Oct. 16, 1923. 1,471,246

E. S. DANIELS

AUTOMATIC GROOVING AND STRIP INSERTING MACHINE.

Filed Aug. 6, 1923 4 Sheets-Sheet 1

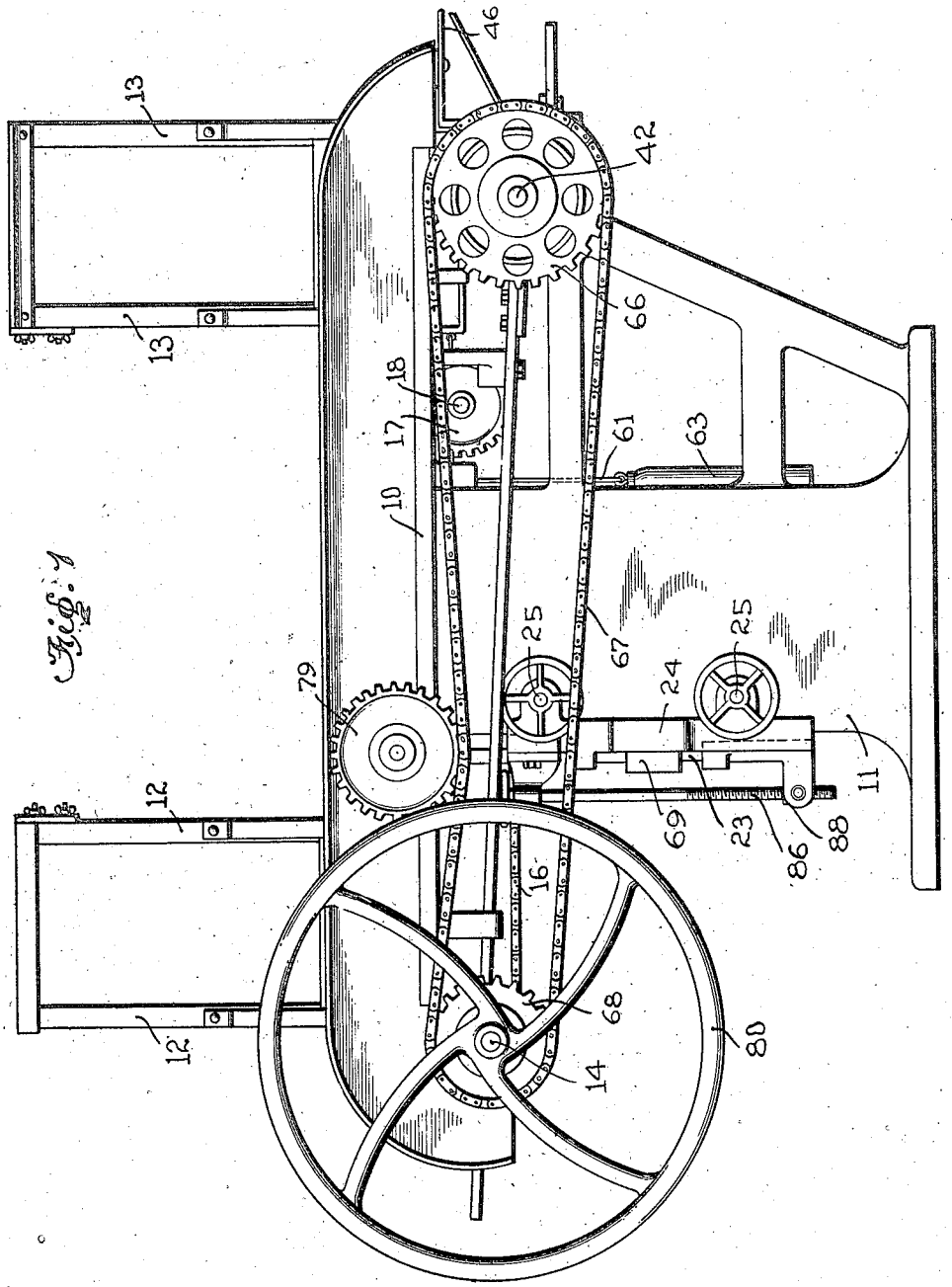


