C. W. BORG.

WOODWORKING MACHINE.

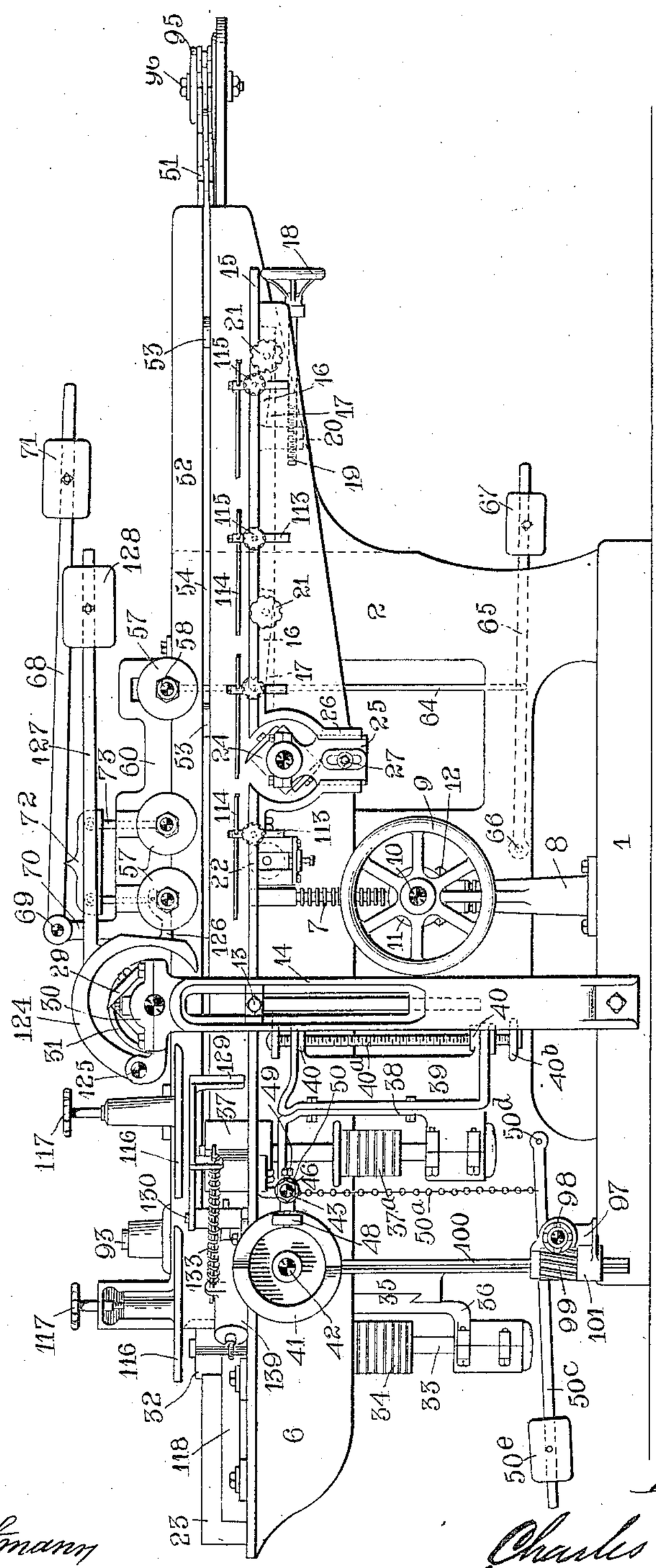
APPLICATION FILED SEPT. 7, 1906.

965,983.

Patented Aug. 2, 1910.

6 SHEETS—SHEET 1.

Fig. 1.



Witnesses:

Paul J. Gathmann

V. Curtis Lammond

Inventor

Charles W. Borg

By his Attorney:

H. H. Bliss

THE NORRIS PETERS CO., WASHINGTON, D. C.

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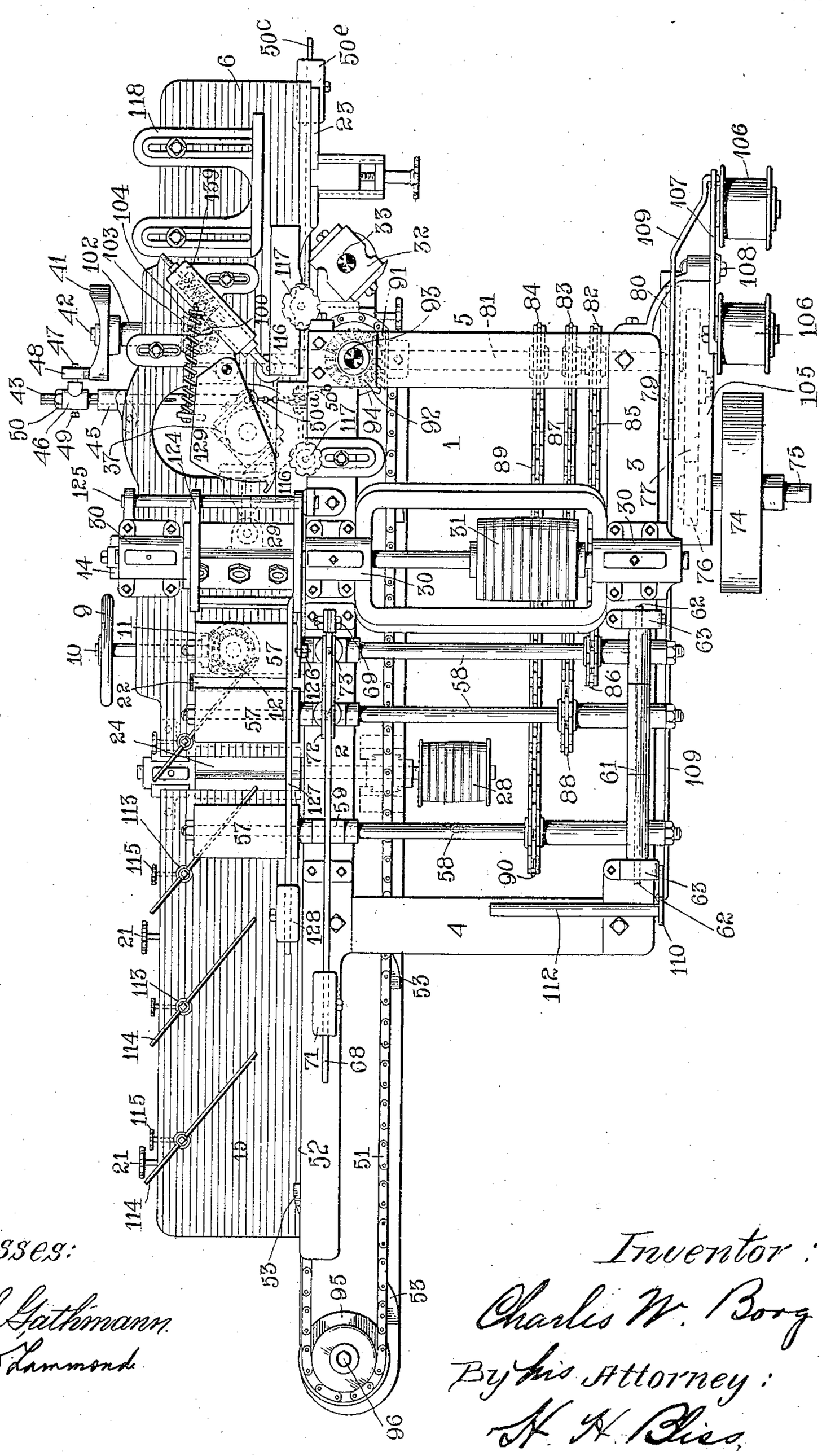
6 SHEETS—SHEET 2.

