H. SCHELHAMMER.

COMB CUTTING MACHINE.

APPLICATION FILED SEPT. 7, 1921.

1,423,968.

Patented July 25, 1922.

6 SHEETS—SHEET 1.

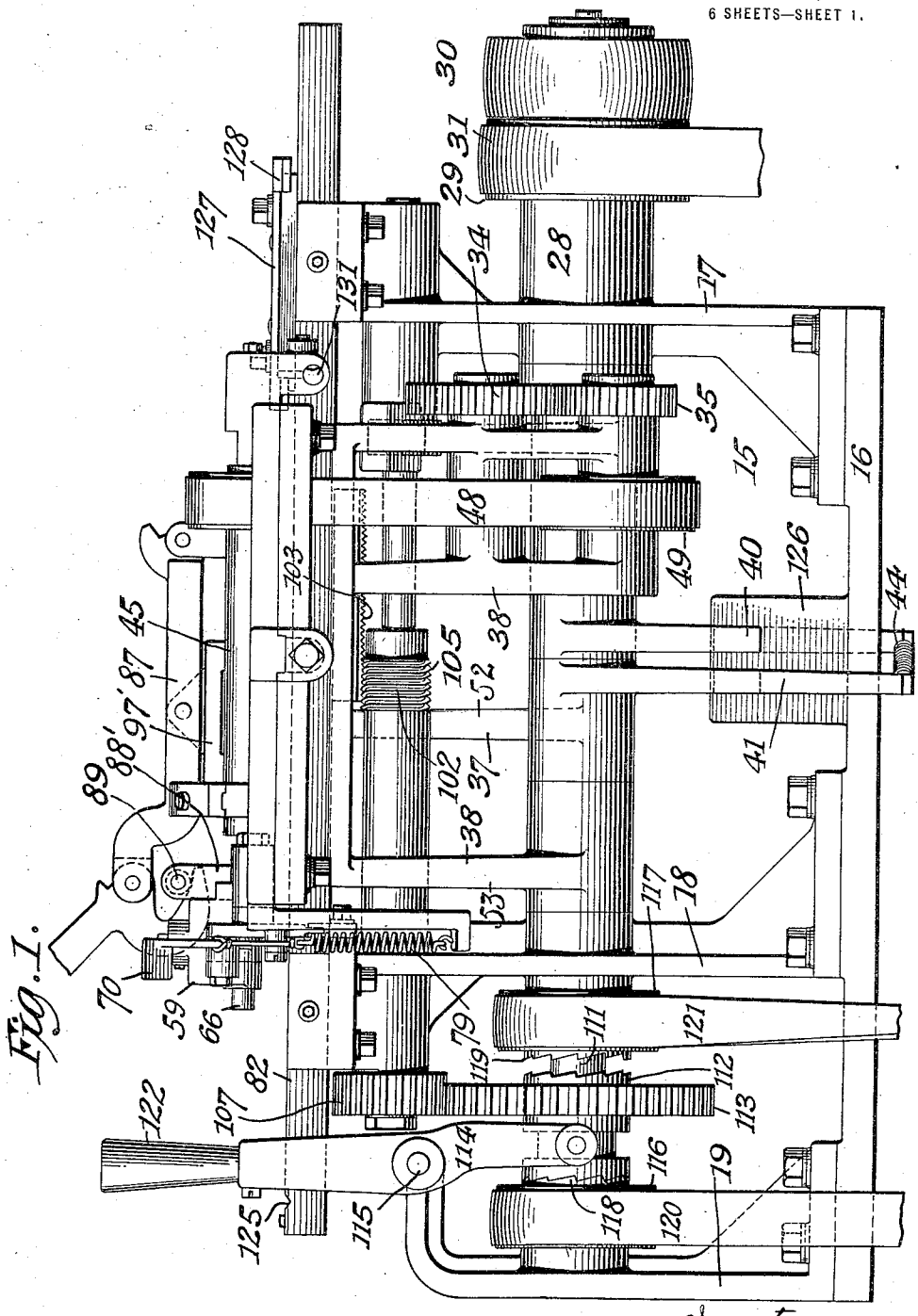


Fig. 1.

Inventor:
Herman Schelhammer
by Leo J. Mattys atty

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COMB CUTTING MACHINE.