Fig. 1

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Fig. 2

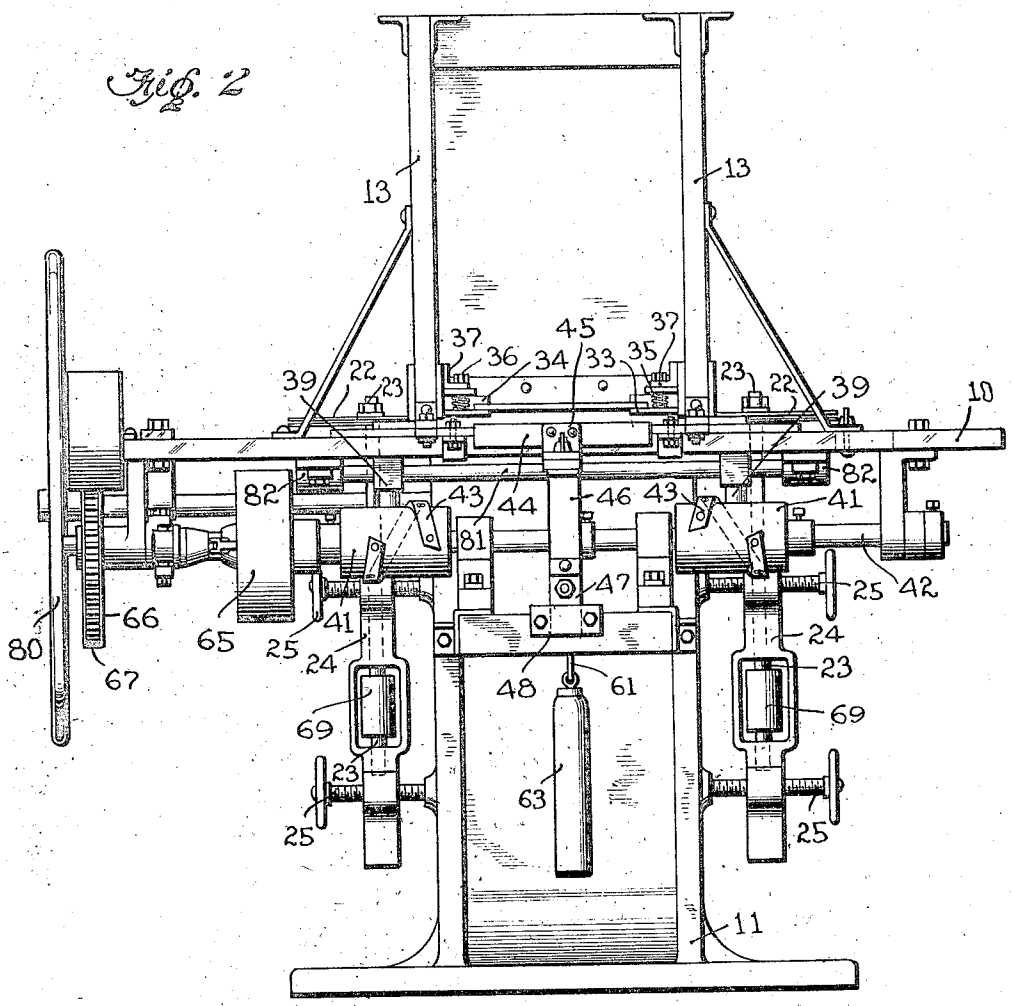
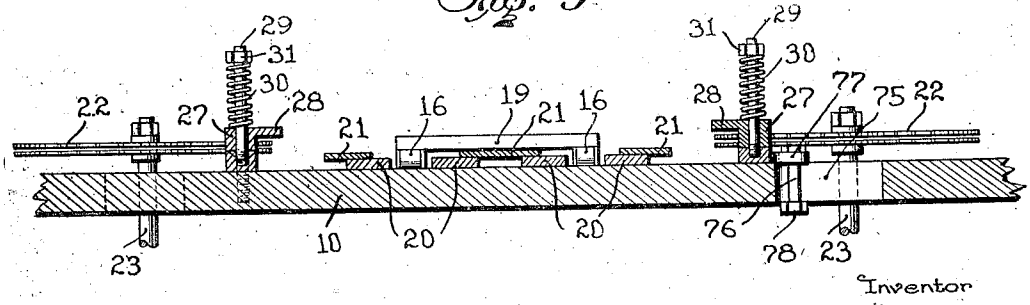


