United States Patent

Heterick, Jr.

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[54] NAILING MACHINE

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[73] Assignee: **Boise Cascade Corporation**, Boise, Idaho

[22] Filed: **Nov. 24, 1969**

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[52] **U.S. Cl.** **227/3**, 227/7, 227/40, 227/100

[51] **Int. Cl.** **B27f 7/02**

[58] **Field of Search** 227/5, 6, 7, 40, 99, 100, 101, 227/151, 152, 153, 154, 3

[56] **References Cited**

UNITED STATES PATENTS

3,381,870	5/1968	Haskins	227/3
3,086,210	4/1963	Good et al.	227/99
3,228,580	1/1966	Washington et al.	227/101

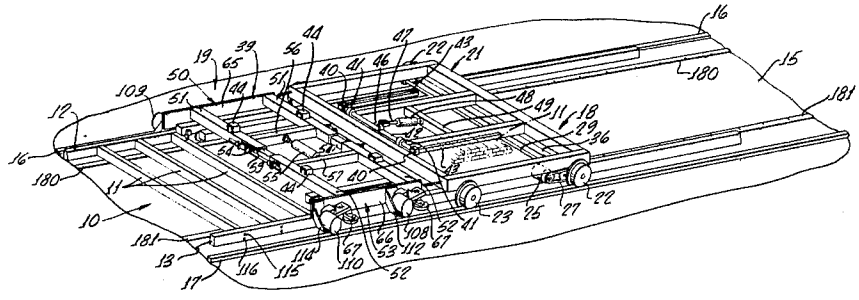
Primary Examiner—Granville Y. Custer, Jr.

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[57] **ABSTRACT**

A device for nailing together a framework including a first support for elements of the framework, and a second support movable relative to the first support, the second support having opposed nailing gun means thereon which are operable by trigger arrangements activated upon engagement by members of the framework to be nailed, there being means biasing the framework members inwardly to impose a compressive force on them, together with pulley means for properly aligning the framework members at the time nails are driven. A traction unit may be used to pull the nailing unit over the first support in the nailing operation, while being capable of lifting the nailing unit above the first support during return movement in which the nailing unit is inoperative. The nails are driven while the device is in motion.

9 Claims, 13 Drawing Figures



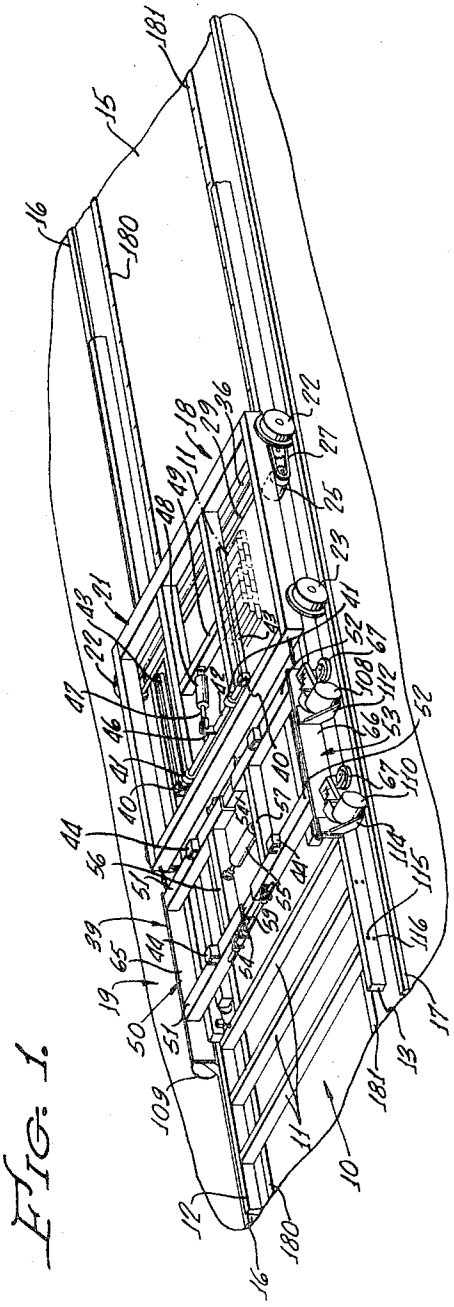


FIG. 1.

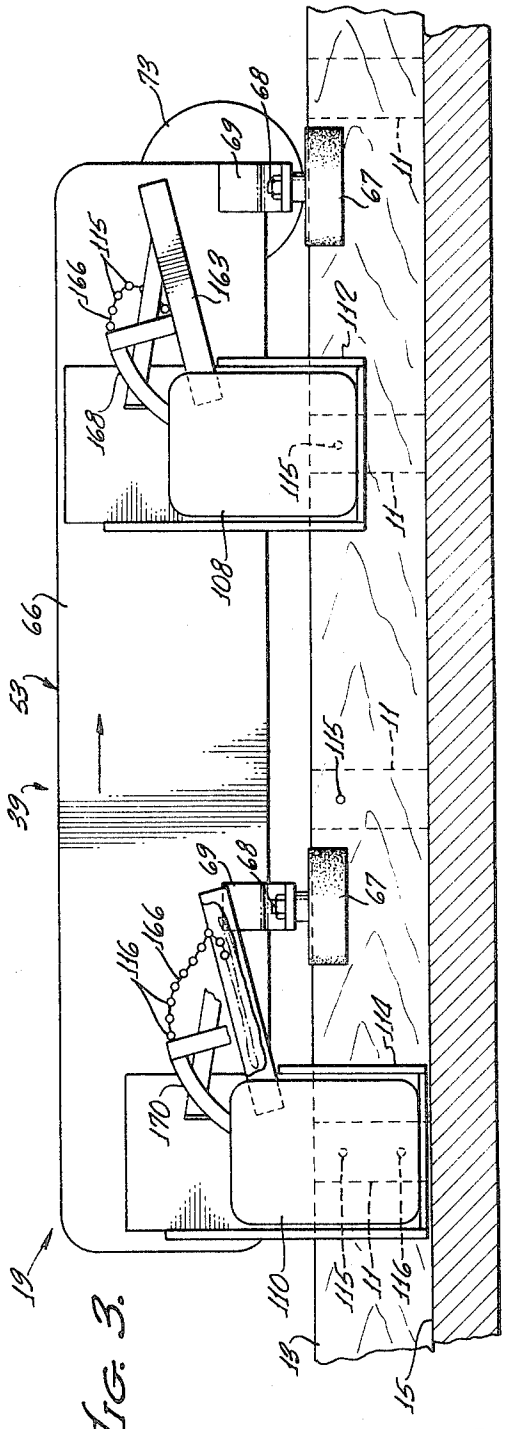


FIG. 3.

