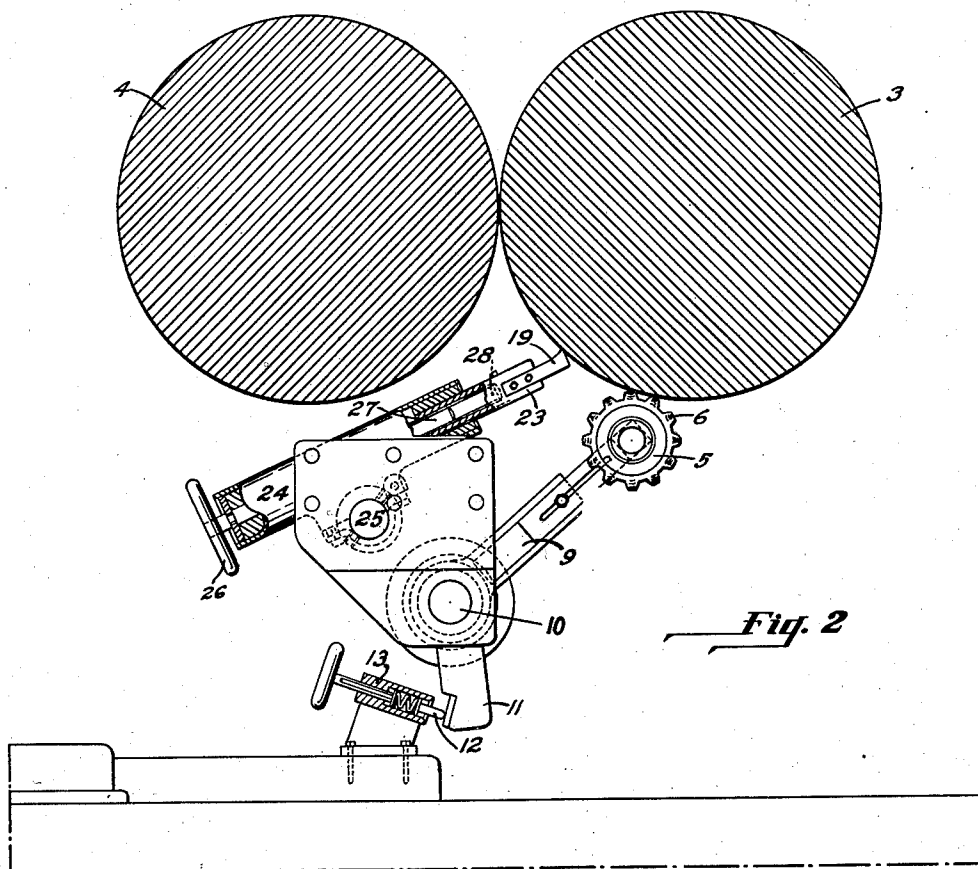


Fig. 2

Fig. 4

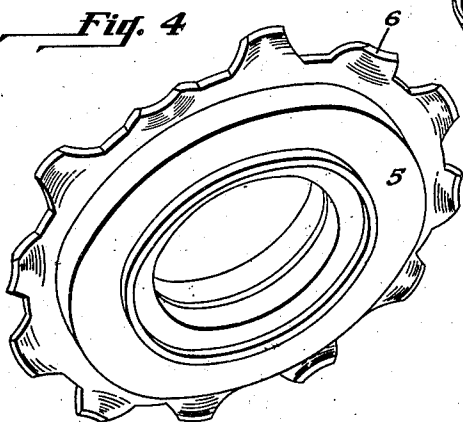
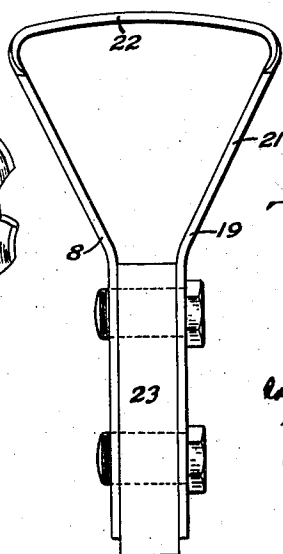


Fig. 3



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UNITED STATES PATENT OFFICE

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APPARATUS FOR MAKING VARIEGATED
HARD SURFACE COVERINGArlington C. Perry, Lancaster, Pa., assignor to
Armstrong Cork Company, Lancaster, Pa., a
corporation of PennsylvaniaOriginal application October 3, 1940, Serial No.
359,506. Divided and this application January
14, 1943, Serial No. 472,364

4 Claims. (Cl. 18—2)

This application is a division of my copending application, Serial No. 359,506, filed October 3, 1940, and relates to an apparatus for making variegated linoleum by what is generally termed the "cross-rolling" process.

