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METHOD OF CUTTING TILE IN REGISTER FROM A CONTINUOUS SHEET

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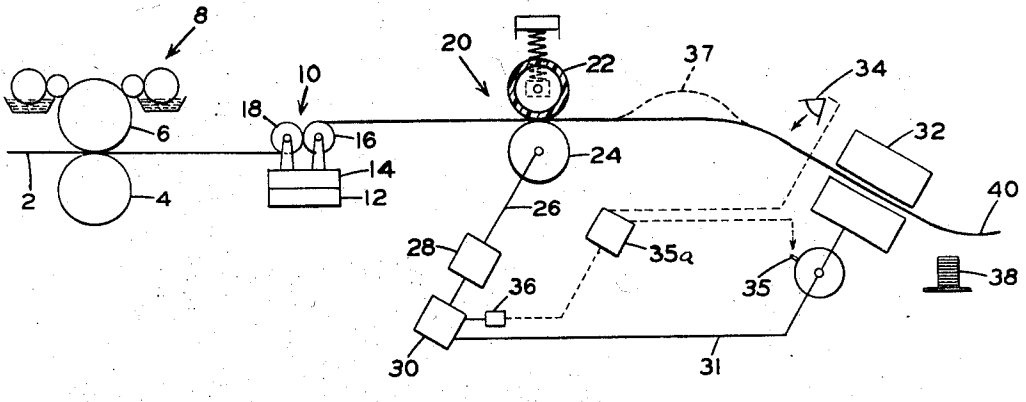

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METHOD OF CUTTING TILE IN REGISTER FROM A CONTINUOUS SHEET

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U.S. Cl. 264—40 1 Claim

ABSTRACT OF THE DISCLOSURE

A method of trimming and cutting into short tile-size sections a continuous length of sheet goods with impressions thereon. The continuous sheet goods is first guided in its longitudinal direction by a guider. The sheet material is then fed into a photocell controlled feeder which operates to feed the sheet material in a proper sequence to a punch press. The punch press then cuts the goods in register from the continuously fed sheet material.

BACKGROUND OF THE INVENTION

Field of the invention

The invention relates to the trimming and cutting of continuous lengths of material, and in particular, to the trimming and cutting of pieces of floor tile in register with embossing thereon from continuously moving lengths of material.

Description of the prior art

Prior to this invention, floor tiles were not of a design such that would require the critical placing of the embossing relative to the edges of the tile. Previous tile designs did not have border arrangements or a layout configuration that required adjacent tiles to be in proper alignment to provide an overall continuity in the design of the flooring. The first attempts made at cutting tile in registry from a sheet material are disclosed in copending application Ser. No. 600,990, filed Dec. 12, 1966, now Pat. No. 3,407,690, dated Oct. 29, 1968, wherein the continuous lengths of material are cut into short sections, and the short sections in turn are fed into a punch press to again be subdivided into individual tile pieces. Such an operation is not continuous in that there is no feed of a continuous blanket of material through the manufacturing apparatus.

SUMMARY OF THE INVENTION

The invention has as its primary object the accomplishment of the proper registration of the embossed pattern within the edge limits of the tile shape. This proper registration of the embossed area then provides for continuity of the design between adjacent tiles.

The invention further has the object of trimming and cutting continuous lengths of sheet goods with impressions thereon so that the sheet goods may be kept continuously moving through the operating apparatus as the tiles are cut in register with the pattern embossed thereon.

BRIEF DESCRIPTION OF THE DRAWING

The drawing is a schematic side view of the trimming and cutting apparatus for forming individual tiles.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The apparatus of the drawing is the structure that will cut in register individual tiles from a continuous flow of sheet material. The sheet material or goods **2** is fed past rollers **4** and **6**. These rollers particularly roller **6**, provides the embossed pattern on the upper surface of the sheet goods. Appropriate coloring apparatus **8** will apply color to the raised areas of the embossing roll so that the embossing roll will in turn emboss and color the depressed areas of the sheet material.

The guider device **10** has a fixed base **12**, a movable section **14**, carrying thereon support rollers **16** and **18**. The sheet material passes under roller **14** and over roller **16**. Appropriate control means will sense the edge configuration of the sheet material and so control the guider **10** that the lateral displacement of the sheet will be maintained. The lateral displacement of the sheet material is maintained to insure that the longitudinal edges of the sheet material and the individual tiles to be cut therefrom will be in register with the longitudinal edge and cutting surface of the press. The particular guider is conventional in the art and is normally controlled by a photocell sensing system which follows the longitudinal edge of the sheet material being guided.

