

Dec. 10, 1940.

P. HINGSTON

2,224,599

CORRUGATED FASTENER DRIVING MACHINE

Filed July 2, 1938

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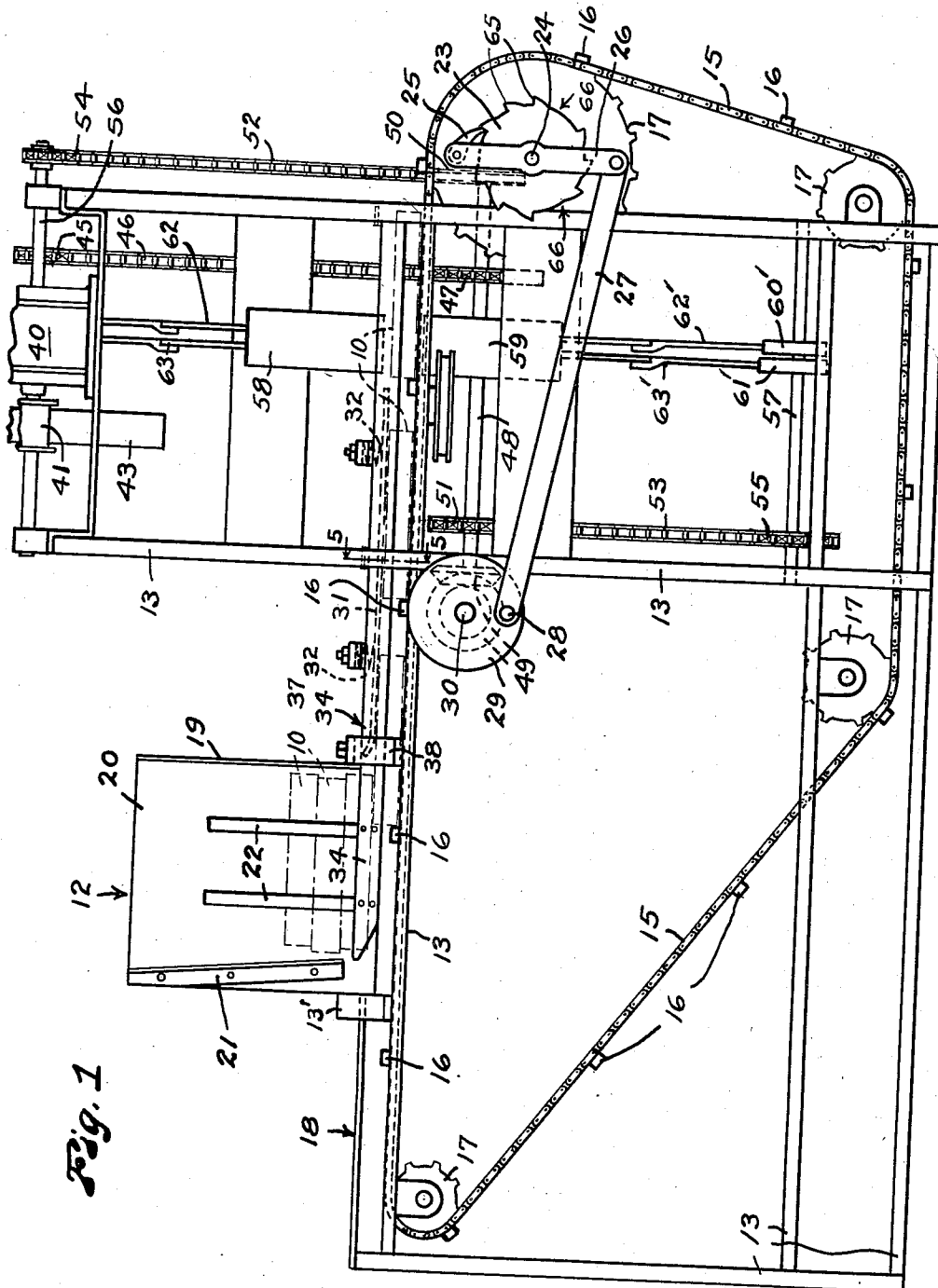