Fig. 5



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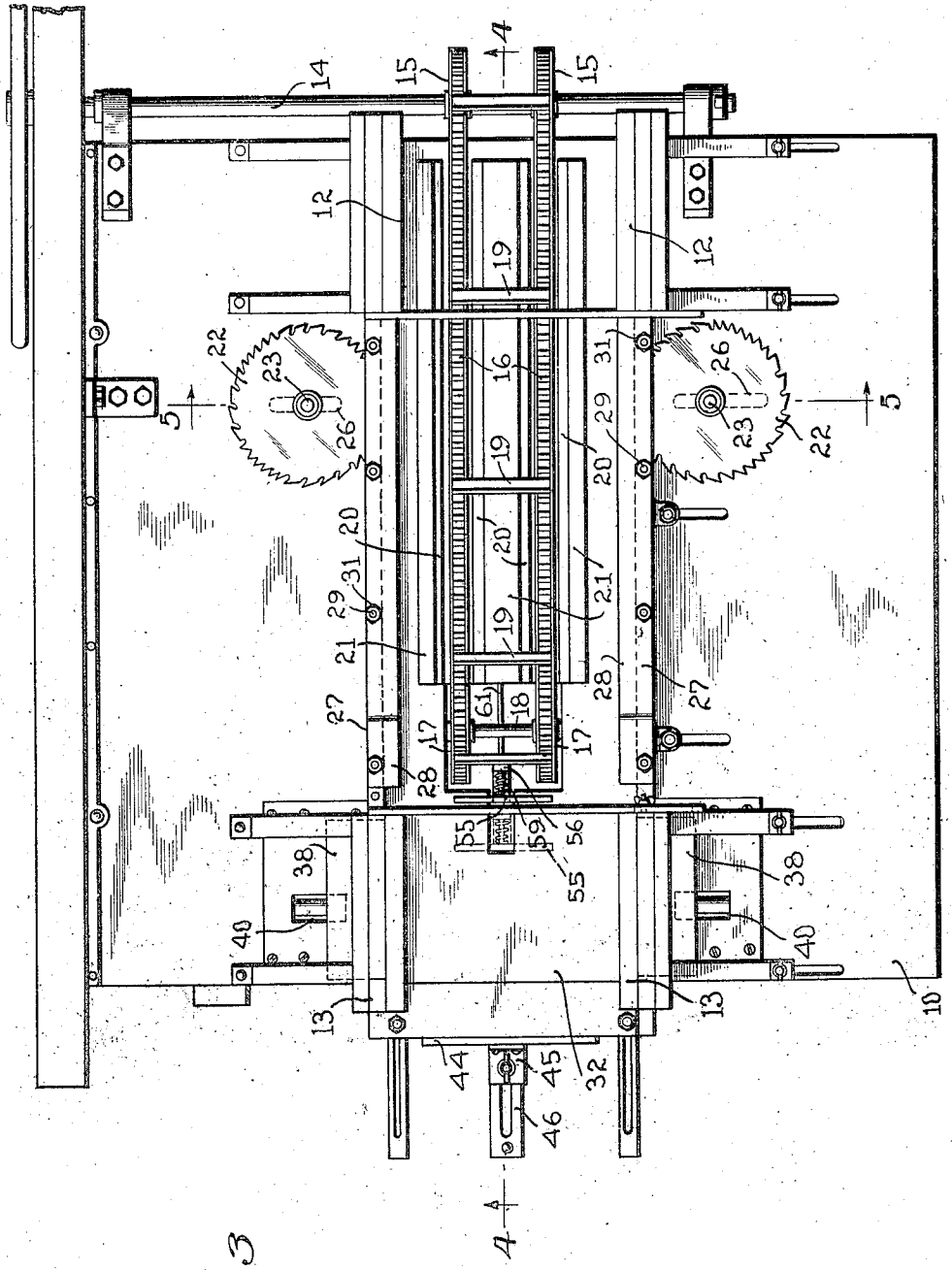


Fig. 3

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AUTOMATIC GROOVING AND STRIP INSERTING MACHINE.

