

June 24, 1930.

G. S. MARION

1,765,987

MACHINE FOR SAWING TIMBERS

Filed July 23, 1927

6 Sheets-Sheet 1

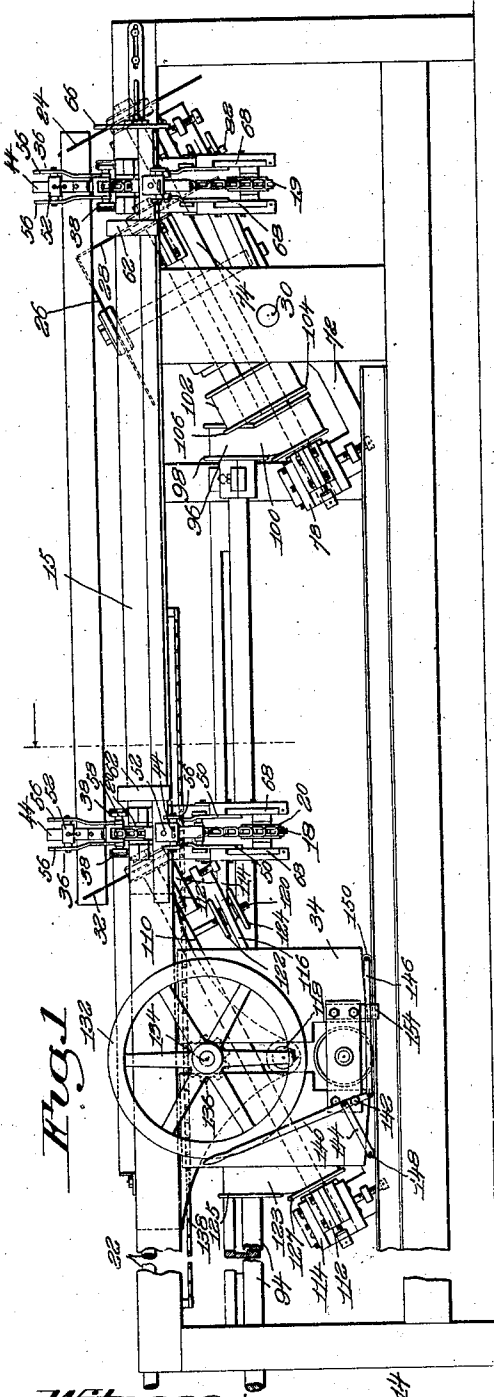


Fig. 1

Witness
Frederick S. Greenleaf.

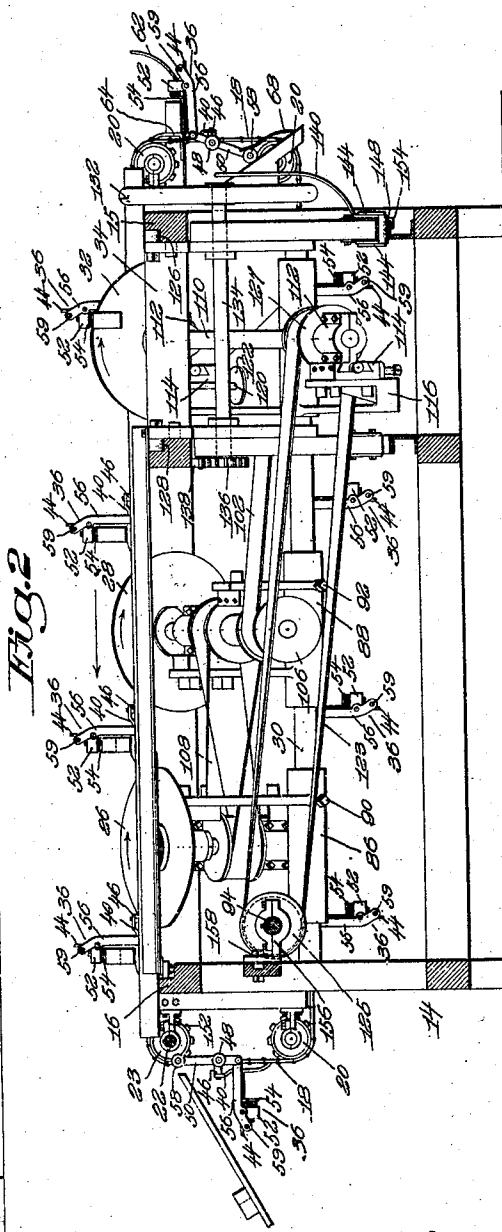


Fig. 2

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June 24, 1930.