Fig. 1

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4 Sheets-Sheet 2

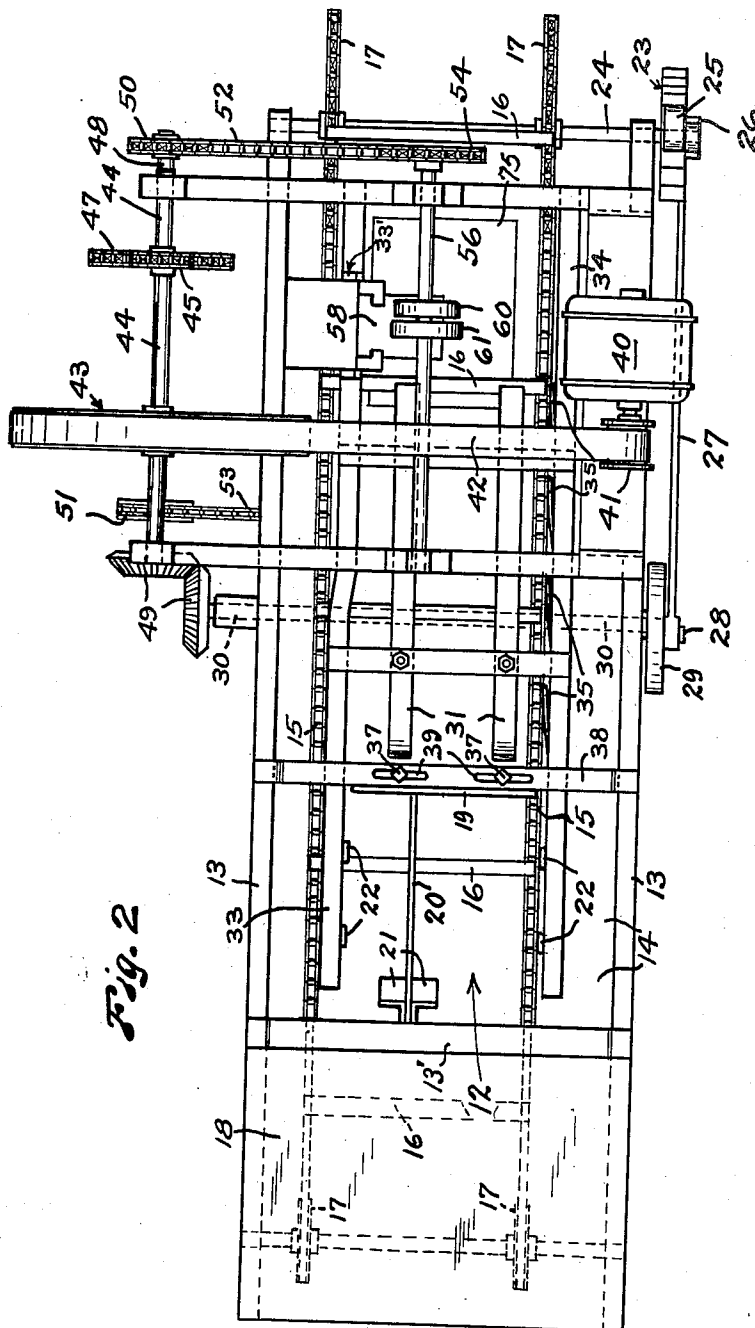


Fig. 2

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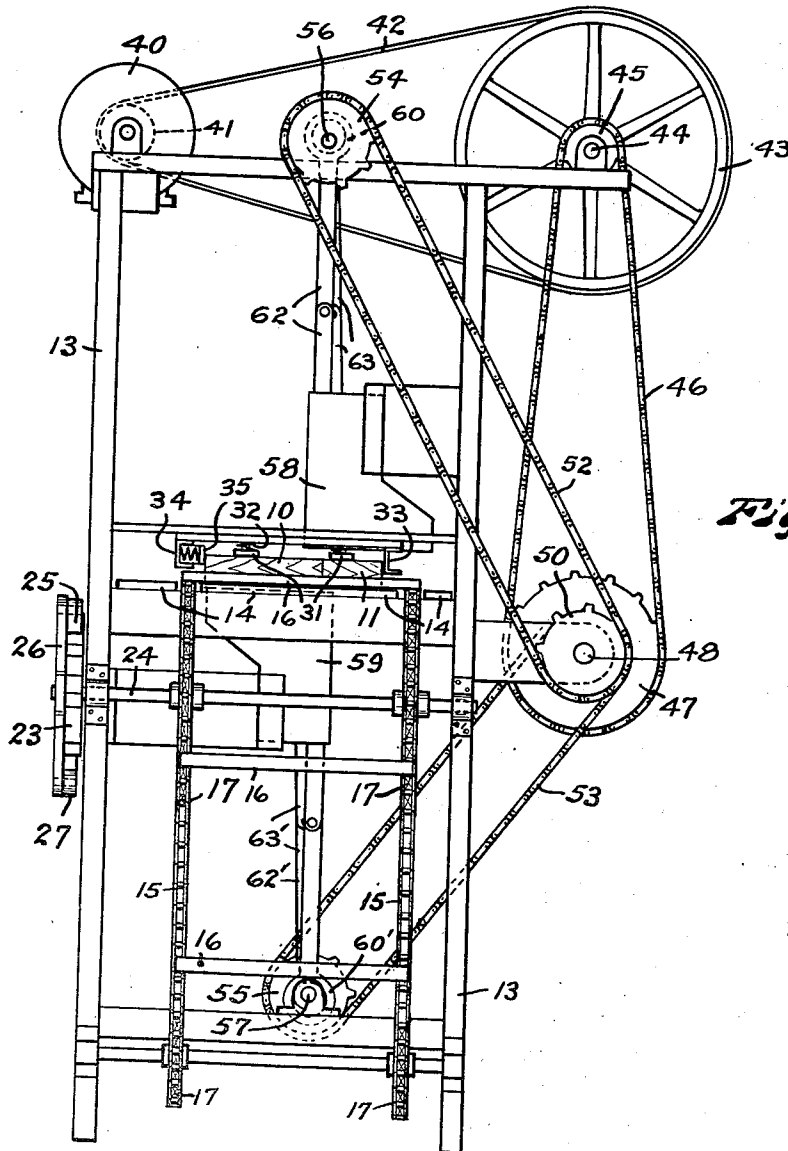


Fig. 3

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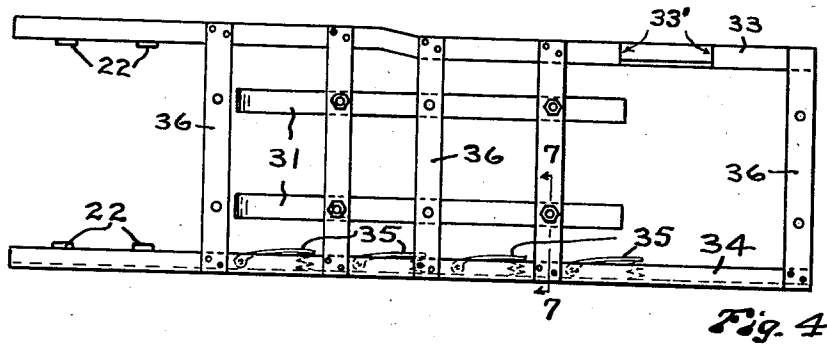
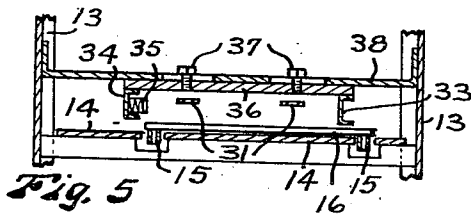