The cross-rolling process of making variegated linoleum as applied to the continuous production of linoleum on rotary inlaying machines of the Walton or Batten type contemplates the formation of a sheet having a definite directional graining commonly called "jaspe," overlapping a plurality of such sheets and passing the overlapped sheets through a sheeting calender at right angles to the direction of graining thus forming an integral sheet and shortening and spreading the jaspe graining of the face of the sheet to obtain the desired variegation which is generally considered to resemble marble. It is known that graining produced by this process varies throughout the thickness of the sheet and that the graining of the back of the sheet bears only a remote resemblance to the graining on the face of the sheet.

One of the chief problems present in such practice resides in the visible discontinuity between sheets where an overlapped or overlapping sheet adheres to and becomes an integral portion of a following or preceding sheet. This phenomenon is termed "hook-on" in the industry and appears to be a visible distortion of face graining which is not compatible with the required variegation and presents an entirely different appearance at the sections where the overlapped sheets join one another. The cause of "hook-on" is not known with any degree of certainty but it is believed to be due almost entirely to the abrupt change in volume of material present in the nip of the rolls at the overlapped portions of the sheet and the subsequent flow and surge of the plastic material resulting from increased pressure. It may be due in part to the fact that in some cases the edge portions of the overlapped sheets presented to the calender rolls turn over slightly when subjected to pressure and thus permit back graining to appear on the face of the sheet. In any event, this visible discontinuity is a serious distortion of face graining which is undesirable and which annually creates an enormous waste in the production of variegated linoleum on rotary inlaying machines.

The chief object of my invention is to provide improvements in apparatus for making variegated hard surface covering by the cross-rolling process designed to eliminate substantially or entirely the visible discontinuity present in those portions

of the finished sheet where overlapped sections join. An object of my invention is to provide an apparatus for producing variegated linoleum which is economical in operation and highly satisfactory in service. A further object is to obviate the abrupt change in volume of plastic composition at those places where one sheet joins and adheres to a second sheet in the manufacture of variegated hard surface covering.

This invention relates to a device for making variegated hard surface covering comprising, in combination, a sheeting calender adapted to form a sheet having a definite directional graining, a perforating element adapted to form a plurality of openings in the sheet, means for tearing the sheet along the openings so as to form two sections each of which has an irregular edge composed of torn and formed portions, and means for cross-rolling a plurality of sections disposed in overlapping relationship with the irregular edge of one section adjacent the face of a second sheet to form a continuous sheet.

The attached drawings illustrate a preferred embodiment of my invention, in which

Figure 1 is a plan view of my device for making variegated hard surface covering by the cross-rolling process;

Figure 2 is a view partly in elevation and partly in section of a portion of the device shown in Figure 1, the frame of the device being removed to illustrate the skiving and perforating mechanism;

Figure 3 is a view in elevation of a suitable skiving tool;

Figure 4 is an isometric view of the perforating cutter;

Figure 5 is a sectional view of a sheet of linoleum composition serving to illustrate the skived recess formed in its under surface; and

Figure 6 is an exaggerated plan view of a portion of a sheet provided with arcuate slots.

Suitable mixing equipment is provided for forming two differently colored linoleum compositions. It will be appreciated suitable equipment may be provided for any desired number of differently colored compositions. The differently colored compositions are blended into a cohesive vari-colored mass which is fed to a two-roll sheeting calender 2, as shown in Figure 1. The face roll 3 of the calender 2 is maintained at a lower temperature than the back roll 4 in order to ensure that a formed sheet will adhere thereto rather than to the back roll 4 and to assist in securing the desired graining. The roll 3 is rotated at the same or a slightly greater speed than

the roll 4 which extrudes the granules and elongates the differently colored granules to some extent thus forming what is known as a jaspe sheet. A doctor blade (not shown) is usually provided to remove the jaspe sheet from the roll 3. Such equipment is well-known in the industry and does not require lengthy description for a full and complete understanding of my apparatus and method.

