H. SCHELHAMMER.

COMB CUTTING MACHINE.

APPLICATION FILED JULY 1, 1921.

1,423,967.

Patented July 25, 1922.

5 SHEETS—SHEET 1.

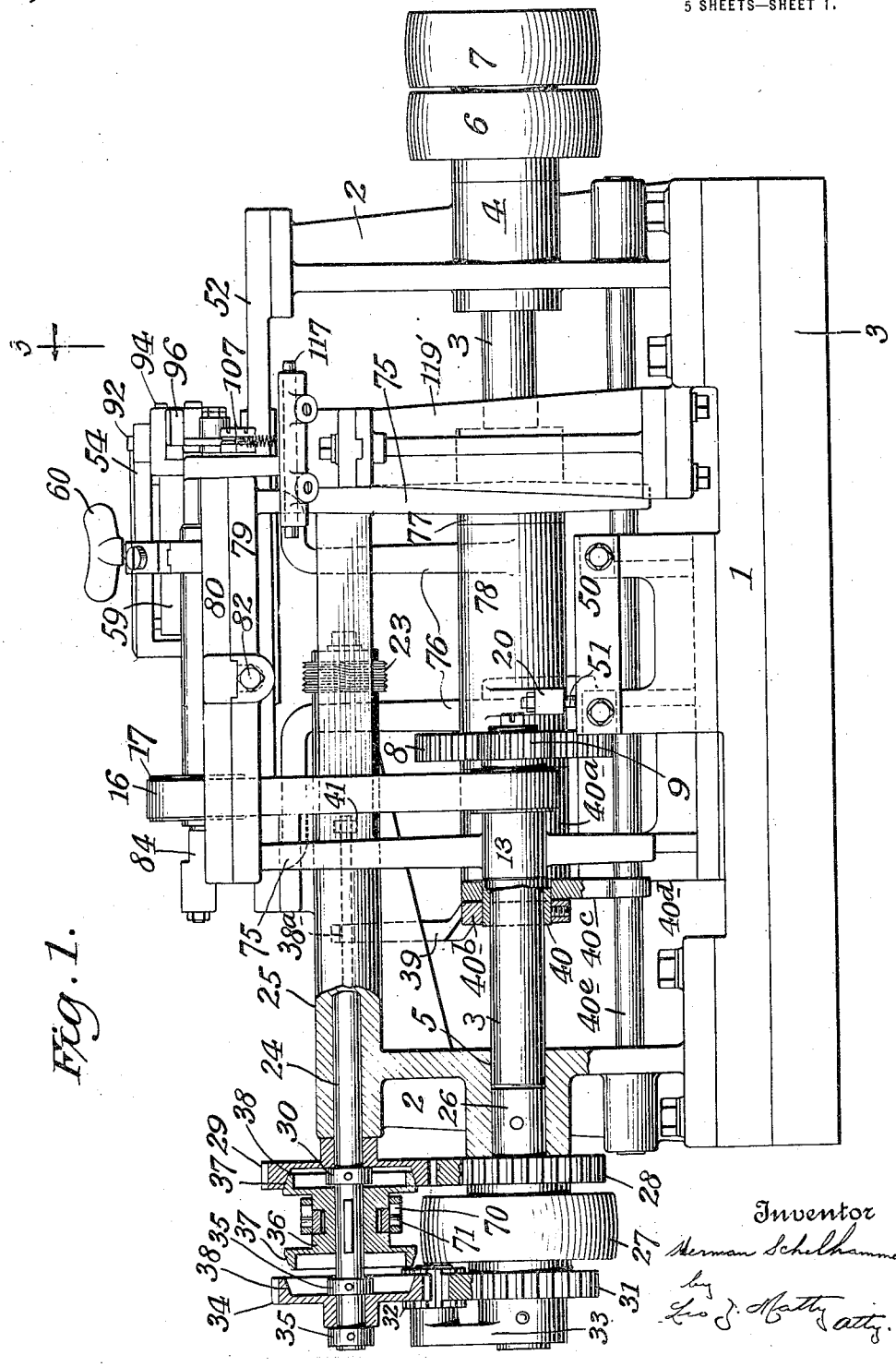

FIG. 1.

Inventor

Herman Schelhammer

by Geo. J. Matty Atty.