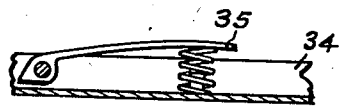
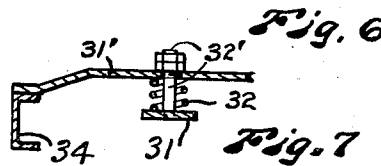
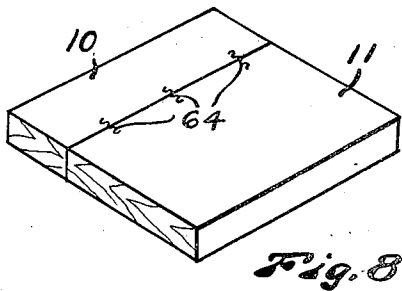
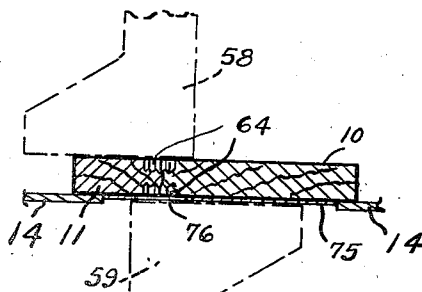
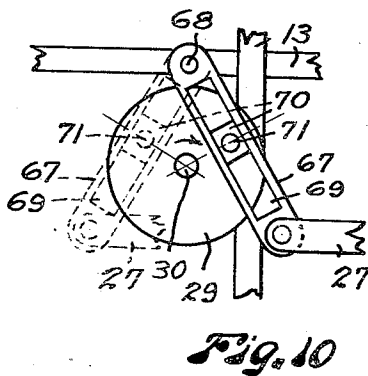
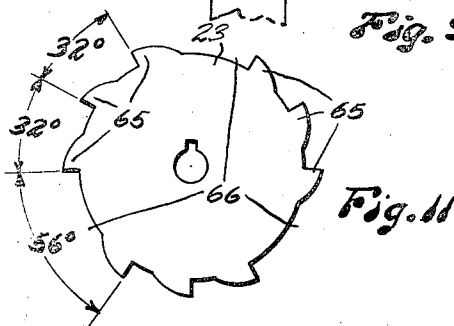
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CORRUGATED FASTENER DRIVING MACHINE