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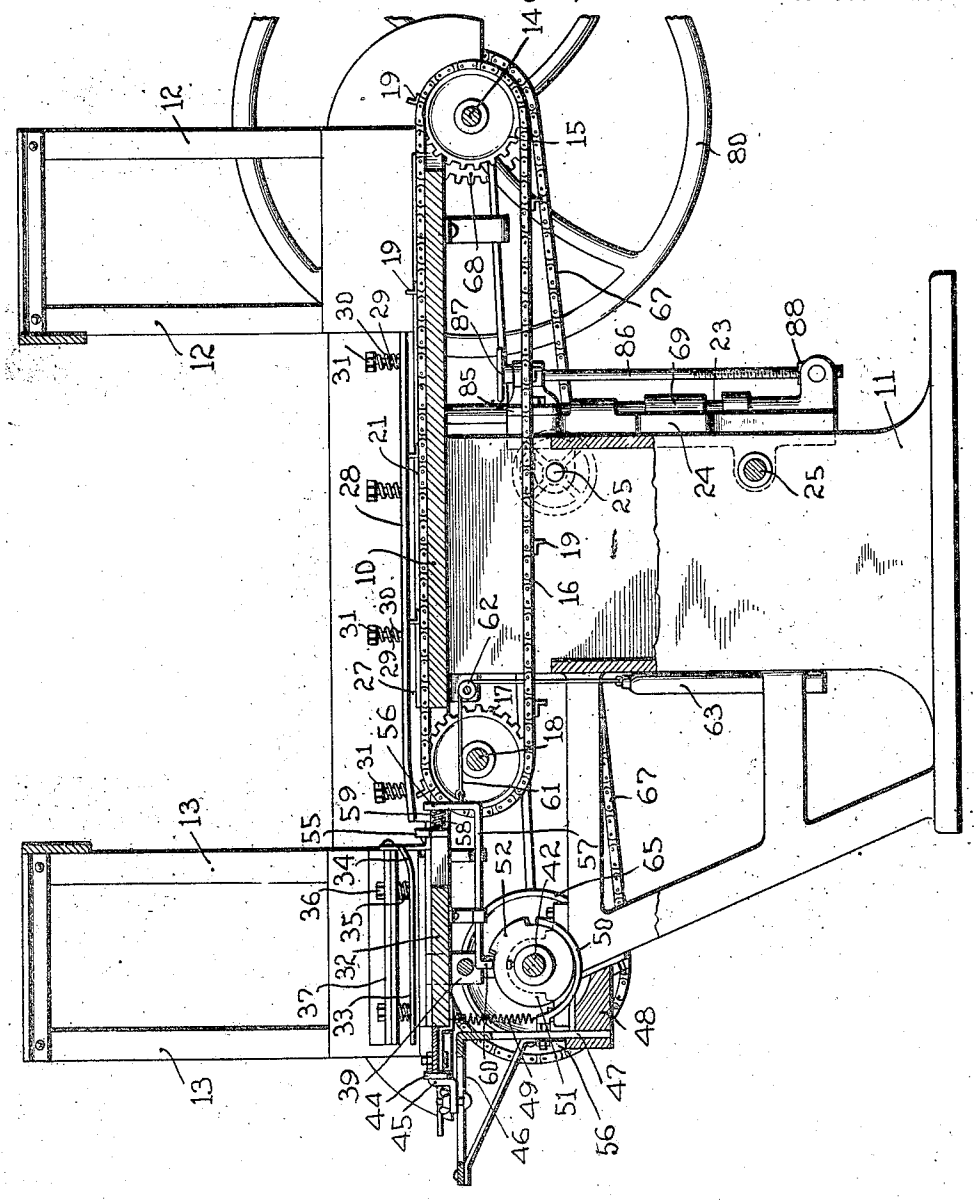


Fig. 4

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Patented Oct. 16, 1923. 1,471,246

UNITED STATES PATENT OFFICE.

ERNEST STUART DANIELS, OF WASHINGTON, DISTRICT OF COLUMBIA.

AUTOMATIC GROOVING AND STRIP-INSERTING MACHINE.

Application filed August 6, 1923. Serial No. 656,122.

To all whom it may concern:

Be it known that I, ERNEST STUART DANIELS, a subject of the King of England, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Automatic Grooving and Strip-Inserting Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to machines for manufacturing wooden shipping cases or crates, and more particularly to machines for manufacturing the ends of packing cases for petroleum or general merchandise, for which a strong, protective and non-collapsible container may be required adequately to protect the goods from injury incident to careless and rough handling during shipment.

In my co-pending application, Serial No. 619,304, filed February 15, 1923, I have shown an improved box or packing case structure in which the end or side pieces are reinforced by cutting a groove in the ends of the same and inserting a small strip of wood, thus positively holding the panel ends of the boxes together and preventing the ends from collapsing or breaking apart, even though cracks or splits may occur in the wood.

The present invention relates to a machine for cutting the grooves in the ends of the boards, and for applying strips thereto, the object of the invention being to provide a machine which will automatically perform both of these functions.

The invention will first be hereinafter more particularly described, with reference to the accompanying drawings, which are to be taken as a part of this specification, and then pointed out in the claims at the end of the description.

