G. C. PURDY & J. H. MANSFIELD.

TIE GAINING MACHINE.

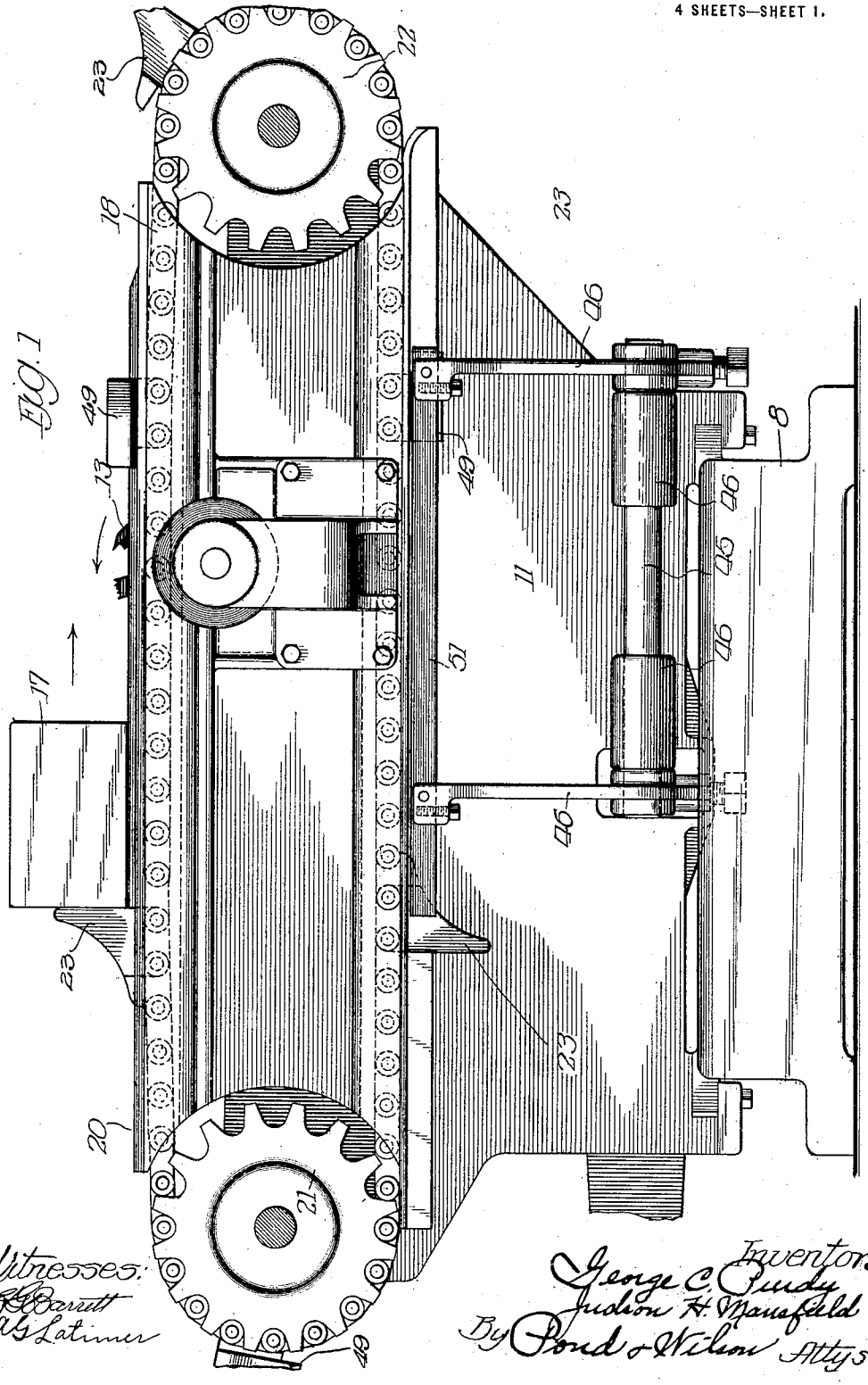
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Patented Nov. 9, 1915.

4 SHEETS—SHEET 1.

Fig. 1



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4 SHEETS—SHEET 2.