Filed July 2, 1938

4 Sheets-Sheet 4



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2,224,599

CORRUGATED FASTENER DRIVING
MACHINE

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Application July 2, 1938, Serial No. 217,303

8 Claims. (Cl. 1—8.1)

This invention relates to built up wooden slabs and to machines for applying corrugated fasteners to the same.

A primary object of this invention is to provide a built up wooden slab formed of two or more pieces of wood positioned in edge to edge relation and secured together by corrugated metal fasteners driven from the two opposite sides of the slab, the fasteners on one side being positioned directly opposite the corresponding fasteners on the other side, the length of the fasteners being less than one half of the thickness of the slab leaving the medial plane of the slab unobstructed whereby the slab may be sawed in a medial plane to form two box ends.

Another primary object of this invention is to provide an automatic machine of efficient construction for feeding and supporting pieces of wood which are to be secured together to form built up slabs and for driving corrugated metal fasteners in said pieces of wood to secure said pieces of wood together.

Another primary object of this invention is to provide an automatic machine of this nature in which the corrugated fasteners are driven simultaneously from opposite sides of the piece of wood in such a manner that the driving forces on the two opposite sides of the piece of wood are substantially balanced and substantially offset each other thus obviating the necessity for providing heavy and solid supporting means for the pieces of wood during the fastener driving operation.

Another object is to provide efficient means for guiding and positioning and holding the slabs as they are advanced by intermittent movements to the driving heads, said guiding and positioning and holding means being adjustable transversely of the machine to provide for the use of pieces of wood of different widths in building up the slabs.

Other and more specific objects of the invention will be apparent from the following description taken in connection with the accompanying drawings.

In the drawings, Fig. 1 is a side elevation of a machine constructed in accordance with this invention.

Fig. 2 is a plan view of the same.

Fig. 3 is an end elevation of the same.

Fig. 4 is a detached plan view of the guiding positioning and holding means for the slabs.

Fig. 5 is a fragmentary sectional view with parts in elevation substantially on broken line 5—5 of Fig. 1, showing adjustable supporting

means for the device shown in Fig. 4 and showing the work supporting table.

Fig. 6 is a detached fragmentary view, partly in section and partly in plan, showing the hold over means for the pieces of wood.

Fig. 7 is a detached fragmentary sectional view taken substantially on broken line 7—7 of Fig. 4 and showing the hold down means for the pieces of wood.