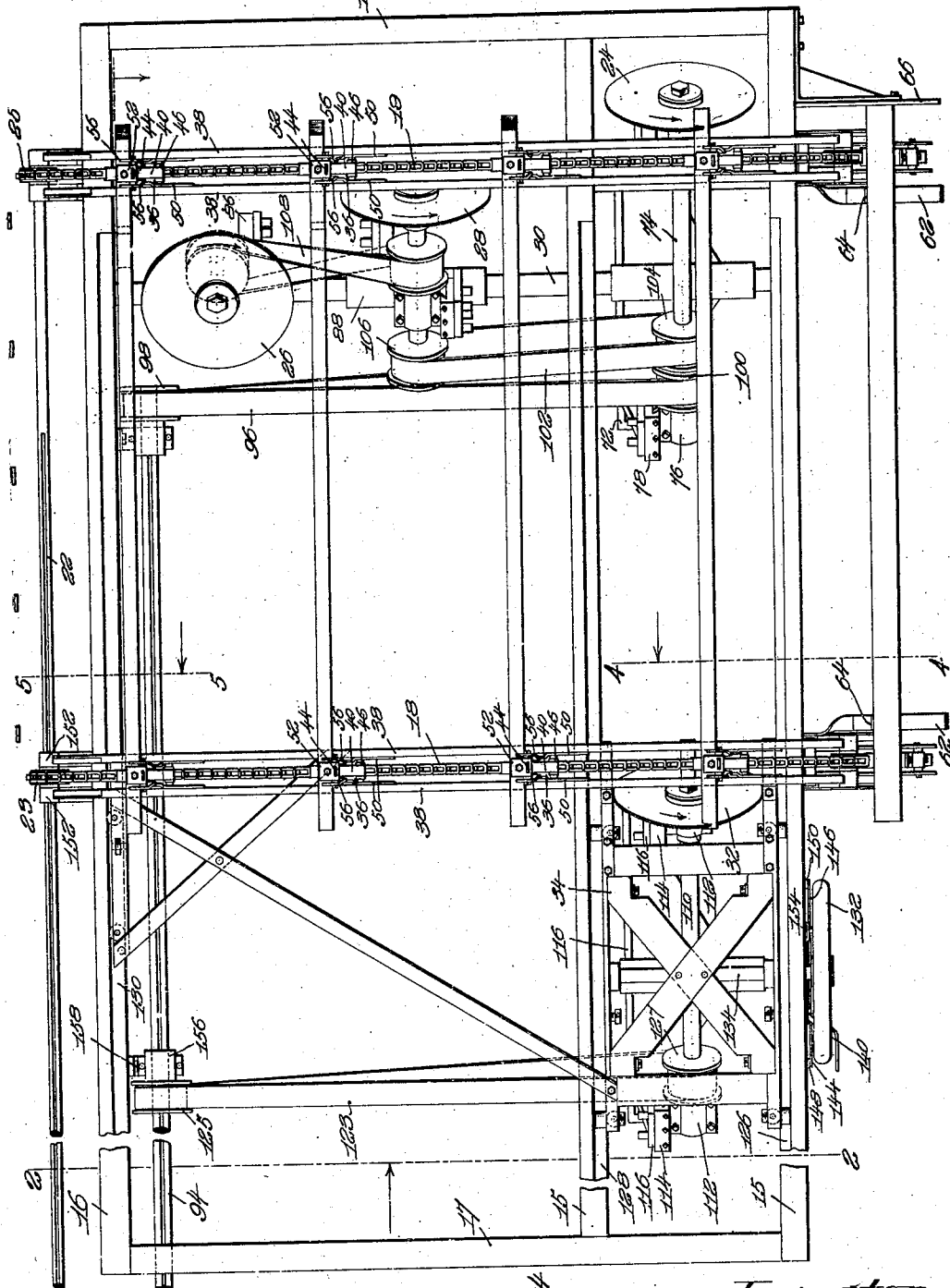
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6 Sheets-Sheet 2



Witness
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Fig. 3

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June 24, 1930.