It is desirable that the edge of the sheet which is disposed adjacent the face of the subsequent or preceding sheet be irregular in contour and have some portions thereof extending beyond the body of the sheet to a greater extent than other portions since this materially reduces the volume of plastic composition present in the nip of the cross-rolling calender when overlapped sheets are joined and made into an integral sheet. I have found that an irregular edge formed by perforating and tearing the edge substantially alternately achieves the desired result. I provide a perforating tool or cutter 5 having a plurality of oppositely curved teeth 6 which are bent outwardly in opposite directions. The cutter 6 is thus adapted to form a plurality of offset arcuate slots 7 in a formed sheet 8. It will be understood, of course, the teeth 6 of the perforating tool 5 may be straight or curved in the same direction if desired.

Preferably, the tool 5 is disposed adjacent the roll 3 in order that such roll may serve as a platen therefor and is supported by a lever 9 pivoted on a shaft 10 extending across the device. The lower portion 11 of the lever 9 engages and is held in contact with a pin 12 held in a support 13. As the pin 12 is moved outwardly, it rotates the lever 9 about the shaft 10 to move the perforating tool 5 upwardly toward the roll 3. As the pin 12 is retracted within the support 13, the weight of the perforating tool 5 is sufficient to rotate the lever 9 about the shaft 10 thus moving the tool 5 in the opposite direction. The tool 5 is adjustable laterally of the shaft 10 in order that the slots 7 may be formed in any desired position laterally of the sheet 8.

The sheet 8 containing perforations, slots or openings 7 is then led over a bar 14 as shown in Figure 1, which serves to tear the sheet into two similar sections 8a and 8b by connecting the offset openings. Thus similar sections are produced each of which possesses an irregular edge formed of alternately torn and formed portions. The sections are placed on a conveyor 15 which carries them to a table 16 positioned adjacent the rolls of a cross-rolling calender 17. Such sections 8a and 8b while traveling on the conveyor are subdivided, either manually or mechanically, into suitable sizes to be fed to the cross-rolling calender 17.

The subdivided sheets are disposed in overlapping relation on the table 16 with the irregular edge of one sheet disposed adjacent the face of the other sheet. As shown in Figure 1, the subdivided sheets are fed to the cross-rolling calender 17 face-down and, accordingly, the irregular edge of the sheet is the rear edge. Of course, if a continuous sheet 18 were to be formed face-up, the irregular edge would be that edge of the sheet first fed to the cross-rolling calender. The overlapped sheets are fed to the rolls of the cross-rolling calender 17 at right angles to the direction of graining to form a continuous integral sheet 18 and to further shorten and spread the graining to form variegations on the face thereof which resemble marble.

I have found it of material aid in the substantial elimination of "hook-on" to provide the irregular edge of the sheet with a tapered portion of less thickness than the body of the sheet.

This, of course, materially reduces the volume of plastic composition present in the nip of the cross-rolling calender at those points where overlapped sheets adjoin. In the copending application of Virgil Spencer, Serial No. 359,328, filed October 2, 1940, there is shown a skiving device especially suitable for this purpose. As shown in Figure 2, there is provided a skiving tool 19 which serves to skive or form a recess or groove 20 in the formed jaspe sheet 8. The skiving tool 19 preferably is disposed adjacent the roll 3 in order that the roll 3 may serve as a platen therefor, but it will be understood the tool 19 may be used to skive a groove 20 in the sheet 8 after it has been removed from the roll 3. In such case, a suitable backing plate or platen need be provided. The skiving tool 19 skives a thin tapered ribbon from the sheet 8 thus leaving a tapered groove or recess therein.

The skiving tool 19 preferably consists of a thin metal strip 21 having a sharpened and tapered edge 22 bent into the form shown in Figure 3. The tool 19 is bolted to a metal bar or rod 23 held in a barrel 24 adjustably mounted upon a shaft 25 extending across the device. The skiving tool 19 is adjusted by means of a handwheel 26 secured to a threaded rod 27 which extends through the barrel 24 and into a threaded opening 28 provided in the bar 23. The bar 23 is keyed to the barrel 24 to prevent its rotation. Rotation of the handwheel 26 causes rotation of the threaded rod 27 permitting the bar 23 to be raised and lowered in the barrel 24 to move the skiving tool 19 toward and from the roll 3, thus varying the depth of the groove or recess skived in the formed sheet.