Fig. 8 is a perspective view of a built up wooden slab constructed in accordance with this invention.

Fig. 9 is a sectional view of said built up wooden slab showing two corrugated fasteners embedded therein in directly opposite positions and showing by dotted lines the positions of two fastener driving heads at the time of driving.

Fig. 10 illustrates a detached fragmentary modified construction of a quick return driving means used in the machine when high speed operation is desired.

Fig. 11 is a detached view in elevation of a ratchet wheel.

Like reference numerals designate like parts throughout the several views.

The machine shown in the accompanying drawings is adapted for driving corrugated fasteners into pieces of wood to secure said pieces together for the purpose of forming slabs from which box ends may be made. The machine illustrated uses two pieces of wood to form each slab but it will be understood that the slabs may be made up of more than two pieces if desired. The machine takes a plurality of pieces of wood of equal thickness and thick enough to form two box ends and preferably planed on both sides and secures these pieces together by driving corrugated fasteners into the pieces from opposite sides thereof. The pieces thus secured together are later re-sawed in the medial plane, along the line A—A shown in Fig. 9, to form two box ends of standard thickness each of which will have one planed side and one rough side. The machine may be adjusted to conform to pieces of wood of different width.

The machine comprises a frame 13 having horizontal supporting means 14, see Figs. 3 and 5, constituting a work table over which the material passes. Conveyor means in the nature of two link belts 15 movable on sprocket wheels 17 and having cross slats 16 advances the material over the work supporting means 14 and through the machine. A feed table 18 is provided at the intake end of the machine. A dual feed hopper, designated generally by 12 is provided just in

front of the feed table to receive and hold the pieces of material which are to be picked up by the conveyor. This feed hopper, Figs. 1 and 2, comprises a front plate 19 extending crosswise of the machine, a longitudinal partition plate 20, inclined guide members 21 at the rear of the hopper and upright side bars 22 at each side of the hopper. The pieces of wood of one size are placed at one side of the partition plate 20 and those of another size and placed at the other side of the partition plate. The lowermost pieces of wood rest on the work supporting means 14 and the conveyor slats 16 engage with and advance the two lowermost pieces as said slats pass under the piles of wood on the table. Some of these pieces of wood are indicated by dot and dash lines in Fig. 1.

The movement of the conveyor belts 15 is intermittent. This is accomplished by the use of a ratchet wheel 23 on a shaft 24 on which two large sprocket wheels 17 at the discharge end of the machine are secured. A pawl 25 on a lever 26 engages ratchet wheel 23. A connecting rod 27 connects lever 26 with a crank pin 28 on a disc 29. The disc 29 is secured to a continuously driven shaft 30. The ratchet wheel 23, Figs. 2 and 11, has unequally spaced teeth as shown so as to advance the pieces of wood a greater distance between successive pieces and then two shorter steps between the driving of successive staples in the same piece. In the present instance I have shown three groups of teeth with three teeth 65 in each group and longer spaces indicated by numeral 66 between the respective groups. The spaces 66 are greater than the distance between two adjacent teeth of a group but slightly less than the distance between the faces of the first and third teeth of any group. For instance the angular distance between the faces of adjacent teeth 65 in the groups may be thirty two degrees, while the angular distance between the face of the last tooth of one group and the face of the first tooth of the next adjacent group may be fifty six degrees. With this spacing of the teeth 65 if the stroke of the pawl 25 is more than fifty six degrees and less than sixty four degrees, (sixty four degrees being twice the angular distance between two teeth of any group), said pawl will always span the distance between the last tooth of one group and the first tooth of the next adjacent group and will have a substantial amount of overtravel and lost motion between the adjacent teeth of each group. The result will be that the shaft 24 and conveyor 15—16 will be advanced by intermittent movements in which two short steps and one long step will take place alternately.