FIG. 3

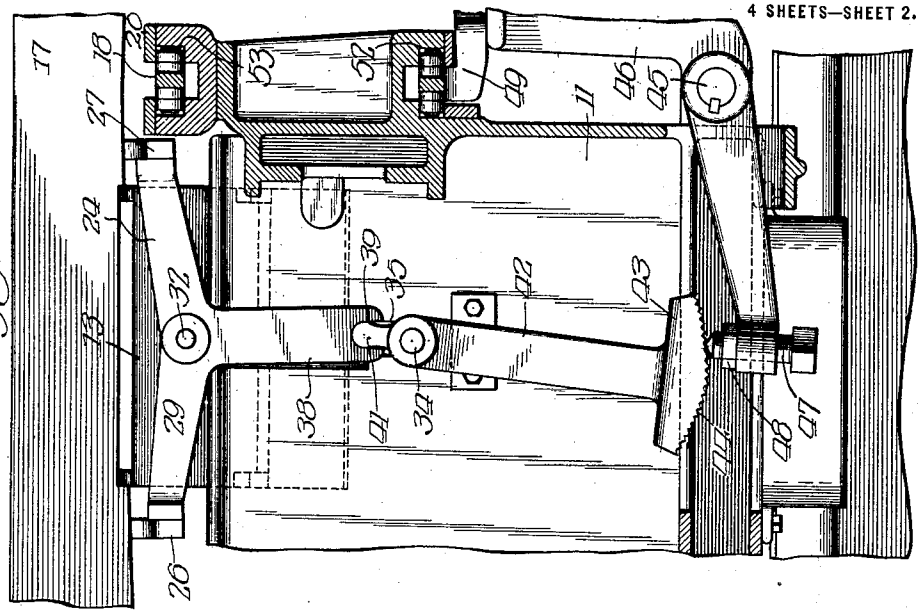
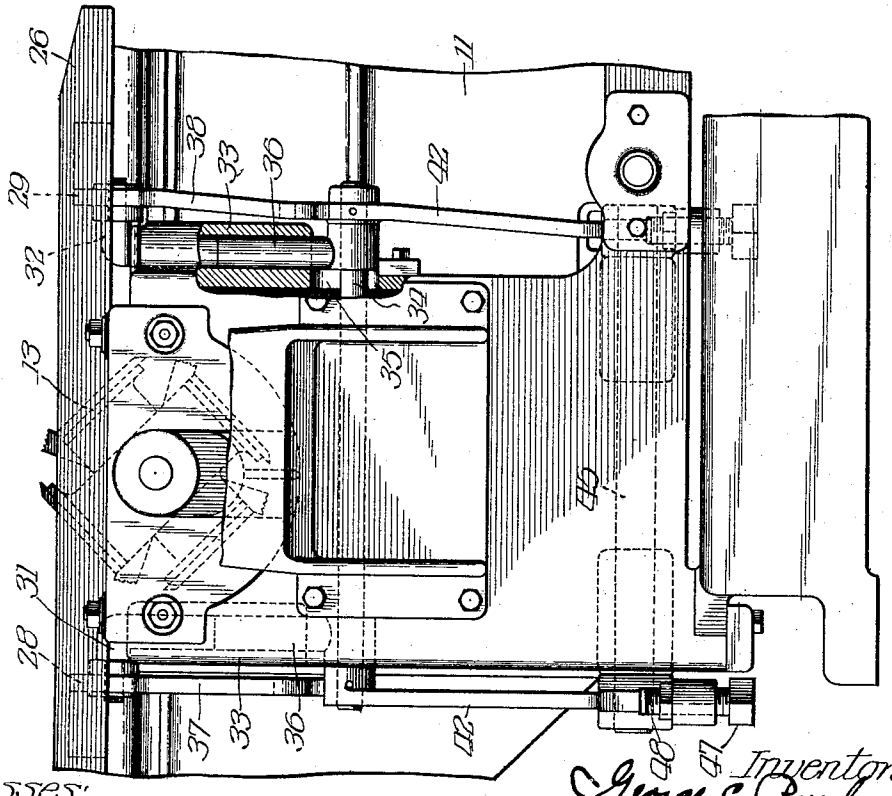