In said drawings, Fig. 1 is a side elevation of the machine;

Fig. 2 is a rear end elevation;

Fig. 3 is a top plan view;

Fig. 4 is a longitudinal section on the line 4—4 of Fig. 3; and

Fig. 5 is a section on the line 5—5 of Fig. 3.

The invention consists generally in the arrangement of saws or other cutting means for grooving or kerfing the edges of the boards or planks to be operated upon, the articles being fed, one piece at a time, to the cutters by suitable conveying mechanism. After the cutting or kerfing operation, the grooved boards or planks are fed forward to a mechanism for applying the narrow strips to the kerfs, and after the latter operation, the completed and reinforced box-end panels are discharged from the machine.

The mechanism for accomplishing these results includes a table 10 supported upon a suitable pedestal 11 a proper distance above the floor, and this table maintains in separated relation hoppers 12 and 13; the former containing the boards or other articles to be slotted or kerfed, while the hopper 13 contains the strips to be applied to the grooved articles. As the boards or articles to be grooved are of rectangular shape, the hopper 12 will be constructed of a size properly to accommodate such articles stacked one upon the other and adapted to be withdrawn from the hopper one at a time by the mechanism to be hereafter described in detail.

Journaled in suitable bearings at one end of the table is a shaft 14, having a pair of sprockets 15 keyed thereto in spaced relation over which conveyor chains 16 pass. The sprockets 15 are arranged so that the chains 16 carried thereover will pass directly beneath the hopper 12, and these chains pass over sprockets 17, secured to a stub shaft 18 beyond the central part of the table. The sprockets 15—17 are arranged so that the chains 16 carried thereby will rest upon the upper surface of the table 10, and the said chains are connected by a plurality of cross bars 19 disposed transversely of the table at spaced intervals equal substantially to the breadth of the boards or other articles contained in the hopper 12. The chains 16 travel within guides 20 arranged one upon each side of each chain on the upper surface of the table, and these guides support rests 21 over which the articles or boards are carried. These rests elevate the boards to be grooved, above the level of the table a distance substantially equal to the depth of the chains 16, and properly support the boards during their passage to and through the cutting or kerfing operation.

The grooves or kerfs to be made in the

edges of the boards during their course of travel are formed by rotary cutter blades or saws 22, oppositely arranged at either side of the path of travel of the boards. These cutters or saws are supported upon shafts 23, and the latter are mounted in suitable bearings formed on a slide member having longitudinal flanges adapted to slidably fit between parallel grooves or guides formed in brackets 24 located beneath the table. Each bracket is supported by a pair of adjusting screws or bolts 25 threaded to sockets formed in the pedestal of the table and disposed at right angles to the path of travel of the conveyor chains 16. The shafts 23 project through to the upper surface of the table through slots 26 disposed at right angles to the direction of travel of the conveyor chains, and it is obvious, therefore, that by rotating the screws 25, the brackets 24 may be adjusted toward or away from the pedestal, and therefore the saws 22 are adjustable toward or away from each other. This enables the depth of the groove to be cut in the articles to be accurately governed. The breadth of the groove or kerf cut in the boards will depend upon the thickness of the cutters or saws, or the number of saw plates applied to the upper ends of the shafts 23.

Each cutter or saw shaft 23 has its upper portion journaled in an adjustable bearing indicated at 85, while the lower end of the shaft is loosely carried by an elongated bearing formed or provided on the slide member vertically movable between the guides or grooves on the bracket 24. (see Figs. 1 and 2). A threaded stem 86 which is collared or swiveled at its upper end in an interiorly recessed bracket 85 by which its longitudinal movement is prevented, may be rotated to vertically adjust the shaft 23. The upper end of said stem is provided with a hand wheel 87 for convenience in operation, while the lower end of the same is threaded through a swiveled block 88 supported between lug portions formed at the lower part of the slide member carried by the bracket 24.

