

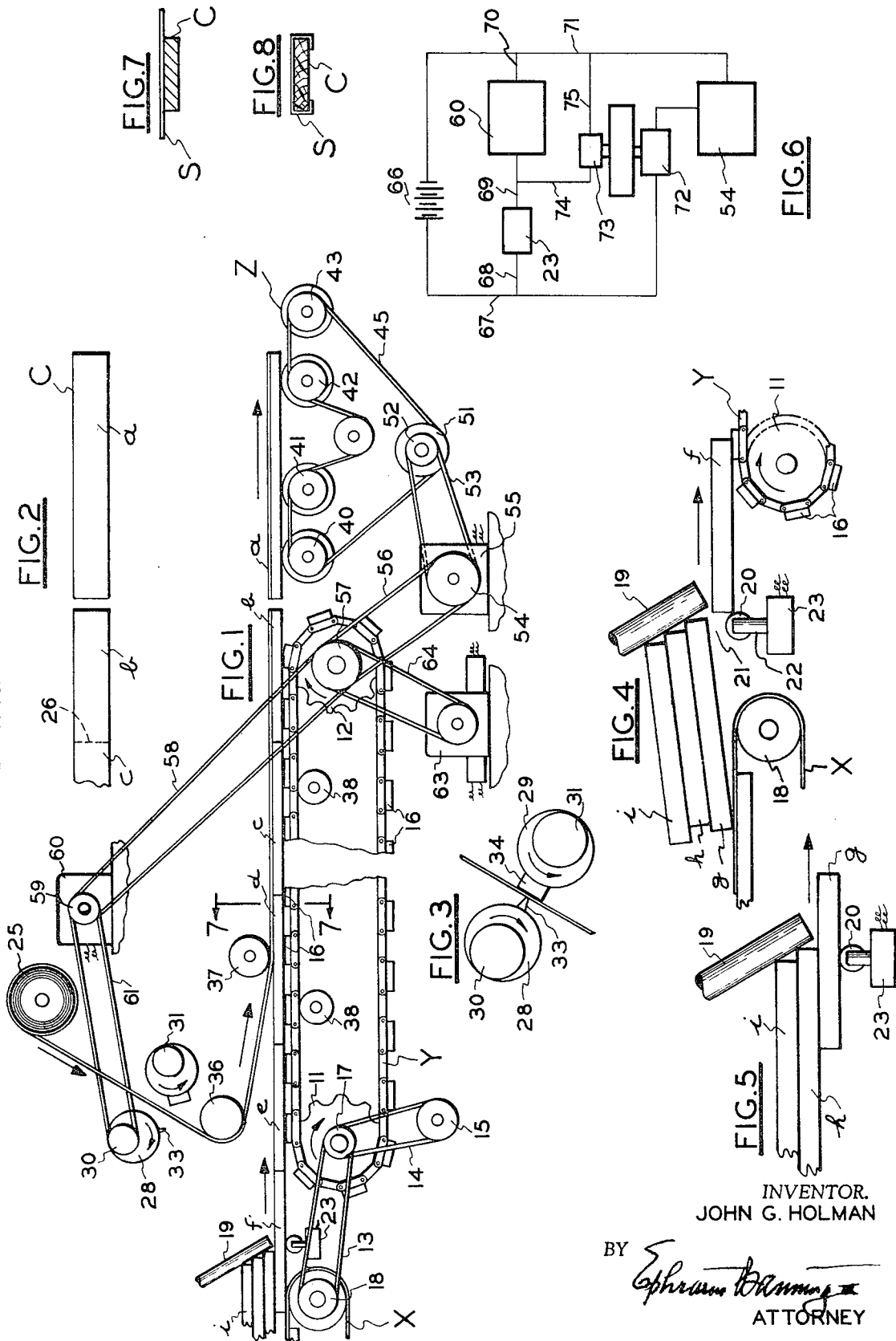
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MEANS AND METHOD FOR APPLYING FACING STRIPS TO CORES

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MEANS AND METHOD FOR APPLYING FACING STRIPS TO CORES

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6 Claims

ABSTRACT OF THE DISCLOSURE

A means and method for the continuous application of a flexible facing strip of indefinite length to one face of each of a succession of cores while all are advancing in end to end engagement through a fixed path. The method involves (1) drawing the strip from a supply roll to overlie the top face of a plurality of cores for adhesion thereto while advancing end to end in a procession, (2) forming lines of future rupture across the strip, while advancing toward the cores, at points which are coincident with the trailing ends thereof, and (3) thereafter tensioning the advancing strip, as each core nears the end of its movement through a fixed path therefor, at points on opposite sides of each line of rupture, transversely of the strip to produce thereat a clean severance thereof whereby to free each core, in turn, for removal from those to the rear thereof.