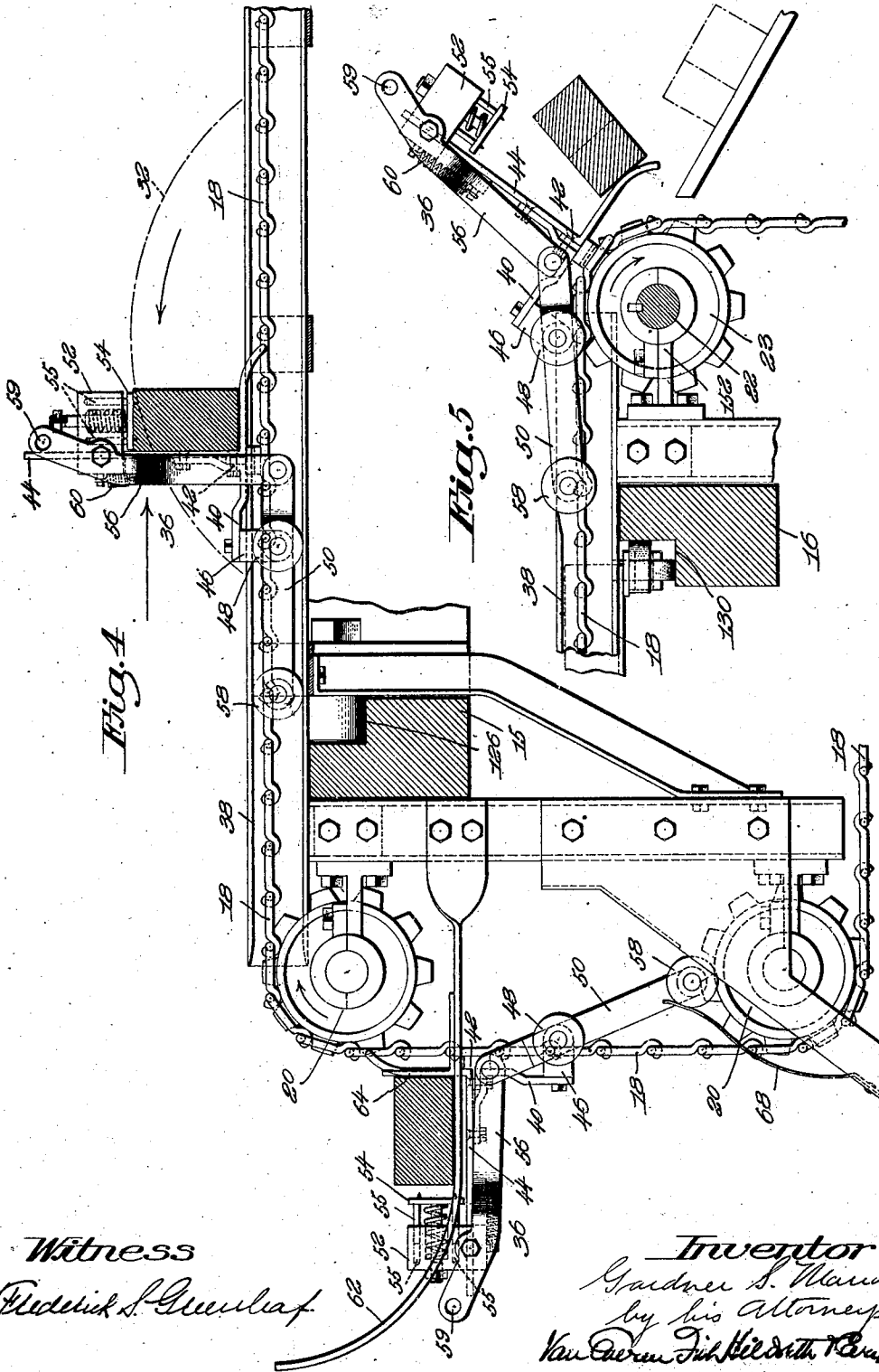
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6 Sheets-Sheet 3



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6 Sheets-Sheet 4

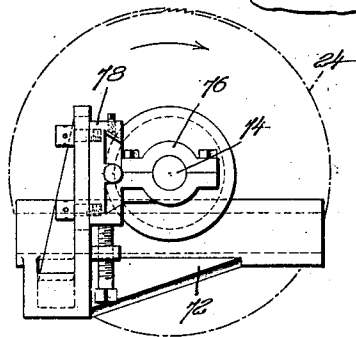
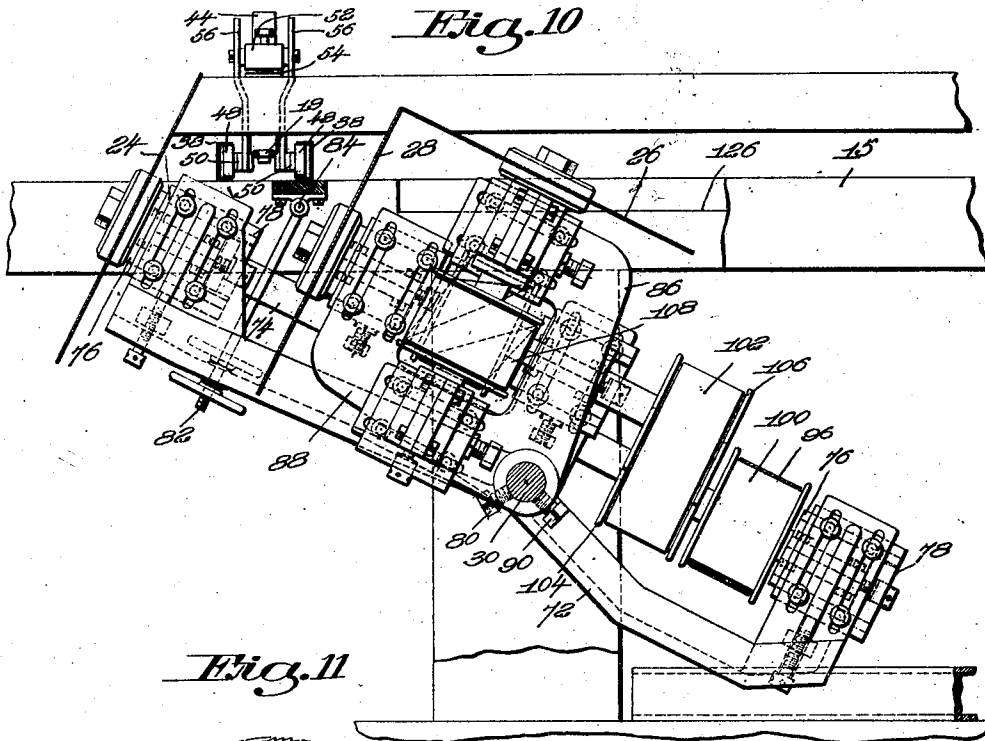