Arranged upon each side of the article conveyor, parallel and co-extensive therewith, is a guide 27, each of which has an inwardly projecting overhanging portion 28 beneath which the edges of the boards or articles to be kerfed are confined. These guides are fastened upon the table by stems 29 passed through holes in the guides and threaded in orifices formed in a fixed part of the table or in the surface of the table itself, and each of these stems has arranged thereon an expansion spring 30, bearing at its upper end against a nut 31, its lower end pressing against the guide member. The springs 30 press down upon the guides with sufficient force to maintain a yielding downward pressure upon the boards underlying the overhanging portions 28, thus permitting the guides to yield and compensate for variations in the thickness of boards carried by the conveyor. As shown in the drawings, the cutters or saws 22 project through suitable openings in the guides 27 so as to engage with the edges of the boards confronting the same beneath the overhanging portions 28. One of the guides 27 is laterally adjustable on the table, toward and away from its corresponding opposite guide, so that boards, panels or articles of differing lengths may be accommodated in the machine. The table 10 is provided with a plurality of lateral slots 75 disposed at spaced intervals along the outer edge of the adjustable guide 27, through which bolts 76 extend. These bolts connect at their upper ends with outwardly projecting ears 77 carried by guide 27, and are provided on their lower end with clamp nuts 78. It is apparent, therefore, that when it is desired to make adjustment of the guide 27, it is but necessary to loosen the nuts 78 and move the guide inwardly or outwardly the desired distance, whereupon the nuts 78 are again tightened upon the bolts and the guide 27 will be held rigid.

After the boards have been grooved or kerfed, they are delivered one at a time to the platform portion 32 subjacent the hoppers 13, where the wooden strips are inserted in the cut grooves. A spaced pair of runners 33 overlie the platform 32 and are adapted to receive and engage the grooved boards or articles and hold the same in rigid position during the strip-inserting operation. These runners are curved upwardly as at 34 at their receptive ends to deflect the boards fed toward the platform 32 by the chains 16. Helical springs 35, enclosing bolts 36, which are threaded into angle bars 37, the latter being carried by a rigid part of the machine frame, are adapted to depress the runners 33.

A narrow hopper 13 is arranged adjacent and parallel to each grooved edge of the board as it lies upon the platform 32, and these hoppers are of such dimensions as to accommodate the strips for application to the boards. These hoppers each have a feed opening in their lower ends facing toward the path of movement of the boards, through which one at a time from each, the strips are simultaneously released and pressed into the adjacent grooves at opposite edges of the board. The mechanism for effecting this "strip-inserting" operation, comprises a pair of actuating members or sliding blocks 38 arranged one beneath the lower end of each hopper 13 and co-operatively movable toward and away therefrom. These slides correspond approximately in length and thickness with the strips within the hoppers 13, and in

their movement toward each other, they encounter and engage the lowermost strip from the respective hoppers, forcing the same in their continued movement from under the hoppers and into the opposing groove of the board resting upon the platform. The reciprocal operation of slides 38 is accomplished as follows:

Each slide block 38 has secured thereto, a downwardly extending stud 39, projecting through a slot 40 in the table or platform, the lower end of each stud resting upon a cam wheel 41 keyed to a horizontal shaft 42 disposed transversely beneath the table. The studs 39 are guided in their reciprocal sliding movement by a rod 81 extending therethrough, said rod being held securely to the underside of the table by brackets 82. Cams 43 are provided on cam wheels 41, the former operating against studs 39 to move the latter alternately toward and away from each other.

In order that boards fed to the platform 32 by the conveyor may be properly positioned and held rigidly in place, an adjustable stop member is provided, said stop including a plate 44, secured to a carrier 45, the latter being carried by a vertically movable bracket 46. The bracket comprises a vertical arm 47 slidably mounted in a bearing 48 carried by the machine frame, and a contracting spring 49, connecting a portion of the bracket with the table, normally maintains the bracket in raised position. When in such position, the stop plate 44 will project a slight distance above the upper surface of platform 32, so that a plank or board conveyed to the platform may not pass beyond the inner edge thereof. After the "strip-inserting" operation, the plate 44 is dropped below the level of the platform 32 in order that the board may be removed form the platform. To accomplish this result, the arm 47 of the bracket is provided with a rearwardly extending arcuate arm 50, located beneath a cam wheel 51 on the shaft 42. The cam wheel 51 is provided with a cam surface 52 which, at each revolution of the cam, after the "strip-inserting" operation, moves into contact with the arcuate arm 50 and causes the latter to depress and cause the stop plate 44 to move below the level of the platform, so that the completed board or panel may be removed therefrom. After the cam 52 has moved beyond engagement with the arm 50, during which movement, the next succeeding board (impelled forward by the conveyor) has engaged and pushed the completed board or panel off the platform, the contracting spring 49 restores the bracket 46 and the parts carried thereby, to normal position, so that the stop-plate 44 will confront the next succeeding board or panel as it is subsequently pushed forward by the push-plate 55. It will be noted that the push-plate is not actuated until the stop-bar has returned to normal position, since the conveyor alone impels each successive board or panel forward sufficiently to expel the preceding board from the platform before the push-plate is brought into operation.