Fig. 2.



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6 SHEETS—SHEET 3.

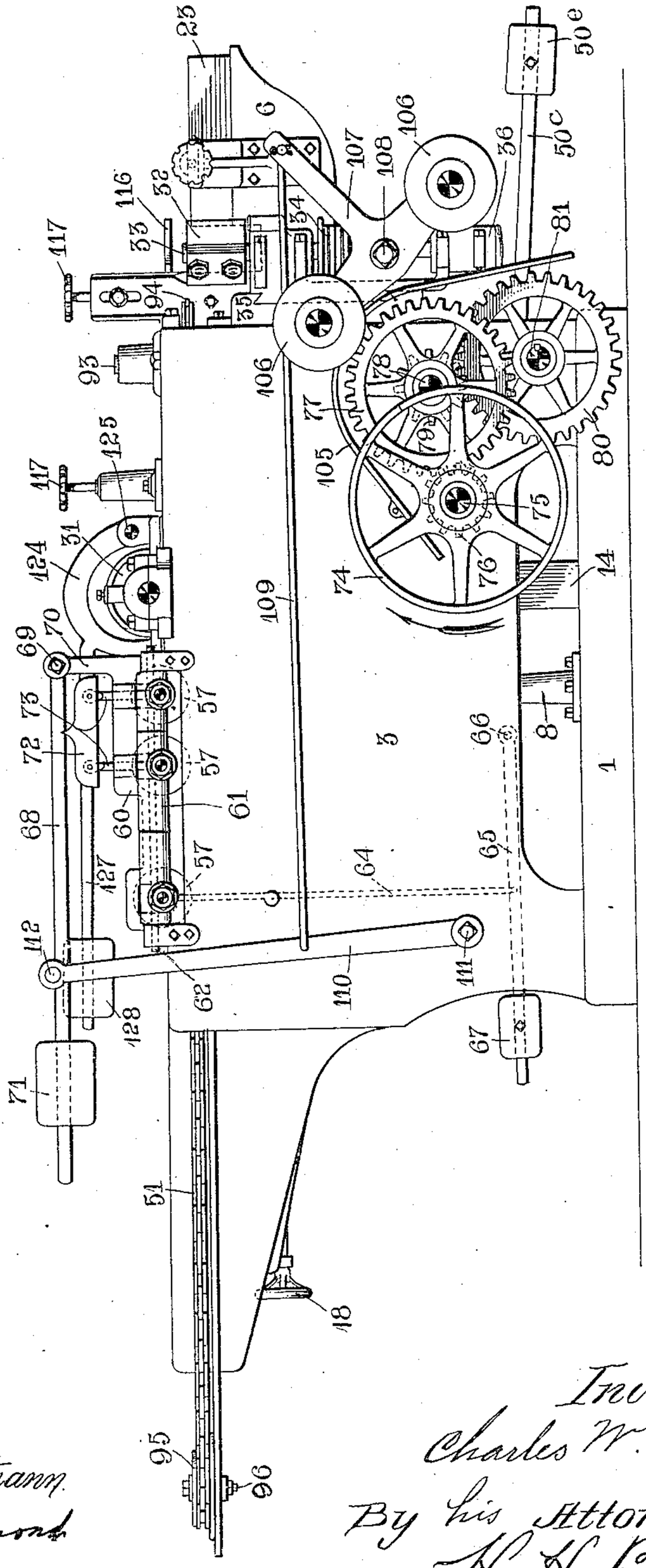

Fig. 3.

Witnesses:

Paul J. Gathmann.

N. Curtis Lammond.

Inventor:

Charles W. Borg.

By his Attorney:

H. H. Bliss.

THE NORRIS PETERS CO., WASHINGTON, D. C.

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6 SHEETS—SHEET 4.