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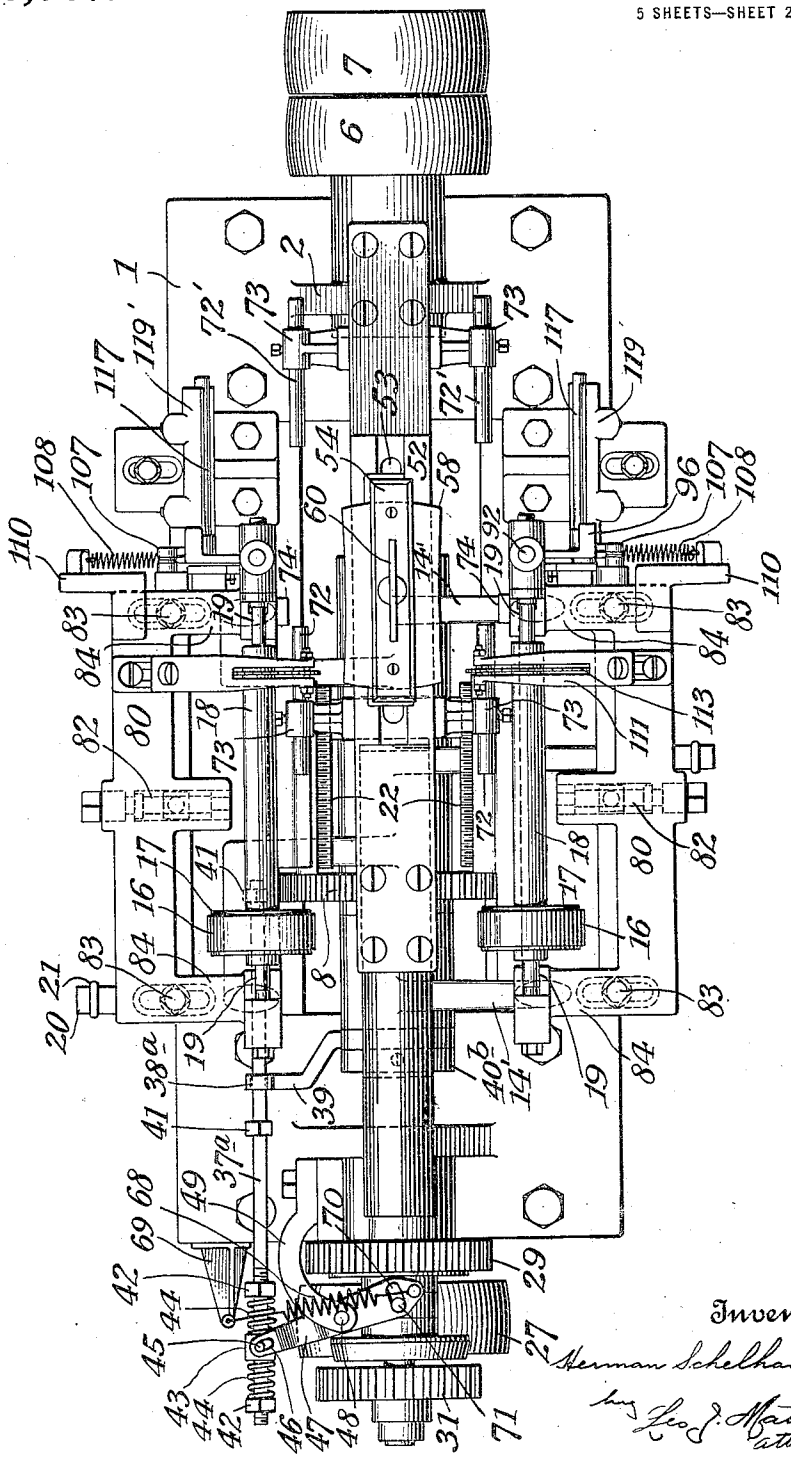
5 SHEETS—SHEET 2.

Fig. 2.



Inventor

Herman Schelhammer

by Geo. J. Matter Atty

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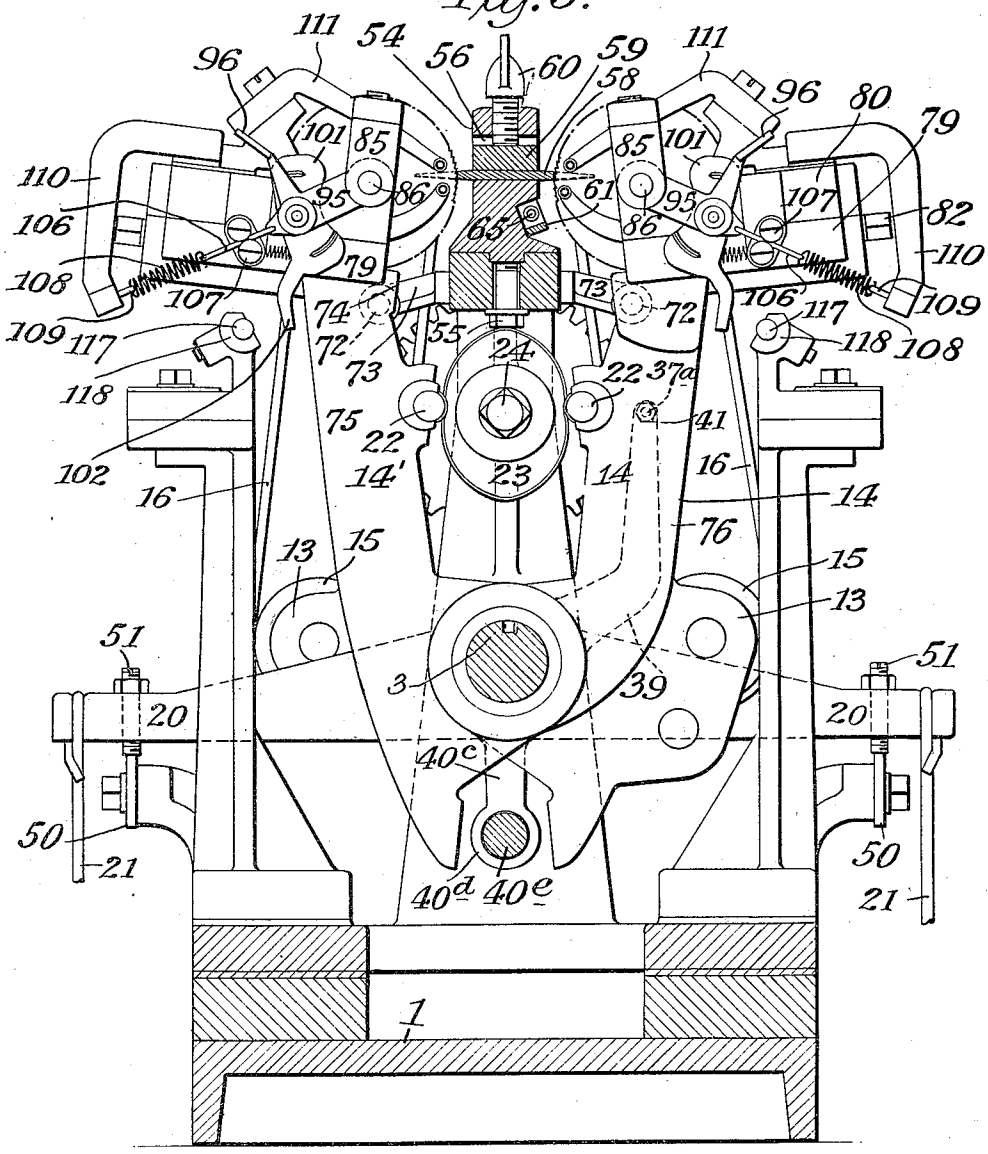
5 SHEETS—SHEET 3.