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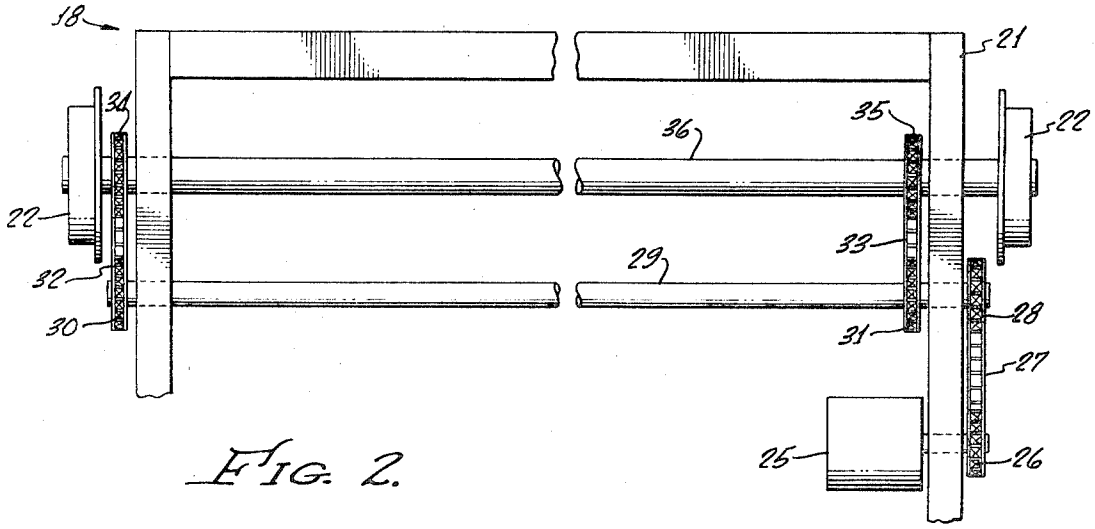


FIG. 2.

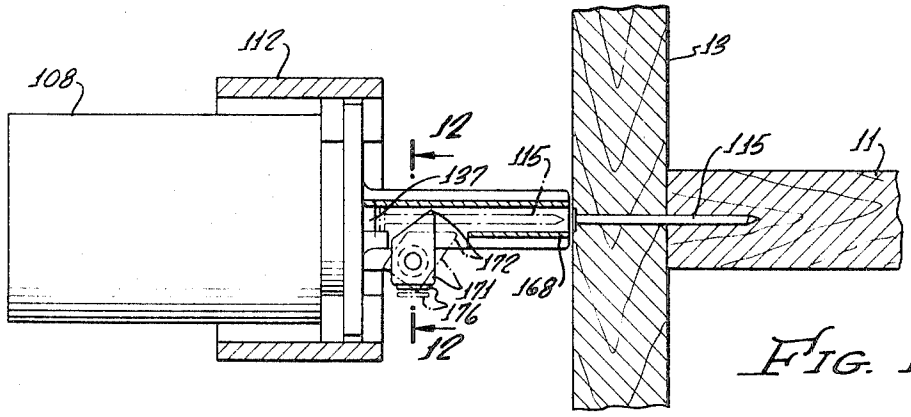


FIG. 11.

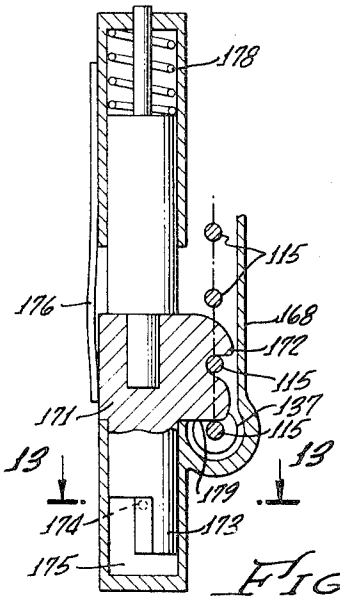


FIG. 12.

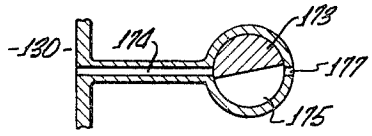


FIG. 13.

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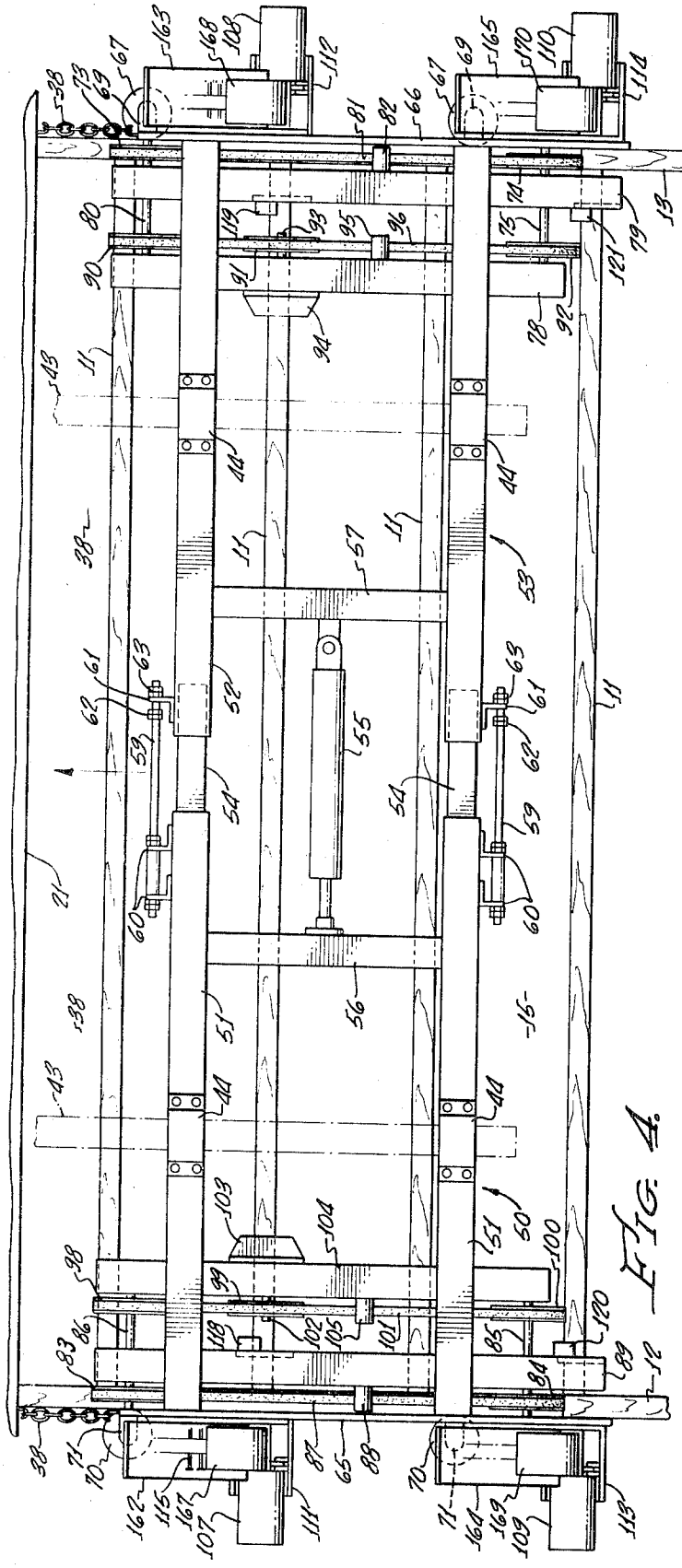