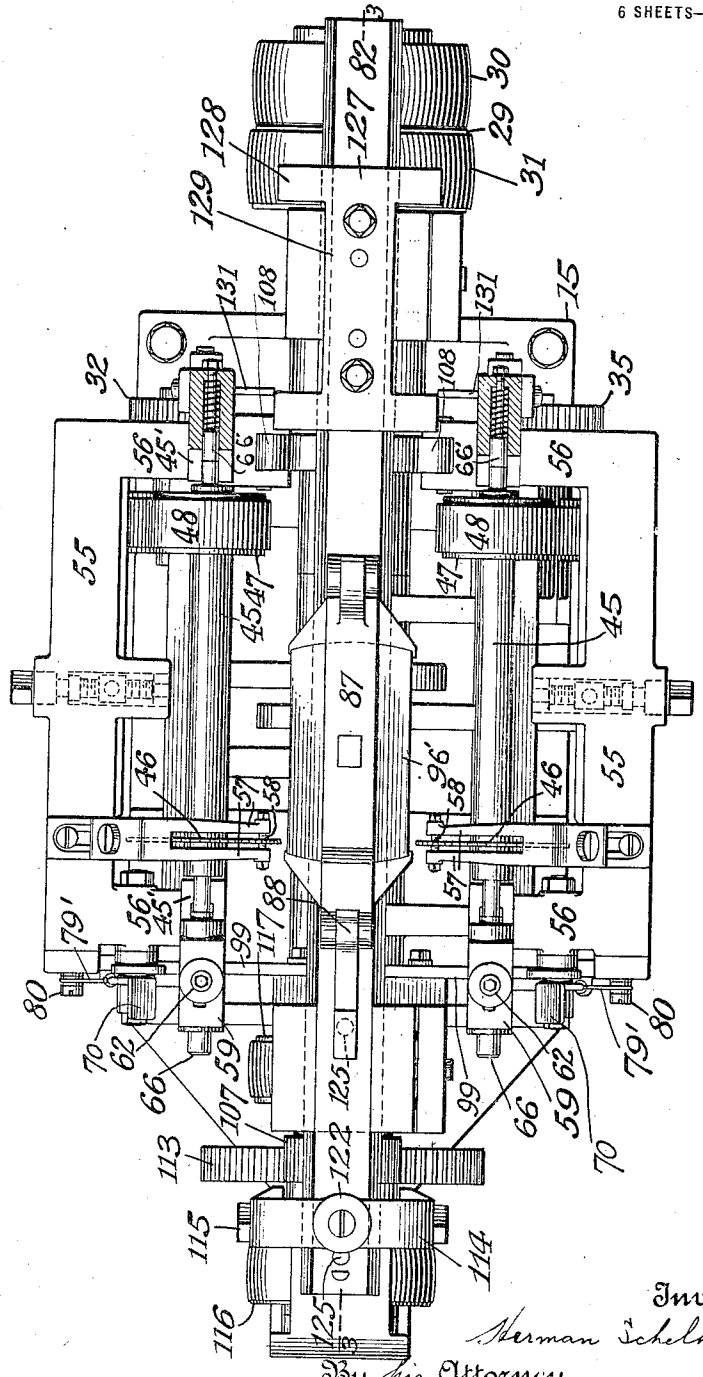
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6 SHEETS—SHEET 2.

Fig. 2.



Inventor

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By his Attorney

Leo J. Matthy

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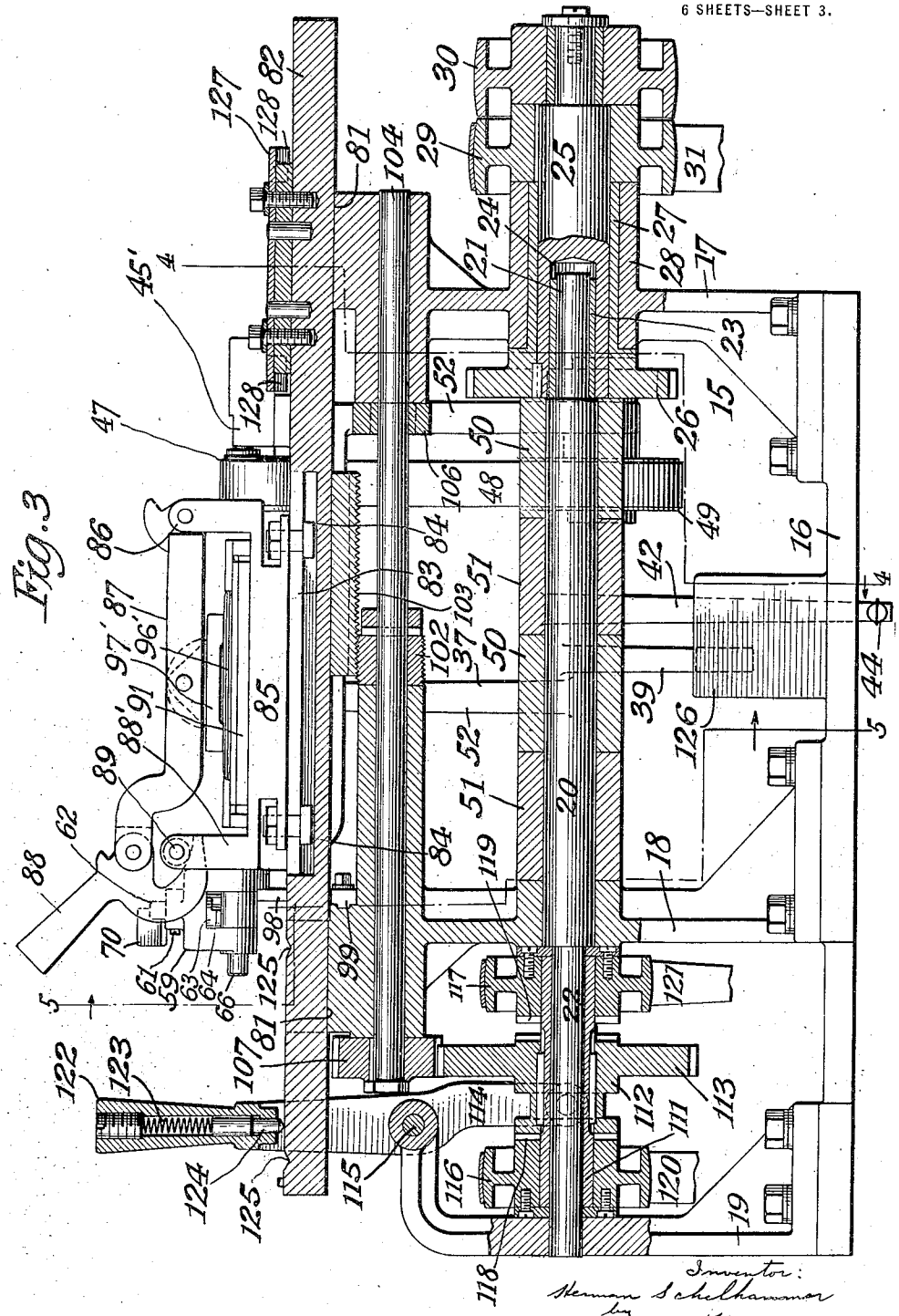
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6 SHEETS—SHEET 3.