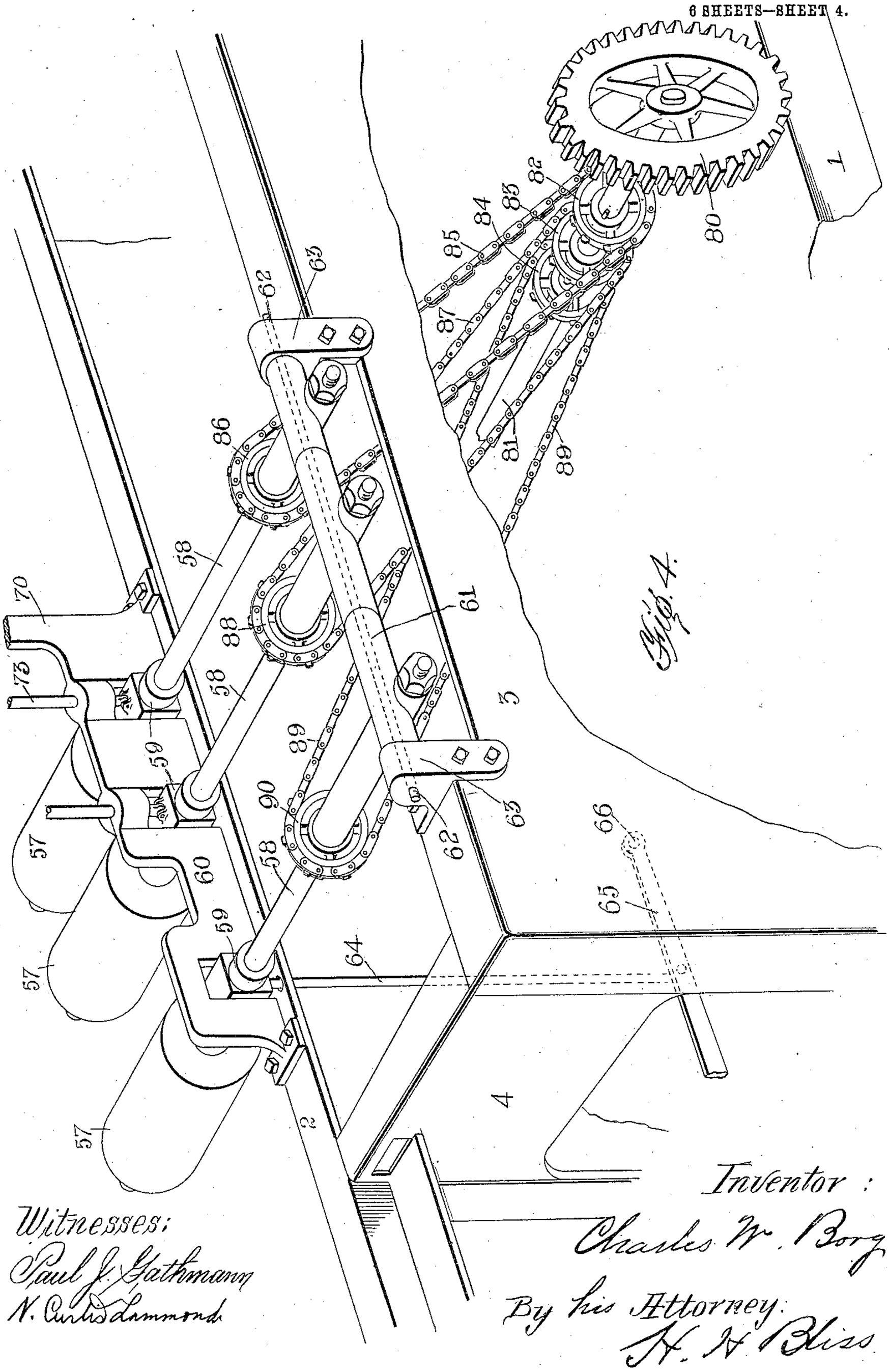

Fig. 4.

Witnesses:
Paul J. Gathmann
N. Curtis Lammond

Inventor:
Charles W. Borg
By his Attorney:
H. A. Bliss

THE NORRIS PETERS CO., WASHINGTON, D. C.

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6 SHEETS—SHEET 5.

Fig. 5.

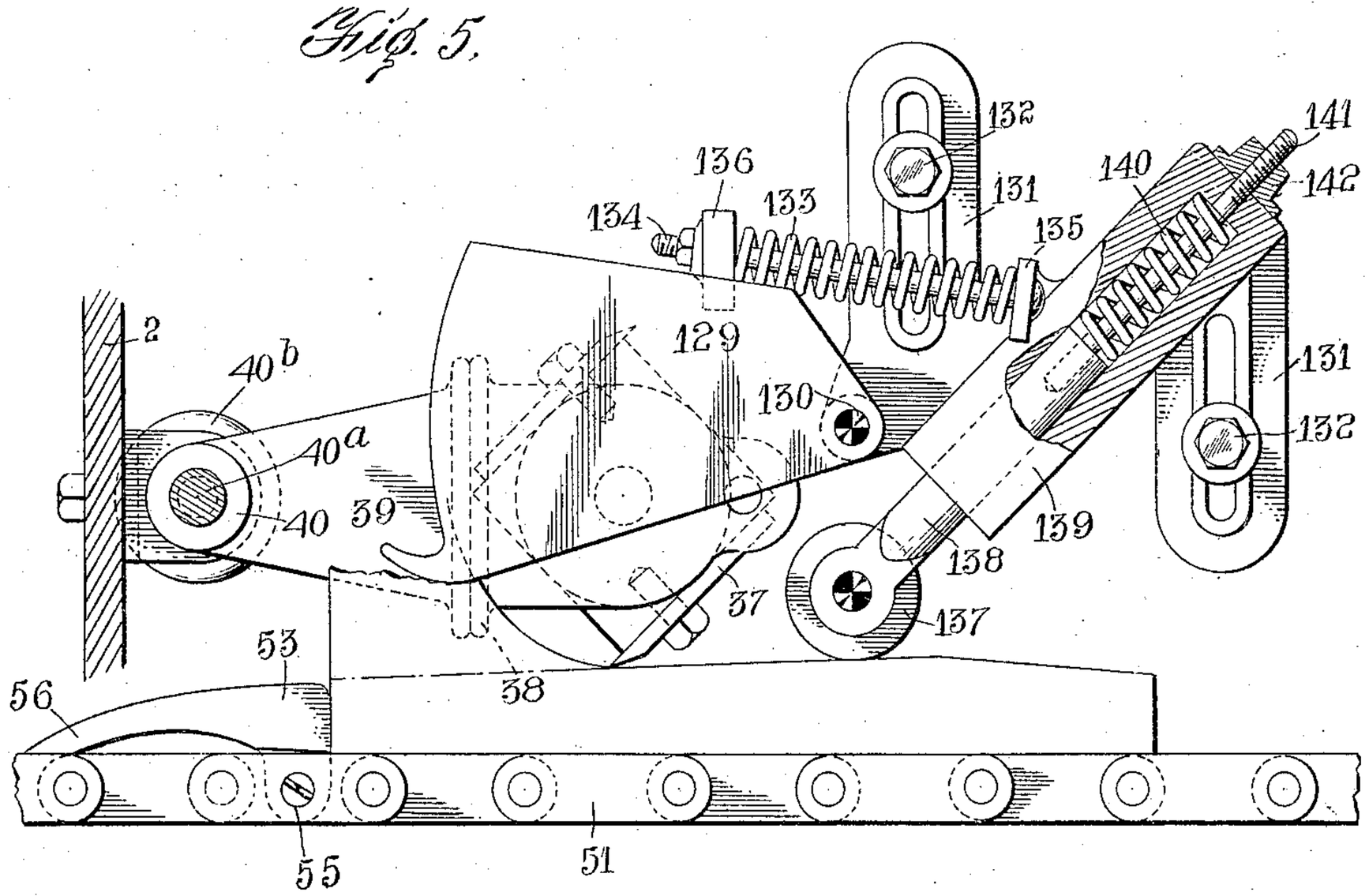


Fig. 6.