FIG. 4.

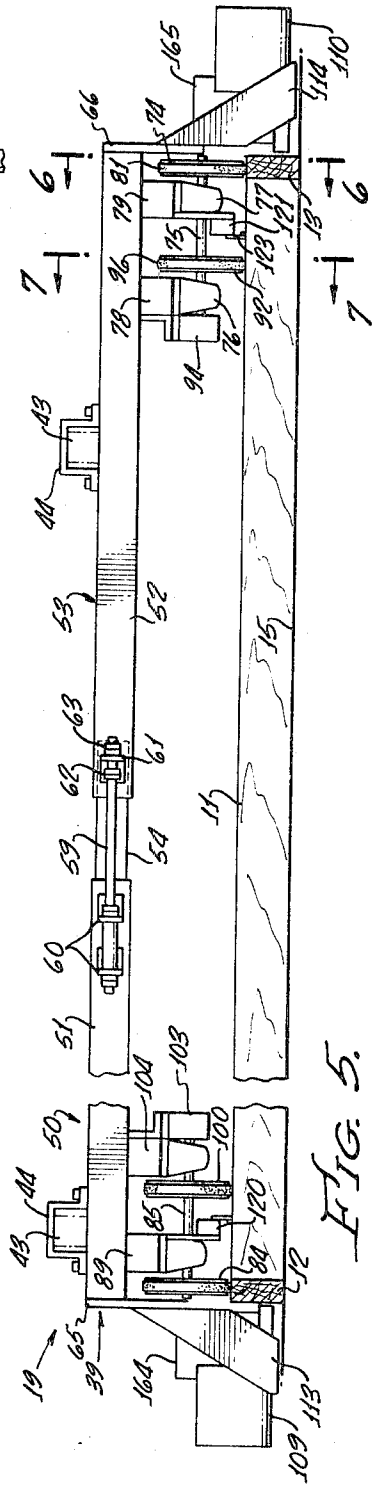


FIG. 5.

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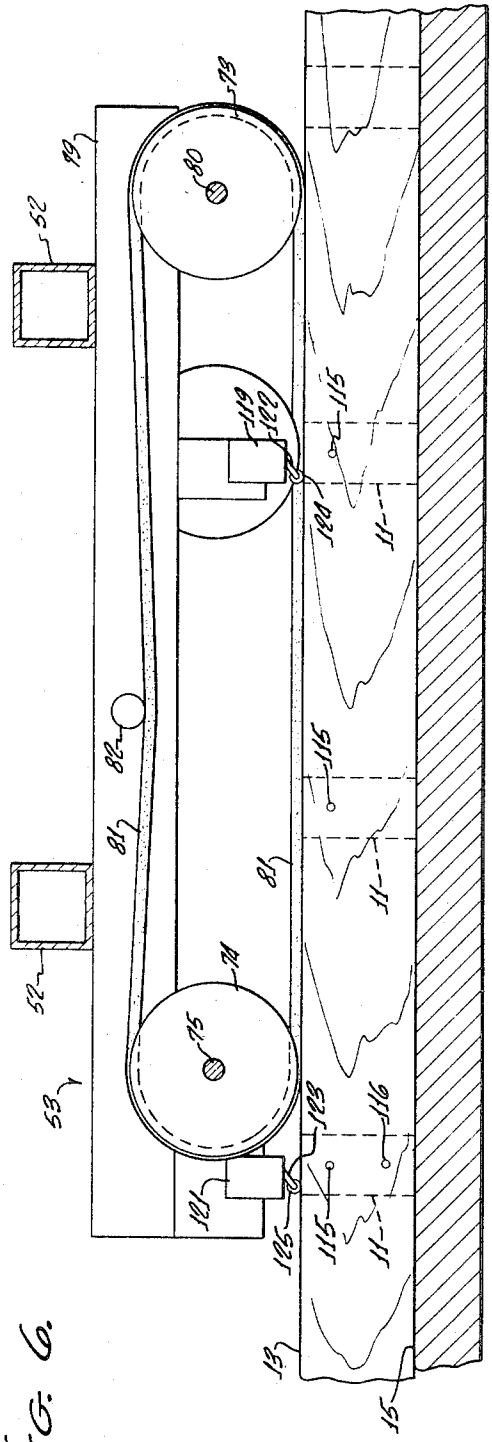


FIG. 6.