The speed of operation of the machine may be increased by providing a quick return device for moving the pawl 25. One such quick return device is shown in Fig. 10. This device comprises a lever 67 having one end mounted on a fixed pivot 68. The lever 67 has a longitudinal slot 69 within which a slide block 70 is slidably mounted. The lever 67 extends across the face of the disc 29 and the slide block 70 is mounted on a crank pin 71 which is used instead of the crank pin 28 and is similar to the crank pin 28 except that it is at a less radial distance from the center of the disc 29 than the crank pin 28. The lower end portion of the lever arm 67 is pivotally connected with the connecting rod 27. The pivot 68 is relatively close to the disc 29 and the stroke of the lever arm 67 in one direction, namely while the slide block is traversing the

upper portion of its arc, will be made in less than one half of one complete revolution of the crank pin 71 while the stroke of the lever arm 67 in the opposite direction, namely while the slide block is traversing the lower portion of its arc, will require more than one half of one complete revolution of the crank pin 71 to complete. By using the faster stroke to retract the pawl mechanism and the slower stroke to advance the conveyor mechanism I am able to provide for holding the pieces of wood 10 and 11 unmovable just long enough to permit operation of two corrugated fastener driving heads 58 and 59 hereinafter described. Also I am able to advance the pieces of wood 10 and 11 by a slower movement which minimizes shock and jar incidental to stopping the moving conveyor and parts connected therewith and reduces the danger of over travel of the pieces of wood.

Hold down members 31, urged downwardly by springs 32, Fig. 7, are provided for holding the pieces of wood down on the table. Stud bolts 32' are rigid with hold down members 31 and extend upwardly through suitable holes in cross bars 31' and the springs 32 are positioned on the stud bolts 32' between the hold down members 31 and the cross bars 31'. The cross bars 31' are secured to two spaced apart substantially parallel side guide members 33 and 34 which are fixedly but adjustably secured to the frame and are adapted to be engaged by the sides of the pieces of wood. Spring pressed hold over members 35 are provided in connection with the side guide 34. The assembly of members 31—35 is best shown in Fig. 4. This assembly has cross bars 36, which extend crosswise of the side guides 33 and 34 and are secured by cap screws 37, Fig. 5, to transverse frame bars 38 having slots 39 through which the cap screws 37 pass. This permits the entire assembly shown in Fig. 4, to be moved or adjusted transversely of the machine when the cap screws 37 are loosened and provides an adjustment for correctly positioning the side guides 33 and 34 for engagement by the outer edges of pieces of wood of different widths whose abutting edges are positioned in line with corrugated fastener driving heads. For instance, the slabs may be made up of one piece 3 3/4 inches wide and one piece 7 1/4 inches wide or they may be made up of one piece 4 inches wide and one piece 6 1/2 inches wide. It is necessary to adjust for these variations in width.

The upright side bars 22 which form the sides of the hopper are secured to the side guide members 33 and 34 so that they are always adjusted transversely with the side guide members. The partition plate 20 is positioned in line with the fastener driving heads 58 and 59 and is not adjustable with the side guide members. The inclined guides 21 at the rear of the hopper are secured to the partition plate 20. Preferably the front plate 19 of the hopper is secured to the frame by welding or otherwise securing it to one of the cross bars 38. The partition plate 20 preferably has one edge thereof secured to the front plate 19 and the other edge thereof secured to a cross bar 13'.

The drive means, see Fig. 3, comprises a motor 40 having a pulley 41 connected by a belt 42 with a sheave 43 on a shaft 44. A sprocket wheel 45 on shaft 44 is connected by a link belt 46 with a sprocket wheel 47 on a shaft 48, see Fig. 3. Bevel gears 49, see Fig. 2, connect the shaft 48, with the shaft 30, see Figs. 1 and 2. Two sprocket wheels 50 and 51 on the shaft 48 are respec-

tively connected by link belts 52 and 53 with sprocket wheels 54 and 55 on an upper fastener driving head operating shaft 56 and a lower fastener driving head operating shaft 57.