In operation, a cohesive vari-colored mass of linoleum composition is fed to the two-roll calender 2 and formed into a sheet 8 having a definite directional graining. While the sheet 8 adheres to the cold roll 3, the skiving tool 19 skives a portion of the under surface of such sheet so as to reduce its thickness, preferably at its central portion. The perforating tool 5 then, while the sheet still adheres to the cold roll 3, forms a plurality of slots 7 in the skived portion 20 of the sheet 8. The sheet is doctored from the cold roll 3 and passed over a bar 14 which tears it in two separate sections 8a and 8b by connecting the offset slots 7. Each section so formed possesses a tapered irregular edge formed of alternate torn and formed portions. The sections 8a and 8b are placed upon a conveyor 15 which carries them to the cross-rolling calender 17. During their passage on the conveyor 15, the sections are subdivided, manually or mechanically, into sheets of suitable size for feeding to the cross-rolling calender.

The sheets are placed in overlapping relationship on the table 16 with the tapered irregular edge of one sheet disposed adjacent the face of another sheet and are so fed to the rolls of the cross-rolling calender 17. As shown in Figure 1, such sheets are fed face-down so that the irregular edge is the rearward edge of the sheet. The sheets are cross-rolled to spread and shorten the graining and to form a continuous integral sheet which may be placed upon a suitable backing or fed to the dies of the rotary inlaying machine as well-known in the industry.

The practice outlined above substantially or

entirely eliminates the visible discontinuity between overlapped sheets. Distortion of face graining at the overlapped edges does not occur to any substantial extent and accordingly, a continuous variegated linoleum sheet is produced in which the graining presents substantially the desired appearance over the face of the sheet. The enormous waste created by "hook-on" is entirely eliminated and a more desirable and decorative sheet is produced. The improvements in the cross-rolling process above described add little or nothing to the costs involved in making the sheet. The additional apparatus required in order to effectuate such improvements is inexpensive and does not require frequent replacement. Needless to say, however, the chief advantage of my improved process resides in the substantial or entire elimination of grain distortion at those sections of the continuous sheet where overlapped sheets are adhered to one another.

While I have described and illustrated a preferred embodiment of my invention, it will be understood my invention is not so limited since it may be otherwise embodied or practiced within the scope of the following claims.

I claim:

1. In combination with a sheeting calender, a skiving tool adapted to form a recess extending longitudinally of the under surface of a sheet of hard surface covering material, means to adjust said tool to vary the depth of the recess, and a perforating element for forming a plurality of openings in the recessed portion of the sheet, said sheet being adapted to be torn along the openings so as to form two sections each of which has an irregular edge formed of alternate torn and formed portions and of less thickness than the body of the section.

2. In combination with a sheeting calender, a skiving tool adapted to form a recess extending longitudinally of the under surface of a sheet of

hard surface covering material, means to adjust said tool to vary the depth of the recess, and a circular cutter adapted to form a plurality of offset openings in the recessed portion of the sheet, said cutter having a plurality of alternately outwardly and inwardly bent cutting portions disposed in spaced relationship to one another, said sheet being adapted to be torn along the offset openings to form two sections each of which has an irregular tapered edge having at least a portion thereof formed of alternate torn and formed portions.

3. In a device for making a variegated sheet of hard surface covering, the combination of a sheeting calender adapted to form a sheet having a definite directional graining, a skiving tool disposed adjacent thereto adapted to form a recess extending longitudinally of the under surface of a formed sheet, means to adjust said tool to vary the depth of the recess, and a perforating element adapted to form a plurality of openings in the recessed portion of the sheet, said sheet being adapted to be torn along the openings so as to form two sections each of which has an irregular edge of less thickness than the body of the section.

4. In a device for making a variegated sheet of hard surface covering, the combination of a sheeting calender adapted to form a sheet having a definite directional graining longitudinally thereof, and a perforating member disposed adjacent said calender for forming a plurality of openings longitudinally of said sheet, said perforating member comprising a circular cutter having a plurality of alternately outwardly and inwardly bent cutting portions disposed in spaced relationship to one another, said sheet being adapted to be torn along the openings so as to form two sections each of which has an irregular edge composed of torn and formed portions.

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