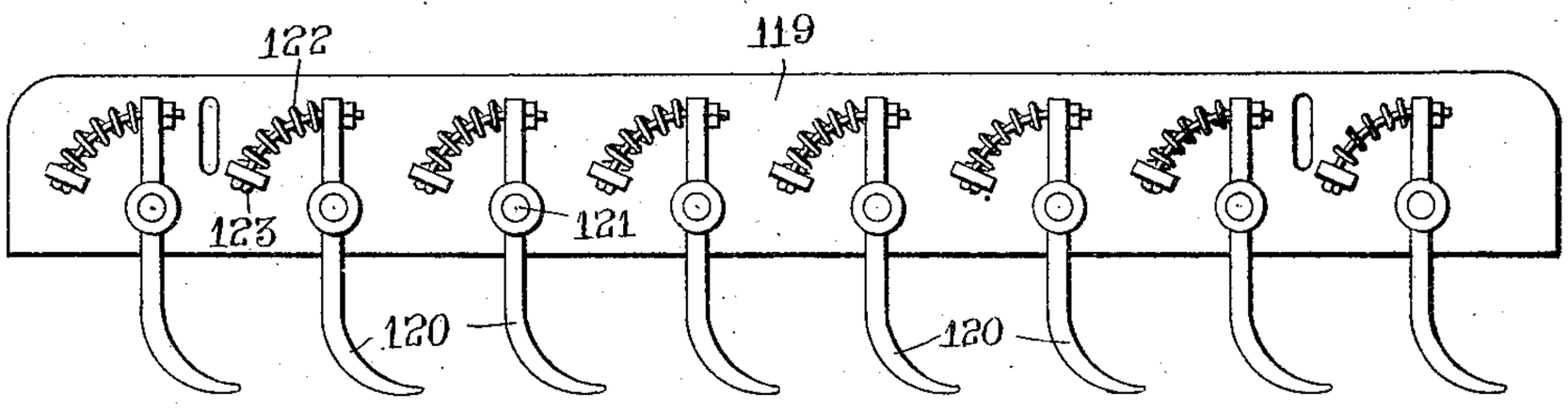
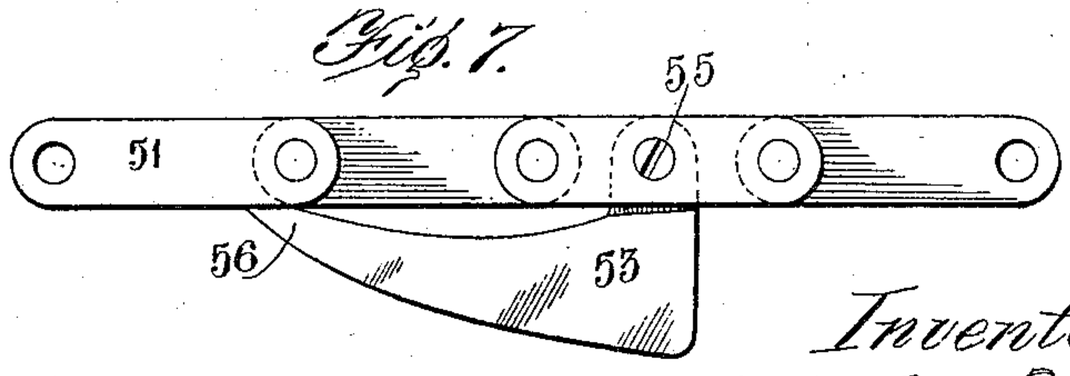


Fig. 7.



Witnesses:

Paul J. Gathmann

N. Curtis Lammond

Inventor:

Charles W. Borg

By his Attorney:

A. H. Bliss

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6 SHEETS—SHEET 6.

Fig. 8.

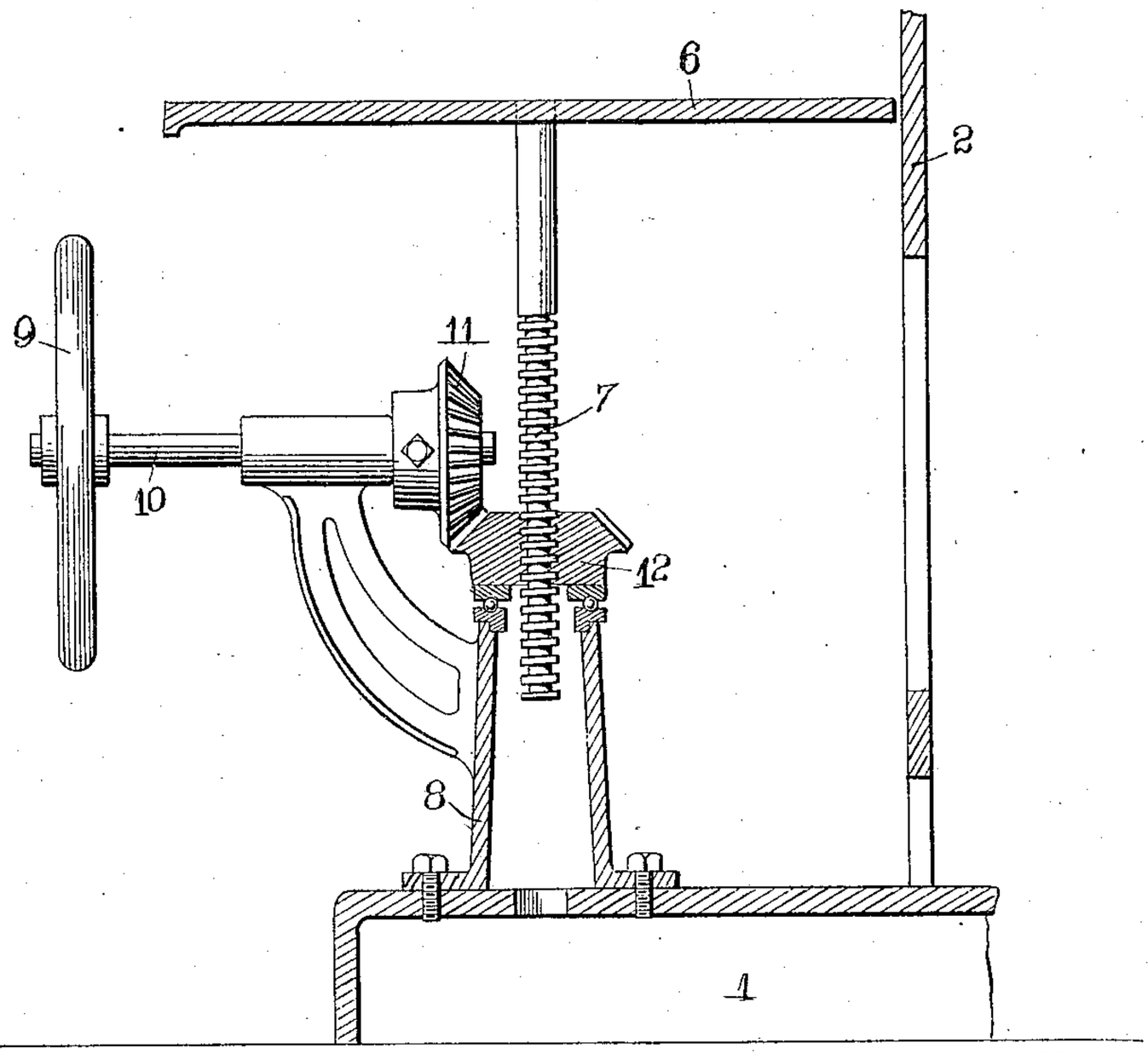

Fig. 9.