5 The corrugated fastener driving heads used in this machine and shown in Figs. 1, 2 and 3, are of standard construction. One head which is suitable for this use is commercially known as the "Morgan" head. It is indicated in a general
10 way in the drawings but is not herein shown or described in detail. An upper driving head 58 is provided above the work and a lower driving head 59 is provided below the work. These two driving heads drive corrugated fasteners simultaneously into the top and bottom of the same pieces
15 of wood. Movement of the upper driving head 58 toward and away from the work is controlled by an upper cam means 60 on the shaft 56. The fastener driving operation of this upper head 58 is controlled by an upper cam means 60 on this
20 same shaft 56. Connecting rods 62 and 63 connect the respective upper cam means 60 and 61 (see Figure 2) with the driving head 58. Movement of the lower driving head 59 toward
25 and away from the work is controlled by cam means 60' on the shaft 57. The fastener driving operation of this lower driving head is controlled by a lower cam means 61' on said shaft 57. Connecting rods 62' and 63' connect the
30 respective cam means 60' and 61' with the lower driving head 59. The cams 60, 61, 60', and 61' and the links 62, 63, 62' and 63' are of well known construction, being standard operating parts for the standard corrugated fastener driving heads
35 58 and 59. The corrugated fasteners 64 are shown in Figs. 8 and 9 and are of well known form. These fasteners may be supplied to the heads 58 and 59 from rolls, not shown, the fasteners being in strap or tape form as they are
40 fed to the heads and the heads cutting them off and driving them.

The side guide member 33 is notched, as shown at 33' in Figs. 2 and 4, to provide working clearance for the upper fastener driving head 58 to
45 move down onto the work. Preferably a thin plate 75 of somewhat flexible metal, see Fig. 9, is provided in the supporting table 14 directly above the lower fastener driving head 59 and an opening 76 is provided in this flexible plate 75
50 through which the fasteners are driven. This flexible plate 75 provides a smooth surface for the pieces of wood to pass over but is flexible enough so that the pieces of wood are in effect supported by and between the two fastener driving heads
55 during the fastener driving operation. The two fastener driving heads are adjusted and timed so that the lower head 59 engages with the flexible plate 75 at substantially the same instant the upper head 58 engages with the pieces of wood.
60 The plate 75 will yield slightly if necessary to permit the two pieces of wood to be supported by and between the two driving heads when the fasteners are driven, whereby the driving forces of the two heads are counterbalanced and the necessity for providing heavy and solid work supporting frame means for the driving heads to
65 react against is obviated. Plate 75, being thin also allows lower driving head 59 to approach very close to the work when driving.

70 In the operation of the machine the hopper 12 is supplied with superimposed pieces of wood of correct size. The conveyor slats 16 successively remove the two lowermost pieces and advance them side by side toward the driving heads. The
75 movement is intermittent and the proper dis-

tance at each stroke. The heads are properly synchronized so that both heads engage the work and drive a fastener each time the work is stopped. The two heads engage the work directly opposite each other, as shown in Fig. 9, 5 and drive simultaneously into opposite sides of the wood pieces. The spacing of teeth on the ratchet wheel 23 provides for a longer distance of movement between successive slabs than two shorter steps between successive fasteners in a 10 slab then another long step to the next succeeding piece. This provides the proper sequence of movement for driving three corrugated fasteners into each slab.

Driving the fasteners from two opposite sides 15 of the slab simultaneously sets up opposing forces which substantially offset or balance each other and this obviates the necessity of providing strong and heavy means for supporting the slabs during the driving operation. 20

The hopper 12 is a divided hopper with the partition 20 in alignment with the heads 58 and 59. The hold over members 35 and guide rails 33 and 34 provide means for holding the two pieces of wood together while they are being 25 advanced and stapled. The sides of the hopper formed by parts 22 are carried by the guide rails 33 and 34 and are adjustable with the assembly shown in Fig. 4.

The foregoing description and accompanying 30 drawings clearly disclose a preferred embodiment of my invention but it will be understood that this disclosure is merely illustrative and that changes may be made which are within the spirit and scope of the following claims. 35

I claim:

1. A machine of the class described comprising means for supporting in edge to edge relation pieces of wood which are to be secured together by corrugated fasteners, two corrugated fastener driving heads positioned in alignment with each other on opposite sides of the pieces of wood; and means for simultaneously operating said two fastener driving heads to simultaneously drive corrugated fasteners into said pieces of 45 wood from opposite sides thereof.