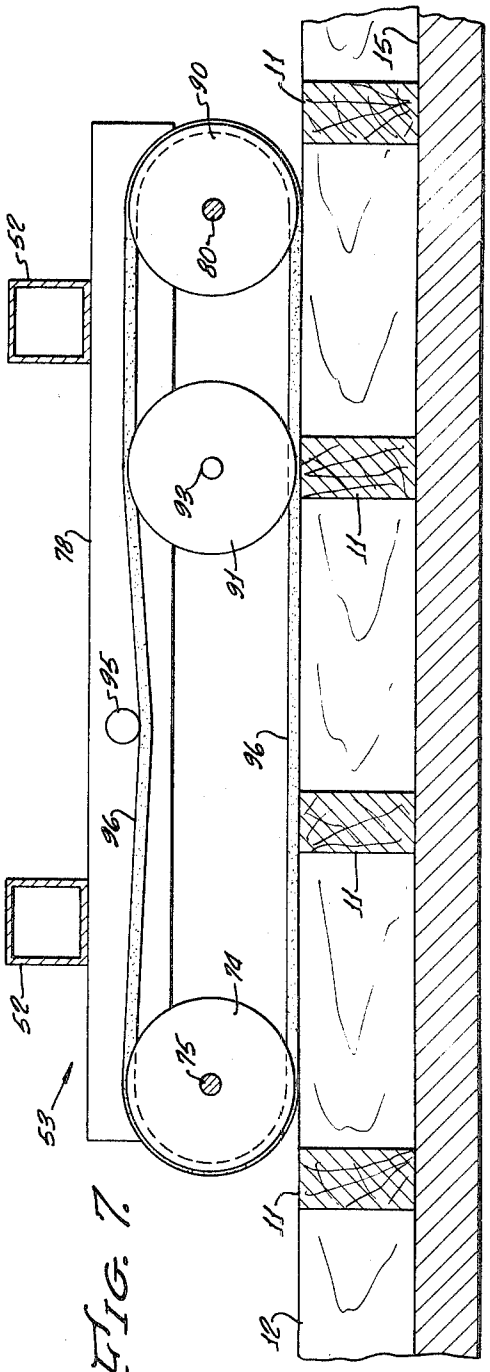


FIG. 7.

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FIG. 9.

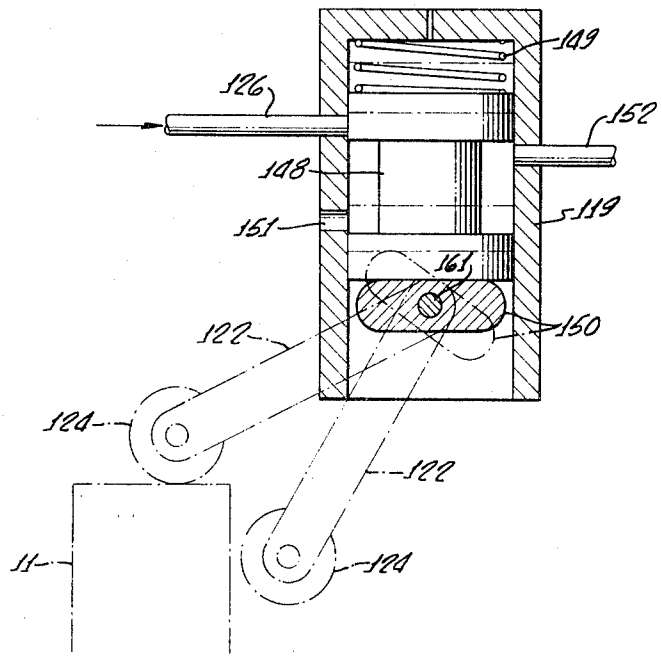
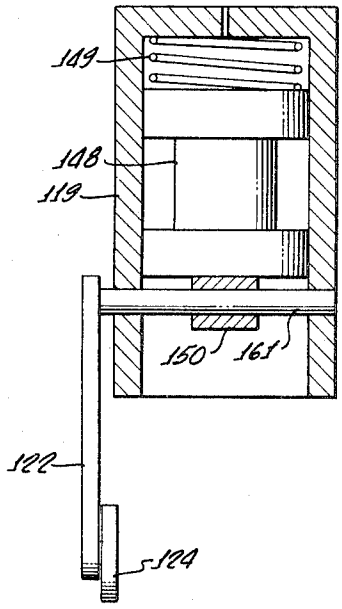


FIG. 10.



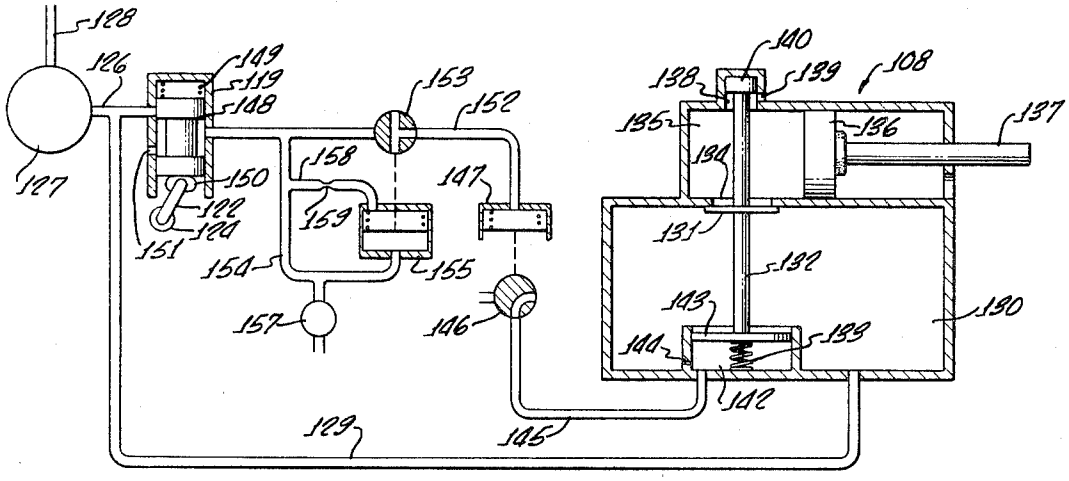


FIG. 8.

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NAILING MACHINE

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to an automatic nailing device.

2. The Prior Art

A building such as a residential dwelling, includes walls which have a framework that is nailed together. This framework includes elongated top and bottom plates which are nailed to vertical studs extending between them. Normally, the construction of the wall framework is entirely a hand operation, with the studs being individually nailed into place. This is a relatively slow and expensive operation. Moreover, the quality of the resulting construction depends entirely upon the skill of the carpenter who performs the job. Consequently, uniformity of results and proper construction are not always realized.

SUMMARY OF THE INVENTION

The present invention provides a means by which the wall framework may be nailed together automatically, greatly reducing the time required in producing the framework, while assuring superior results in the completed product. The device includes a bed that is adapted to support the members to be nailed together into the framework. Over this bed is movable a unit that carried two sets of opposed nailing guns. One set is elevated slightly relative to the other so that the nailing guns will drive in nails at different heights with respect to the bed to position them one adjacent the other in a properly spaced relationship in the ends of the studs. Each nailing gun is actuated by a trigger system that includes a rotatable member adapted to engage the studs as the unit is moved. Upon rotation of this trigger element, the gun is fired to drive in the nail without the necessity for stopping the unit. Rollers are included on the outside of the unit to engage the longitudinal members of the framework, while a pneumatic power cylinder urges these rollers inwardly toward the center. This holds the longitudinal members against the transverse studs in firm engagement at the time the nails are driven. There are also two sets of pulleys on either side of the unit, each having a belt circumscribing it. One set of pulleys on each side engages the longitudinal plate to hold it firmly in engagement with the bed in a properly aligned relationship. The other belt engages the studs as they are reached, holding the studs against the surface of the bed so that they are aligned with the plates. Thus, correct positioning of the elements of the framework is assured as the nailing takes place.