Witnesses:
Paul L. Gathmann
N. Curtis Lammond

Inventor:
Charles W. Borg
By his Attorney
H. H. Blies

THE NORRIS PETERS CO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

CHARLES W. BORG, OF ROCK ISLAND, ILLINOIS.

WOODWORKING-MACHINE.

965,983. Specification of Letters Patent. Patented Aug. 2, 1910.

Application filed September 7, 1906. Serial No. 333,707.

To all whom it may concern:

Be it known that I, CHARLES W. BORG, a citizen of the United States, residing at Rock Island, in the county of Rock Island and State of Illinois, have invented certain new and useful Improvements in Wood-working-Machines, of which the following is a specification, reference being had therein to the accompanying drawing.

The object of my invention is to provide in a single wood working machine, a standard hand-jointer, an automatic wood shaping machine and a standard straight-work "sticker;" capable of a wide range and variety of work. I accomplish these objects by means of the construction hereinafter described and shown in the accompanying drawings, in which;

Figure 1, is an elevation of the front or operator's side of the machine; Fig. 2 is a general plan view; Fig. 3 an elevation of the opposite or rear side of the machine; Fig. 4 a perspective detail of the feed roll drive; Fig. 5 a detail of a combined chip breaker and presser mechanism, showing also a portion of the feed chain hereinafter described; Fig. 6 is a plan view of a yielding presser mechanism adapted to take the place of the rigid gage shown at the upper right corner of Fig. 2; Fig. 7 is a detail of one of the feed teeth of the feed chain; Fig. 8 is a detail partially in section of the feed table elevating mechanism; and Fig. 9 a detail of the driving mechanism for the cam control of the shaping cutter hereinafter more fully described.

In the drawings, 1 represents the base of the machine frame, 2 the front side of the box frame mounted on said base, 3 the rear side of said box frame, 4 and 5 the front and rear ends of said box frame, 6 the vertically adjustable shaping table which carries and controls a bottom jointing cutter, an outside shaping cutter and the associated side presser mechanism hereinafter more fully described. Said feed table is vertically adjustable by means of an elevating screw 7 attached thereto, as shown in Fig. 1 and projecting downwardly into a standard 8 integral with or attached to the base 1. Said screw is operated by means of a hand wheel 9 on a shaft 10, said shaft having at its inner end a bevel-gear 11 which meshes with a second bevel-gear 12, said gear 12 also constituting a nut for the elevating screw 7, as clearly shown in Fig. 8. Said table is suitably guided in ways on the side 2 of the box frame and is clamped in its adjusted position by means of a clip 13 which contacts with a downwardly projecting support 14 suitably attached to the box frame, said support 14 also providing at its upper end a bearing for the upper facing cutter hereinafter more fully described. Said table 6 supports at its forward or entering end a jointer-table section 15 having downwardly projecting wedge sections 16, 16, as shown in dotted lines in Fig. 1, which wedges rest upon corresponding wedge sections 17, 17 formed at the bottom of a longitudinally arranged slot in the table 6, as will be understood from Fig. 1. The table section 15 is adjusted both vertically and longitudinally by means of a hand wheel 18 carrying a screw 19 which passes through a threaded lug 20 depending from the bottom of the table 15; and the table 15 when adjusted is clamped by means of screws 21, 21, in any desired relation with the bottom or jointing cutter hereinafter more fully described. That portion of the table 6 in rear of said jointing cutter, carries a friction reducing roll 22, adjustable with relation to said table, as will be understood from Fig. 1. As shown at the right of Fig. 2 said table 6 has attached thereto an adjustable side jointing section 23 for receiving the blank or work-piece after it has passed the side jointing cutter hereinafter described.

The bottom jointing cutter is shown as a whole at 24 and is adjustable with relation to table 6 by means of the slotted bearing 25, guides 26 and clamping nut 27 (Fig. 1). This cutter is driven by means of a pulley 28 receiving its power from a belt driven from the main countershaft (not shown) but attached to the floor of the shop at the right of Fig. 2 as will be readily understood.

29 indicates as a whole a top dressing cutter suitably mounted in boxes or journals 30 on the top of the main frame, as clearly shown in Fig. 2. This cutter receives power from the main countershaft by means of a belt passing over the pulley 31, as will be readily understood. The side jointing cutter 32 is mounted on a vertical shaft 33 and receives its power from the main countershaft through a belt passing over the pulley 34 with a quarter turn, as will be apparent from Fig. 2. Said jointing cutter is laterally adjustable in guides 35 secured to the main frame; being carried in a journal

frame 36 which may be adjusted and clamped by any desired mechanism (not shown).

The shaping cutter 37, whose function is to give any desired contour to the outer or free side of the blank is driven from the main countershaft by a quarter turn belt passing over the pulley 37[a] and is suitably mounted in a frame 38 which is adjustably secured to the hinge member 39 pivoted at 40, 40, on the vertically adjustable shaping table 6. The attachment of frame 38 to hinge member 39 permits angular as well as lateral relative adjustment of these parts; so that cutter 37 may be inclined in either direction from the vertical. Said frame 39 may be vertically adjusted with reference to the table 6 by means of a screw 40[a] and hand wheel 40[b]. Said cutter is controlled in its lateral movements by means of a pattern cam 41, which is removably mounted on a shaft 42 driven by means hereinafter described. Said frame 38 and hinge member 39 with the associated cutter are moved outwardly from the vertical face of the work table by means of a rod 43 pivoted to the frame 38 as at 44, and passing through a supporting lug 45 suitably attached to the table 6. Said rod 43 is splined and threaded at its free end and carries adjustably thereon a sleeve 46 having a stud 47 on which is rotatably mounted a roller 48 adapted to bear against the face of the cam 41. The sleeve 46 may be secured in any desired position by a set screw 49 and nut 50 as will be readily apparent and for a purpose hereinafter described. The cutter 37 is held against the work and the roll 48 is held against the cam 41 by means of a chain 50[a] passing over a sheave 50[b] and attached at its lower end to a lever 50[c] pivoted at 50[d] and carrying at its outer end an adjustable weight 50[e].

