

(No Model.)

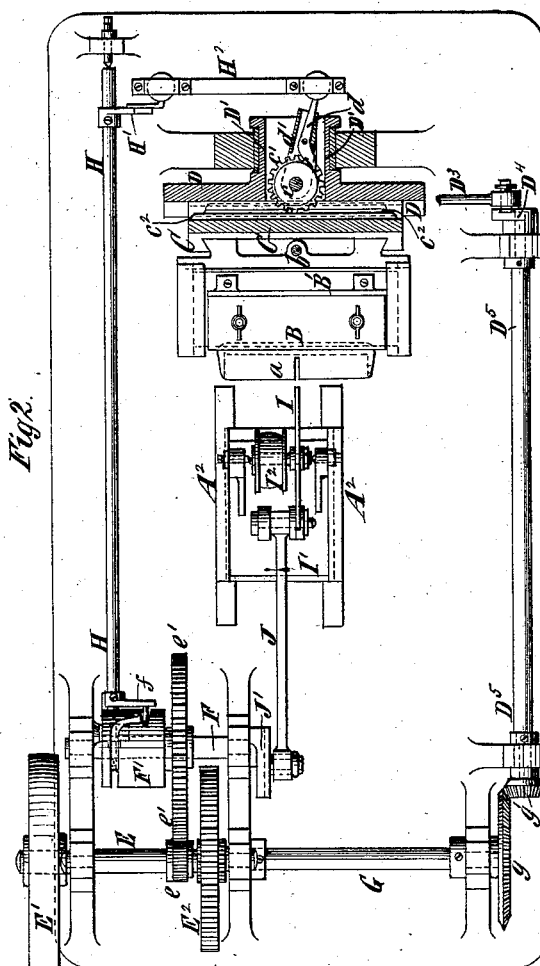
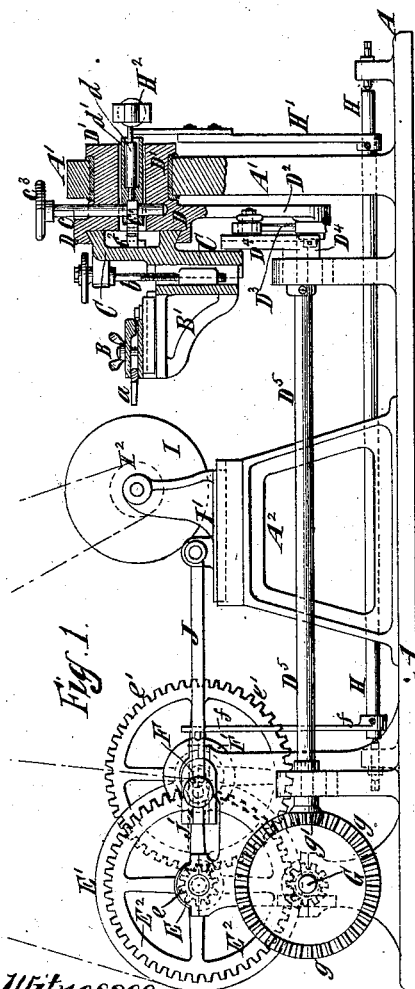
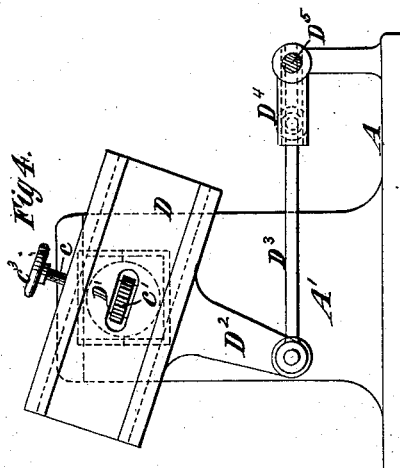
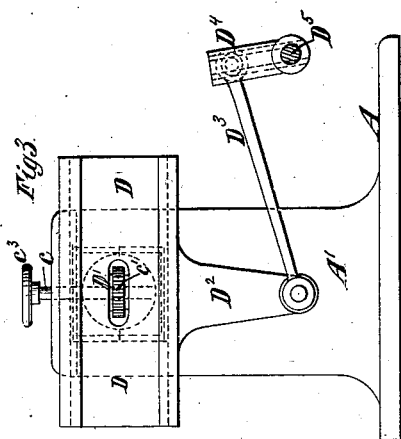
2 Sheets—Sheet 1.

C. POPPENHUSEN.

# MACHINE FOR CUTTING AND FINISHING THE TEETH OF COMBS.

No. 260,320.

Patented June 27, 1882.



*Witnesses*

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(No Model.)