Fig. 3.



Inventor

Herman Schelhammer

by Lee J. Hatty atty.

H. SCHELHAMMER.

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5 SHEETS—SHEET 4.

Fig. 10.

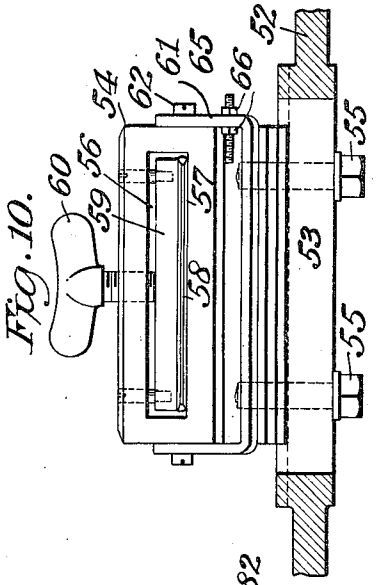


Fig. 11.

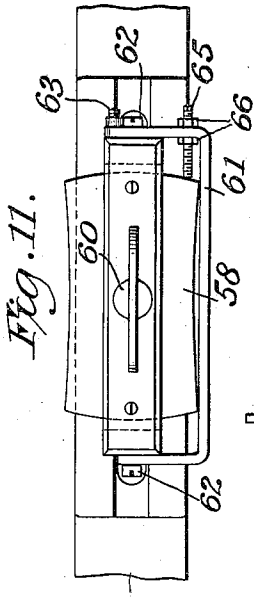


Fig. 13.

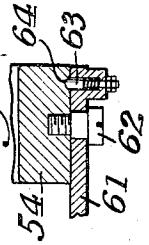


Fig. 12.

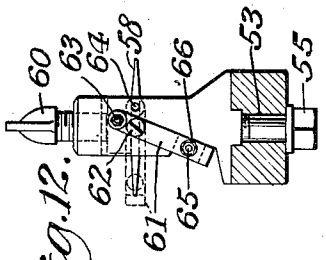
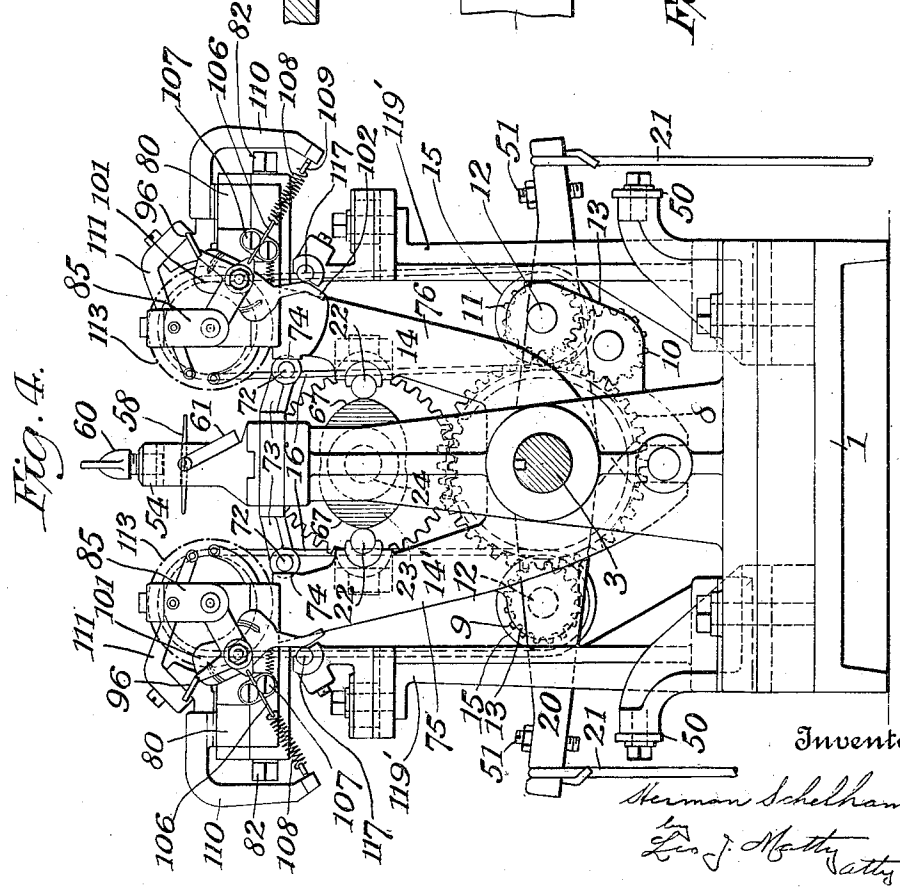


Fig. 4.