The machine as a whole is provided with two feed mechanisms, the first consisting of an endless feed chain 51 working in a horizontal plane, its front side passing through a slot in the vertical portion 52 of the feed table, said chain having a plurality of feed teeth 53, 53, which teeth extend through a comparatively narrow horizontal slot 54 and project into the path of the blank to be fed. Said feed teeth 53 (shown more clearly in Figs. 5 and 7) are pivoted as at 55 to links of the chain 51 and have rearwardly extending portions 56 adapted to span one or more links on the chain and have a rearward free bearing on other links of said chain. The purpose of this construction is to obviate the forward throw of the tooth 53 which would result as it passes its driving sprocket (hereinafter described), and further to obviate the canting of the link to which it is pivotally attached, and the consequent binding of said link during its passage through the slot in the vertical portion 52 of the feed table. When used to drive the blanks which are to be shaped on their outer or free edge, the feed teeth 53 are so located and driven as to move in timed relation with the lateral movements of the shaping cutter 37, as will be hereinafter more fully described. The second portion of the feed mechanism of the machine comprises a series of feed rolls 57, 57, clearly shown in Figs. 1, 2 and 4, which, when used for driving the blank in conjunction with the feed chain, may be toothed on their peripheries; but which rolls are removably mounted on their driving shafts so that smooth faced rolls may be substituted therefor, which smooth rolls will have a mere pressing or holding down function. Said rolls, whether toothed or plain, are mounted on shafts 58, 58, the free ends of said shafts passing through journals 59, 59, capable of vertical motion in a frame or bracket 60 suitably secured to the upper edge of the side 2 of the main frame. The opposite end of each of the said shafts is rotatably mounted in a bearing member 61 that is supported upon a rod or shaft 62 mounted in brackets 63 that are integral with or suitably attached to the top of the side 3 of the main frame, as clearly shown in Figs. 2 and 4. It will be seen that this construction permits the rotation of the feed roll shafts 58 and at the same time their independent vertical movement at the front or free ends thereof. Said feed rolls are held to their work by the following mechanism: The first feed roll; that is the one acting first on the blank when the latter is fed into the machine, is held down by a rod 64 attached to its box 59 and passing downward through the frame member 2, said rod being pivoted at its lower end to a lever 65, which lever is in turn pivoted as at 66 to the frame member 2, and carries at its free end a weight 67 adjustable thereon for varying the pressure of said roll on the blank. The second and third rolls 57 are in turn held to their work by means of a lever 68 pivoted as at 69 to an upward extension 70 of the bracket 60; said lever 68 having adjustably secured to its outer end a weight 71. Near the pivot 69 of said lever 68 is suitably mounted an equalizing member 72 so arranged that the lever 68 bears thereon, as clearly shown in Fig. 1. Upwardly pivoted to said member 72 are rods 73 which pass downward freely through openings in the bracket 60 and are pivotally attached at their lower ends to the boxes or journals 59 of the second and third rolls. The purpose of this construction is to give to the primary roll 57 a comparatively light pressure upon the blank; as this roll acts upon the blank while its underside is as yet rough and not acted upon by the bottom jointing-cutter 24. After the blank has passed the said bottom

jointing-cutter and proceeds over the portion of the table 6 in rear thereof and over the anti-friction roll 22, it may be held to its position on the table 6 with a comparatively greater pressure; which pressure is applied by the longer lever 68 and heavier weight 71. Passing now to the driving mechanism for said feed chain and feed rolls, this drive is effected by the train of mechanism now to be described. This train receives power from a belt driven by the main counter shaft, which belt passes over a pulley 74 (Figs. 2 and 3), said pulley being mounted on a stud 75 suitably located in the side 3 of the main frame. Integral with, or suitably attached to the pulley 74 is a pinion 76, which pinion meshes with a gear 77 mounted on a stud 78 also suitably located on the frame member 3. Coaxially mounted on the same stud, and either integral with or secured to the gear 77 is a pinion 79 meshing with a gear 80 keyed or otherwise secured to the main power shaft 81. Said power shaft passes transversely through the main frame of the machine and has secured thereto first a series of sprockets 82, 83, 84. Sprocket 82 is connected by a chain 85 with a sprocket 86 secured to the shaft 58 of the third feed roll 57. In like manner sprocket 83 is connected by a chain 87 with a sprocket 88 secured to the shaft 58 of the middle or second feed roll 57; and sprocket wheel 84 is connected by a chain 89 with a sprocket 90 secured to the shaft 58 of the first or primary feed roll 57. The main power shaft 81 has also secured thereto a bevel-gear 91 (see Fig. 9), said bevel-gear meshing with a second bevel-gear 92 secured to a vertical shaft 93 which passes upwardly through the top of the member 5 of the main frame and carries at its upper end the sprocket 94 which drives the feed chain 51. Said feed chain, at its opposite end, is carried by a toothless flanged roll or carrier 95 suitably mounted on a stud 96 located in an extension of the main frame, as clearly shown in Fig. 2.

Returning to the main power shaft 81, said shaft extends beyond the bevel-gear 91 and is provided with a clutch 97; said shaft being divided within the clutch so that the extreme end thereof may be disconnected from the remainder of said shaft as will be readily understood. The stub end of said shaft is suitably mounted in a bracket 97^a and is provided with a worm 98 which meshes with a worm gear 99 splined to the vertical shaft 100 in such manner that shaft 100 is vertically movable through the worm wheel 99 and a second bearing 101 of the bracket 97^a. The upper end of said shaft 100 is journaled in a bracket 102 suitably attached to or integral with the table 6 and depending therefrom. Secured to the shaft 100 above its upper journal is a bevel-gear 103 meshing with a second bevel-gear 104 secured to the cam shaft 42 which shaft is also suitably journaled in the bracket 102. Said shaft 42 carries at its outer end the cam 41 above described as actuating the laterally movable shaping head 37.

The gear train which drives the main feed shaft 81 is provided with a suitable shield 105 and the belt which actuates said feed train may be controlled by idlers 106, 106, mounted on a T-shaped lever or carrier 107, which carrier is pivoted on a stud 108 suitably mounted on the main frame. The third arm of the carrier 107, is connected by a link or rod 109 to a lever 110 pivoted as at 111 to the box side 3 of the main frame and extending upwardly within reach of the operator where it is provided with an operating handle 112 for controlling the belt tightening pulleys 106, as will be readily understood. This lever 110 and the link 109 are so mounted and proportioned that when the aforesaid lever is swung to one side of its pivot 111 its weight will tend to hold the tighteners 106 in contact with the driving belt; and when swung to the opposite side it will tend to hold said tighteners out of contact with the driving belt and stop the entire feed train of the machine.

Since the feed chain 51 and shaper actuating cam 41 are both driven from the same main power shaft; it will be readily understood that the feed teeth 53 and shaping cutter 37 may be always maintained in a timed relation to each other so that a blank propelled by one of said feed teeth will always reach the cutter 37 at the proper time to be shaped according to any desired pattern. Moreover, in shaping pieces of different outlines and different lengths, cams 41 of different contours may be placed upon the shaft 42 and the number of feed teeth remaining in the chain may be varied so as to secure any desired outline on the work-piece.

The work guiding means, as distinguished from the work propelling means, comprises the following: On the table 15 may be adjustably mounted a plurality of studs 113 carrying leaf springs 114. The studs 113 being vertically and rotatably adjustable in the table 15 and secured in any desired position by clamping screws 115. Such yielding guide means will be seen to be necessary when work of irregular outline is to be shaped and securely held in traveling contact with the vertical face 52 of the main frame. After the work-piece has passed the bottom jointing and top dressing cutters 24 and 29 and has been reduced to uniform depth and provided with smooth upper and lower surfaces, it may be further held to its path of movement by adjustable but rigid guides 116, 116, secured to the main frame and vertically movable by means of the adjusting screws 117. If only straight work is to be

planed the work-piece after having passed the cutters 37 and 32 (the former having in this event no lateral movement), the finished piece may then be held to the vertical face 52 by means of an adjustable guide 118. If, however, a "shaped" piece or one having an irregular outer surface is to be produced, this guide 118 may be replaced by the guide 119, shown in Fig. 6, as will be readily understood. This guide has a series of yielding fingers 120, 120, pivoted as at 121 and held to their work by means of springs 122, located between the outer ends of the levers 120 and stationary lugs 123 on the body of the guide 119, as will be readily understood.

There remains to be described the chip breaker mechanisms for the cutters 29 and 37. The former consists of a member 124 (Figs. 1 and 2) pivoted as at 125 to the journal box 30 of the cutter 29, and arching over said cutter; its free end resting on an extension of the box 59 of the third feed roll 57; so that the free end of said chip breaker will be raised to nearly its working position by the rising of the third feed roll 57 and not by the direct contact of the work-piece therewith. The extension of said third roll journal which carries the chip breaker is indicated at 126. Adjustable holding down pressure is applied to the chip breaker by means of the lever 127 and movable weight 128.

The combined presser roll and chip breaker for the shaping-cutter head is shown at 129 in Fig. 1 and in enlarged detail in Fig. 5. Said chip breaker is pivoted as at 130 to a member 131 which is adjustably secured to the table 6 by means of studs 132. The chip breaker 129 is yieldingly held to its work by means of a spring 133 surrounding a rod 134 between the stationary lug 135 and the movable lug 136. In the rear of the shaping cutter head 37 is a spring-pressed presser roll 137 carried on a rod 138 which is longitudinally movable in a sleeve 139, said rod 138 being backed by the spring 140; said spring having tension adjusting means as at 141, 142.

Operation: For jointing or "sticking" straight work, it will be readily understood that the shaping cam 41 may be held stationary by disconnecting its drive at the clutch 97 (Fig. 9). The feed chain drive may be also disconnected by moving the bevel gear 91 out of contact with gear 92 and the feed teeth (or so many thereof as is necessary) may be removed from the feed chain to leave clear the path of the blank which may then be driven solely by the toothed feed rolls 57; or, if preferred, both the rolls and feed chain may be used for feeding short pieces of straight work. The shaping cutter may remain in contact with the outer side of the blank so as to merely dress it in straight lines, or may be thrown altogether out of contact with the outer edge of the work.

In shaping an irregular work-piece, such, for example, as a bolster stake, shown in outline in Fig. 5, the leaf springs 114 may be adjusted to yieldingly hold the work against the vertical face 52 of the table; the chip breaker 129 and its associated pressing mechanism may be secured to the table 6 and the spring presser 119 adjusted upon the rear end of said table in place of the stationary guide 118. The shaping-cutter controlling-cam is then adjusted and arranged in timed relation to the feed teeth 53 and the work-pieces placed in the path of travel of the teeth. Thereafter the shaping action of the machine on such irregular work-pieces is entirely automatic; it being only necessary for the operator to place the work-pieces each in advance of a driving tooth, whereupon the blank is fed through the machine, automatically planed on three sides, shaped on the fourth side and discharged.

The planing mechanism shown and described herein is not claimed in this application independently of the shaping devices, but has been made the subject of a separate application, Ser. No. 353,663, and has been claimed in that application. The guides and chip breakers shown and described in this application are also shown and described in a separate application, Ser. No. 533,393 and claimed therein. The feed and pressure mechanism shown and described in this application have been made the subject of a separate divisional application, Ser. No. 353,664 and have been claimed therein.

Many changes may be made in the proportion and arrangement of parts without departing from my invention, since

What I claim is:—

1. A feed table, an under planing cutter and a rear plane table in the cutting plane thereof adjustable with reference to the feed table to take a sufficient cut to insure a plane lower surface to the work, a vertical faced longitudinal gage or fence extending in front of said under-cutter a substantial distance and to the rear thereof, means for pressing the work laterally against said fence, substantially throughout the length of the portion in front of the lower cutter, a comparatively heavy pressure means adjacent and to the rear of the under cutter operating to hold said lower plane surface of the work firmly to the plane table and tending to maintain the guided position of the work determined by the feed gage or fence and the lateral pressure means presented during the planing of said lower surface, a lateral shaping cutter to the rear of the under cutter and opposite to the rear portion of the fence, and pattern mechanism for moving said shaping cutter toward and from the fence.

2. A feed table, an under planing cutter and a rear plane table in the cutting plane thereof adjustable with reference to the feed table to take a sufficient cut to insure a plane lower surface to the work, a vertical faced longitudinal gage or fence extending in front of said under cutter a substantial distance and to the rear thereof, means for pressing the work laterally against said fence, substantially throughout the length of the portion in front of the lower cutter, a comparatively heavy pressure means adjacent and to the rear of the under cutter operating to hold said lower plane surface of the work firmly to the plane table and tending to maintain the guided position of the work determined by the feed gage or fence and the lateral pressure means presented during the planing of said lower surface, a lateral shaping cutter to the rear of the under cutter and opposite to the rear portion of the fence, pattern mechanism for moving said shaping cutter toward and from the fence, a lateral jointing cutter and a rear fence-extension in the cutting plane of said cutter adjustable to insure a sufficient cut to produce a lateral plane surface of the work opposite to the shaped surface, and means for maintaining said plane surface in contact with the fence extension.