This invention is concerned with a repetitively-performed two-step operation on a moving film or strip. The first step takes place before the strip has reached a line of cores moving through a fixed horizontal path, and the second after the strip has been adhesively applied to a first core and others to the rear thereof. The first step is the production of a future rupture line transversely of the strip at a point coincident with the trailing end of each core, and the second is the severance of the strip by applying a pulling force thereto when nearing the end of its movement through the fixed path of travel of the cores. Performance of these two steps is also facilitated by advancing the cores while rested upon conveyor means which may comprise endless belts and/or chains, arranged in tandem, the first acting to load the cores seriatim on to the second in fixed positions thereon to be processionally advanced thereby, end to end, interengaged, and all interconnected by the strip. A third unit is a tensioning means for producing a sudden acceleration in the movement of the interconnected cores, each such acceleration acting to tension and sever the strip at its line of rupture which is then proximate to each leading core.

The production of rupture lines across the strip, where severance thereof is to take place at points coinciding with the trailing end of each core, is a primary feature of this invention which involves (1) a special speed relationship between the several means comprised in the conveyor system, and (2) a trigger in continuous engagement with the under faces of the cores while advancing through a gap between the loading and feeding means, the trigger also acting to engage with each passing trailing end of a core whereby to complete an electrical circuit to operate means which produce rupture lines across the strip at points coinciding with each such core trailing end, preliminary to a subsequent severance of the strip along each such rupture line in response to operation of the delivery means.

A detailed description of the steps involved now follows. Reference is made therein to the accompanying drawing which exhibits a suggestive embodiment of this invention in the manner following:

FIG. 1 is a schematic view of an arrangement and interconnection of operating units which are adapted for

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effective use in the performance of the various operations involved, these units being mounted upon an elongated framework (not shown) much of which, intermediately of its ends, together with certain mechanisms carried thereon, is broken away and omitted from the view as foreign to this invention;

FIG. 2 is a plan view of the foremost advancing core as it appears when it is first separated from the procession of interconnected cores to the rear thereof;

FIG. 3 is an enlarged schematic fragmentary end view of the cutting rollers in their operative positions at opposite faces of the strip;

FIG. 4 is an enlarged schematic fragmentary side view of a core in lagging position as it appears when first advancing through the space between the loading and feeder belts, with portions of other cores shown as stacked thereon on the loading belt to await their turn to drop down, one at a time, into the movement path of the feeder belt whereon each of the cores is, in turn, processionally advanced;

FIG. 5 which is a view similar to FIG. 4 shows the advancing core of that figure as it appears a moment later as it is catching up with the core immediately ahead to engage therewith;

FIG. 6 is a diagram of a simple electrical system between the various operating and controlling units which act upon the continuously advancing cores and strip to (1) to unite one to the other and later (2) to separate one core, together with the strip facing applied thereto, from the remaining cores advancing through their movement path;

FIG. 7 is a transverse sectional view, taken on line 7—7 of FIG. 1, showing a core with a strip applied thereto before start of any wrapping of the strip around the core; and

FIG. 8 is an elevational view of one end of the core with the strip facing applied thereto as it appears when wrapped around the core edges, with edges of the strip applied to the rear face of the core, all ready for fabrication into any one of various products for which the cores are suited.

The work herein described comprises a facing strip or film S which may be produced from various materials, such as a vinyl derivative, having a uniform thickness, usually ranging from 2 mm. up. It is tough, flexible and available in various widths up to several feet. When coated on one face with a suitable adhesive, contact, or otherwise, it is conditioned to serve as an excellent and permanent facing for any base to which it may be affixed. The base herein referred to generally as a core C is obtainable in various lengths and cross-sections. The cores, all alike, are specifically designated as a-i depending upon their positions as shown in FIGS. 1, 4 and 5. These cores which are relatively cheap and a desirable product, are usually raw and unfinished, and often produced from plywood or particle wood, sometimes called "chipboard." While cores are regularly available in certain standard lengths, they also come in other random lengths, usually for a lower price. The materials just mentioned are suggestive only. The facings and strips to benefit from this invention are many, and offer a wide selection to successful treatment when subjected to the continuous operations involved in this invention.