Inventor

Herman Schelhammer

by Geo. J. Matthews Atty.

H. SCHELHAMMER.

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5 SHEETS—SHEET 5.

Fig. 5.

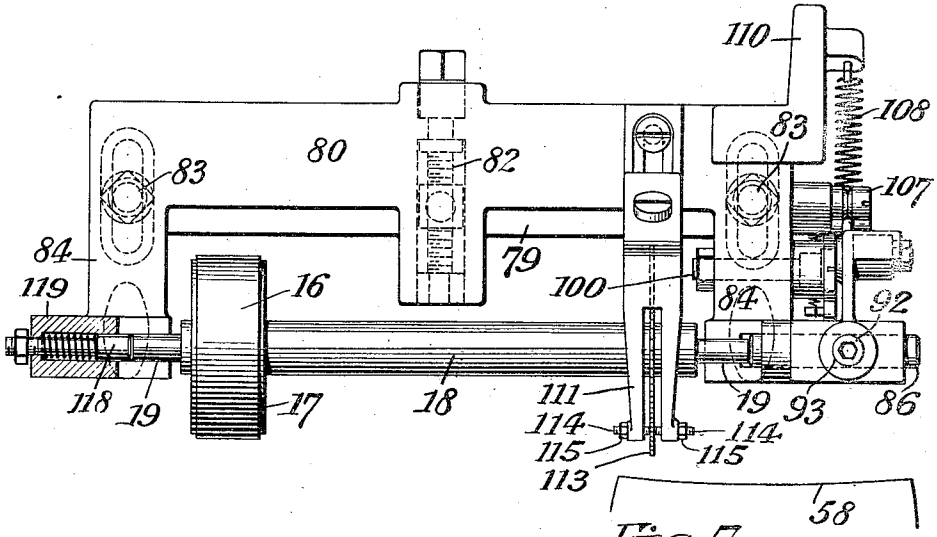


Fig. 6.

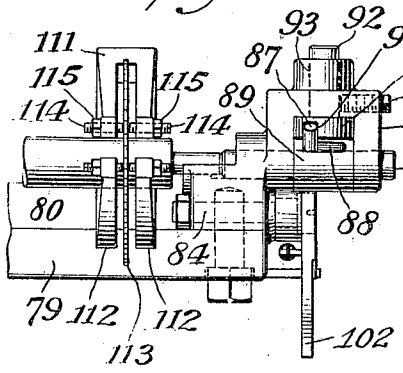


Fig. 7.

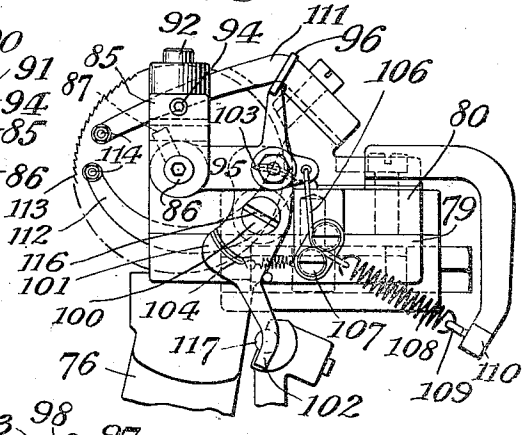


Fig. 8.

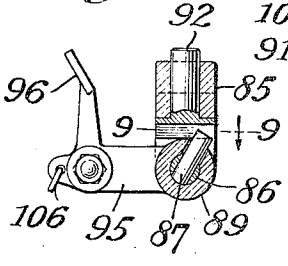
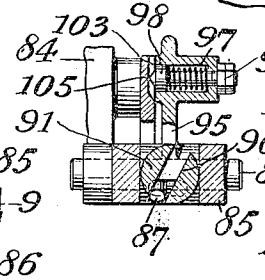


Fig. 9.



Inventor

Herman Schelhammer

by Leo J. Matthy atty.

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.

1,423,967. Specification of Letters Patent. **Patented July 25, 1922.**

Application filed July 1, 1921. Serial No. 481,757.

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 and to be fed longitudinally of the blank between oscillations.

The invention further comprises improved means for bending the circular cutters toward the line of greatest resistance to produce a straight initial cut, this being an improvement over means for the same purpose shown in my joint application for patent filed April 22, 1921, Serial No. 463,708; and also means for releasing said bending means after the initial cut has been made, means for automatically reversing the direction of the longitudinal feed of the cutters after the cutting of a blank has been completed, and means for preventing further oscillation and longitudinal feeding of the cutter frames after the last cut has been made in the blank and until a new blank has been inserted into the machine.

Referring to the drawings:—

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

Figure 2 is a plan view thereof.

Figure 3 is a cross section on the line 3—3 of Figure 1.