3. A feed table, an under planing cutter and a rear plane table in the cutting plane thereof adjustable with reference to the feed table to take a sufficient cut to insure a plane lower surface to the work, a vertical faced longitudinal gage or fence extending in front of said under cutter a substantial distance and to the rear thereof, means for pressing the work laterally against said fence, substantially throughout the length of the portion in front of the lower cutter, a comparatively heavy pressure means adjacent and to the rear of the under cutter operating to hold said lower plane surface of the work firmly to the plane table and tending to maintain the guided position of the work determined by the feed gage or fence and the lateral pressure means presented during the planing of said lower surface, a lateral shaping cutter to the rear of the under cutter and opposite to the rear portion of the fence, pattern mechanism for moving said shaping cutter toward and from the fence, a lateral jointing cutter and a rear fence-extension in the cutting plane of said cutter adjustable to insure a sufficient cut to produce a lateral plane surface of the work opposite to the shaped surface, means for maintaining said plane surface in contact with the fence extension, and a lateral pressure device in advance of the jointing cutter adapted to maintain pressure upon the shaped surface, toward the fence.

4. A feed table, an under planing cutter and a rear plane table in the cutting plane thereof adjustable with reference to the feed table to take a sufficient cut to insure a plane lower surface to the work, a vertical faced longitudinal gage or fence extending in front of said under cutter a substantial distance and to the rear thereof, means for pressing the work laterally against said fence, substantially throughout the length of the portion in front of the lower cutter, a comparatively heavy pressure means adjacent and to the rear of the under cutter operating to hold said lower plane surface of the work firmly to the plane table and tending to maintain the guided position of the work determined by the feed gage or fence and the lateral pressure means presented during the planing of said lower surface, a lateral shaping cutter to the rear of the under cutter and opposite to the rear portion of the fence, and pattern mechanism for moving said shaping cutter toward and from the fence, and a feed chain traveling wholly in a plane parallel with the plane table and having spaced projections arranged to engage behind the rear end of the work.

5. A feed table, an under planing cutter and a rear plane table in the cutting plane thereof adjustable with reference to the feed table to take a sufficient cut to insure a plane lower surface to the work, a vertical faced longitudinal gage or fence extending in front of said under cutter a substantial distance and to the rear thereof, means for pressing the work laterally against said fence, substantially throughout the length of the portion in front of the lower cutter, a comparatively heavy pressure means adjacent and to the rear of the under cutter operating to hold said lower plane surface of the work firmly to the plane table and tending to maintain the guided position of the work determined by the feed gage or fence and the lateral pressure means presented during the planing of said lower surface, a lateral shaping cutter to the rear of the under cutter and opposite to the rear portion of the fence, pattern mechanism for moving said shaping cutter toward and from the fence, a lateral jointing cutter and a rear fence-extension in the cutting plane of said cutter adjustable to insure a sufficient cut to produce a lateral plane surface of the work opposite to the shaped surface, means for maintaining said planed surface in contact with the fence-extension, and a feed chain traveling wholly in a plane parallel with the plane table and having spaced projections arranged to engage behind the rear end of the work.

6. A feed table, an under planing cutter and a rear plane table in the cutter plane thereof adjustable with reference to the feed table to take a sufficient cut to insure a plane lower surface to the work, a vertical faced

longitudinal gage or fence, means for pressing the work laterally against said fence, a comparatively heavy pressure means adjacent and to the rear of the under cutter operating to hold said lower plane surface of the work firmly to the plane table, a lateral shaping cutter to the rear of the under cutter and opposite to the rear portion of the fence, pattern mechanism for moving said shaping cutter toward and from the fence, a lateral jointing cutter and a rear fence-extension in the cutting plane of said cutter adjustable to insure a sufficient cut to produce a lateral plane surface of the work opposite to the shaped surface, and means for maintaining said planed surface in contact with the fence-extension.

7. A feed table, an under planing cutter and a rear plane table in the cutting plane thereof adjustable with reference to the feed table to take a sufficient cut to insure a plane lower surface to the work, a vertical faced longitudinal gage or fence extending in front of said under-cutter a substantial distance and to the rear thereof, means for pressing the work laterally against said fence, substantially throughout the length of the portion in front of the lower cutter, a comparatively heavy pressure means adjacent and to the rear of the under-cutter operating to hold said lower plane surface of the work firmly to the plane table and tending to maintain the guided position of the work determined by the feed gage or fence and the lateral pressure means presented during the planing of said lower surface, a lateral shaping cutter to the rear of the under-cutter and opposite to the rear portion of the fence, pattern mechanism for moving said shaping cutter toward and from the fence, a lateral jointing cutter and a rear fence-extension in the cutting plane of said cutter adjustable to insure a sufficient cut to produce a lateral plane surface of the work opposite to the shaped surface, and means acting on the shaped surface for maintaining said planed surface in contact with the fence extension.

8. A feed table, an under planing cutter and a rear plane table in the cutting plane thereof adjustable with reference to the feed table to take a sufficient cut to insure a plane lower surface to the work, a vertical faced longitudinal gage or fence extending in front of said under cutter a substantial distance and to the rear thereof, means for pressing the work laterally against said fence, substantially throughout the length of the portion in front of the lower cutter, a comparatively heavy pressure means adjacent and to the rear of the under cutter operating to hold said lower plane surface of the work firmly to the plane table and tending to maintain the guided position of the work determined by the feed gage or fence and the lateral pressure means presented during the planing of said lower surface, a lateral shaping cutter to the rear of the under cutter and opposite to the rear portion of the fence, pattern mechanism for moving said shaping cutter toward and from the fence, a lateral jointing cutter and a rear fence extension in the cutting plane of said cutter adjustable to insure a sufficient cut to produce a lateral plane surface of the work opposite to the shaped surface, and means for maintaining said planed surface in contact with the fence extension, and a feed chain traveling wholly in a plane parallel with the plane table and having spaced projections arranged to engage behind the rear end of the work, said feed chain passing said under cutter and shaping cutter and terminating short of said jointing cutter.

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

CHARLES W. BORG.

Witnesses:
MARSHALL BECK,
W. C. GILMORE.