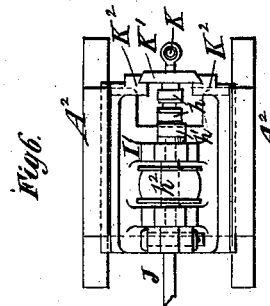
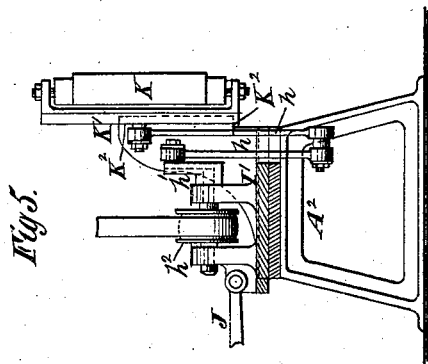
2 Sheets—Sheet 2.

C. POPPENHUSEN.

MACHINE FOR CUTTING AND FINISHING THE TEETH OF COMBS.

No. 260,320.

Patented June 27, 1882.



Witnesses

*Justus Wagner*  
*Ed. Glatzmayer*

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*Conrad Poppenhusen*  
*by his Attorneys*  
*Brown & Brown*

# UNITED STATES PATENT OFFICE.

CONRAD POPPENHUSEN, OF HAMBURG, GERMANY.

MACHINE FOR CUTTING AND FINISHING THE TEETH OF COMBS.

SPECIFICATION forming part of Letters Patent No. 260,320, dated June 27, 1882.

Application filed December 19, 1881. (No model.) Patented in Germany December 2, 1880; in England March 18, 1881, No. 1,190; in Belgium March 26, 1881; in France March 30, 1881, and in Austria-Hungary June 11, 1881.

*To all whom it may concern:*

Be it known that I, CONRAD POPPENHUSEN, a citizen of the United States, temporarily residing at Hamburg, in the Empire of Germany, have invented certain new and useful Improvements in Machines for Cutting and Finishing the Teeth of Combs and other Articles, of which the following is a specification.

The removing of the edges of comb-teeth, or "breaking," as it is termed, and the finishing of the teeth, has generally been done by hand; but it has also been done by imparting to the cutting or finishing disk or tool an oscillating or swinging motion in a vertical plane transverse to the teeth. This is objectionable for various reasons; and the object of my invention is to break or finish the teeth by giving the comb itself or other article being finished a similar swinging or oscillating movement, while the cutting or finishing disk or tool always works in the same vertical plane.

The invention consists essentially in the combination, with a cutting or finishing disk or tool, of carriages which provide for the vertical and lateral adjustment of the comb or other article, a support or holder therefor, provided with a trunnion or journal, whereon it may be swung or oscillated in a vertical plane transverse to that in which said disk or tool operates, and mechanism for imparting the desired motion to such support or holder.

The invention also consists in novel details of construction in the feed mechanism, which are rendered necessary by the swinging or oscillating of the carriage support or holder, and particularly hereinafter described.

In the accompanying drawings, Figure 1 represents a partly-sectional side view of a machine embodying my invention. Fig. 2 represents a plan and partial horizontal section of the machine. Figs. 3 and 4 represent transverse sections of portions of the machine, showing the swinging or oscillating support and holder for the carriage in two positions; and Figs. 5 and 6 represent respectively a vertical section and a plan of a vertically-reciprocating cutting or polishing tool and devices for working it, which may be substituted for the saw or rotary polishing-disk shown in Figs. 1 and 2.

Similar letters of reference designate corresponding parts in all the figures.

Referring first to Figs. 1 to 4, inclusive, A designates the bed-plate of the machine, and A' designates an upright erected thereon near one end.

B designates the holder or clamp, in which is clamped a comb, *a*, to be operated on, and which is secured on a carriage, B', which may be adjusted up and down in a second carriage, C, by means of an adjusting-screw, *b*. The second carriage, C, is fitted in a horizontal dovetailed or rabbeted slideway in the support or holder D, wherein it may be adjusted laterally to feed the comb *a* along.

The support or holder D is provided at the back with a horizontally-extending trunnion or journal, D', which is adapted to turn in a bearing in the upright A', wherein it is mounted. In the support or holder D is a shaft or spindle, *c*, which carries a pinion, *c'*, engaging with a rack, *c''*, on the carriage C, and by turning the spindle by means of a hand-wheel, *c'''*, the carriage C may be shifted laterally, as desired, and the work with it. In the ordinary operation of the machine the carriage C is fed slowly by means of a pawl-lever, *d*, which is pivoted in an arm, *d'*, fitting loosely on the spindle *c*, and which engages with the pinion *c'* and turns it step by step. The arm *d'* projects through an opening in the trunnion or journal D'.

E designates the main driving-shaft of the machine, which may be rotated by a belt passing over the pulley E', and which is connected by a pinion, *e*, and wheel *e'* with a counter-shaft, F, mounted in suitable bearings, and by a gear-wheel, E<sup>2</sup>, and pinion with a second shaft, G.

Upon the shaft F is a cam, F', which engages an arm, *f*, projecting from a longitudinal shaft, H, and thereby oscillates said shaft; and on the opposite end of said shaft H is a second arm or lever, H', which is connected with the pawl-lever *d* by a connecting-rod, H<sup>2</sup>. The arm H' is connected to the rod H<sup>2</sup> by a ball-and-socket joint, and the said rod is connected with the pawl-lever *d* in a similar manner.

The support or holder D is provided with a downwardly-projecting arm, D<sup>2</sup>, and a swinging or oscillating motion is imparted to the holder or support by means of a rod, D<sup>3</sup>, which

is operated by a crank,  $D^4$ , on the end of a shaft,  $D^5$ . The shaft  $D^5$  is continuously rotated by means of a bevel-wheel,  $g$ , engaging with a pinion,  $g'$ , and the support or holder  $D$  is oscillated to and fro as the machine works.

It will be observed that the universal joints between the rod  $H^2$  and the arm  $H'$  and pawl-lever  $d$  are necessary, because of the swinging or oscillating movements of the support or holder  $D$ .

$I$  designates a saw or polishing-disk the mandrel of which is mounted in suitable bearings on a base-plate or sliding carriage,  $I'$ , and which is rotated by a belt driving onto the pulley  $I^2$ . The base-plate or carriage  $I'$  is mounted on a stand or frame,  $A^2$ , erected on the bed-plate  $A$ , and it is reciprocated to cause the saw or disk to act upon the work by means of a connecting-rod,  $J$ , and a crank,  $J'$ , on the shaft  $F$ .

From the above it will be seen that during the cutting of the teeth by the saw or the finishing of the teeth by a polishing-disk the comb or other article has a rapid oscillating or swinging motion imparted to it in a plane transverse to that in which the saw or disk operates, and the breaking and finishing of the teeth are more effectively accomplished.

In Figs. 5 and 6 I have represented a reciprocating cutter or finishing-tool which may be employed. The tool  $K$  consists of a straight blade or strip, which is secured in a carriage,  $K'$ , fitted to a vertical slideway,  $K^2$ . This slideway is erected on a base-plate or carriage,  $I'$ , similar to that before described, and is adapted to be reciprocated by means of a connecting-rod,  $J$ .

The carriage  $K'$  is reciprocated by means of connecting rods or links  $h$  and a crank,  $h'$ , fixed on a shaft which is mounted in bearings on the plate or carriage  $I'$ , and which may be rotated by a belt driving onto the pulley  $h^2$ .

The swinging or oscillating holder or support  $D$  is intended to be used with either the reciprocating or the rotary cutter or polishing-tool, and the other parts of the machine will be alike in both cases.

The mechanism for imparting motion to the oscillating holder or support and to the other parts of the machine may be varied without departing from my invention.

I am aware that machines for cutting and polishing the teeth of combs have been made in which a rotary or reciprocating saw or polishing-tool is oscillated in a plane transverse to the length of the comb-teeth; but this is not so desirable as oscillating the comb, for several reasons. The swinging or oscillating of the

comb enables reciprocating saws to be successfully used, while they cannot be successfully used if an oscillating motion is imparted to them, as they are then liable to tear and break the combs. Even with a rotary saw it is objectionable to give it an oscillating motion, as a very fast-moving circular saw is difficult to control if it has also an oscillating motion. The oscillating of the comb enables the polishing of the teeth to be done by a rapidly-reciprocated band of emery-coated cloth or other material, which could not be used if it had also an oscillating motion.

I am also aware that it is old to impart to a comb-holder in a comb-sawing machine an oscillating or rocking motion toward and from the edge of the saw; but such motion has been simply to feed the comb against the saw as it cuts, and not for the purpose of rounding the teeth, and I therefore do not claim it as of my invention.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination, with a cutting or polishing disk or tool and carriages providing for the adjustment of the comb or other article, of the support or holder  $D$  for said carriages, provided with the rearwardly-extending trunnion or journal  $D'$ , the bearing  $A'$ , receiving said journal or trunnion, and mechanism for oscillating said support or holder in a plane transverse to that in which said disk or tool operates, substantially as and for the purpose specified.

2. The combination, with the cutting or finishing disk or tool, of the carriages  $B' C$ , the holder or support  $D$  for said carriages, with its trunnion or journal  $D'$  and arm  $D^2$ , and the rod  $D^3$  and crank  $D^4$ , connected with said arm, for swinging or oscillating said holder or support in a vertical plane transverse to that in which said disk or tool operates, substantially as and for the purpose specified.

3. The combination of the carriage  $B'$ , the carriage  $C$ , on which the carriage  $B'$  may be adjusted vertically, the holder or support  $D$ , the spindle  $c$ , pinion  $c'$ , and rack  $c^2$  for adjusting the carriage  $C$  horizontally in said holder or support, the hollow trunnion  $D'$  on the holder or support  $D$ , the pawl-lever  $d$ , passing through said trunnion and engaging with said pinion, and the shaft  $H$ , arm  $H'$ , and connecting-rod  $H^2$  for operating said pawl-lever, substantially as specified.

CONRAD POPPENHUSEN.

Witnesses:

F. ENGEL,  
F. CLAIRMONT.