The grooved boards conveyed to the platform by the chains 16, are forced into proper position between the oppositely disposed hoppers 13 by means of a push plate 55. This plate is of a length equal approximately to the measured distance between the conveyor chains 16 (see Fig. 3), and is secured to a vertical arm portion 56, of a traveler 57, arranged subjacent platform 32. A rod or bolt 58 connects the arm 56 with the push plate 55, and an expansion spring 59 encircling said rod, permits the plate 55 to yield when pressure is exerted thereupon, and also allows the push-plate to yield in compensation for slight variations in the width of boards or panels conveyed to the platform. The traveler 57 is reciprocably mounted in depending bearings as shown, and extends forwardly to a point above the axis of shaft 42. The forward end of said traveler is provided with a depending catch finger 60 riding over cam wheel 51 in the path of cam surface 52. The vertical arm 56 has connected thereto, one end of a cable or chain 61, passing over a pulley 62 beneath the table 10, and a counterweight 63 is attached to the opposite end of said cable to normally hold the catch plate 55 in rearmost position. As cam wheel 51 rotates on the shaft 42, the cam surface 52 will be brought into engagement with catch finger 60, causing the traveler 57 to move forwardly, thus impelling push plate 55 to foremost position, its forward surface engaging the rear edge of a board delivered from the conveyor, causing the board to be moved with its forward edge against stop plate 44, above referred to. As this position is reached, the catch finger 60 slips over cam surface 52, whereupon counterweight 63 will move the traveler with push plate to normal position for moving the successive grooved board to position for the "strip-insertion."

The entire mechanism may be actuated by an ordinary belt driven from a source of power and for such purpose a pulley 65, keyed to shaft 42 is provided. A sprocket wheel 66, likewise keyed to said shaft, drives a chain 67 passing over a similar sprocket 68 secured to the conveyor driving shaft 14. Proper tension upon the chain 67 is effected by an idler 79, conveniently secured to a rigid part of the machine frame. The cutters or saws 22 are driven by belts passing over pulleys 69 keyed to the shafts 23 below the table 10.

A fly wheel 80 is secured to the shaft 14 and performs a two-fold function of steady-

ing the motion of the machine and providing means by which the operator may turn the machine over by hand for the purpose of making any desired adjustments.

In operation, the spaced connectors 19, on the conveyor chains 16, are moved laterally forward to the ends of the machine and pass below hopper 12 from which a board is released by gravity, one at a time, between successive connectors. Continued movement of the conveyor causes these boards to be moved into the cutting path of the saws 22, so that grooves or kerfs of desired breadth and depth are cut in the edges thereof. Thereafter the boards are carried on to platform 32, with their kerfed edges parallel with and immediately below the oppositely disposed hoppers 13, and the push plate 55 forces these boards into proper position. The pressure exerted upon the boards by the above mentioned runners 33 tend to hold the same in rigid position during operation of the "strip-applying" mechanism, and as the strip appliers move toward each other, they engage the lowermost strip released from the respective hoppers and force the strips firmly in place within the opposing groove in the board. When this application has been effected, the actuating members retract. Simultaneously, the stop plate 44 moves below the level of the platform and the finished board or article is discharged from the machine by pressure thereagainst of the succeeding board, whereupon the stop-bar 44 returns to normal position to confront the succeeding board before the push-plate 55 is actuated to move it into position for the "strip-insertion."

It will be understood of course that various changes and arrangement of parts may be made without departing from the spirit and scope of this invention, and I do not wish to be restricted by the appended claims to the specific structure hereinbefore shown and described.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. In a grooving and strip-inserting machine, the combination with a table, of a hopper mounted on said table adapted to contain articles to be cut, an endless continuously moving conveyor located below said hopper and adapted to remove and convey articles therefrom, means for cutting grooves in said articles while carried by said conveyor, a platform onto which the conveyor delivers, a push-bar engaging behind the delivered articles, a shifting stop-bar between which and the push-bar the articles are temporarily held, oppositely disposed strip-containing hoppers arranged adjacent to said platform in the path of travel of articles delivered from said conveyor, means for projecting strips carried by said hoppers toward the grooved edges of articles retained between said hoppers, and means for operating said push-bar and stop-bar to hold said articles stationary during the strip-applying operation.