FIG. 2



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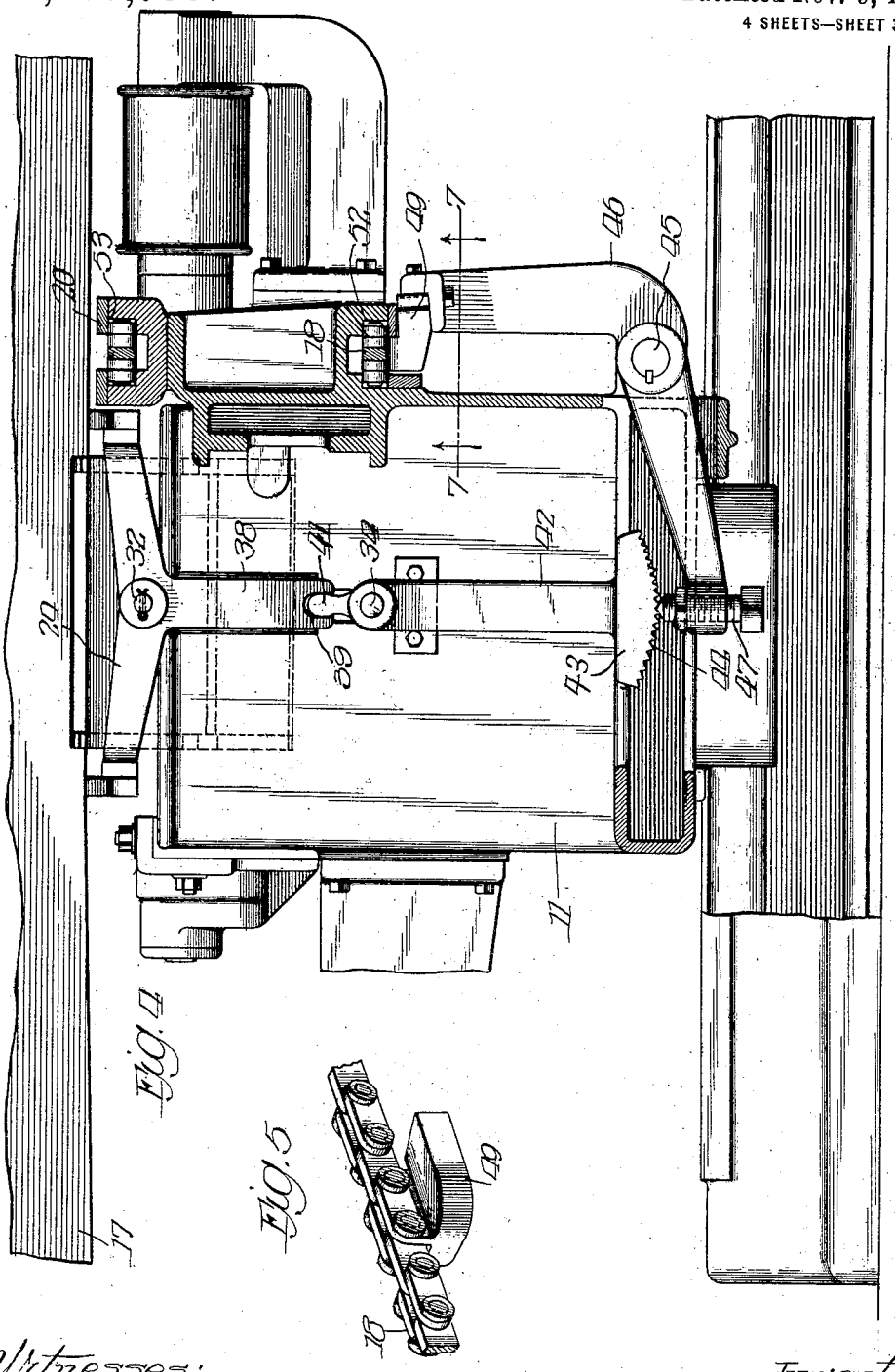


Fig. 4

Fig. 5

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4 SHEETS—SHEET 4.