Fig. 13

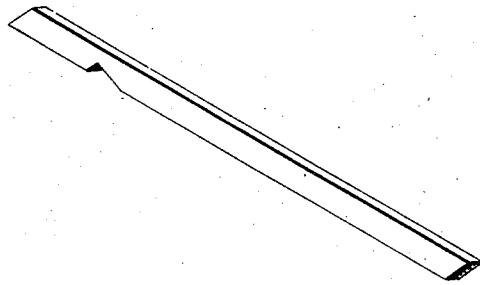
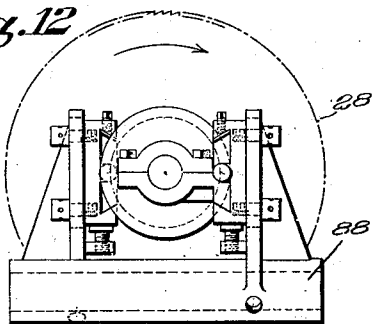


Fig. 12



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MACHINE FOR SAWING TIMBERS

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5 Sheets-Sheet 5

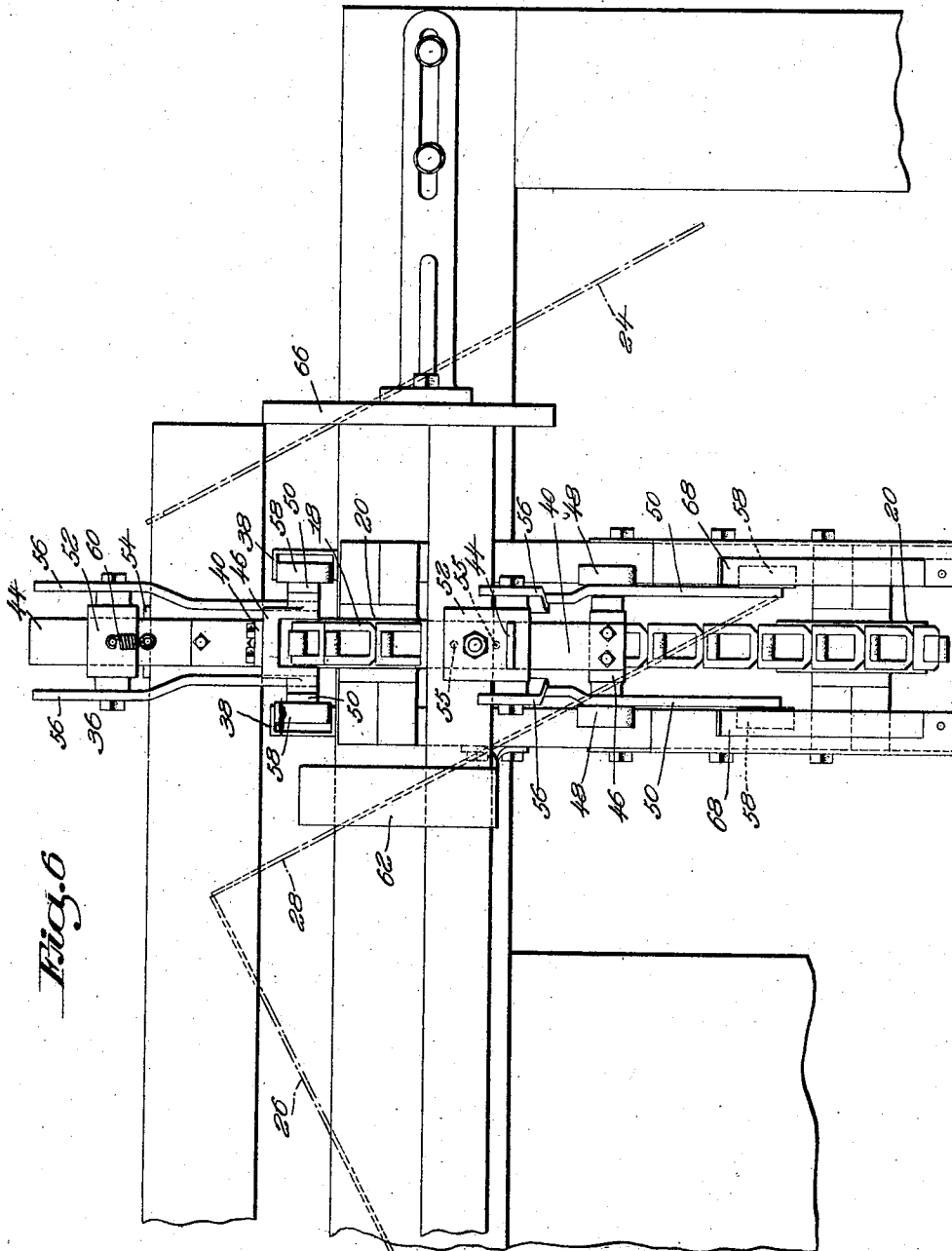


Fig. 6

Witness

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June 24, 1930.

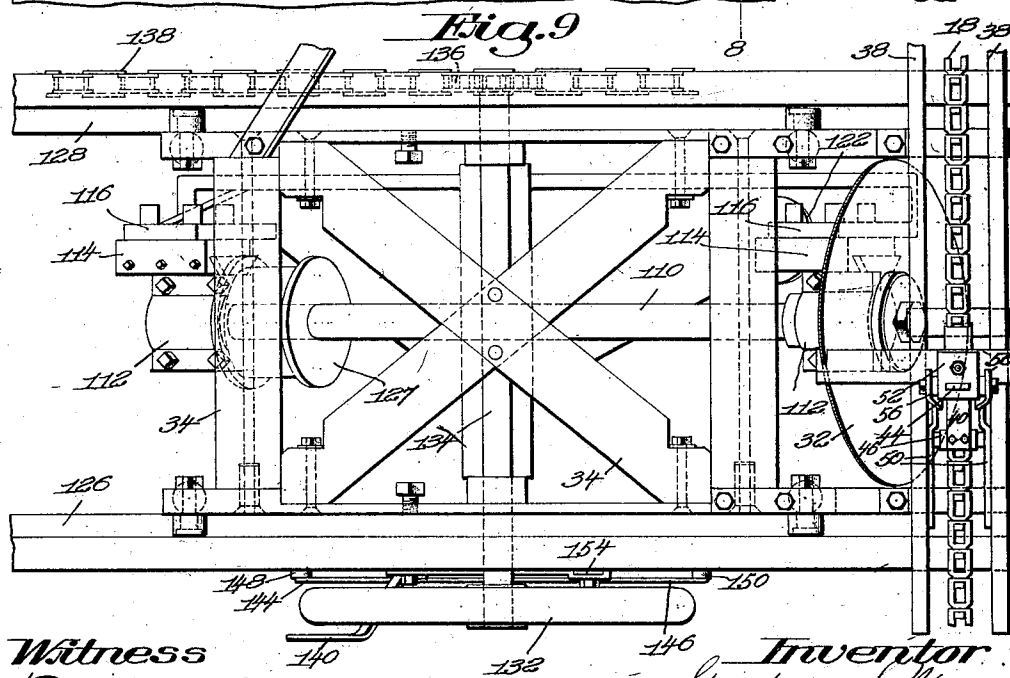
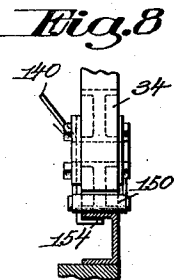
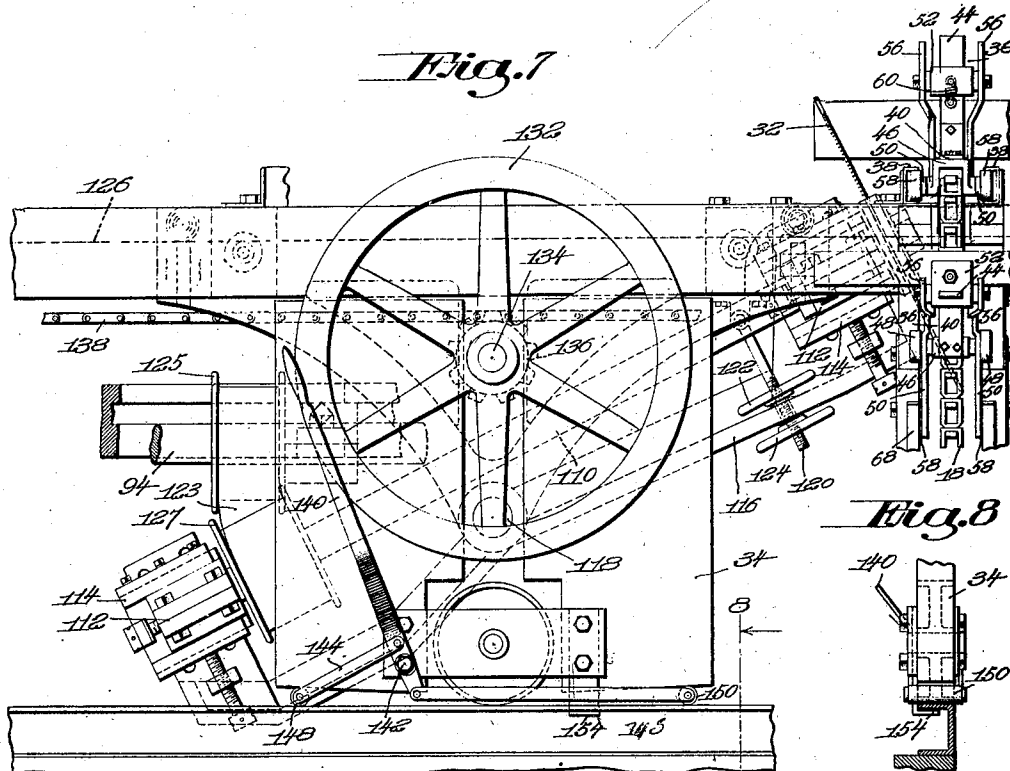
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MACHINE FOR SAWING TIMBERS

Filed July 23, 1927

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Witness

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UNITED STATES PATENT OFFICE

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MACHINE FOR SAWING TIMBERS

Application filed July 23, 1927. Serial No. 207,886.

The present invention relates to machines for sawing timbers and is herein disclosed as embodied in a machine for sawing roof rafters.

5 One object of the invention is to produce a machine which will operate automatically to saw timbers accurately, rapidly, and efficiently to any one of a large variety of shapes and sizes as required for building
10 and similar purposes. More specifically, its object is to produce a machine for sawing roof rafters which will operate automatically to cut the ends of and notches in rafters in rapid succession and in exact dupli-
15 cation to fit accurately without further alteration into the building scheme for which they are designed.

20 With these objects in view the features of the invention consist in the devices, combinations and arrangement of parts hereinafter described and claimed.

The several features of the invention together with the advantages to be obtained thereby will be clearly understood by those skilled in the art from the following description taken in connection with the accompanying drawings, in which Fig. 1 is a view in front elevation of one embodiment of the invention in a machine for sawing
25 roof rafters; Fig. 2 is a view in transverse vertical section on the line 2—2 of Fig. 3; Fig. 3 is a plan view of the machine; Fig. 4 is an enlarged view in vertical section of a portion of one of the endless chains and the
30 work clamps attached thereto comprising the travelling work support, taken on the line 4—4 of Fig. 3 at the receiving end of the work support; Fig. 5 is a similar view showing the work clamp discharging the
40 finished rafter at the rear end of the machine, taken on the line 5—5 of Fig. 3; Fig. 6 is a detailed view in front elevation of the parts shown in Fig. 4; Fig. 7 is a detailed view in front elevation of the rotary
45 saw for cutting the upper ends of the rafters and a portion of the carriage in which the saw is mounted; Fig. 8 is a view taken on the line 8—8 of Fig. 7; Fig. 9 is a detailed plan view of the parts shown in Fig. 7;
50 Fig. 10 is a rear elevation of the saws for

notching and cutting the lower ends of the rafters, together with their mountings; Fig. 11 is a view of one of the rotary saws with its mounting for cutting the lower ends of the rafters, the view being taken along the axis of the bearing from the rear; Fig. 12 is a similar view of the bearings for the rotary saw cutting the side of the notch parallel to the ends of the rafter; and Fig. 13 is a perspective view of a finished rafter.

60 The machine disclosed in the drawings as illustrating one embodiment of the present invention is a machine for sawing roof rafters and operates to make the diagonal or oblique cuts at each end of the rafter and also the angular notch near the eaves end of the rafter to receive the plate or other support for the rafter. The machine comprises a travelling work support and four rotary saws adjustably mounted to cut the ends of and notch the rafters at the desired angles and distances as the rafters are fed past the saws. The travelling work support consists of two endless chains adapted to run parallel with each other at the same
65 rate of speed and equipped at corresponding intervals with work carriers having clamping devices mounted thereon to position the rafters relatively to the line of feed as they are presented to the saws. In order more
70 firmly to hold the rafters so that the requisite degree of accuracy may be obtained in feeding the work to the saws, runways are provided which hold the clamps rigidly in the line of feed while the rafters are being fed to the saws.

Referring more specifically to the drawings, the machine comprises a broad rectangular frame 14 consisting of two front members 15, one rear member 16, and two
75 end members 17. On the frame are mounted two parallel endless chains 18 and 19 for feeding the timbers across the top of the machine past the saws. The chains run on idler sprocket wheels 20 and are driven at the same rate of speed from the driving shaft 22 at the rear of the machine through sprocket wheels 23 and 25 mounted on the driving shaft. A rotary saw 24 for cutting the lower ends of the rafters and the rotary saws
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26 and 28 adapted to notch the rafters to receive the wall plate of the house are all adjustably mounted on brackets which are sleeved to a fixed support 30 formed in the machine frame. A similar saw 32 is provided for cutting the upper ends of the rafters, this saw and also the endless chain 18 being mounted on a carriage 34 for adjustment transversely to the line of feed to determine the length of rafter to be cut.

The timbers are securely held in position on edge as they are presented to the saws by means of work carriers 36 which are fastened at corresponding intervals to the chains 18 and 19. To further insure the requisite degree of accuracy in feeding the work, guideways 38 are mounted on both sides of the chains so that the carriers are rigidly positioned in the line of feed as the work is fed past the saws.

The work carriers comprise a base 40 which is fastened at 42 to the chain and a back support 44 secured at right angles to the base. The front end of the base is bent down so that it is supported on the chain and also facilitates the casting off of the finished rafter at the end of the operation. To the rear end of the base 40 is secured a bracket 46 which carries two rollers 48 adapted to ride in the guideways 38 and serves as a pivot for the parallel clamping levers 50. The movable jaw of the clamp by which the work is securely held on edge in the carrier comprises a block 52 which is slidably mounted on the back support 44 and carries a spring pressed plunger 54 adapted to engage the timber. Two rods 55 secured to the enlarged head of the plunger 54 and adapted to slide in corresponding holes in the block 52 serve to guide the plunger with relation to the block 52 and the sharpened lower ends extending below the face of the plunger prevent any slipping of the material held in the clamp. Two parallel links 56 connect the block 52 to the clamping levers 50 which carry on their other ends the rolls 58 adapted to engage in the guideways 38. The clamping jaws of the carrier may be adjusted to accommodate a materially larger timber which could not be taken care of by the yield in the spring pressed plunger 54 by securing the block 52 to the links 56 through the eyelets 59 formed in the ends of the links for this purpose. A spring 60 stretched between the block 52 and a point on the vertical back support 44 tends to hold the block depressed in clamping position.

While feeding lumber to the saws the work carrier is supported at one point by the chain, and by the contact of the rollers 48 with the guideways 38. To some extent the work carrier is also held rigidly in position by the contact of the rolls 58 of the clamping levers 50 with the guideways 38

since the parts of the clamp when in clamping position with a rafter in the jaws of the clamp tend to support each other and prevent forward or backward movement of the clamp. The chain is held taut to form a firm support for the clamp by placing the driving sprocket wheel at the end of its work feeding travel at the rear end of the machine and further by the use of tensioning devices of ordinary construction on the lower or slack side of the chain.

The timbers are automatically fed to the machine from a bumper or receptacle formed on the front of the machine which comprises two curved bands 62 mounted on the machine frame each being provided with a vertical back rest 64 to position the rafters placed in the bumper with relation to the clamping devices. To further assist in positioning the rafters an end plate 66 is provided for the bumper secured on the machine frame.

Just before the work carriers mounted on the endless chains 18 and 19 come into contact with the rafter placed in the bumper, the rear ends of the clamping levers 50 are depressed to open the clamping jaws by means of springs 68 which are mounted on a fixed bracket and adapted to come into contact with the rolls. As the clamping devices are carried over the sprocket wheels 20 onto a horizontal plane the rolls 48 and 58 will engage in the guideways 38 causing the block 52 to be depressed to clamp the rafter firmly on the work carriers. As the carriers pass over the sprocket wheels 23 and 25 at the rear of the machine the tipping of the clamp will cause the clamping levers 50 again to be depressed relatively to the clamp to release the finished rafter as illustrated in Fig. 5.

The rotary saw 24 for cutting the lower ends of the rafters is adjustably mounted on a bracket 72 to cut the lower ends of the rafters at the desired angle which will correspond to the pitch of the roof and will be parallel to the cuts made by the saws 28 and 32. The saw 24 is mounted on a shaft 74 which turns in bearings 76 mounted for adjustment lengthwise of the shaft in blocks 78 which are in turn mounted for adjustment transversely of the shaft in a vertical plane by means of bolt and slot connections with the bracket 72. The bracket 72 is sleeved on the fixed support 30 to permit angular adjustment of the saw with relation to the work and is held adjustably in position by means of a set screw 80. An additional support is provided for the bracket 72 comprising a rod 82 hinged at 84 to the machine frame and two nuts which are threaded onto the lower end of the rod to hold the bracket in position between them.

The saws 26 and 28 for notching the rafters are similarly mounted for adjustment lengthwise of their axes and trans-

versely of their axes in a vertical plane on brackets 86 and 88 which are sleeved onto the fixed support 30 and held adjustably in the desired angular position by means of set screws 90 and 92.

5 The rotary saws 24, 26 and 28 are all driven from the driving shaft 94 by a belt 96 which runs on a pulley 98 on the driving shaft and a pulley 100 on the shaft 74 of saw 24. The saw 28 is in turn driven from the
10 saw shaft 74 by a belt 102 running on pulleys 104 and 106, and the saw 26 is similarly driven from the shaft of saw 28 by a belt 108.

15 The rotary saw 32 for cutting the upper ends of the rafters is similarly mounted for adjustment illustrated as in Figs. 7 and 9 to cut the rafters at the exact angle required to fit into the building scheme for which they are designed. The rotary saw is mounted
20 on a shaft 110 which turns in bearings 112 one at each end of the shaft the bearings being mounted for adjustment lengthwise of the shaft in blocks 114, and the blocks being in turn mounted for adjustment trans-
25 versely of the shaft in a vertical plane by means of bolt and slot connections with the bracket 116. In order to secure the desired angular position of the saw, the bracket 116 is sleeved on a horizontal supporting bar
30 118 mounted on the carriage 34 and is held adjustably in position by a set screw. The bracket 116 is further supported by means of a rod 120 hinged on the carriage 34 and
35 two nuts 122 and 124 threaded onto the rod to bear against the bracket 116. The saw is driven from the driving shaft 94 by a belt 123 which runs on a pulley 125 splined to the driving shaft and a pulley 127 on the
40 saw shaft 110.

45 The carriage 34 which supports the rotary saw 32 and the endless chain 18 for adjustment transversely to the line of feed comprises a supporting bracket for these parts and is provided with rollers adapted to run on guideways 126, 128 and 130 formed in the frame of the machine. The carriage
50 may readily be moved to adjust the saw 32 to cut the rafters to the desired length by a hand wheel 132 mounted at the front of the machine on a shaft 134 which turns in bearings on the carriage 34 and carries at its
55 other end a pinion 136 which engages a sprocket chain 138 fastened to the frame of the machine.

To lock the carriage 34 in its adjusted position, a hand lever 140 is pivoted at 142 to the carriage and connected by means of links 144 and 146 to two small rollers 148
60 and 150 so that when the hand lever 140 is moved to the right the rollers will be drawn together, riding under oppositely inclined portions of the carriage 34 to lift it off the guideway. At the same time, hook shaped
65 brake member 154 secured to the carriage

will be brought into contact with the flanged under sides of the guideways to lock the carriage in position. The driving sprocket wheel 23 of the endless chain 18 is splined to the driving shaft 22 and is moved axially
70 with the carriage 34 by engagement on both sides with supporting bearings 152 for the driving shaft which are secured to the carriage 34. When adjusting the position of the carriage the driving pulley 125 for the
75 saw 32 and the adjacent supporting bearing 156 which is adjustably secured by a bolt and slot connection 158 in the machine frame must be moved along and again secured in position at a point corresponding with the
80 adjusted position of the carriage.

The operation of the machine is as follows: Two corresponding work carriers riding on the endless chains 18 and 19 will have their clamping jaws opened by the contact of the cam surface 68 with the clamping
85 levers 50 as they approach the loading bumper to receive an uncut rafter placed therein by the operator. As the carriers rise and make contact with the rafter, the clamping levers 50 will ride out from under
90 the influence of the springs 68, permitting the jaws to contact with the rafter under the influence of the light spring 60. Then as the carriers pass around the sprocket wheels 20 onto a horizontal plane, the rollers
95 48 and 58 entering the guideways will position the carriers rigidly in the line of feed and acting through the clamping levers will depress the clamping jaws still further to
100 take up the yield in the spring pressed plunger 54 so that the rafter is held rigidly positioned in the carrier. The rafter is now carried past the saws which are adjusted first to cut simultaneously the ends of the
105 timber at the desired angle and then to make first one and then the other cut of the notch. Preferably the saws and carriers are so arranged and spaced that in regular operation of the machine, two saws will always be
110 cutting; first the end cutting saws on the same rafter, and then the notching saws on different rafters. Thus a steady and uniform load is provided, enabling the machine to operate with a minimum of power and at
115 maximum speed. As the carriers ride over the driving sprocket wheels at the rear of the machine, the clamps are opened permitting the finished rafters to slide off onto a chute or other appropriate receptacle while
120 the carriers return to repeat the cycle.

Although the invention is herein disclosed as embodied in a machine for sawing roof rafters, certain features of the invention are of more general application to machines
125 for automatically sawing any relatively heavy and unwieldy timbers to fit without further alteration into the building schemes for which they are intended. The work is handled easily, rapidly, and with a degree
130

of accuracy not obtainable by present methods.

One embodiment of the invention in a machine for sawing roof rafters having been described and illustrated, what is claimed is:

5 1. A machine for sawing roof rafters having, in combination, rotary saws for shaping the lower ends and notching the rafters, a saw for shaping the upper ends of the rafters, a continuously travelling work support
10 for feeding the rafters horizontally at spaced intervals, a carriage for the latter saw adjustable to determine the length of the rafters, and means for clamping the carriage rigidly in position comprising an inclined face on the carriage and cooperating rolls for engaging the same.

2. A machine for sawing roof rafters having, in combination, a continuously travelling work support for feeding the rafters
20 horizontally, tipping mountings, rotary saws carried thereby to cut the lower ends and notch the rafters at the desired angle, means for adjusting the saws on the mountings lengthwise of and at right angles to their
25 respective axes, and an additional saw adjustably mounted to cut the upper ends of the rafters at the desired length and angle.

3. A machine for sawing roof rafters
30 having, in combination, a continuously travelling work support for feeding the rafters horizontally at spaced intervals, three saws spaced to operate consecutively on the same rafter, and common means providing for
35 angular adjustments of the three saws.

In testimony whereof I have signed my name to this specification.

GARDNER S. MARION.

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