A horizontal movement path for the work is provided, as is also means for continuously advancing the work therethrough. This usually takes the form of a framework mounting a conveyor system comprising a loading means X, and a feeder means Y, the latter comprising an endless chain movable around spaced sprocket wheels 11 and 12 one of which, through an endless belt 14 is power driven by a motor 15. The links of this chain are equipped with upstanding friction pads 16 for fixed support there-

on of the cores when rested upon the top run of the belt. Each core starts from the loading means X shown as an endless belt, then advances on to the feeder belt Y, and ends upon a set of traction rollers constituting the delivery means Z, all three being arranged in tandem with small gaps therebetween. The loading means X is here shown as an endless belt synchronously driven with the feeder chain, as by an endless chain 13 which travels around sprockets 17 and 18 of unequal diameter (FIG. 1), one mounted coaxially fast with the sprocket wheel 11 and the other similarly mounted with the slightly larger wheel 17 whereby the loading belt X is caused to operate at a slightly faster speed. The delivery means traction rollers of the delivery unit Z are driven separately and intermittently at a higher speed. The upper runs of the two belts are disposed in a single plane which is also tangential to the tops of the traction rollers 40-43 to operate in the same direction so that the work advancing on one unit may be readily transferred to the next unit for continued movement through the prescribed path of movement.

In operation, a plurality of elongated cores, arranged end to end are continuously advanced by the conveyor units. As shown in FIG. 1, the foremost core *a*, when rested upon the delivery unit Z, is separated from the next succeeding core *b*. Other cores *c-e*, processionally arranged to the rear of cores *a* and *b*, are shown as being advanced by the feeder belt Y; a core *f*, bridging the gap between the loading and feeder belts, is also shown in process of advancing from one to the other; and still other cores *g-i*, stacked on the loading unit X (FIGS. 4 and 5), are indicated as temporarily restrained by one or more inclined bars 19, from advancing on to the feeder chain Y pending clearance therefor to be provided by the core *f* when further advanced (FIGS. 4 and 5). Below this bar (or bars) is a vertical space just wide enough for one core at a time to pass through on its way to the feeder belt. The term "foremost" as used herein designates the position of the core *a* at the head of the line, rather than any particular core, although each core in turn will eventually occupy that position for a very brief moment of time.

There is initially produced an initial lag in the starting movement of the core *g* when released for its advance on to the feeder belt Y (FIG. 4). This lag creates a gap 21 between the core forward end and the trailing end of the core *f* immediately ahead of it; shortly thereafter there will be a closing of that gap (FIG. 1) whereby these two cores are endwise interengaged and continue to remain so during the balance of their movements through the fixed path provided therefor. This initial lag in core movement is due to inertia, slippage of the core *g* when first advanced by the smooth loading belt X, and by friction between the top face of the core on the loading belt and the cores stacked thereupon. This initial slippage quickly decreases to the zero point whereupon the core *g* then proceeds to overtake and engage endwise with the core *f* ahead of it. Its continued advance will cause it to become seated on several of the friction pads 16 upstanding from the feeder belt Y, to remain thereon in a fixed position for the remainder of its movement therewith.

During the brief period while the movement of the core *g* lags behind those forwardly thereof, an upwardly movable roller 20 continues to engage in turn, with the under face of each advancing core. This continuous engagement also includes the transverse gap 21 of brief duration which is created between the ends of adjacent cores then advancing between the loading and feeder belts. The slow start of each core, as it leaves the loading belt, is followed by a quick catch-up with the core immediately ahead of it as the loading belt acts to transmit an accelerated speed thereto whereby it is enabled to join the core procession then advancing on the feeder belt. The roller 20 also is free to rise and partly enter into the gap 21 which inter-

venes briefly between the lagging core and the one ahead of it (FIG. 4). This roller is carried at the top end of an upwardly-biased stem 22 upstanding from a normally-open micro-switch 23. As a result, the roller, while rising to its upper position, tends to engage the trailing end of the core *f*. This range of movement for the roller suffices for the micro-switch to momentarily close the electrical circuit wherein it is installed, whereby to trigger operation of the various mechanisms controlled thereby. It is important to note that repetitive operation of the trigger is responsive to passing of the trailing end of each core which thereby sets in motion certain mechanism which acts instantly upon the strip S then advancing toward the moving cores for permanent affixation to the top faces thereof.