A traction unit is employed to pull the nailing unit along the bed in effecting the nailing operation. Rails are provided on the bed to provide a path for the movement of the traction unit. The traction unit is power-driven and includes a connection so that it can tow the nailing unit behind it. The traction unit also is adapted to support the studs to be assembled into the framework so that, as the machine advances, the studs may be removed from the traction unit and placed in position for nailing. The traction unit also can elevate the nailing unit so that it is remote from the bed and may be returned rapidly to the starting position.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a perspective view of the nailing machine of this invention;

FIG. 2 is an enlarged fragmentary plan view showing the drive arrangement for the traction unit of the machine;

FIG. 3 is a side elevational view of the nailing unit;

FIG. 4 is a top plan view of the nailing unit;

FIG. 5 is a rear end elevational view of the nailing unit;

FIG. 6 is an enlarged sectional view taken along line 6—6 of FIG. 5;

FIG. 7 is an enlarged sectional view taken along line 7—7 of FIG. 5;

FIG. 8 is a schematic view of a pneumatic circuit for operating the nailing gun;

FIG. 9 is a longitudinal sectional view of the trigger valve unit;

FIG. 10 is a longitudinal sectional view of the trigger valve unit, taken at 90° from the position of the view of FIG. 9;

FIG. 11 is a sectional view illustrating the feed arrangement for the nails;

FIG. 12 is an enlarged sectional view taken along line 12—12 of FIG. 11; and

FIG. 13 is a sectional view taken along line 13—13 of FIG. 12.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The device of this invention is used in nailing together a typical framework 10, as shown in FIG. 1, which constitutes the structural portion of a wall for a residential building. The framework 10 includes parallel studs 11, the ends of which are to be nailed to elongated plates 12 and 13. Normally, the members 11, 12 and 13 are made of finished wood two-by-fours. After the framework 10 is completed, it is positioned such that the studs 11 are vertical when the building is assembled.

The machine used in producing the framework 10 includes a flat horizontal bed 15 on which are positioned parallel rails 16 and 17. The spacing between the rails 16 and 17 is slightly greater than that between the plates 12 and 13 of the framework 10 to be produced by the machine. The machine also includes a traction unit 18, which pulls a nailing unit 19, the latter including the means for driving the nails into the members of the framework 10.

The traction unit 18 includes a rectangular frame 21, beneath which are flanged front and rear wheels 22 and 23, respectively, which engage the rails 16 and 17 to support the traction unit 18 above the horizontal bed 15. The front wheels 22 are powered for driving the unit, while the rear wheels 23 are idler wheels. Power to drive the unit is provided by an air motor 25 in the example illustrated, although an electric motor or other prime mover could be used if desired. As seen in FIG. 2, a sprocket 26 driven by the motor 25 connects, through a chain 27, to a sprocket 28 on a transverse shaft 29. The latter element carries a pair of sprockets 30 and 31. These two sprockets connect, through chains 32 and 33, to sprockets 34 and 35 on the axle 36 for the wheels 22. Therefore, rotation of the sprocket 26 by the motor 25 causes the sprocket 28 to drive the shaft 29. This, in turn through the chains 32 and 33, rotates the sprockets 34 and 35 to turn the axle 36 and the wheels 22, which are rotatable with the axle. The sprockets 34 and 35 are spaced apart, each being adjacent one of the front wheels 22. As a result, the driving torque is applied equally at the two end portions of the axle 36.

The traction unit 18 is connected to the nailing unit 19 by means of chains 38 that extend from the rearward end of the frame 21 of the traction unit to the forward end of the frame 39 of the nailing unit. This permits the traction unit 19 to tow the nailing unit 18 as the traction unit moves along the path defined by the rails 16 and 17.

Transversely mounted in bearings 41 at the rearward end of the frame 21 of the traction unit 18 is a shaft 42, as seen in FIG. 1. Spaced parallel arms 43 extend rearwardly from the shaft 42 at locations beyond the bearings 41, extending through square tubular members 40 welded to the shaft. Each of the arms 43 extends through a pair of spaced generally U-shaped brackets 44 mounted on the frame 39 of the nailing unit 19. A crank arm 46 projecting upwardly from the central portion of the shaft 42 is connected to a rod, 47 that extends from a power cylinder 48. The latter unit, which may be pneumatically operated, is mounted on a transverse beam 49 at the central portion of the frame 21 of the traction unit 18. When the power cylinder 48 retracts the rod 47, the crank arm 46 will be caused to rotate, thereby turning the shaft 42. This rotates the arms 43 upwardly, thereby lifting the nailing unit 19. Consequently, the traction unit 18 may carry the nailing unit 19 in an elevated position where it is spaced from the bed

15 and inoperative. This may be used for rapid return to the starting position after the nailing unit 19 has been towed along the bed 15 in a nailing operation.

During use of the machine in a nailing operation, the arms 43 are slid forwardly through the tubular members 40 and out of the brackets 44 so that they are retracted into the frame 21 of the traction unit. This frees the space between the units 18 and 19 so that the studs 11 may be positioned on the bed 15 without interference.

The frame 39 of the nailing unit 19 is in two sections which are capable of limited transverse movement relative to each other. This allows an inward compressive force to be exerted, urging the plates 12 and 13 against the ends of the studs 11, as will be explained below. As seen in FIGS. 4 and 5, the left-hand section 50 of the frame 39 includes parallel transverse box section beams 51. A similar pair of beams 52 is included in the right-hand frame section 53. The ends 54 of the beams 51 are of reduced transverse dimension and extend into the adjacent open end of the beams 52. This provides a telescoping connection, allowing the frame sections 50 and 53 to move relative to each other transversely of the machine. They may be drawn inwardly toward each other by a power cylinder 55 which connects at one end to a longitudinally directed beam 56 that extends between the parallel beams 51 of the left-hand frame unit 50. The opposite end of the power cylinder 55 connects to a longitudinal beam 57 that interconnects the parallel beams 52 of the right-hand frame unit 53. Consequently, if the power cylinder 55 is contracted, the two frame sections 50 and 53 are drawn toward each other. The power cylinder 55 preferably is pneumatically operated.

Only limited movement of the two frame units 50 and 53 is permitted. To provide for this, transverse rods 59 are carried by brackets 60 on the sides of the beams 51. The rods 59 extend through openings in brackets 61 mounted on the sides of the beams 52 of the right-hand unit 53. Spaced stops 62 and 63 on the rods 59 receive the brackets 61 between them. Thus, the unit 53 may move relative to the unit 50 as the bracket 61 slides along the rod 59, but the movement is limited by the stops 62 and 63. The rods 59 may be threaded and the stops 62 and 63 may be nuts to allow adjustment of the positions of the stops.