2. In a grooving and strip-inserting machine, the combination with a table, of a hopper mounted on said table adapted to contain articles to be cut, an endless continuously moving conveyor located below said hopper and adapted to remove and convey articles therefrom, yieldable spring-pressed guide means arranged parallel with said conveyor and adapted to hold the conveyed articles rigidly on the conveyor during the grooving operation, means for cutting grooves in said articles while carried by said conveyor, a platform onto which the conveyor delivers, a push-bar engaging behind the delivered articles, a shifting stop-bar between which and the push-bar the articles are temporarily held, oppositely disposed strip-containing hoppers arranged adjacent to said platform in the path of travel of articles delivered from said conveyor, means for projecting strips carried by said hoppers toward the grooved edges of articles retained between said hoppers, and means for operating said push-bar and stop-bar to hold said articles stationary during the strip-applying operation.

3. In a grooving and strip-inserting machine, the combination with a table, of a hopper mounted on said table adapted to contain articles to be cut, an endless continuously moving conveyor located below said hopper and adapted to remove and convey articles therefrom, oppositely disposed rotary adjustable cutter blades arranged adjacent to the conveyor and adapted to cut grooves in said articles while carried by said conveyor, a platform onto which the conveyor delivers, a push-bar engaging behind the delivered articles, a shifting stop-bar between which and the push-bar the articles are temporarily held, oppositely disposed strip-containing hoppers arranged adjacent to said platform in the path of travel of articles delivered from said conveyor, means for projecting strips carried by said hoppers toward the grooved edges of articles retained between said hoppers, and means for operating said push-bar and stop-bar to hold said articles stationary during the strip-applying operation.

4. In a grooving and strip-inserting machine, the combination with a table, of a hopper mounted on said table adapted to contain articles to be cut, an endless continuously moving conveyor located below said hopper and adapted to remove and convey articles therefrom, oppositely disposed rotary adjustable cutter blades arranged ad-

jacent to the conveyor and adapted to cut grooves in said articles while carried by said conveyor, a platform onto which the conveyor delivers, a yieldable push-bar engaging behind the delivered articles, a shifting stop-bar between which and the push-bar the articles are temporarily held, oppositely disposed strip-containing hoppers arranged adjacent to said platform in the path of travel of articles delivered from said conveyor, co-operable means for projecting strips carried by said hoppers toward the grooved edges of articles retained between said hoppers, and cam actuated means for alternately operating said push-bar and stop-bar to push and hold said articles stationary during the strip-applying operation.

5. In a grooving and strip-inserting machine, the combination with a table, of a hopper mounted on said table adapted to contain articles to be cut, an endless continuously moving conveyor located below said hopper and adapted to remove and convey articles therefrom, oppositely disposed rotary adjustable cutter blades arranged adjacent to the conveyor and adapted to simultaneously cut grooves at opposite ends of said articles while carried by said conveyor, a platform onto which the conveyor delivers, a cam and weight actuated yieldable push-bar engaging behind the delivered articles, a shifting cam actuated stop-bar between which and the push-bar the articles are temporarily held, oppositely disposed strip-containing hoppers arranged adjacent said platform in the path of travel of articles delivered from said conveyor, co-operable cam actuated reciprocating slide blocks for simultaneously projecting strips carried by said hoppers toward the respective grooved edges of articles retained between said hoppers, and means for alternately operating said push-bar and stop-bar to push the articles into rigid position and hold said articles stationary during the strip-applying operation.

6. In a grooving and strip-inserting machine, the combination with a table, of a hopper mounted on said table adapted to contain articles to be cut, an endless continuously moving conveyor located below said hopper and adapted to remove and convey articles therefrom, yieldable spring-pressed guide means arranged parallel with said conveyor and adapted to hold the conveyed articles rigid on the conveyor during the grooving operation, oppositely disposed rotary adjustable cutter blades arranged adjacent the conveyor and adapted to cut grooves in said articles while carried by said conveyor, a platform onto which the conveyor delivers, a cam actuated yieldable push-bar engaging behind the delivered articles, a shifting cam and weight actuated stop-bar between which and the push-bar the articles are temporarily held, oppositely disposed strip-containing hoppers arranged adjacent said platform in the path of travel of articles delivered from said conveyor, co-operable cam actuated reciprocating slide blocks for simultaneously projecting strips carried by said hopper toward the respective grooved edges of articles retained between said hoppers, yieldable spring-pressed bars arranged between said last mentioned hoppers adapted to hold the articles rigid upon said platform, and means for alternately operating said push-bar and stop-bar to push the articles into rigid position and co-operatively hold said articles stationary during the strip-applying operation.

In testimony whereof I affix my signature in the presence of two witnesses.

ERNEST STUART DANIELS.

Witnesses:
BENJAMIN B. DOWELL,
LOUISA J. MILLS.