The method herein described involves also a consideration of the other component of the work, viz., the strip of film S and its coordinated movements with those of the cores. To one face of this strip, which is continuously withdrawn from a supply roll 25, an adhesive is applied, as by spraying, and then dried, thereby conditioning it for adhesive affixation to the cores. Before its application to any core, however, the strip is operated upon to form crosswise thereof a rupture line along which the strip may be subsequently severed. This rupture line may be a row of perforations or slits extending crosswise of the strip at a point opposite the trailing end of the core to whose face the facing will thereafter be applied. Since the lengths of the cores so to be faced may vary considerably, the location of each such rupture line presents a problem which is dependably solved herein by the method of this invention.

First of all, the means for so perforating or slitting the strip comprises a pair of interconnected rollers 28 and 29 (FIG. 3) having eccentric trunnions 30 and 31 at opposite ends to be mounted within suitable bearings therefor. When operated in unison, through one revolution in opposite directions, the two rollers will be simultaneously shifted toward and from each other while remaining parallel. The roller 28 mounts endwise thereof a blade 33 having, by preference, a scalloped cutting edge which at one point in the roller cycle lies radially opposite of a cushioned backing bar 34 extending lengthwise of the other roller 29. These two rollers are so rotatively interconnected that during each cycle of revolution the blade on one roller always arrives at a position radially opposite that of the backing bar on the other roller. The strip S, which is then being drawn between the two rollers at a speed equal to their peripheral speeds, is momentarily engaged by the cutting edge of the revolving blade 33, to be cut radially or slit thereby along the line 26 transversely of the strip. The exact form and extent of the cut is not as important as is the effective weakening of the strip along a line of future severance. A scalloped cutting edge is one accepted form; it will provide a number of aligned slits, separated slightly from each other by webs at their ends. A row of closely spaced holes would also suffice. The backing bar 34 assures a clean cut whatever be its form and depth. The cut desirably extends for the full distance between opposite faces of the strip, but not necessarily so. The webs of material remaining intact between the cuts should always be adequate to safeguard the strip against parting until its application to a plurality of cores and its movement therewith has been completed through the fixed travel path provided therefor.

From the cutting roller 28 the strip proceeds on toward the rearward end of the feeder belt Y where a succession of cores is being steadily advanced into fixed positions thereon. At a point proximate thereto, the strip passes around an idling roller 36 to assume a nearly horizontal position before contact is made with any core C then advancing with the feeder belt. This point of contact is fixed by a near-by idler roller 37 beneath which the strip is required to pass. This last roller may be spring-biased downwardly or gravity-impelled when engaging the strip

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to assure its firm and smooth adhesion to the top face of each core. Other idling rollers (not shown) may be similarly positioned at various points lengthwise of the advancing cores. Also rollers 38 fixedly positioned below the top run of the feeder chain are provided to supply any needed support therefor. All the cores then advancing on the feeder chain, it will be noted, are interconnected by the strip S to hold them closely together independent of any other means for this purpose.

The roller 37 establishes a fixed junction point for the advancing strip and cores. It should be equidistant, travel-wise, from (1) the cutting blade 33, when engaged with the strip, and (2) and roller 20 when engaged with the trailing end of each core. Since movements of the strip and cores proceed at equal speeds, and operation of the triggered blade is practically an instantaneous one, it follows that each slitted line 26 will be coincidental with the trailing end of a core, regardless of its length. This step and those remaining proceed so rapidly that travel of the strip and cores may be safely maintained at or about 150 feet per minute. This fixed relationship between the three points just noted—the junction, slitting and triggering—is essential to subsequent severing of the strip coincidentally with trailing ends of the cores. The term “coincide” and variants thereof, as used herein, do not mean a perfect flush relationship, but rather a registration of the core and strip ends sufficiently close to permit facile handling of the cores, with facings applied, as well as all further operations thereto. Trimming of the product is usually a different and final operation, as noted in the Bechtold patent infra.

It is while the cores are continuing their processional movement on the feeder belt that any desired wrapping of the strip around the cores may be performed. The width of the strip should be chosen with due regard to that of the cores and the extent of the strip wrapping desired. For example, FIG. 7 shows a normal relationship in the widths involved, the strip width exceeding that of the cores to provide initially co-planar extensions laterally thereof to be available for later bending around opposite edges of the core and slightly thereunder, as shown in FIG. 8. The means for so wrapping the cores may comprise rollers mounted on the apparatus framework at various points along opposite edges of the travel path of the work (omitted from FIG. 1) to engage the lateral extensions of the strip for guiding and bending it downwardly, inwardly and possibly otherwise. Such an arrangement of bending means which is disclosed in the Bechtold Pat. No. 3,296,052 would be satisfactory here. With completion of any such wrapping operation, the only remaining step to be performed is severing of the strip along its slitted line 26 to free the core *a* then advancing to a foremost position on the delivery means Z at the end of its processional movement.

Operations of the delivery means proceed intermittently, as accelerations thereof occur with movements of each core trailing end through the space between the feeder belt and the traction rollers comprised in the delivery means. A control system therefor is also coordinated with operations of the cutting roller 28 and of the feeder belt Y. This part of the present invention will now be described.

As shown, a set of co-level traction rollers 40-43 is mounted to underlie a plane which is tangent to the under faces of the cores when advancing through their movement path. Each of these rollers is desirably sleeved within a tubular cover of effective rubber-like friction material, such as “neoprene.” The surfaces of these rollers are endowed with frictional properties sufficient to transmit to the cores a quick pull when resting on the delivery means. In response to the accelerations so transmitted from the traction rollers, the foremost core *a* thereon is moved at an enhanced speed to exert a tension force rearwardly thereof sufficient to sever the strip S along its slitted or

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rupture line 26. This accelerated movement is timed to occur when only the foremost core *a* is resting on the traction rollers, with the trailing end of this core then disposed within the space between the conveyor units Y and Z. Since the strip slitted line 26 is also positioned thereat, speeding up of the traction rollers will transmit to the strip a like movement which is confined largely to the area forwardly of the rupture line 26 to assure severance of the strip at that point. When so severed, the core *a* with facing affixed, is then free for removal elsewhere, manually or otherwise.

The traction rollers 40-43 are driven by an endless chain or belt 45 passing over a pulley 51 on an over-running clutch 52 which, in turn, is belt-connected at 53 to a pulley 54 on a 1-revolution clutch 55 over which is passed an endless belt 56 which is driven from a pulley 57 coaxially fast with the sprocket wheel 12. Since the sprocket wheel drives the feeder belt Y in constant steady motion, power is supplied therefrom to both the 1-revolution clutches 55 and to the over-running clutch 52 for operation thereof in the special way for which they are designed. A further endless belt connection 58 extends from the pulley 57 to a pulley 59 on a 1-revolution clutch 60, and through a further endless belt 61, extending therefrom to a pulley coaxially of one of the eccentric trunnions 30, the cutting roller 28 is intermittently driven through a single revolution. A gear drive between the two eccentric rollers 30 and 31 (not shown) serves to drive both rollers oppositely and in unison. There is also a timer switch 63 driven from the belt sprocket wheel 12 by a chain or belt 64. The whole system of mechanically connected units just described is operated from the continuously moving feeder belt Y, but with certain electrical controls therefor now to be described.

The wiring diagram of FIG. 6 is well suited for use with this invention. It shows a current source 66 with a main wire 67 extending therefor to join with a connection 68 to one side of the micro-switch 23 and with a further wire 69 leading to one side of the 1-revolution clutch 60 for operation thereof. Such a unit, commonly called to “1-revolution clutch,” includes a shaft driven by a motor having adjustable means by which to pre-set its operation for a limited number of turns, one revolution being a common setting and being suitable for operation here although not essential. A second wire 70 connected with the other side of the 1-revolution clutch switch, extends therefrom to join with a second main wire 71 leading back to the current source. There is also the second “1-revolution clutch” 54 to which the main wires 67 and 71 are connected for operation thereof. A mechanical timer in the form of a micro-switch 72 is also interposed in this last circuit. Operation of this timer is controlled by the axially-movable plunger of a solenoid 73 in connection at opposite sides thereof with wires 74 and 75, which are joined respectively with the wire 69 leading from the micro-switch 23 and the main wire 71 leading to the current source. In such a wiring system, the microswitch 23 controls everything. In other words, it is only when in closed position that any current can pass through to energize the 1-revolution clutch 60 (for the cutting roller), and then only when the other micro-switch 72 is also closed can the second 1-revolution clutch 54 (for the pulling rollers) be operated.

Manifestly, it is operation of the primary micro-switch 23 and the timing of its closing movements to coincide with passage of the trailing end of each advancing core, that is all-important here. Operation of the cutting roller 28 follows directly upon each core trailing end and movement past this switch to trigger its operation. All else is dependent thereon with the operation thereof only indirectly connected thereto. This is a feature basic to the method of applying laminate faces to cores of variable length, since the timing of all operations must be related directly to the advancing movements of all cores of uncertain length. Initial application of the facing strip to

cores of random length has heretofore not been wholly satisfactory. It is a first step which sets the pace for subsequent operations, particularly the bending and wrapping operations, so is a desideratum long sought and needed in the various industries concerned with the fabrication and use of faced cores for trim around doors and windows of buildings, baseboards, wainscoting, picture and mirror frames, edges of game tables, etc.

I claim:

1. The method of adhesively applying a flexible facing strip of indefinite length to one face of a succession of like cores interengaged end to end for continuous processional advance through a fixed path wherein they are releasably held in fixed positions, which comprises the steps of (1) positioning a trigger means for engagement with a second face of each core moving processionally through its fixed path, the trigger means being sensitive to operation in response to movement of each passing trailing end of the core, (2) slitting the strip transversely and concurrently with each operation of the trigger means, while the strip continues its advance toward the core path of movement for application to one face of each core, thereby to interconnect a plurality of the cores then processionally advancing, and (3) applying to the foremost core, when near the end of its movement path, a brief pulling force sufficient to sever the strip connection with the next adjacent core along the slitted line therebetween, the foremost core being then free, with facing strip attached thereto, for separation from those still interconnected and remaining in the core movement path rearwardly thereof.

2. The method of adhesively applying a facing strip to a succession of advancing cores, as specified in claim 1, wherein each new core, when added to the procession at its tail end, is initially advanced at a relatively slow speed to create a temporary gap between itself and the core immediately ahead, then accelerated to a relatively high speed to overtake the core immediately ahead and engage therewith for the balance of its advance through the movement path therefor, and wherein the trigger means is advanced into the gap so created to engage with the core trailing end at one side thereof.

3. The method of adhesively applying a facing strip to a succession of advancing cores, as specified in claim 1, wherein the advancing strip and procession of cores first contact with each other at a point which is travelwise equidistant from (1) the temporary gap produced between two of the cores and (2) the point where each slitting of the strip is performed, whereby each of the transverse slittings produced by the latter will register with the trailing end of the core to which it is to be applied.

4. Means for adhesively applying a flexible facing of indefinite length to one face of a succession of like cores

interengaged end to end for continuous processional advance through a fixed path, comprising a continuously moving feeder means whereon each core may be releasably held in a fixed position, while advancing through the said path, means for continuously feeding the facing strip to a point of junction with one face of a foremost core and each core following thereafter, while advancing through the fixed path therefor, means operable repetitively to transversely slit the strip, while advancing to its point of junction with the advancing cores, along lines coincident with the trailing ends of the passing cores, trigger means biased to engage a second face of each core and, with passing movement of each core trailing end, to initiate concurrent operation of the slitting means, and means for thereafter applying a pulling force to the foremost core sufficient to cause severance of the strip along its slitted line, the foremost core being then free, with facing strip attached thereto, for separation from those still interconnected and remaining in the movement path rearwardly thereof.

5. Means for applying an advancing strip to a succession of moving cores, as specified in claim 4, wherein means is provided to cause (1) a temporary lag in the initial movement of each core when newly added to the tail end of the procession, followed by (2) a speed-up in each core movement to close the gap resulting from each lag, and wherein the trigger means is movable to a position within the gap, while still open, whereby to engage with the trailing end of the proximate core end, and wherein the trailing end of the proximate core is located equidistantly, travelwise, from the point of engagement between the slitted line on the strip and the point of engagement between the trigger means and core, whereby to assure coincidental operations thereof.

6. Means for applying an advancing facing strip to a succession of moving cores, as specified in claim 4, wherein the point of junction between the strip and advancing cores is located equidistantly, travelwise, from (1) the point of engagement between the slitted line on the strip, and from (2) the point of engagement between the trigger means and core, whereby to assure concomitant operations thereof.

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