The outer ends of the beams 51 and 52 connect to vertical webs 65 and 66 at the left- and right-hand sides, respectively, of the frame of the nailing unit 19. Wheels 67 are mounted by vertical axles 68 on brackets 69 at the lower edge of the web 66, as best seen in FIG. 3. Thus, the axes of rotation of the wheels 67 are perpendicular to the bed 15 and to the path of movement defined by the rails 16 and 17. The wheels 67 are positioned with one adjacent the forward end and the other toward the rear of the right-hand side of the nailing unit 19. Similarly, wheels 70 are carried by brackets 71 along the lower edge of the left-hand side of the nailing unit 19. The wheels 67 and 70 define an opening between them that receives the framework 10, being engageable with the outer surfaces of the plates 13 and 12, respectively, of the framework. When the cylinder 55 is pressurized, and the two frame sections 50 and 53 are drawn toward each other, the wheels 67 and 70 exert inward forces against the plates 13 and 12, guiding these members and causing them to be held in firm engagement with the ends of the studs 11. In the event of dimensional variation of the components of the framework 10, the pneumatic cylinder 55 will allow the frame sections 50 and 53 to move inwardly or outwardly relative to each other while the wheels 67 and 70 continue to exert pressure against the plates 12 and 13.

Positioned along the inside of the web 66 at the right-hand side of the nailing unit 19 are pulleys 73 and 74 adjacent the forward and rearward ends of the unit 19, respectively. The rearward pulley 74, as may be seen in FIG. 5, is mounted on a transverse shaft 75 that extends through bearing supports 76 and 77 carried along the underside of longitudinal frame rails 78 and 79, respectively. The forward pulley 73 is similarly mounted on a transverse shaft 80 supported in bearings at the forward end of the nailing unit 19. A belt 81, engaged also by a tensioning roller 82, extends around the pulleys 73 and 74. This positions the belt 81 longitudinally of the machine to engage the upper surface of the plate 13 of the framework 10 at the right-hand side of the unit. The weight of the nailing unit 19 holds the plate 13 downwardly in firm contact with the bed 15 beneath it.

The construction is the same at the left-hand side, where forward and rearward pulleys 83 and 84, respectively, mounted on transverse shafts 85 and 86 are circumscribed by a belt 87. The exterior of the belt 87 is engaged by a tensioning roller 88 carried y the outboard longitudinal frame rail 89 at the left-hand side of the nailing unit 19. The belt 87 engages the upper surface of the plate 12, forcing the plate 12 into firm engagement with the bed 15.

Inwardly of the pulleys 73 and 74 are three additional pulleys 90, 91 and 92 at the right-hand side of the machine. The pulleys 90 and 92 are mounted on the shafts 80 and 75, respectively. The intermediate pulley 91 is on a shorter transverse shaft 93, which is carried by the frame rail 78 through a bearing support 94. This positions the pulley 91 relatively closer to the forward pulley 90 than to the rearward pulley 92. A tensioning roller 95, also carried by the frame rail 78, bears against the periphery of a belt 96 that extends around the pulleys 90, 91 and 92. The belt 96, therefore, is transverse to the studs 11 and engages their upper surfaces as the machine progresses along its path of movement. The engagement of the belt 96 with the studs 11 causes the weight of the nailing unit 19 to force the end portions of the studs 11 downwardly against the bed 15, assuring that they are properly aligned with the plate 13, while making certain that the studs are not displaced angularly.

At the left-hand side of the machine is a similar aligning feature for the opposite ends of the studs 11. This includes pulleys 98, 99 and 100, around which extends a belt 101. The pulleys 98 and 100 are carried by the shafts 86 and 85, respectively, while a shorter transverse shaft 102, having a bearing support 102 on the frame rail 104, mounts the intermediate pulley 99. A tensioning roller 105, carried by the frame rail 104, bears against the upper intermediate peripheral portions of the belt 101. As for the right-hand side, therefore, the belt 101 at the left bears against the upper surfaces of the studs 11, forcing them against the bed 15 and into proper alignment with the plate 12 of the framework 10 to be produced.

The nailing unit 19 includes, in addition, nailing guns which drive nails through the plates 12 and 13 and into the ends of the studs 11 to accomplish the attachment of the elements of the framework 10 to each other. This includes guns 107 and 108 mounted exteriorly of the side frame webs 65 and 66 at the left- and right-hand sides of the forward end of the nailing unit 19. These nailing guns are aligned with the intermediate pulleys 91 and 99. An additional pair of oppositely positioned guns 109 and 110 is mounted at the rearward end of the nailing unit 19. These nailing guns may be of conventional pneumatically operated construction of a type such as that marketed by Paslode Co., Skokie, Ill. Their triggering mechanisms are modified, however, to provide for automatic operation during the time that the nailing unit 19 is in motion, as will be explained below.

The guns are supported on the nailing unit 19 by suitable mounting brackets 111, 112, 113 and 114, positioning them below the outer edges of the nailing unit frame assembly 39. This may be seen in particular for the nailing guns 109 and 110 in FIG. 5. The forward guns 107 and 108 are positioned above the rearward guns 109 and 110. In operation, the forward guns 107 and 108 drive in the upper nails 115, as shown in FIG. 3, while the rearward guns 109 and 110 drive in the lower nails 116. This provides properly spaced nails for making the attachments of the studs 11. The upper nails 115 are driven in first at the time when the stud 11 is beneath the intermediate pulleys 91 and 99 and held with maximum force on the surface of the bed 15. With the upper nail 115 in place, there is little tendency for the stud 11 to twist or otherwise become misaligned before the bottom nail 116 is driven.

The nailing guns are operated automatically as the studs 11 are reached to cause them to fire and drive the nails through the plates 12 and 13 into the central portions of the ends of the studs 11. This is accomplished by means of forward trigger units 118 and 119 carried by the frame rails 89 and 79, respectively, and rearward trigger units 120 and 121, also carried by these frame rails. Pivotal arms extend downwardly from the trigger units for actuating them as the studs 11 are reached. The arms 112 and 123 for the right-hand trigger units 119 and 121 may be seen in FIG. 3. Rollers 124 and 125 are at the ends of the arms 122 and 123, respectively, and positioned to engage the upper edges of the studs 11 as the unit 19 progresses. When the roller strikes a stud 11, its arm is caused to rotate, thereby triggering the gun with which it is associated.