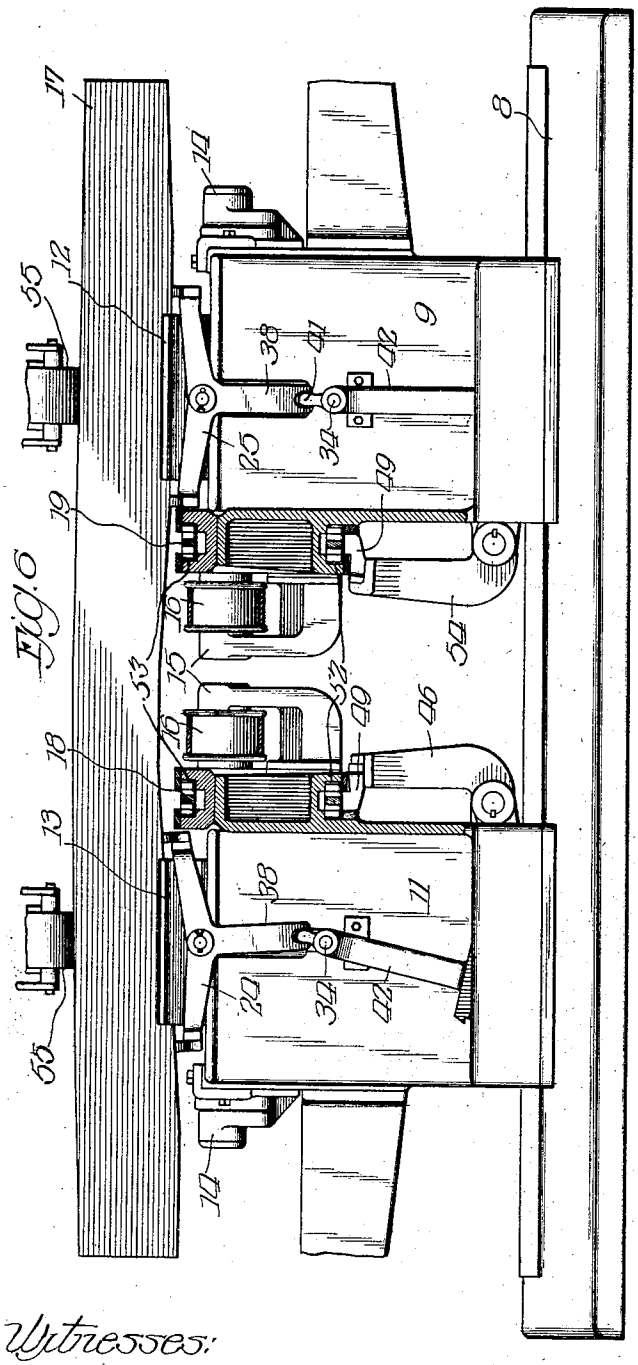


FIG. 6

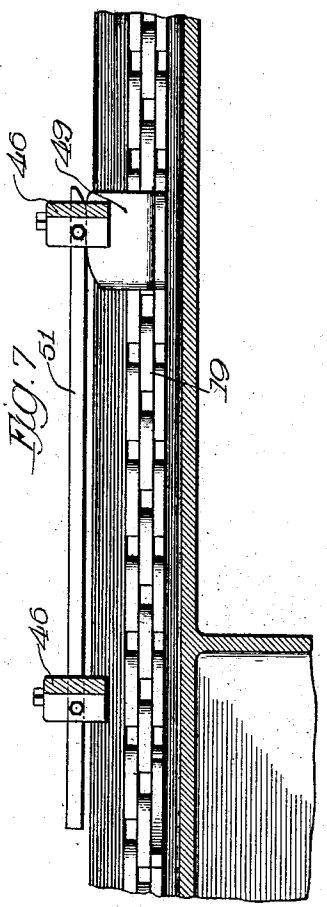


FIG. 7

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UNITED STATES PATENT OFFICE.

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TIE-GAINING MACHINE.

1,159,795. Specification of Letters Patent. Patented Nov. 9, 1915.

Application filed September 24, 1914. Serial No. 863,309.

To all whom it may concern:

Be it known that we, GEORGE C. PURDY and JUDSON H. MANSFIELD, citizens of the United States, residing at Rockford, in the county of Winnebago and State of Illinois, have invented certain new and useful Improvements in Tie-Gaining Machines, of which the following is a specification.

This invention relates to wood gaining machines, and has more particular reference to machines for gaining railway ties to provide seats for the reception of the rail plates.

A machine of this general character was disclosed in a pending application, Serial No. 758,172, filed April 1, 1913, which embodied mechanism for adjustably supporting the ties so that the gains or cuts produced therein will be of a substantially uniform depth irrespective of irregularities in the shape and size of the ties being gained. The mechanism for accomplishing this result consisted of pivotally mounted cradles or tie supporting members which, as they were rocked on their pivots by irregularities in the ties, actuated indicators to indicate to the operator the degree of irregularity in the tie. Manually operated mechanism for raising and lowering the cradles was provided, by means of which the operator could lift or lower the supporting cradles with respect to the cutters so that a cut or gain of the required depth would be produced. It is desirable, however, for some classes of work and with some types of machines that the operator be relieved of the burden of manually adjusting the cradles in accordance with irregularities in the stock, and our present invention is designed therefore to automatically control the position of the supporting cradles so that gains of the required depth will be produced in the ties without any control or supervision on the part of the operator.

Another feature of the invention resides in the provision of novel mechanism which is connected with and controlled by the tie supporting cradles to regulate the vertical shifting movements of the cradles and thereby determine the depth of cut to be produced.

Another object of the invention is to provide mechanism which will be operated at predetermined intervals as the ties reach a predetermined position in their travel through the machine to elevate the ties and sustain them in proper position during the gaining operation so that the cutters will operate to the desired depth.

A further object is to so construct and operate the mechanism for accomplishing the aforementioned results that each end of the tie will be controlled independently of the other and each cutter will produce its gain of the required depth independently of the other and irrespective of the shape of or irregularities in the surface to be gained.

Other objects and many of the advantages of this invention will be more fully appreciated as the same becomes better understood by reference to the following description when considered in connection with the accompanying drawings.

Referring to the drawings—Figure 1 is a longitudinal sectional view through the machine, looking at one side of the conveyer; Fig. 2 is a fragmentary transverse sectional view taken at one end of one of the cutters; Fig. 3 is a fragmentary sectional view, looking at one end of one of the tie supporting cradles; Fig. 4 is a similar view, showing the cradle in another position; Fig. 5 is a detail perspective view of one of the conveyer chain blocks; Fig. 6 is a transverse sectional view through the machine, showing an irregularly shaped tie in gaining position, and Fig. 7 is a fragmentary sectional view, looking at the lower lap of the conveyer chain on the line 7—7 of Fig. 4.

On the drawings reference character 8 designates the base or main portion of the machine upon which the standards or uprights 9 and 11 are mounted. Gaining cutters 12 and 13 of any well known or preferred construction are carried upon shafts journaled in suitable bearings 14 and 15 on the standard, each shaft being equipped with a drive pulley 16 by means of which the cutters are rotated by belts or other driving means from any suitable source of power.

The ties to be gained, and which are indicated on the drawings by reference character 17, are fed to the machine by hand or by suitable feeding mechanism at the left hand end thereof, viewing Fig. 1, from which point they are conveyed through the machine past the gaining cutters by means

of a pair of chain conveyers 18 and 19 traveling over suitable sprocket wheels 21 and 22 adjacent the inner ends of the cutters. Each chain is equipped with a plurality of shoulders or abutments 23 adapted to engage the rear face of a tie and carry the same with the chain through the machine. The ties are supported during their initial travel upon tracks or guideways 20 until they reach substantially the position in which the tie is shown in Fig. 1, whereupon they are elevated above the tracks and supported during their travel past the cutters by tie-supporting cradles 24 and 25 disposed adjacent each cutter.

Since the cradles and the mechanism for operating the same are substantially identical a detailed description of one of them will be sufficient for an understanding of the present invention.

Referring now more particularly to Figs. 1 to 4 inclusive, it will be observed that the cradle 24 comprises a pair of parallel supporting members 26 and 27 rigidly connected together by end members 28 and 29 to produce a rigid construction in the form of a substantially rectangular frame. The supporting members 26 and 27 are spaced apart a distance slightly greater than the length of the cutter so that each member is disposed adjacent to an end of the cutter in position to support a tie before and during the gaining operation. The end members 28 and 29 are pivotally supported midway their ends upon the horizontally extending portions of pins or studs, 31 and 32 respectively, having vertically disposed portions extending downwardly into sockets or guideways 33 formed on the standard 11. The height of the supporting studs 31 and 32, and consequently the height of the cradle, is determined by a vertically movable shaft 34 mounted in vertical slots 35 in the upright and carrying posts 36 which are loosely journaled upon the shaft and project upwardly into the sockets 33 to form supports upon which the studs 31 and 32 rest. The shaft 34 is raised and lowered in the slotted bearings by mechanism which will be later described, thereby elevating the cradle upon which the tie is supported and positioning the tie with respect to the cutter so that a cut of the desired depth will be produced.

The end members 28 and 29 of the cradle are provided with integral downwardly extending arms 37 and 38, bifurcated at their lower ends to form sockets 39, as shown in Figs. 3 and 4, adapted to receive the upwardly projecting finger 41 of an arm or lever 42 fixed upon the shaft 34. A head 43 carried by the lower end of the arm 42 is shaped to provide a curved or inclined lower face which is preferably serrated or roughened as indicated by reference character 44. When a straight tie, such as is shown in Fig. 4, is fed into the machine and the cradle is elevated to raise the tie above the track 20 said cradle will assume a substantially horizontal position and the arm 42 will be centrally disposed, as shown. If an irregular tie is fed in which has a portion at one end of the cutter higher than the portion at the other end the cradle will be tilted on its pivot as shown in Fig. 3 to rock the arm 42 away from its normal vertical position.

The height of the cradle with respect to its adjacent cutter, and consequently, the depth of cut which will be made by said cutter, is determined by the position of the arm 42 by mechanism which will now be described. A rock shaft 45 mounted in suitable bearings 46′ on the standard 11 has securely fixed thereto at each end bell crank levers 46. The horizontal arms of these levers project beneath the heads 43 of the arms 42 and are each provided with an adjustable screw or abutment 47 threaded through a tapped opening in the end of the lever and adapted to be held in adjusted position by a lock nut 48. The abutment projects upwardly into proximity to the head 43 and when the bell crank lever is rocked in a clockwise direction, viewing Figs. 3 and 4, will be elevated into engagement with the serrated face of the head 43 to lift the shaft 34 through the intermediary of the arms 42 thereby, through the posts 36 and the studs 31 and 32, elevating the cradle 24.

The bell crank levers 46 are actuated at predetermined intervals by means of cam-shaped blocks 49 carried by the conveyer chain 18. The upper ends of the vertical arms of the bell crank levers are connected by a bar or member 51, Figs. 1 and 7, normally disposed in the path of travel of the blocks 49, and the cam blocks are so positioned on the chain conveyer with respect to the abutments 23 that the bar will be engaged by a block and moved outwardly to operate the bell crank levers, thereby lifting the cradle each time a tie reaches substantially the position shown in Fig. 1. The bar 51 is of sufficient length to be engaged by a cam block on the carrier chain during the complete travel of a tie past the cutting tools, so that the tie will be supported on the cradles during the gaining operation. It will be manifest from Figs. 3, 4 and 6 that the conveyer chains 18 and 19 are guided and held against lateral movement during their travel in guideways 52 and 53. The guideway 52 holds the chain against lateral movement when the cam block engages with the bar 51, thereby insuring that the bell crank levers will be moved a predetermined and definite amount at each actuation thereof by the cam block. A similar set of bell crank levers 54 is operated by the chain 19 to control the cradle 25.

It should now be evident that the height

to which each cradle will be raised will be determined by the position of the head 43 with respect to the abutment or lifting bolt 47. If the arm 42 is in a vertical position, such as shown in Fig. 4, the central or high portion of the serrated face 44 will be engaged by the upper end of the bolt 47, and since the bolt moves upwardly the same distance at each actuation of the bell crank levers the cradle will be elevated the maximum amount so that a cut of minimum depth will be produced in the tie supported thereby. Should the arm 42 be inclined in one direction or the other by the tilting of the cradle, as shown for instance in Fig. 3, the bolt 47 will have completed a greater portion of its travel before it engages the inclined surface 44 of the head 43, with the result that the cradle will be elevated a less amount and a cut of greater depth will be produced. The height to which the cradle will be elevated by the bell crank levers may be regulated to a fine degree of nicety by adjusting the bolt or abutment 47 in its lever arm. The upper end of the bolt is shaped as shown in Figs. 3 and 4 to provide a relatively sharp edge adapted to engage without slipping the serrated face of the head 43. Any adjustment of the bolt in its arm will of course require a half or a complete rotation of the bolt in order to properly position this edge with respect to the serrations. The ties are yieldingly held down upon the cradles and in coöperative relation with the cutters by means of pressure members 55 of any well known or preferred construction.

The operation of a machine embodying our invention is, briefly, as follows: When a tie, fed into the machine, has reached substantially the position shown in Fig. 1 so that it is resting upon the forward ends of the cradles the cam blocks 49 on the conveyer chains 18 and 19 are brought into coöperative relation with their respective bars 51 to rock the bell crank levers 46 and 54. Viewing Fig. 6, for purposes of illustration, it will be seen that the tie 17 while quite irregular in contour presents portions at each end of the cutter 12, engaged by the longitudinal members of the cradle 25, which are disposed in a substantially horizontal plane. The cradle 25 is accordingly not tilted and its arm 42 remains in a substantially vertical position with the high portion of its head in position to be engaged by its respective lifting bolt so that the cradle will be lifted the maximum amount, with the result that the cutter 12 will produce a gain of minimum depth in the tie. The portions of the tie, however, at opposite ends of the cutter 13 engaged by the longitudinal members of the cradle 24 deviate considerably from the horizontal so that the cradle will be tilted. The tilting of the cradle rocks the lever 42 to the position shown so that a lower portion of the head 43 will be presented to its lifting bolt 47 and the cradle will consequently be lifted a lesser amount. A cut will be produced by the cutter 13 which will be deeper at one end than at the other. The cut, however, will be in all cases sufficient to provide a level surface upon which a tie plate may rest. The cradles will remain in elevated position to support the tie during the whole of the gaining operation, and after the tie has passed the cutters the cam blocks 49 will travel off from the ends of the bars 51, thereby permitting the bell crank levers to return to normal position and the cradles to drop to normal position, with the shaft 34 supported in the lower ends of the slotted bearings 35. The parts will remain in this position until the next tie is moved onto the supporting cradles whereupon the cradles will be rocked to position the heads 43 and will then be elevated by the bell crank levers 46 a distance dependent upon the amount that the cradles are tilted.

It should be apparent from the foregoing that we have provided a machine which is entirely automatic in operation and which will produce gains of the required depth in the ties irrespective of irregularities in the shape of the ties. The machine is simple in construction and infallible in operation, and while we have shown and described that practical embodiment of the invention which appears at the present time to be preferable, nevertheless, it should be understood that the structural details disclosed are capable of considerable variation and modification without departing from the spirit of the invention or sacrificing any of its material advantages.

We claim:

1. In a tie gaining machine, the combination of a gaining cutter, pivotally mounted stock supporting means adapted to be tilted on its pivot by irregularities in the surface of the stock being gained and mechanism for intermittently lifting said stock supporting means relatively to the cutter, comprising means for automatically varying the amount of lifting movement in accordance with variations in the tilting of said stock supporting means to thereby automatically vary the depth of the cut.

2. In a tie gaining machine, the combination of a gaining cutter, means for supporting the stock to be gained at each end of said cutter, and mechanism operated by the stock to automatically control the position of said supporting means so as to produce a cut of the required depth irrespective of differences in height of the face of the stock at its points of support.

3. In a tie gaining machine, the combination of a gaining cutter, means for supporting the stock to be gained at each end of the

cutter, said means comprising a pair of rigidly connected supporting members disposed in parallelism at the ends of the cutter and pivotally supported intermediate the ends of the cutter, and means for automatically varying the height of said pivot relatively to the cutter in proportion to the deviation of said supporting members from a horizontal plane.

4. In a tie gaining machine, the combination of a gaining cutter, stock supporting means mounted upon a horizontal pivot and having supporting members disposed at the ends of said cutter adapted for vertical movement about said pivot to conform to irregularities in the surface of the stock to be gained, and means for automatically varying the height of said horizontal pivot in proportion to the tilting movement of said supporting means on said pivot.

5. In a tie gaining machine, the combination of a gaining cutter, a stock supporting cradle comprising parallel side members rigidly connected together and pivotally supported intermediate the ends of said cutter, said cradle being adapted to tilt on its pivot to accommodate itself to deviations from a horizontal in the face of the stock supported thereby, and means for automatically elevating said cradle before each gaining operation a distance proportional to the tilting of said cradle on its pivot.

6. In a tie gaining machine, the combination of a gaining cutter, a supporting cradle pivoted intermediate the ends of the cutter and having a supporting member adjacent each end of the cutter, and means for automatically varying the height of said pivot proportional to the tilting of the cradle thereon.

7. In a tie gaining machine, the combination of a gaining cutter, means for feeding ties to be gained in succession past said cutter, a pivoted cradle comprising a member disposed adjacent each end of the cutter for supporting the ties during the gaining operation, and means for varying the mean height of said cradle in proportion to the differences in height between those portions of the tie at opposite ends of the cutter.

8. In a tie gaining machine, the combination of a gaining cutter, means for conveying the ties in succession past said cutter, a supporting cradle pivotally mounted intermediate the ends of the cutter and having a member disposed at each end of the cutter upon which the tie to be gained is supported, an intermittently operated lifting member, and connections between said member and said cradle controlled by the tilting of said cradle whereby said cradle is elevated from said member an amount determined by the amount of tilting of said cradle.

9. In a tie gaining machine, the combination of a gaining cutter, a conveyer for moving the ties to be gained past said cutter, a tie supporting cradle mounted upon a horizontal pivot intermediate the ends of the cutter and adapted to support a tie adjacent to each end of the cutter, an arm projecting downwardly from said cradle, an intermittently operated lifting device, and means controlled by said arm through which said cradle is lifted by said device a variable distance, depending upon the position of said arm.

10. In a tie gaining machine, the combination of a gaining cutter, a conveyer, a tie supporting cradle of rigid construction substantially rectangular in shape carried by a pair of horizontal pivots disposed intermediate the ends of the cutter, an arm rigid with said cradle projecting downwardly from the pivot, a pivotally mounted lever connected with said arm and provided at one end with an inclined bearing surface, and means intermittently engaged with said surface to elevate the cradle an amount determined by the position of said cradle with respect to its pivots.

11. In a tie gaining machine, the combination of a gaining cutter, a tie supporting cradle pivotally mounted on vertically movable pivots intermediate the ends of said cutter, a pivotally mounted arm connected at its upper end with said cradle and having an inclined bearing surface at its lower end, a bell crank lever adapted to engage said surface and elevate the cradle, and means for intermittently operating said bell crank lever, the position of said arm determining the amount that said cradle will be elevated.

12. In a tie gaining machine, the combination of a gaining cutter, a tie supporting cradle comprising supporting members at each end of said cutter, a pair of vertically movable pivots upon which said cradle is mounted, a shaft disposed beneath said cradle, means whereby said cradle pivots are supported from said shaft, a lever mounted on said shaft and having its upper end connected with said cradle and its lower end provided with an inclined bearing surface, and lifting means movable upwardly to a predetermined position beneath said inclined surface, said cradle being lifted from said means through said shaft a distance determined by the position of the inclined surface with respect to said lifting means.

13. In a tie gaining machine, the combination of a gaining cutter, a tie supporting cradle comprising a rigid frame having longitudinal members disposed adjacent the ends of said cutter in position to support a tie thereon, vertically movable pivots upon which said cradle is supported, a conveyer for conveying ties past said cutter, a lifting device movable a determined distance at

regular intervals by said conveyer, a vertically movable rock shaft upon which said cradle pivots are supported, an arm mounted on said shaft and having an inclined bearing surface at its lower end, said arm being connected with said cradle so as to be moved by tilting movements of said cradle, and an adjustable abutment carried by said lifting device in position to engage said inclined surface whereby said rock shaft and the cradle supported thereby is lifted at each actuation of said device an amount determined by the tilting of said cradle.

14. In a tie gaining machine, the combination of a gaining cutter, an endless conveyer for moving ties in succession past said cutter, a tie supporting cradle pivoted intermediate the ends of the cutter and adapted to support a tie at each end of said cutter, said cradle being adapted to tilt on its pivot to conform to the under surface of the tie being gained, a block carried by said conveyer, a lever mounted to be operated by said block, and connections between said lever and said cradle whereby the cradle is elevated by said lever an amount determined by the tilting of the cradle.

15. In a tie gaining machine, the combination of a gaining cutter, a conveyer for feeding ties in succession past said cutter, a lever having one end disposed adjacent to the path of travel of said conveyer, means mounted on the conveyer for actuating said lever, a pivotally mounted tie supporting cradle, means including a vertically movable shaft and an arm carried thereby having an inclined surface adapted to be engaged by said lever for lifting said cradle at each operation of the lever, and connections between said cradle and said arm for swinging said arm as the cradle is tilted, thereby varying the position of said inclined surface with respect to said lever to regulate the amount that said cradle will be elevated.

16. In a tie gaining machine, the combination of a vertically movable shaft, studs projecting upwardly therefrom, horizontal cradle pivots supported by said studs, a tie supporting cradle mounted on said pivots, means whereby said shaft is rocked from the cradle and means for lifting said shaft proportionately to the rocking movement thereof to thereby elevate said cradle.

17. In a tie gaining machine, the combination of a cradle comprising longitudinal tie supporting members rigidly connected together, a plurality of vertically disposed longitudinally movable studs, a plurality of cradle pivot pins loosely supported on said studs so as to permit the cradle to be bodily removed, and means for automatically varying the height of said studs in accordance with variations in the surface of the stock being gained.

18. In a tie gaining machine, the combination of a main frame provided with a pair of guideways, a tie supporting cradle, studs vertically movable in said guideways, and pivot carrying pins upon which said cradle is supported resting in said guideways upon said studs, said pivot carrying pins being removable with the cradle from the frame.

19. In a tie gaining machine, the combination of a rigid tie supporting cradle pivotally mounted at its ends upon horizontal pivots, means including a vertically movable shaft and an arm mounted thereon for raising and lowering said pivots, connections between said arm and said cradle whereby the position of the arm is varied in accordance with the tilting movements of the cradle, and means intermittently moved upwardly a predetermined distance to engage with said arm and lift the cradle a distance determined by the tilting of said cradle.

20. In a tie gaining machine, the combination of a tie supporting cradle, a conveyer for successively moving ties to be gained upon said cradle, a bell crank lever having one arm positioned adjacent to the lower lap of said conveyer, a block carried by said conveyer for operating said lever, means pivotally supporting said cradle so as to permit tilting movements of the cradle, and connections between said cradle and said bell crank lever whereby the cradle is elevated at each actuation of the lever an amount determined by the tilted position of said cradle.

21. In a tie gaining machine, the combination of a gaining cutter, means for moving ties in succession past said cutter, means pivotally supported at the front and rear of the cutter upon which the ties are carried during the gaining operation, and means for automatically varying the vertical position of said tie carrying means with respect to the cutter in accordance with irregularities in the surface to be gained.

22. In a tie gaining machine, the combination of a cutter, a pivotally mounted tie supporting cradle, and means for intermittently elevating said cradle comprising a bell-crank lever movable a predetermined distance at each actuation, an adjustable abutment carried thereby and a member connected with said cradle and having an inclined face adapted to be engaged and elevated by said abutment.

23. In a tie gaining machine, the combination of a plurality of gaining cutters, a plurality of tie supporting cradles, each pivotally mounted in position to afford a support for a tie at each end of a cutter, means for independently elevating each of said cradles just prior to the gaining operation, and mechanism controlled by the tilt-

ing of each cradle on its pivot for automatically determining the amount that said cradle will be elevated.

24. In a tie gaining machine, the combination of a plurality of cutters, a tie supporting cradle mounted adjacent to each of said cutters, horizontal pivot supports for each of said cradles upon which said cradles are adapted to tilt in accordance with irregularities in the surface of the tie to be gained, a bell crank lever for each cradle intermittently movable a uniform distance, and operative connections between each cradle and its respective lever including a shaft upon which said pivot pins are supported, a lever carried thereby having its upper end connected with its respective cradle and its lower end provided with an inclined surface adapted to be engaged by said bell crank lever, whereby each cradle is elevated an amount determined by the deviation of said cradle from a horizontal.

25. In a tie gaining machine, the combination of a cutting tool, a conveyer for advancing stock past said tool, a pivotally mounted work-supporting cradle, and means for automatically varying the height of said cradle comprising a lever, means mounted on said conveyer, in position to intermittently actuate said lever, and connections between said lever and said cradle.

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."