2. A machine of the class described comprising means for supporting in edge to edge relation pieces of wood which are to be secured together by corrugated fasteners, means for advancing 50 said pieces of wood by intermittent movements; two corrugated fastener driving heads positioned in alignment with each other on opposite sides of the pieces of wood; and means for simultaneously operating said two fastener driving heads to simultaneously drive corrugated fasteners into said pieces of wood from opposite sides thereof. 55

3. A machine of the class described comprising means for supporting in edge to edge relation pieces of wood which are to be secured together by corrugated fasteners; means for advancing said pieces of wood by intermittent movements; two corrugated fastener driving heads positioned in relatively substantially vertical alignment above and below the path of travel of the pieces of wood respectively; and means for simultaneously operating said two fastener driving heads to simultaneously drive corrugated fasteners into said pieces of wood 60 from opposite sides thereof.

4. A machine of the class described comprising a frame; horizontal support means on said frame; conveyor means positioned to move pieces of wood over said horizontal support means by 75

- intermittent movements; means for guiding and positioning said pieces of wood on said horizontal means; two corrugated fastener driving heads positioned in relatively substantially vertical alignment above and below the path of travel of the pieces of wood respectively and means for simultaneously operating said two corrugated fastener driving heads to simultaneously drive corrugated fasteners into opposite sides of said pieces of wood, whereby the driving forces exerted by said two fastener driving heads on said pieces of wood will be substantially balanced.
5. A machine of the class described comprising a frame; horizontal support means on said frame; conveyor means positioned to move pieces of wood over said horizontal support means by intermittent movements; a corrugated fastener driving head positioned to drive corrugated fasteners into pieces of wood on said horizontal support means; and guide means for pieces of wood positioned above said horizontal support means and supported for adjustment transversely of said horizontal support means, said guide means comprising side guide members; spring pressed side hold over members and spring pressed hold down members.
6. A machine of the class described comprising a frame; horizontal support means on said frame; conveyor means positioned to move pieces of wood over said horizontal support means by intermittent movements; a corrugated fastener driving head positioned to drive corrugated fasteners into pieces of wood on said horizontal support means; and guide means for pieces of wood positioned above said horizontal support means and supported for adjustment transversely of said horizontal support means, said guide means comprising upright supports positioned to support a plurality of superimposed pairs of wood pieces with adjacent edges of each pair of wood pieces aligned with said fastener driving head, side guide members positioned to receive said pairs of wood pieces from said upright supports, spring pressed hold over members positioned to engage one edge of a wood piece of each pair, and spring pressed hold down members positioned in spaced relation above said support means.
7. A machine of the class described comprising a frame; a horizontal support on said frame;

conveyor means positioned to move pieces of wood over said horizontal support; two parallel spaced apart side guide members positioned above said horizontal support; cross bars connecting said side guide members; adjustable means connecting some of said cross bars with the frame providing for adjustment of said side guide members transversely of said horizontal support; a plurality of spring supported hold over members carried by one of said side guide members, spring supported hold down members carried by some of said cross bars in spaced relation above said horizontal support; a corrugated fastener driving head positioned above said horizontal support; a vertical partition plate supported by said frame in alignment with said fastener driving head; and upright supporting members secured to said side guide members and positioned in spaced relation from the respective sides of said partition plate to provide receptacles for pieces of wood between said upright supporting members and said partition plate.

8. A machine of the class described comprising a frame; a horizontal support on said frame; conveyor means positioned to move pieces of wood over said horizontal support; two parallel spaced apart side guide members positioned above said horizontal support; cross bars connecting said side guide members; adjustable means connecting some of said cross bars with the frame providing for adjustment of said side guide members transversely of said horizontal support; a plurality of spring supported hold over members carried by one of said side guide members, spring supported hold down members carried by some of said cross bars in spaced relation above said horizontal support; two corrugated fastener driving heads positioned in substantially vertical alignment above and below said horizontal support respectively; a vertical partition plate fixedly supported in alignment with said driving heads; and upright supporting members carried by said side guide members and positioned in spaced relation from the respective sides of said partition plate to provide receptacles for pieces of wood between said upright supporting members and said partition plate.

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