The sheet material **2** then passes onward to a drive assembly **20**. A rubber-covered spring bias roll **22** presses on the upper surface of the sheet material. This roll forces the sheet material against a drive roll **24**. These two rolls operate as a feed roll structure to feed or meter the sheet material into the press so that the sheet material will be in register with the cutting edges within the press. The drive shaft **26** of the lower roll **24** is connected to a brake **28** to permanently load the drive structure to eliminate backlash in the various gear trains. A phase shift differential **30** is driven directly from the drive **31** of the punch press **32**. The diameter of the feed roll **24** ist sized so that the material requirements of the punch press are satisfied with each press stroke. Consequently, the drive of the punch press as it carries the press through one stroke cycle insures that the feed roll **24** provides the material requirements for the die for that one stroke.

However, due to any number of different errors such as variations in the difference between repeat patterns feed, slippage between drive rolls, etc., it is possible that the amount of material metered by the feed roll will not correspond to the exact amount of material that is needed for the die of the punch press. During the embossing of the pattern on the sheet goods **2**, a registration mark is placed upon the sheet goods. This registration mark corresponds to the emboss pattern, and the distance between any two registration marks is the repeat distance of the pattern and the amount of material that should be fed into the die of the punch press to secure proper cut in register of the individual tiles. A photocell structure **34** is used to view the registration marks on the sheet goods. The reading of the register marks by the photocell-electric scanner **34** emits a pulse or signal as each mark passes. The position of each pulse is compared to a reference obtained from a selection switch **35** geared to the press crankshaft. Any deviation from an in-position relationship initiates correction action to restore the material to the correct position for registration. The signal of scanner **34** and switch **35** are fed to a computer system **35***a* and compared in the conventional manner. Based on the comparison, a correction signal is fed to the correction motor **36**. The comparison system is a conventional electronic circuitry.

The positioning of the photo-electric scanner relative to the punch press is such that the register mark should be seen by the photo-electric scanner when the punch press is in a certain point in its cycle. If this condition is met, then the feeding by the feed roll **24** as driven by the punch press power train will provide the proper feeding of the correct amount of material to satisfy the die size of the punch press so that the tiles will be cut in register. If the register mark is not in position by the scanner **34**, then a pulse is generated which operates a DC correction motor **36**. The DC correction motor **36** is connected to

the phase shift differential **30** and provides a correction of drive for the feed roll **24**. The use of a phase shift differential with a DC correction motor and a photo-cell-electric scanner is a conventional structure in the art for providing automatic control of a powered system.

While it is true that the sheet material **2** cannot be moving while the punch press is actually cutting the individual tiles from the sheet material, the sheet material otherwise is continuously moving. The continuous infeed of material to the punch press causes a bulgeup **37** of the material between the feed roll and the punch press to compensate for the continuous movement of the sheet material and the relative intermittent operation of the punch press. The actual time that the sheet material is stationary in the punch press is very small to the time that the material is continuously moving through the punch press. The sheet material is actually stationary in the punch press only during the very last portion of the punch press cycle when the die of the punch press is actually cutting through the sheet material to form the individual tiles. The individually cut tiles **38** then drop from the punch press while the now perforated sheet material **40** passes on as scrap for possible reuse in mixing new material.

Although the invention has been described in considerable detail, such description is intended as being merely illustrative, rather than limiting, since the invention may be variously embodied and the scope of the invention is to be determined as claimed.

What is claimed is:

1. The method of trimming and cutting into individual tiles, a continuous sheet material with repeated impressions thereon having register reference marks, comprising the steps of:

(a) embossing the sheet material;

(b) passing the sheet material over a guider which positions it laterally relative to a means for punching the repeated impressions out of the sheet material;

(c) passing the sheet material by a control means which senses the register reference marks;

(d) continuously feeding the sheet material by a feed roller means which meters the sheet material to the punching means;

(e) directly mechanically connecting the feed means which feeds the sheet material with the drive means which operates the punching means so that these two means operate continuously and in an interconnected relationship; and

(f) controlling the relationship between the feed means and drive means by varying said relationship as a result of signals generated by the sensing means for the register reference marks when necessary so that the sheet material is metered into the punch press with its repeat pattern longitudinally in reference to cutting elements of the punching means.

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