Figure 4 is an end view of the machine.

Figure 5 is an enlarged plan view of the cutter and its associated parts.

Figure 6 is a front elevation thereof.

Figure 7 is a side view thereof.

Figure 8 is a detail of the cutter bending means.

Figure 9 is a sectional plan view on the line 9—9 of Figure 8.

Figure 10 is a front elevation of the comb clamp and its support.

Figure 11 is a plan view thereof.

Figure 12 is an end view thereof.

Figure 13 is a detail of the construction shown in Figure 12.

In the drawings 1 designates a base frame to which is bolted end frames 2, in which a power shaft 3 is journaled in suitable bearings 4 and 5. One end of the shaft 3 is provided with a fast pulley 6 and a loose pulley 7 arranged to engage a suitable power belt (not shown) for driving the shaft 3.

The shaft 3 carries a gear 8 suitably splined thereto to permit of the gear 8 during its rotation being moved longitudinally back and forth along the shaft 3. The gear 8 is arranged to mesh with a gear 9 on one side of the machine and with an idler gear 10 on the other side of the machine, the gear 10 being arranged to mesh with the gear 11 to rotate the same in a direction opposite to the direction of rotation of the gear 9. The gears 9, 10 and 11 are suitably supported on short shafts 12 journaled in bearings 13 on cutter frames 14, 14'. The cutter frame 14 has a pair of arms 76 the lower ends of which are secured to a hub 78 slidably mounted on the shaft 3. The cutter frame 14' has a pair of arms 75 the lower ends of which are secured respectively to hubs 40^a and 77 slidably mounted on the shaft 3 adjacent the hub 78 and the gear 8 to permit of the hubs 78, 40^a and 77 together with the gear 8 being moved as a unit along the shaft 3.

Each pair of arms 75 and 76 of the cutter frames 14 and 14' is connected at their upper ends by a table or platform 79 on which is positioned a cutter support 80 held in adjusted position by means of suitable adjusting screws 82 and 83.

Each cutter support 80 has inwardly directed arms 84 which are provided with bearings 19 for the ends of a cutter shaft 18 on which is mounted a circular cutter 113.

Each cutter shaft 18 is provided with a suitable pulley 17 which is arranged to be connected by means of a suitable belt 16 with a corresponding pulley 15 mounted on the short shaft 12 adjacent the gears 9 and 11 which rotate in opposite directions through the medium of the gear 8 to rotate the circular cutters 113 in opposite directions so that the cutters 113 will both cut the comb blank in an upward direction.

Each pair of arms 75 and 76 of the cutter frames 14 and 14′ is provided adjacent their upper ends with a threaded rack 22 which is arranged to engage a threaded double cam 23 carried on one end of a centrally arranged cam shaft 24 journaled in an elongated bearing 25 formed on one of the end frames 2. The cutter frames 14 and 14′ which are loosely mounted on the shaft 3 as before described are kept with the threaded racks 22 in engagement with the threaded face of the double cam 23 by means of weights (not shown) suspended from the ends of arms 20 connected respectively to the hub 78 and the hubs 40ª and 77.

When in the operation of the machine the cam shaft 24 is operated to rotate the double cam 23 the same acts to move the cutter frames and the circular cutters 113 mounted on the upper end of the cutter frames toward and away from each other against the action of the weighted levers 20. As the circular cutters 113 move inward or toward each other the same are arranged to engage opposite edges of a comb blank 58 held in a suitable comb clamp 54 adjustably secured by means of bolts 55 in a slot 53 provided in a comb bracket 52 supported at one end on one of the end frames 2 and at the other end upon the elongated bearing 25.

The double cam 23 is made ellipsoidal and the threads thereon which are arranged to engage the threaded racks 22, are made parallel with the sides of the cam except at elongated ends 67 where the threads incline to one side the width of one thread so that in the present instance at each revolution of the cam 23 the cutter frames 14 and 14′ at their extreme outer movement, together with the circular cutters 113 are away from the comb blank as shown in Figure 4 and are moved along the shaft 3 one step, to place the circular cutters 113 in position to cut a new tooth on each side of the comb blank and owing to the elliptical peripheral contour of the double cam 23, oscillate the cutter frames 14 and 14′, as before described, positively in one direction and permit of their oscillation in the opposite direction by the weighted levers 20 hereinbefore referred to.

It is of course to be understood that the lateral feeding movement of the cutter frames 14 and 14′ may be made greater or less by providing double cams 23 and threaded racks 22 having different thread inclinations depending upon the comb blank teeth to be cut.

The cam shaft 24 to one end of which is secured the double cam 23, is provided at the other end with means for reversing the direction of rotation of the cam shaft 24 and with it the double cam 23 in order to reverse the lateral feeding movement of the cutter frames 14 and 14′ along the shaft 3, so that a comb blank held by the comb clamp 54 can be cut, for example, beginning at the right end, and when all the teeth of the comb blank have been cut the comb blank can be removed and another comb blank inserted in the comb clamp 54 and the teeth cut beginning at the left, without stopping to return on an idle movement the cutter frames to extreme right or left hand position.

The cam shaft 24 is operated as follows, fixed in the outer end of the bearing 5 of the end frame 2, is a stud shaft 26 on which is rotatably carried a power pulley 27 made fast to a spur gear 28 meshing with a similar gear 29, loose on the cam shaft 24 and confined between the end of the bearing 25 and a collar 30. Another spur gear 31 is also made fast to the pulley 27 and is in mesh with an idler 32 on a bracket 33 said idler being also in mesh with a spur gear 34 loose on the end of the cam shaft 24 and confined between fixed collars 35. Splined to the cam shaft 24 is a double clutch member 36 having two male clutch faces 37 arranged to alternately engage female clutch faces 38 formed in the spur gears 29 and 34.

The sliding movement of the clutch member 36, on the splined portion of the cam shaft 24, is controlled by a push rod 37ª which passes loosely through an eye 38ª formed in an arm 39 carried on a reduced extension 40 of the hub 40ª of one of the cutter frames and is held in place by a collar 40ᵇ. The hub of the arm 39 is extended downwardly as at 40ᶜ and forked as at 40ᵈ to straddle a longitudinal bar 40ᵉ which construction serves to hold the arm 39 against swinging movement when the cutter frames are oscillated. The push rod 37ª is provided with two adjustable nuts 41 arranged to alternately engage the arm 39 to trip the clutch 36, after each full longitudinal movement of the cutter frames, in other words, after each successive comb is finished.

The push rod 37ª is provided at one end with two nuts 42 spaced apart and between which is placed a loose sleeve 43, yieldingly held between springs 44. The sleeve 43 has outwardly directed pins 45, engaging slots 46. in a shift fork 47 which is adapted to rock on trunnions 48, supported in a bracket 49 fixed to the frame of the machine. The shift fork 47 is held in either of the two clutched positions by a pull spring 68 attached to one end of the shift fork 47 and to a bracket 69 made fast to the frame of the machine.

To easily accomplish the shifting operation the arms of the shift fork 47 are provided with slots 70 to receive pins 71 which permit of considerable lost motion at the beginning of the shifting movement, so that

the shift fork 47 does not pick up the sliding clutch member 36 until nearly the dead center pull of the spring 68 has been reached, a further movement of the lower end of the shift fork 47 throws the pull of the spring 68 beyond the center of the trunnions 48 which permits the spring to snap the clutch to the opposite position.

When in the operation of the machine, as before described, the arm 39 is engaged by either of the nuts 41, the shift fork 47 is operated to reverse the direction of rotation of the cam shaft 24 and with it the double cam 23 which acts to reverse the longitudinal feeding movement of the cutter frames.

The inward cutting movement of the circular cutters 113 into the comb blank to make the cuts of uniform depth is regulated by means of a gauge bar 50 mounted on each side of the machine, which is arranged to engage in each instance a gauge pin 51 threaded through the arm 20 of its corresponding cutter frame. The gauge pins 51 are regulated to engage the gauge bars 50 at the end of each inward movement of the cutters and this movement can be regulated by adjusting the gauge pins 51 to change the depth of cut into the comb blank.

In the present instance the comb clamp 54 is provided with an opening 56 having a seat 57 for holding the comb blank 58 which is locked in position by a clamp plate 59 forced into locking position by a winged screw 60.

In order to properly place the comb blank in the comb clamp a swinging gauge yoke 61, secured to the comb clamp by means of pins 62, so that the gauge yoke will normally hang down out of the way of the circular cutters 113, as shown in full lines in Fig. 12. The operative position of the yoke 61 is shown in full lines in Fig. 11 and in dotted lines in Fig. 12, in which position it is held by a spring controlled pin 63, entering a socket or depression 64 in the end of the comb clamp 54.

An end gauge pin 65 is passed through one of the arms of the yoke 61, the same being held in adjusted position by lock nuts 66.

From the above it will be seen that in order to properly place a comb blank in the comb clamp it is only necessary to move the comb blank backward against the yoke 61 and endwise against the gauge pin 65 and clamp down the winged screw 60, after which the yoke is moved to inoperative position.

In Fig. 2 the parts are shown in position to begin the cutting operation with the uncut comb blank 58 in position in the comb clamp 54. Suitable gauge bars 72, adjustably mounted in brackets 73 secured to the frame of the machine are provided and are arranged to engage suitable stops 74 on the cutter frames when the cutter frames are at their adjusted extreme end positions, to bear against the back of said gauge bars 72 to prevent oscillation of the cutter frames after the last cut has been made in the comb blank and until, on the reverse movement of the cutter frames, after a new comb blank has been inserted in the comb clamp, the said stops 74 pass beyond or clear the inner ends of the gauge bars, to make the first cut in the new comb blank.

Suitable gauge bars 72′ are provided near the opposite end of the comb blank which act in the same manner to prevent oscillation of the cutter frames after the last cut has been made in the new comb blank, when the operations are repeated on another comb blank, as before described. The cam 23 acting to move the cutter frame longitudinally, as before described, during the cutting operation, the direction of rotation of the cam 23 being automatically reversed after each comb blank has been cut to cut a new comb blank inserted in the comb clamp.

When in the operation of the machine after the last tooth has been cut in the comb blank, the gauge bars 72 or 72′ engage the stops of the cutter frames to stop their oscillations, but the cutter frames are free to continue moving longitudinally a certain distance along the gauge bars 72 or 72′ before one of the nuts 41 on the push rod 37^a acts to shift the clutch 36 to reverse the feeding movement of the cutter frames, in order to give the operator sufficient time to insert a new comb blank, before, on the return movement after the clutch 36 has been shifted, the stops 74 pass beyond the end of the gauge bars 72 or 72′ permitting the cutter frames to oscillate to cut the first tooth in the comb blank as previously described.