A suitable pneumatic system for operating a modified Paslode nailing gun is illustrated schematically in FIG. 8. An inlet line 126 connects with a source of compressed air 127 for operating the gun 108, while the line 128 extends from the source of compressed air to the circuits for the other guns, which are identical to the one illustrated. A conduit 129 connects to the air inlet 126 and also to a plenum chamber 130 within the gun 108. The plenum chamber normally is kept sealed by a valve member 131 on a rod 132, biased by a spring 133 against a valve seat around an opening 134 that leads to a cylinder 135. Within the cylinder 135 is a piston 136, from which extends a rod 137 used as the hammer in providing the force for driving a nail. A recessed chamber 138 connects to the cylinder 135 in back of the piston 136 and, in its wall, includes a vent opening 139 that leads to atmosphere. The stem 132 extends past the valve member 131 to a small plunger 140 in the chamber 138, normally located beyond the vent opening 139. Consequently, only atmospheric pressure is present in the cylinder 135 with the device in the position shown in FIG. 8.

A chamber 142 communicates with the plenum chamber 130 and receives a piston member 143 at the bottom end of the stem 132. Beneath the piston 143 in the wall of the chamber 142 is a bleed opening 144, which permits the plenum chamber pressure to exist on both sides of the piston 143. An outlet line 145 connects to the chamber 142 beneath the piston 143 and extends to a diaphragm-operated valve 146. This valve is spring-loaded to the closed position so that, in the absence of pressure in the diaphragm actuator 147, the valve 146 closes the line 145. In the open position, however, the valve 146 will vent the line 145, and hence the chamber 142, to atmosphere.

The air supply also connects to the trigger valve unit 119, within which is a valve spool 148 biased by a spring 149 against a cam 150 at the inner end of the trigger arm 122. In the normal position of the trigger arm 122, the upper lobe of the valve spool 148 covers the air inlet, while an exhaust port 151 opens the interior of the valve to atmosphere. An outlet line 152 connects to the trigger valve unit 119 between the two lobes of the valve spool and extends to the diaphragm actuator 147 of the normally closed valve 146. The line 152 is controlled by a three-way valve 153, which normally blocks communication from the trigger unit 119 and vents the diaphragm actuator 147 to atmosphere.

Branching off the line 152 upstream of the valve 153 is a line 154, which leads to the diaphragm actuator 155 which operates the valve 153. Pressure in the line 154 will react against one side of the diaphragm in the actuator 156, causing the valve 153 to change its position so as to establish communication between the trigger valve unit 119 and the diaphragm actuator 147 of the valve 146. A valve 157 in the line 154 will close upon the existence of pressure in the line 154, but will open to atmosphere in the event that the pressure in line 154 drops.

An additional line 158 connects from the line 154 to the diaphragm actuator 155 on the opposite side of the diaphragm. A restricted orifice 159 is included in the line 158.

The unit is operated when the roller 124 strikes a stud 11 to cause the arm 122 to rotate about its mounting pin 161. When this occurs, the cam 150 is turned to raise the valve spool 148, thereby uncovering the air inlet to the trigger valve unit 119. This pressurizes the line 152 and also the branch 154 that extends to the diaphragm actuator 155. Consequently, the valve 153 is opened, resulting in pressurization of the diaphragm actuator 147 of the valve 146. The latter valve then is moved to vent to atmosphere, thereby dumping the pressure from within the chamber 142. As a result, the full plenum pressure bears against the upper surface of the piston 143, which is of greater area than the valve member 131. This moves the piston 143 downwardly in the chamber 142, causing the stem 132 to move the valve member 131 off its seat at the opening 134 to the cylinder 135. At the same time, the plunger 140 moves downwardly in the chamber 138 to cover the vent opening 139. As a result, the cylinder 135 becomes pressurized by air from the plenum chamber 130, driving the piston 136 through its stroke so that the rod 137 can accomplish the nailing operation.

Pressure builds up beneath the diaphragm of the actuator 155 as it is admitted through the restricted orifice 159, tending to equalize the pressure on both sides of the diaphragm. Also, as the valve spool 148 of the trigger unit 199 returns to its original position when the arm 122 is released by the stud 11, the exhaust opening 151 vents the line 152 upstream of the valve 153 to atmosphere. This reduces the pressure in the line 154 so that the valve 157 also opens to atmosphere. This immediately removes the operating pressure from the actuator 155, so that the valve 153 is returned to its normal position in which it closes off the line 152 and vents the diaphragm actuator 147 to atmosphere. This, in turn, causes the valve 146 to close, again sealing the chamber 142 beneath the piston 143. Pressure from the plenum chamber bleeds through the opening 144 into the chamber 142 so that, as pressure equalize on both sides of the piston 143, the spring 133 pushes it upwardly, thereby causing the valve member 131 to seat. This closes the plenum chamber 130, from the cylinder 135 and vents the cylinder 135 to atmosphere as the plunger 140 is moved upwardly by the stem 132.

This arrangement provides almost instantaneous actuation of the nailing gun upon movement of the triggering arm 122 by the stud 11 encountered. It relies upon pressure pulses which effect changes without delay even in long pressure lines, so that immediate firing of the gun is accomplished. This enables the nails to be positioned accurately with respect to the studs 11 as the gun is actuated without stopping the relative movement between the nailing unit 19 and the components of the framework 10. Additionally, through the timing system provided by the actuator for the valve 153, rapid recycling is assured so that the unit is always ready for actuation by each successive stud 11. The direct venting to atmosphere by the valve 157 adjacent the diaphragm actuator 155 makes certain that the valve will be returned to its normal position immediately, with no delay for the air to bleed from the line 152 all the way to the trigger valve unit 119. This enables the valves to be returned quickly to their normal positions, even though the air lines may be relatively long.

Nails for the nailing guns are kept in open-topped trays 162, 163, 164 and 165, which are positioned adjacent the guns. The nails are connected together in belts by means of cellulose or other adhesive tape 166 (see FIG. 3). The nails are drawn from the trays and into feed chutes 167, 168, 169 and 170 to be directed to the breech of each of the guns.