Fig. 3



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6 SHEETS—SHEET 4.

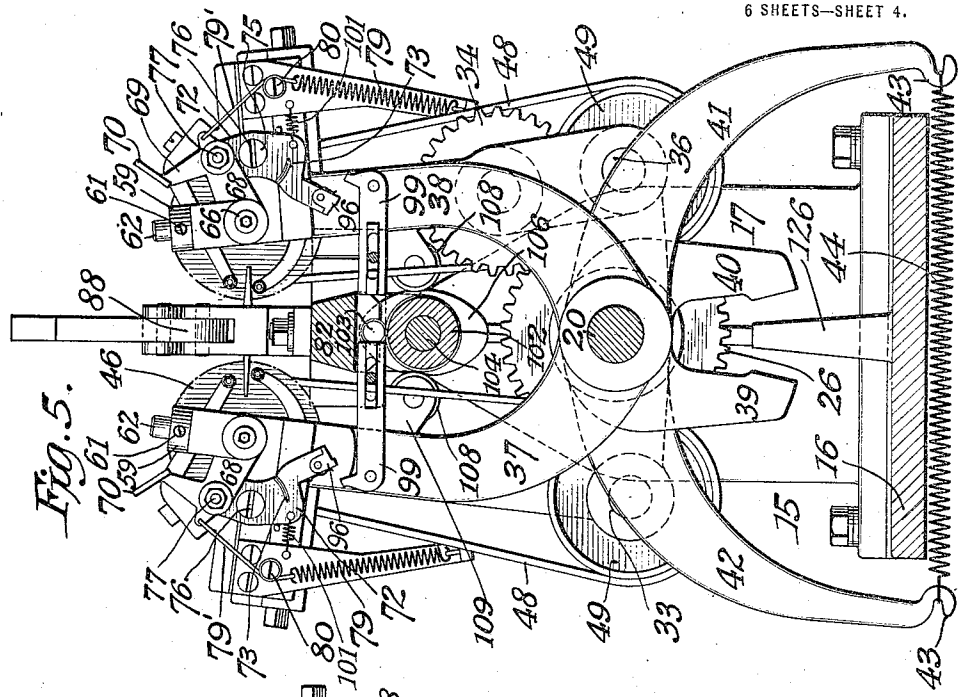


Fig. 5.

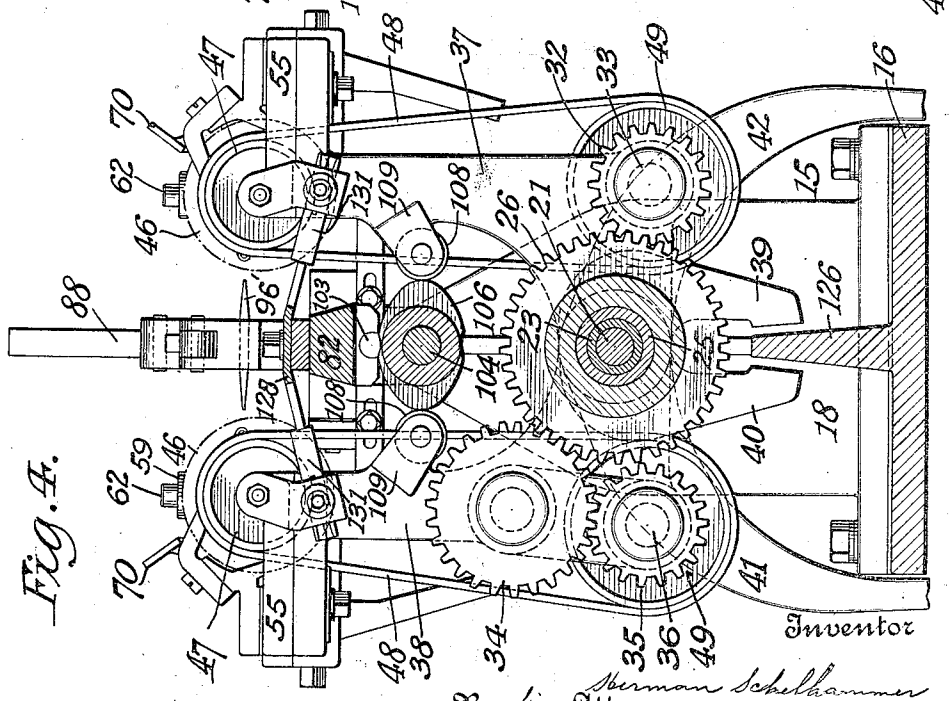


Fig. 4.

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6 SHEETS—SHEET 5.

Fig. 6.

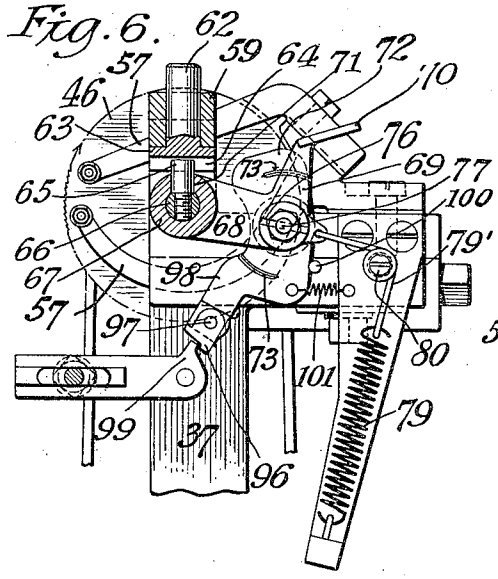


Fig. 7.

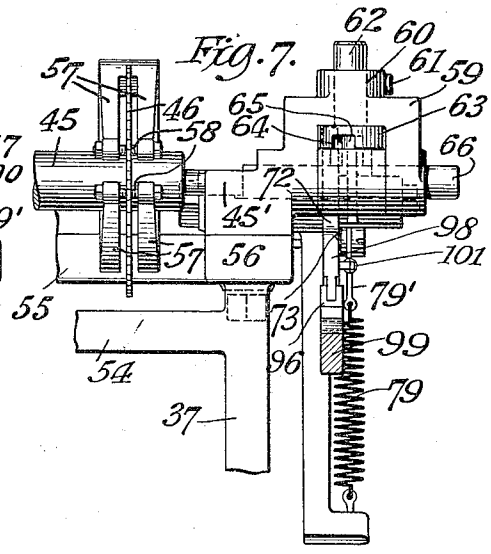


Fig. 8.

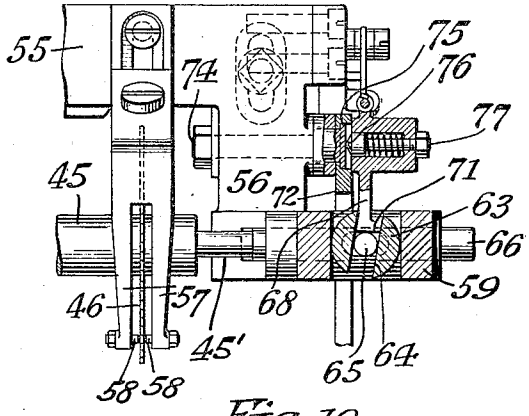


Fig. 9.

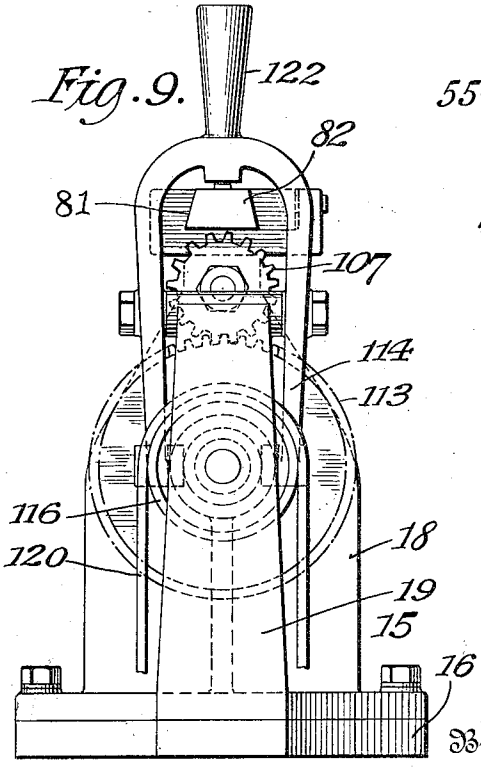
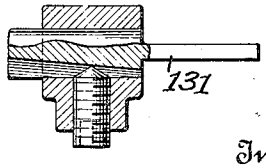


Fig. 10.



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COMB CUTTING MACHINE.

APPLICATION FILED SEPT. 7, 1921.

1,423,968.

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6 SHEETS—SHEET 6.

Fig. 11.

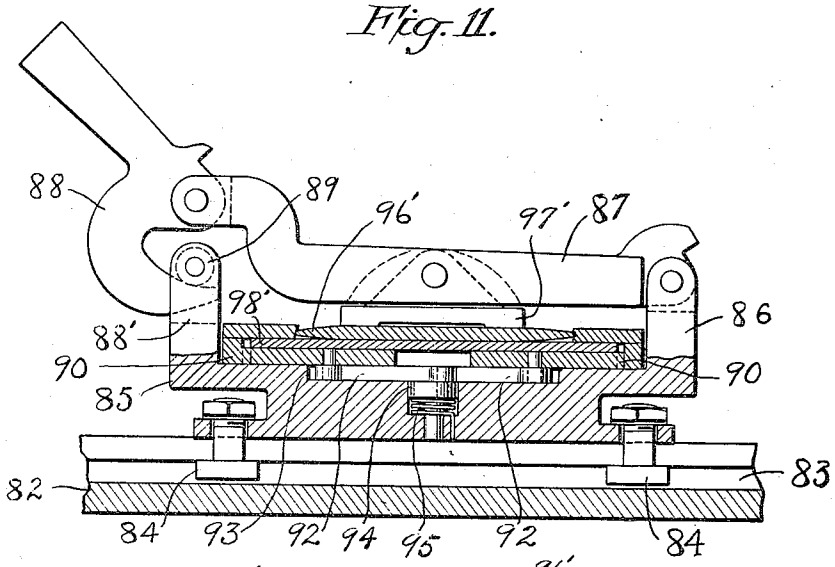


Fig. 12.

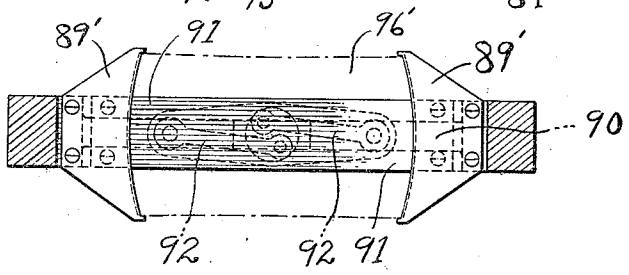
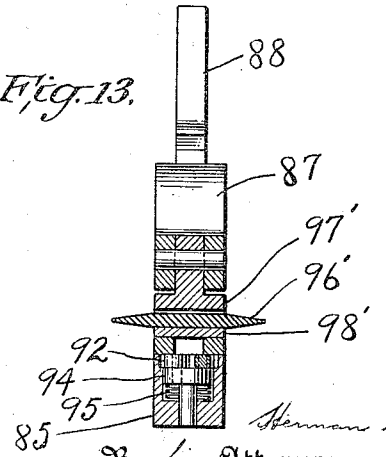


Fig. 13.



Inventor

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By his Attorney

Leo J. Matty

UNITED STATES PATENT OFFICE.

HERMAN SCHELHAMMER, OF WHITESTONE LANDING, NEW YORK, ASSIGNOR TO AMERICAN HARD RUBBER CO., OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

COMB-CUTTING MACHINE.

1,423,968. Specification of Letters Patent. Patented July 25, 1922.

Application filed September 7, 1921. Serial No. 499,001.

To all whom it may concern:

Be it known that I, HERMAN SCHELHAMMER, a citizen of the United States of America, and a resident of Whitestone Landing, in the county of Queens and State of New York, have invented certain new and useful Improvements in Comb-Cutting Machines, of which the following is a specification.

This invention relates to a comb cutting machine and the objects of the invention are to provide a machine for cutting fine tooth combs on one or both sides at the same time and in either direction, that is, automatic in operation and simple in construction.

To the accomplishment of the above objects and to such others as may hereinafter appear the invention comprises a pair of circular cutters mounted in oscillating frames, controlled to swing toward and away from the comb blank at either side thereof simultaneously while the comb blank at stated intervals is moved across the line of travel of said cutters.

The invention further comprises means for bending the circular cutters toward the line of greatest resistance to produce a straight initial cut; and also means for releasing said bending means after the initial cut has been made.

Referring to the drawings:—

Figure 1 is a front elevation of a comb cutting machine made in accordance with the invention.

Figure 2 is a plan view thereof.

Figure 3 is a vertical longitudinal section taken on the line 3—3 of Figure 2.

Figure 4 is a transverse section on the line 4—4 of Figure 3.

Figure 5 is a view similar to Figure 4 on the line 5—5 of Figure 3.

Figure 6 is a side elevation of one of the cutters and associated parts.

Figure 7 is a rear view thereof.

Figure 8 is a plan view thereof.

Figure 9 is an end elevation of the driving reversible clutch.

Figure 10 is a detail.

Figures 11, 12 and 13 are enlarged detail views of the comb clamp and associated parts.

This invention is an improvement over those shown and broadly claimed in previous applications for patent, one filed April 22, 1921, Serial No. 463,708 and the other filed July 1, 1921, Serial No. 481,757.

Referring to the drawings, 15 designates the frame of the machine comprising a base member 16 and upright members 17, 18 and 19 which support a shaft 20, reduced at both ends as at 21 and 22. The reduced portion 21 of the shaft 20 is surrounded by a bushing 23, housed in a bore 24, formed in a cutter driving shaft 25, to which is keyed a major gear 26, having an elongated hub or bushing 27, rotatably mounted in a bearing 28 on the upright 17. The shaft 25 is provided with a fixed power pulley 29 and a loose pulley 30 to receive a power belt 31.

The major gear 26 is in mesh at one side of the machine with a gear 32, rotatable with a short shaft 33 and at the opposite side with an idler gear 34 which is in mesh with a gear 35 rotatable with a short shaft 36, said shafts 33 and 36 being mounted on the lower outer portions of cutter frames 37 and 38, each having respectively a foot stop 39 and 40 arranged to engage an abutment 126. The cutter frames 37 and 38 each have, respectively, a curved arm 41 and 42 provided with a suitable hook 43 at the ends thereof, to which are attached a pull spring 44.

The upper portions of the cutter frames 37 and 38 are each provided with a cutter shaft 45 rotatably mounted in bearings 45′. The cutter shafts 45 are each provided with a cutter 46 and a pulley 47 which is connected by a belt 48 to a pulley 49 mounted on the short shafts 33 and 36.

The cutter frames 37 and 38 are provided with tubular hubs 50, 50 and 51, 51 arranged in pairs to rock on the shaft 20 and are held against end movement by the upright 18 at one end and the gear 26 at the other. The hubs 50, 50 and 51, 51 are provided with upwardly directed arms 52, 52 and 53, 53 formed therewith and arranged in pairs at opposite sides of the machine, each pair of arms being connected at the top by a cross bar 54, above which is supported an adjustable cutter support 55. The cutter support 55 has in each instance end extensions or arms 56 which are provided with the bearings 45′ for the cutter shaft 45.

The top of the uprights 17 and 18 are provided with suitable dovetailed grooves 81 arranged in alignment to slidably receive a horizontal comb bar 82 having midway of its length a central undercut slot 83 arranged to engage bolts 84 employed to adjustably secure a comb blank holder 85 in position on said comb bar.

In the present instance the comb blank holder 85 has a rear post 86, to which is pivoted an arm 87, carrying at its free end a swiveled cam hook 88. The comb blank holder 85 is also provided with a forked front post 88′ having a roller cross pin 89 which is engaged by the hook 88 when the comb blank is clamped in place to be cut. By referring to Figures 11, 12 and 13 it will be seen that the comb blank holder 85 is provided in the present instance with undercut end clips 89′ shaped to engage the end of a comb blank. The outer ends of the clips 89′ are each secured to a suitable clip slide 90 arranged to slide in a groove formed by suitably spaced plates 91, secured to the comb blank holder, the plates 91 being cut away at the ends to permit a small adjusting movement of the clips toward or from each other. Each clip slide 90 is suitably pivoted to one end of a short link 92, situated beneath the same in a suitable groove 93 formed in the comb blank holder. The other end of each link 92 is pivoted to an equalizing drum 94 suitably pivoted in the comb blank holder and situated below the links 92 in a recess formed to embrace a coiled spring 95 which acts through the equalizing drum 94, links 92 and clip slides 90 to removably engage a comb blank 96′ as shown in Figure 12, the parts being arranged to hold comb blanks of slightly varying lengths in a central position. The comb blank 96′ is locked in position by means of a clamp plate 97′ pivoted at its upper end to the arm 87, the equalizing drum 94, links 92 and connecting parts being arranged as before described to be locked in position when the clamp plate 97′ is forced into position by the hook 88, a suitable bottom plate 98′ being provided upon which the bottom of the comb blank rests, which extends over the top of the clip slides 90 and is preferably secured to the plates 91.

The comb blank holder 85 is given intermittent step feed movements through the medium of a rack 103 secured to the bottom of the comb bar 82, which is arranged to engage a feed screw 102, secured to a shaft 104 which is mounted in suitable bearings at the upper end of the upright 17 and 18. The feed screw 102 is provided with threads arranged parallel with the end faces thereof except at diagrammatically opposite points where they are inclined to one side for a distance equal to the distance of one tooth of the comb blank, as shown at 105, so that at each revolution of the shaft 104 the comb blank is fed forward a distance equal to one tooth.

The shaft 104 also carries a double smooth faced cam 106 which engages the rollers 108 mounted in short arms 109 secured to the cutter frames 37 and 38 which acts to oscillate the cutter frames and with them the cutters 46 into and out of engagement with the comb blank.

The shaft 104 is provided with a gear 107 which is driven and reversed through the medium of a suitable clutch mechanism carried on the reduced extension 22 of the shaft 20. In the present instance the clutch mechanism comprises a sleeve or bushing 111 surrounding the extension 22, said sleeve being keyed to a slidable double faced clutch member 112, provided with a gear 113 which meshes with the gear 107, the same being controlled by a shift fork 114, hinged at 115 to the upright 19. Suitable pulleys 116 and 117, having clutch faces 118 and 119, are loosely mounted on the ends of the sleeve 111, and carry respectively a straight belt 120 and a crossed belt 121. The shift fork 114 has a handle 122 provided with a central bore 123 to slidably receive a spring pressed pin 124 having a conical projecting end adapted to engage either of two conical shaped shallow sockets 125, formed in the top of the comb bar 82 which act to automatically throw the fork 114, at the end of the cutting operation, into neutral position, to stop the machine.

When it is desired to start the machine the handle 122 of the fork 114 is moved to throw the clutch member 112 into engagement with one or the other clutch faces 118 or 119 according to the required direction of travel to be given to the comb bar 82, leaving the spring pressed pin 124 resting on the comb bar 82 adjacent one of the sockets 125, into which on the preceding movement of the comb bar 82 it had been forced to stop the machine when in the further operation of the machine the spring pressed pin 124 will be engaged by the other socket 125 to again stop the machine. After which the above operation can be repeated to again reverse the machine.

Means are provided in the present instance for controlling both the timing and inward throw of the cutter frames which comprise a gauge plate 127 secured to the comb bar 82, the same being provided with end lugs 128 and a reduced portion 129, which are arranged to engage at certain times suitable stop pins 131 secured to the cutter frames. The stop pins 131 are arranged to strike the lugs 128 at the beginning of the oscillatory movement of the cutter frames to thereby prevent the cutter frames from moving the cutters into engagement with the comb blank until the same has been moved into its proper predetermined posi-

tion, when the stop pins 131 will clear the lugs 128 permitting the cutter frames to move the cutters into engagement with the comb blank, the inward limit of the cutters being controlled by the stop pins 131 engaging the reduced portion 129. After the comb blank has moved sufficiently to permit the stop pins 131 to pass the lugs 128 to make the initial cuts in the comb blank the reduced portion 129 acts to limit the inward movement of the cutters on all succeeding cuts and until the last predetermined cuts have been made when the stop pins 131 are arranged to engage the other lugs 128 on the other end of the gauge plate 127, after which the machine is stopped as above described. When a new comb blank is inserted in the comb clamp the machine is reversed and the lugs 128 that controlled the last cuts on the previously cut comb blank, controls the initial cuts on the new comb blank.

To obtain the best results in cutting high grade combs, the initial cut at the end of the comb should be straight and true; this initial cut is difficult to make for the reason that the same is so near the end of the blank, the circular cutter being thin will follow the line of least resistance and will ordinarily curve outward away from the greater mass of comb stock, resulting in an outwardly curved cut.

The difficulty above described is obviated by providing cutter bending means, that are reversible, for giving the circular cutters a slight inward or outward bend during the first or initial cut, automatic tripping means being provided to release the circular cutters and permit them to return to the normal straight position, previous to the time the second cut is made.

The cutter support 55 with the inwardly directed arms 56, provided with the bearings 45′ for the reduced ends of the cutter shaft 45, is provided with a yoke shaped frame 59, in the present instance, adjacent the right hand bearing 45′. The yoke shaped frame 59 carries a longitudinally movable bending bar 66, provided with an upwardly directed pin 65, extending through a slot 71, in a sleeve 67, which is confined against longitudinal movement in the fork of the yoke frame. The pin 65 is arranged to engage a cam slot 64, formed in a circular head 63, carried on the lower end of a pin 62, which passes upward through a bore 60 in the yoke frame, the same being locked in adjusted position by a set screw 61. The sleeve 67 has a backwardly directed arm 68 formed with an upwardly extending finger piece 70 and a socket arranged to house a spring actuated locking pin 77.

Swiveled on a pin 74, having a head 75, carried by the right hand arm 56 of the cutter support 55, is a segmental lock and trip plate 72, formed with an extension 98, to which is secured a trip piece 96, by means of a knuckle joint 97. The trip plate 72 has a pair of grooves 73, V shaped in cross section and concentric with the swivel pin 74 to alternately receive the conical teat on the end of the locking pin 77. To the outer end of the arm 68 is attached a flexible wire or cable 79′ which is arranged to pass over a roller 80, the other end of the flexible wire 79′ being secured to one end of a pull spring 79 anchored at its other end to a bracket secured to the cutter support.

The cutter support 55 is arranged to adjustably support two pairs of guide arms 57 made to extend outward on each side of the cutter 46 above and below the cutter shaft 45, having at their outer ends threaded openings to receive adjustable guide or brace pins 58.

The normal inoperative position of the cutter bending means just described is shown in Figure 6, in which the teat of the locking pin 77 is engaged by a slot or V shaped groove 76 in the top of the swivel pin 74, the spring 79 attached to the flexible wire 79′ acting to hold the pin 65 in a vertical position, which acts to hold the guide arms 57 in normal inoperative position.

When the feed of the comb bar 82 is to be to the right as shown in Figure 2, the arm 68 is raised in each instance until the teat of the locking pin 77 rests in the upper segmental groove 73 which serves to lock the arm 68 in this position against the tension of the spring 79. The raising of the arm 68, as just described, rotates the sleeve 67, and with it the pin 65, the cam slot 64 acting to force the pin 65 and with it the bending bar 66 to which it is secured, slightly to the left, thereby moving the bending bar 66 to force the cutter shaft 45 slightly to the left against the action of a spring pressed plunger bar 66′ carried in a support on the opposite arm 56 of the cutter support 55 and against the stationary left hand guide or brace pins 58, thereby bending the cutter 46 slightly to the right, in which position the cutter 46 is arranged in proper position to make the first or initial cut.

As the cutter frames swing the cutters 46 outward after the first initial cuts have been made, each trip piece 96 contacts with a properly positioned trip bar 99, adjustably mounted on the standard 18, which acts to rock the trip plate 72 on its pivot which causes the teat on the locking pin 77 to ride out of the V shaped groove 73 the spring 79 acting to return the cutter bending means to normal inoperative position, with the teat of the locking pin 77 engaging the groove 76, when, as before described, the guide arms 57 are in normal inoperative position acting merely as guides to hold the cutters in normal straight position while the remaining cuts in the comb blank are made.

When the feed of the comb bar 82 is to the left the arm 68 is drawn down and locked in the lower segmental groove 73 before the first initial cut is made in order to bend the cutter 46 to the left, the cutter shaft 45 in this instance being forced to the right by the spring pressed plunger bar 66′ carried in the opposite arm 56 of the cutter support, when the pin 65 acting in the cam shaft 64 draws the bending bar 66, to which it is secured, to the right or away from the cutter bar 45. When, as before described, the cutter frames swing the cutters outward after the first initial cuts have been made, each trip piece 96 contacts with the trip bar 99, which acts to rock the trip plate 72 on its pivot to return the cutter bending means to normal inoperative position, to hold the cutters in normal straight position while the remaining cuts in the comb blank are made, as before described.

From the foregoing description it will be seen that the comb cutting machine is entirely automatic in operation and requires only the setting of the arms 68 of the cutter bending mechanism before the first initial cuts are made and the operation of the handle 122 to throw the clutch member 112 into engagement with one or the other clutch faces 118 or 119 as before described.

While the invention has been described with particular reference to the details of construction, the same is not to be considered as limited thereto, as many changes can be made and still fall within the scope of the invention set forth in the following claims.

What I claim is:—

1. In a comb cutting machine, a cutter for cutting teeth in a comb blank, an oscillatory cutter carrying frame, a stop on said frame, and an H-shaped gauge plate arranged to allow said stop to clear the legs thereof during the cutting of said teeth, and to cause said legs to engage said stop for preventing further oscillation of said frames on the completion of the cutting operation.

2. In a comb cutting machine, a longitudinally fed comb clamp, a bar having spaced sockets therein carrying said clamp, a clutch for reversing the longitudinal feed of said clamp, a lever for operating said clutch, and a spring pressed pin in said lever for engaging a socket in said bar to throw said lever at a predetermined point.

3. A comb cutting machine comprising in combination a comb clamp for holding a comb blank, cutters situated on opposite sides of said comb clamp, cutter carrying frames, stops on said frames, means for moving said frames toward and away from said comb blank, means for feeding said comb clamp across the line of travel of said cutters, and means for stopping the operation of said cutters when the comb is complete comprising a gauge plate and projecting lugs on the extremities of said plate adapted to engage said stops after the last tooth has been cut in said comb.

4. In a comb cutting machine, a revoluble cutter, a longitudinally slidable shaft carrying said cutter, and means for bending said cutter on the initial cut thereof comprising a stationary yoke arranged about said cutter, a pin on said shaft, a cylindrical cam having a cam slot therein inclined to the axis of said shaft for receiving said pin, and means for partially rotating said pin in said slot for causing said cutter carrying shaft to slide longitudinally, whereby said cutter is forced into contact with said yoke.

5. A comb cutting machine comprising in combination a comb clamp for holding a comb blank, a bar having a pair of spaced sockets therein and carrying said clamp, cutters for cutting teeth in said comb blank, means for simultaneously moving said cutters toward and away from said comb blank, means for intermittently feeding said comb clamp across the line of travel of said cutters, and means for reversing the feeding movement of said comb clamp to cut a new comb blank in the opposite direction comprising a reversing clutch, a lever operatively connected to said clutch, and a spring pressed pin in said lever adapted to engage a socket in said bar for operating said lever.

6. In a comb cutting machine, a revoluble cutter, a longitudinally slidable shaft carrying said cutter, means for bending said saw on the initial cut thereof, and means for locking said saw in the bent position thereof comprising a grooved plate, and a spring pressed teat operatively connected to said saw bending means and adapted to engage a groove in said plate until the initial cut has been completed.

7. In a comb cutting machine, a revoluble cutter, a longitudinally slidable shaft carrying said cutter, means for bending said saw on the initial cut thereof, means for locking said saw in the bent position thereof comprising a pivoted, spring pulled, grooved plate and a spring pressed teat operatively connected to said saw bending means and adapted to removably engage a groove in said plate, and means for releasing said saw comprising a stationary trip piece arranged to rock said plate on the completion of the initial cut to remove said teat from said groove.

8. A comb cutting machine comprising in combination a comb clamp for holding a comb blank, cutter frames, cutters rotatably mounted on said cutter frames, a smooth cam for moving said cutter frames together with the cutters toward and away from said comb blank, and means for giving said comb clamp progressive step movements in either direction across the line of travel of said

cutters, comprising a rack carried by said clamp and a screw independent of said cam for operating said rack.

9. A comb cutting machine comprising in combination a comb clamp for holding a comb blank, a bar having a pair of spaced sockets therein and carrying said clamp, means for feeding said comb clamp, reversible clutch operating means adapted to engage and to be carried by means of one of said sockets for reversing the feeding movement of said comb clamp, cutters for cutting teeth in said comb blank, and means for moving said cutters toward and away from said comb blank.

10. A comb cutting machine comprising in combination a comb clamp for holding a comb blank, a bar having sockets therein and movable with said comb clamp, means for feeding said comb clamp, reversible clutch operating means operated by said bar for reversing the feeding movement of said comb clamp, automatic means for stopping the feeding movement of said comb clamp at the end of each feeding movement, cutters for cutting teeth in said comb blank, and means for moving said cutters toward and away from said comb blank.

11. A comb cutting machine comprising in combination a comb clamp for holding a comb blank, cutters situated on opposite sides of said comb clamp, means for moving said cutters toward and away from said comb blank, means for feeding said comb clamp across the line of travel of said cutters, means for stopping the oscillation of said cutters when the comb is complete, and means independent of said cutter stopping means for stopping the feeding of said comb clamp when the comb is complete comprising a lever operatively connected to said clamp, and a clutch connected to said lever and adapted to be thrown into neutral position when the cutting of the comb has been completed.

12. A comb cutting machine comprising in combination a comb clamp for holding a comb blank, cutters situated on opposite sides of said comb clamp, means for moving said cutters toward and away from said comb blank, means for feeding said comb clamp across the line of travel of said cutters, means for stopping the oscillation of said cutters when the comb is complete comprising an H-shaped plate movable with said clamp, and stops movable with said cutters and adapted to engage the projecting ends of said H-shaped plate when the comb is complete, means independent of said cutter stopping means for stopping the feeding of said comb clamp when the comb is complete, and means for reversing the feeding movement of said comb clamp to cut a new comb blank.

13. A comb cutting machine comprising in combination a comb clamp for holding a comb blank, a rack on said clamp, cutters situated on opposite sides of said comb clamp, a smooth cam for moving said cutters toward and away from said comb blank, a screw engaging said rack for feeding said comb clamp across the line of travel of said cutters and a shaft upon which said cam and said screw are mounted.

14. A comb cutting machine comprising in combination a comb clamp for holding a comb blank, a bar supporting said comb blank, cutters situated on opposite sides of said comb clamp, means for moving said cutters toward and away from said comb blank, means for feeding said comb clamp across the line of travel of said cutters, a shaft upon which is mounted said cutter moving and comb clamp feeding means, and means for reversing the movement of said shaft to reverse the feeding movement of said comb clamp comprising a lever adapted to engage and to be operated by said bar at predetermined intervals, and a clutch operatively connected to said lever and said shaft.

15. A comb cutting machine comprising in combination a comb clamp for holding a comb blank, cutters situated on opposite sides of said comb clamp, a cam for moving said cutters towards and away from said comb blank, means for feeding said comb clamp across the line of travel of said cutters and means for bending the cutters to compensate for side thrust on the initial cut comprising a stationary yoke, means for sliding said cutters into contact with said yoke, and means for removably locking said cutters in the bent position thereof comprising a grooved plate and a spring pressed teat connected to said cutter sliding means and adapted to engage a groove in said plate.

16. A comb cutting machine comprising in combination a comb clamp for holding a comb blank, cutters situated on opposite sides of said comb clamp, a longitudinally slidable shaft carrying said cutters, means for moving said cutters toward and away from said comb blank, means for feeding said comb clamp in either direction across the line of travel of said cutters, and means for bending the cutters in either direction, depending upon the feeding direction of the comb clamp to compensate for side thrust on the inital cut comprising a yoke against which said cutters may be urged, a pin on said cutter shaft, a slotted cam engaged by said pin and arranged to cause said shaft to slide on the rotation of said pin in either direction.

17, A comb cutting machine comprising in combination a comb clamp for holding a comb blank, cutters situated on opposite sides of said comb clamp, means for moving said cutters toward and away from said comb blank, means for feeding said comb

clamp across the line of travel of said cutters, means for bending the cutters to compensate for side thrust on the initial cut, and means for returning said cutter bending means to normal position after the initial cut has been made.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

HERMAN SCHELHAMMER.

Witnesses:
ARTHUR SEUBERT,
HORACE H. NAHM.