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 outwardly 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 80 with the inwardly directed arms 84 provided with the bearings 19 for the reduced ends of the cutter shaft 18, is provided with a yoke shaped frame 85,

in the present instance, adjacent the right hand bearing 19. The yoke shaped frame 85 carries a longitudinally movable bending bar 86, provided with an upwardly directed pin 87 extending through a slot 88, in a sleeve 89 which is confined against longitudinal movement in the fork of the yoke frame. The pin 87 is arranged to engage a cam slot 90 formed in a circular head 91, carried on the lower end of a pin 92, which passes upwardly through a bore 93 in the frame 85, the same being locked in adjusted position by a set screw 94. The sleeve 89 has a backwardly directed arm 95 formed with an upwardly extending finger piece 96 and a socket 97 arranged to house a spring actuated locking pin 98 held in place by nuts 99.

Swiveled on a pin 100 carried by the right hand arm 84 of the cutter support 80 is a segmental lock and trip plate 101 formed with a downwardly extending trip finger 102. The trip plate 101 has a pair of grooves 103 and 104 V-shaped in cross section and concentric with the swivel pin 100 to alternately receive a conical teat 105 on the locking pin 98. To the outer end of the arm 95 is attached a flexible wire or cable 106 which is arranged to pass between rollers 107, the other end of the flexible wire 106 being secured to one end of a pull spring 108 anchored at its other end at 109 to a bracket 110 secured to the cutter support 80.

The cutter support 80 is arranged to adjustably support two pairs of guide arms 111 and 112 made to extend outward on each side of the cutter 113 above and below the cutter shaft 18, having at their outer ends threaded openings to receive adjustable guide or brace pins 114 locked in position by nuts 115.

The normal inoperative position of the cutter bending means just described is shown in Fig. 4 in which the teat 105 of the locking pin 98, is engaged by a slot 116 in the top of the pin 100, the spring 108 attached to the flexible wire 106 acting to hold the pin 87 in a vertical position, which acts to hold the guide arms 111 and 112 in normal inoperative position.

When the feed of the cutters 113 is to be to the right, Figs. 2 and 5, the arm 95 is raised in each instance into the position shown in Fig. 7 with the teat 105 of the locking pin 98 resting in the segmental groove 103, which serves to lock the arm 95 in this position against the tension of the spring 108. The raising of the arm 95, as just described, rotates the sleeve 89 and with it the pin 87, the cam shaft 90 acting to force the pin 87 and with it the bending bar 86 to which it is secured, slightly to the left, thereby moving the bending bar 86 to force the cutter shaft 18 slightly to the left against the action of a spring pressed plunger bar 118 carried in a support 119, on the left arm 84 of the cutter support 80 and against the stationary left hand guide or brace pins 114, thereby bending the cutter 113 slightly to the right, in which position the cutter 113 is arranged in proper position to make the first or initial cut.

As the cutter frames swing the cutters 113 outward after the first initial cuts have been made, each trip finger 102 contacts with a properly positioned trip bar 117, mounted on a support 119′ secured to the frame of the machine, to rock the trip plate 101 on its pivot which causes the teat 105 on the locking pin 98, to ride out of the V shaped groove 103, the spring 108 acting to return the cutter bending means to normal inoperative position with the teat 105 of the locking pin 98 engaging the groove 116 in the swivel pin 100 when, as before described, the guide arms 111 and 112 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 cutters 113 is to the left the arm 95 is drawn down and locked in the groove 104 before the first initial cut is made in order to bend the cutter 113 to the left, the cutter shaft 18 in this instance being forced to the right by the spring pressed plunger bar 118, carried in the support 119, when the pin 87 acting in the cam slot 90 draws the bending bar 86, to which it is secured, to the right or away from the cutter bar 18. When, as before described, the cutter frames swing the cutters outward after the first initial cuts have been made, each trip finger 102 contacts with the properly placed reverse or right hand end of the trip bar 117 mounted on the support 119′ to rock the trip plate 101 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 being 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 95 of the cutter bending mechanisms before the first initial cuts are made.

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, cutters for forming teeth in a comb blank, means for feeding said cutters longitudinally of said blank, and means for reversing the longitudinal feed of said cutters on the completion of the cutting operation comprising a revers-

ing clutch, and means operatively connecting said longitudinal feed means to said clutch.

2. In a comb cutting machine, cutters for forming teeth in a comb blank, means for oscillating said cutters toward and away from said blank, means for rotating said cutters, means for feeding said cutters longitudinally of said blank and means for reversing the longitudinal feed of said cutters on the completion of the cutting operation comprising a reversing clutch, and means operatively connected to said cutters for operating said clutch.

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, means for moving said cutters toward and away from said comb blank means for feeding said cutters longitudinally of said blank, and means for stopping the longitudinal and oscillating movement of said cutters when the comb is complete and for shifting said cutter feeding means preparatory to feeding said cutters longitudinally in the reverse direction.

4. 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 feeding said cutters longitudinally of said comb blank, and means for bending the cutters to compensate for side thrust on the initial cut, comprising a pair of stationary pins arranged on opposite sides of each of said cutters, means for moving said cutters longitudinally of said machine and relatively to said pins, and means for automatically shifting said cutter back to normal position after said initial cut has been made.

5. A comb cutting machine comprising in combination a comb clamp for holding a a comb blank, cutters for cutting teeth in said comb clamp, means for relatively moving said cutters and said blank in one direction longitudinally of said comb blank, and means for reversing said relative movement to cut a new comb blank in the opposite direction.

6. 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 simultaneously feeding said cutters in one direction longitudinally of said comb blank, and means for automatically reversing the feeding movement of said cutters to cut a new comb blank in the opposite direction.

7. A comb cutting machine comprising in combination a comb clamp for holding a comb blank, a gauge pivoted on said clamp for accurately positioning said blank, cutter frames situated on opposite sides of said comb clamp, cutters rotatably mounted on said cutter frames and means for moving said cutter frames together with said cutters toward and away from said comb blank and for feeding said frames longitudinally of said blank.

8. In a comb cutting machine, means for holding a comb blank for operation on both sides thereof, an oscillatory frame, means carried by said frame for cutting teeth in said blank, and means for stopping the further cutting of said blank after the last tooth has been cut therein comprising a stationary adjustable stop and a lug on said frame arranged to engage said stop for preventing inward oscillatory movement of said frame.

9. 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 feeding said cutters longitudinally of said comb blank, means for bending the cutters in one direction to compensate for side thrust on the initial cut when the cutters are fed in one direction, and means for bending the cutters in the opposite direction to compensate for side thrust on the initial cut when the cutters are fed in the opposite direction to cut a new comb blank.

10. 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 feeding said cutters longitudinally of said comb blank, means for bending the cutters in one direction to compensate for side thrust on the initial cut when the cutters are fed in one direction, means for bending the cutters in the opposite direction to compensate for side thrust on the initial cut when the cutters are fed in the opposite direction to cut a new comb blank, and means for returning said cutter bending means to normal position after the initial cut has been made.

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 feeding said cutters longitudinally of said comb blank, means for bending the cutters in one direction to compensate for side thrust on the initial cut when the cutters are fed in one direction, means for bending the cutters in the opposite direction to compensate for side thrust on the initial cut when the cutters are fed in the opposite direction to cut a new comb blank, means for returning said cutter bending means to normal position after the initial cut has been made, and means for automatically reversing the feeding movement of said cutters after the comb blank has been cut.

12. A comb cutting machine comprising in combination a comb clamp for holding a comb blank, a cutter, means for moving said cutter toward and away from said comb blank, means for feeding said cutter across

the face of said comb blank in either direction, means for bending said cutter to compensate for side thrust on the initial cut when the cutter is fed in one direction, and means for bending the cutter in the opposite direction when the cutter is fed in the opposite direction.

13. A comb cutting machine comprising in combination a comb clamp for holding a comb blank, a cutter, means for moving said cutter toward and away from said comb blank, means for feeding said cutter across the face of said comb blank in either direction, means for bending said cutter to compensate for side thrust on the initial cut when the cutter is fed in one direction, means for bending the cutter in the opposite direction when the cutter is fed in the opposite direction, and means for automatically reversing the feeding movement of said cutter after the comb blank has been cut.

14. 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 cutters longitudinally of said comb blank in either direction, means for bending said cutters to compensate for side thrust on the initial cut when the cutters are fed in one direction, and means for bending the cutters in the opposite direction when the cutters are fed in the opposite direction.

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, means for moving said cutters toward and away from said comb blank, means for feeding said cutters longitudinally of said comb blank in either direction, means for bending said cutters to compensate for side thrust on the initial cut when the cutters are fed in one direction, means for bending the cutters in the opposite direction when the cutters are fed in the opposite direction, and means for automatically reversing the feeding movement of said cutters after the comb blank has been cut.

16. A comb cutting machine comprising in combination a comb clamp for holding a comb blank to be cut on both sides thereof, means for cutting teeth on both sides of said blank simultaneously and means on said comb clamp for positioning said comb blank in said clamp comprising a gauge yoke pivoted to said clamp for laterally positioning said blank, an adjustable pin on said yoke for positioning said blank longitudinally, and spring pressed means for removably maintaining said yoke in its operative position.

17. In a comb cutting machine, a cutter for cutting teeth in a comb blank, and means for bending said cutter on its initial cut comprising a stationary bending pin adapted to engage said cutter, a longitudinally slidable shaft carrying said cutter, means operatively connected to said shaft for sliding said shaft longitudinally in either direction, means for locking said shaft in cutter bending position, and means for automatically restoring said shaft to normal position after said initial cut has been made.

18. A comb cutting machine comprising in combination a comb clamp for holding a comb blank to be cut on both sides, cutter frames situated on opposite sides of said comb clamp, cutters rotatably mounted on said cutter frames, a shaft upon which said cutter frames are arranged to oscillate, means on said shaft for rotating said cutters, and means for oscillating said cutter frames and moving the same along the faces of the comb blank.

19. A comb cutting machine comprising in combination a comb clamp for holding a comb blank to be cut on both sides, cutter frames situated on opposite sides of said comb clamp, cutters rotatably mounted on said cutter frames, a shaft upon which said cutter frames are arranged to oscillate, means on said shaft for rotating said cutters, and means independent of said shaft for oscillating said cutter frames and moving the same along said shaft and along the faces of the comb blank.

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

HERMAN SCHELHAMMER.

Witnesses:
FRED J. STELLER,
MINTER C. HEISS.