As illustrated for the gun 108 in FIGS. 11, 12 and 13, a member 171 adjacent the bottom of the feed chute 168 has an end part 172 engageable by the rod 137 when the gun 108 fires to drive a nail 115. This rotates the member 171 to the position shown in phantom in FIG. 11. At the bottom of the member 171 is a semicylindrical stem 173 which normally closes a port 174 which connects to the plenum chamber 130. However, when the member 171 is rotated by the rod 137, it uncovers the port 174, allowing pressurized air to enter a chamber 175 beneath the member 171, thereby forcing the member 171 upwardly. The end part 172 of the member 171 clears the nails 115 when the member 171 is so rotated so that

is does not interfere with the nails **115** as it is moved upwardly by the compressed air in the chamber **175**. A leaf spring **176** engages the flat backside of the member **171** and returns the member rotationally to the solid-line position of FIG. **11** while the member **171** is in its elevated position. This again closes off the port **174**, opening up the exhaust vent **177** in the wall of the chamber **175**. Then, a compression spring **178** above the member **171** forces the member **171** downwardly. When this occurs, the notched end part **172** engages two of the nails **115**, as seen in FIG. **12**. The nail adjacent the lower surface **179** of the member **171** is pushed downwardly into alignment with the rod **137** of the gun **108**. There, it may be driven by the gun into the plate **13** and the end of the stud **11** the next time the gun is fired. The feed takes place automatically as the member **171** is rotated each time the rod **137** goes through its stroke, causing it to move upwardly to grip additional nails to move them downwardly to the breech of the gun.

In preparing for the use of the machine, suitable indicia may be placed along the bed **15** to indicate locations where the studs **11** are to be positioned. This may be tapes **180** and **181** positioned along the left- and right-hand sides of the machine, as indicated by FIG. **1**, each having markings thereon to indicate where the studs are to be located. The elongated beams **12** and **13** are positioned on the bed **15** at a spacing corresponding approximately to the lengths of the studs **11** to be nailed. The studs may be carried by the traction unit **18**, being supported on the upper surface of its frame **21**. As the unit advances, the studs **11** are removed from the traction unit **18** and placed on the bed **15** between the beams **12** and **13** at the locations indicated from them by the markings on the tapes **180** and **181**. Whenever the studs are located, the proper nailing operations take place to complete the framework **10** as the unit moves. The spacing between adjacent studs may be varied to suit particular conditions without affecting the performance of the machine. The driving of the nails is correlated to the position of the stud and dependent upon the engagement of the stud with the trigger elements. Therefore, correct nailing occurs irrespective of where the studs **11** may be positioned.

The rails **16** and **17** may be extended any desired length so that various frameworks may be nailed in succession as the machine progresses. These different frameworks need not be identical. As the machine passes over a completely nailed framework, that unit is removed from between the rails **16** and **17** and additional plates **12** and **13** may be put down preparatory to the production of a subsequent framework. After the machine has completed a run down the rails **16** and **17**, the power cylinder **48** causes the arms **43** to lift the nailing unit **19** upwardly. The machine is returned with relative rapidity to its starting point, the unit **19** lowered to its operative position, and the cycle is repeated. In this manner, the frameworks **10** are made at a minimum expense and in a very short time, while being accurately aligned and of consistent high quality.

I claim:

1. A device for nailing a framework comprising
opposed nailing gun means,
a first support means for said nailing gun means,
a second support means for members of a framework to be nailed together,
means for accomplishing relative movement of said first support means and said nailing gun means relative to said second support means,
means responsive to the position of said nailing gun means relative to said members of a framework on said second support means for actuating said nailing gun means for securing together said members of said framework, opposed spaced means for receiving said member of said framework therebetween and holding said members together for nailing by said nailing gun means,
said opposed spaced means including a duality of wheels at either side of said body,
the axes of said wheels being substantially perpendicular to the line of said relative movement,
and yieldable means urging said opposed spaced means inwardly toward each other,
whereby said opposed spaced means can exert a compressive force on said members of said framework therebetween.

2. A device for nailing a framework comprising
opposed nailing gun means,
a first support means for said nailing gun means,
a second support means for members of a framework to be nailed together,
means for accomplishing relative movement of said first support means and said nailing gun means relative to said second support means,
and means responsive to the position of said nailing gun means relative to said members of a framework on said second support means for actuating said nailing gun means for securing together said members of said framework,
said first support means including
a body extending between said nailing gun means, pulley means on either side of said body, and belt means around each of said pulley means for engaging said members of a framework on said second support means and holding said members against said second support means.

3. A device as recited in claim **2** in which
there are two pulley means at either side of said body,
and a belt extending around each of said pulley means on either side of said body,
said pulley means at either side of said body being laterally spaced apart, thereby providing outer and inner pulley means at either side of said body,
whereby said belt means around said outer pulley means is adapted to engage outer longitudinally extending members of a framework to be nailed together and said belt means of said inner pulley means is adapted to engage inner transversely extending members of said framework.

4. A device as recited in claim **3** in which said inner pulley means includes a pulley substantially aligned with a nailing gun means on either side of said body.

5. A device for nailing a framework comprising
opposed nailing gun means,
a first support means for nailing gun means, a second support means for members of a framework to be nailed together,
means for accomplishing relative movement of said first support means and said nailing gun means relative to said second support means,
means responsive to the position of said nailing gun means relative to said members of a framework on said second support means for actuating said nailing gun means for securing together said members of said framework,
sand nailing gun means including
a first set of opposed nailing guns,
and a second set of opposed nailing guns,
one of said sets being relatively close to said second support means and the other of said sets being relatively remote from said second support means,
whereby said first and second sets drive nails into said members of said framework at different locations relative to said second support means.

6. A device as recited in claim **5** in which one of said sets of opposed nailing guns is adjacent the forward end of said first support means, and the other of said sets of opposed nailing guns is adjacent the rearward end of said first support means.

7. A device as recited in claim **6** in which said set of opposed nailing guns adjacent said forward end of said first support means is also said set relatively remote from said second support means.

8. A device for nailing a framework comprising opposed nailing gun means,
a first support means for said nailing gun means, a second support means for members of a framework to be nailed together,

means for accomplishing uninterrupted movement of said first support means and said nailing gun means relative to said second support means,

and means responsive to the position of said nailing gun means relative to said members of a framework on said second support means for actuating said nailing gun means during said relative movement for securing together said members of said framework,

said means for providing relative movement of said first and second support means including

a traction unit,

drive means for effecting movement of said traction unit,

guide means for directing said traction unit along a predetermined path,

and means interconnecting said traction unit and said first support means for causing said first support means to move with said traction unit,

said means interconnecting said traction unit to said first support means including means for moving said first support means to a position remote from said second support means for movement by said traction unit without operating said nailing gun means.

9. A device as recited in claim 8 in which said means for moving said first support means to a position remote from said second support means includes at least one arm extending from said traction unit to said first support means, and means for rotating said arm for thereby moving said first support means.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,637,126 Dated Jan. 25, 1972

Inventor(s) Clarence R. Heterick, Jr.

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 7, line 67, "member" should read ---members---. Column 8, line 42, after "for insert ---said---.

Signed and sealed this 5th day of September 1972.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents