

(No Model.)

2 Sheets—Sheet 1.

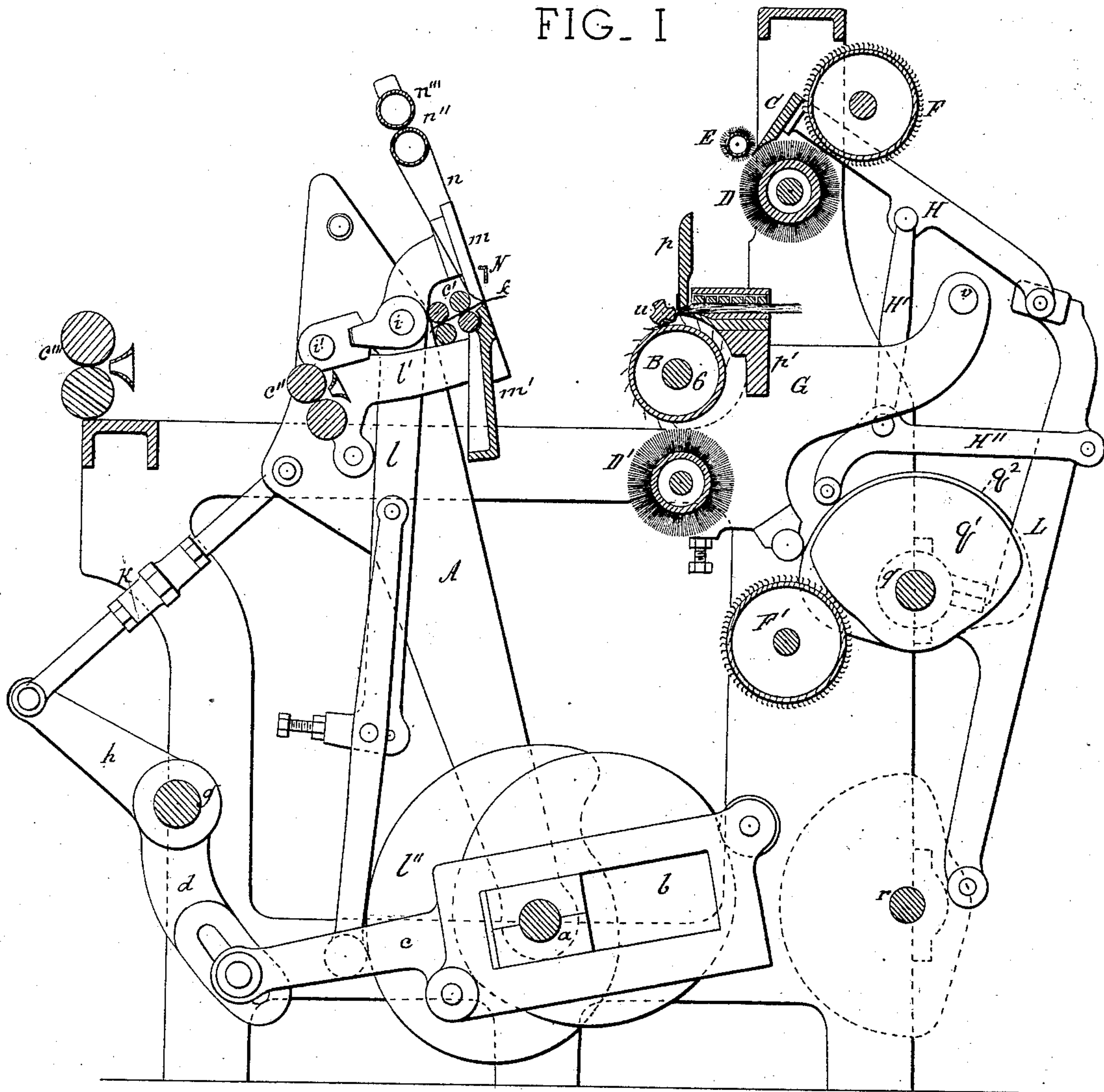
P. HEILMANN-DUCOMMUN.

COMBING MACHINE.

No. 364,172.

Patented May 31, 1887.

FIG. 1



Witnesses:  
John M. Speer  
Gustav Schneppé

Inventor:  
Paul Heilmann-Ducommun  
by Briesen & Steele  
his Attorneys.

(No Model.)

2 Sheets—Sheet 2.

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FIG. 2

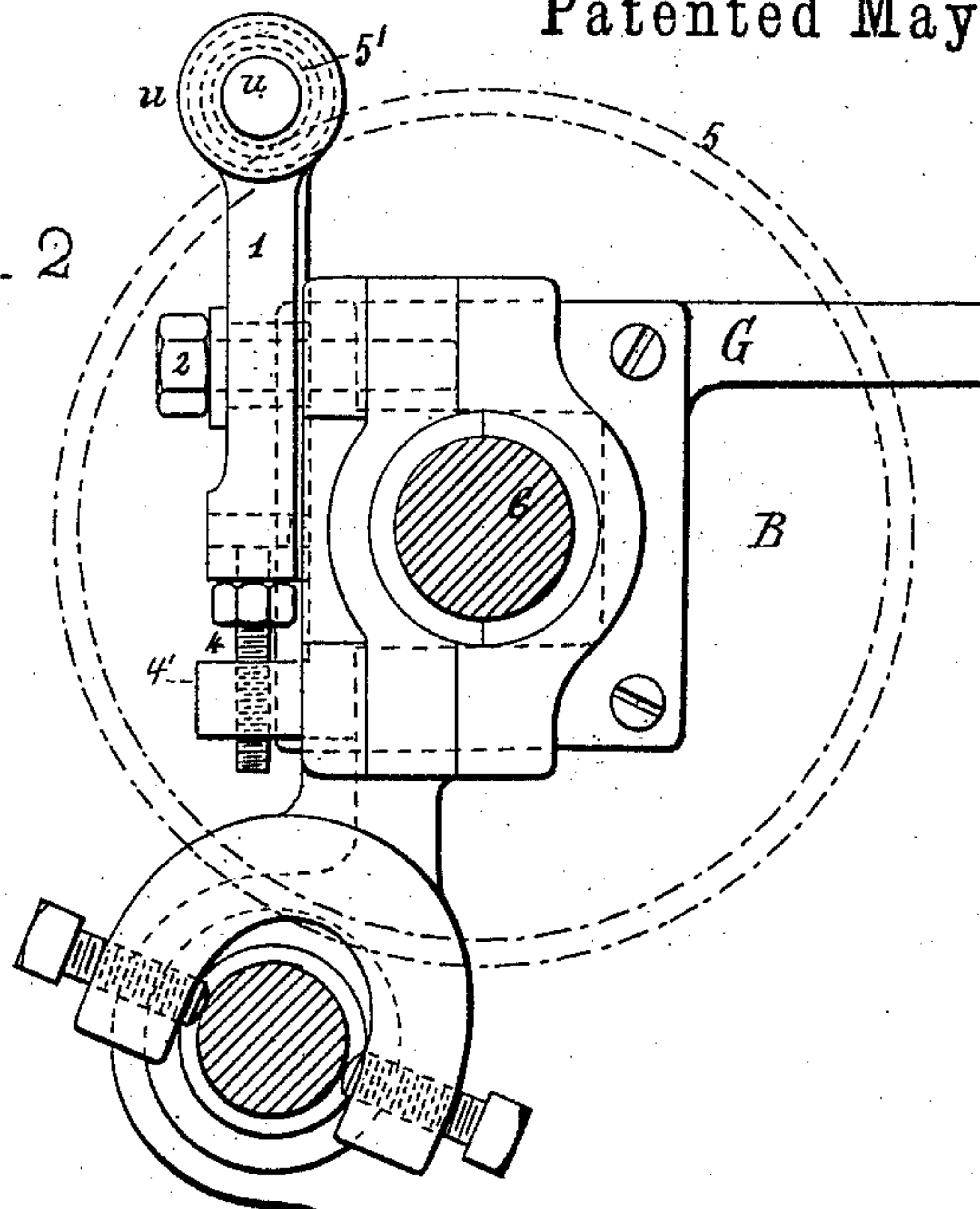
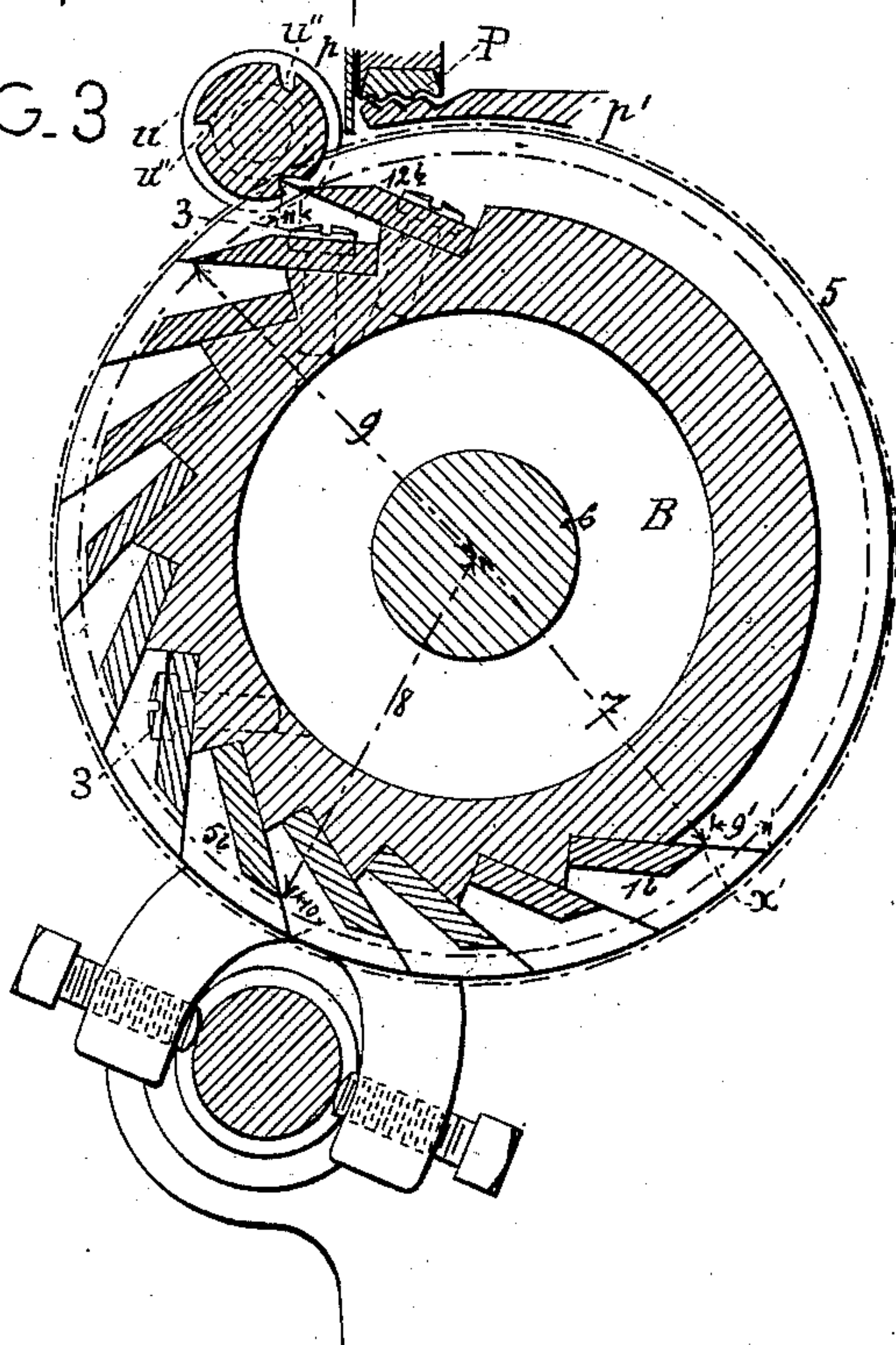


FIG. 3



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Inventor:  
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# UNITED STATES PATENT OFFICE.

PAUL HEILMANN-DUCOMMUN, OF MULHOUSE, GERMANY, ASSIGNOR TO  
HEILMANN-DUCOMMUN & STEINLEN, OF SAME PLACE.

## COMBING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 364,172, dated May 31, 1887.

Application filed September 1, 1884. Serial No. 141,920. (No model.) Patented in France April 8, 1884, No. 161,422, and in Belgium April 12, 1884, No. 64,816.

*To all whom it may concern:*

Be it known that I, PAUL HEILMANN-DUCOMMUN, a subject of the Emperor of Germany, residing at Mulhouse, in the Empire of Germany, have invented an Improvement in Combing-Machines, of which the following is a specification.

This invention has been patented by French Patent No. 161,422, dated April 8, 1884, for fifteen years, and by Belgian Patent No. 64,816, dated April 12, 1884, for fifteen years.

The object of my invention is to provide an apparatus which will break and crush the straws, &c., found in the filaments of the fleece, thereby overcoming the resistance which they offer to the free passage of the same through the teeth of a comb more effectively than has heretofore been done, as will be more fully hereinafter set forth.

The advantages of my machine will be very easily understood, as also its essential details and its operation, with the aid of the accompanying drawings, and in which—

Figure 1 is a side view in section of a combing-machine, showing my invention applied thereto. Fig. 2 is a detail view showing, on an enlarged scale, the arrangement of the regulating mechanism of the presser in its relation to the circular comb. Fig. 3 shows in section the construction of the combing-cylinder modified by reason of its combination with my presser.

The sectional view, Fig. 1, represents the machine at the moment of the combing of the front end of the fiber or filament, the drawing device being nearly at the extremity of its course and the comb C in the act of being cleaned between the two brushes.

A is the frame on which the drawing device is mounted. This frame oscillates around the axis *a* by means of the following different parts:

*b* is a cam giving alternating movement to a connecting-rod, *c*, which is articulated on a slotted lever, *d*, mounted upon a rock-shaft, *g*, which receives from it an oscillatory movement. This movement of the rock-shaft *g* is transmitted by means of the lever *h* and the connecting-rod *k* to the frame A.

The connecting-rod *k* is in two parts, united

by a sleeve nut threaded to the right and left, so as to vary the length of the connecting-rod, and thus adjust the extent of movement of the drawing device to and from the fixed nipper, hereinafter described. The displacement of the head of the connecting-rod *c* in the slotted lever *d* causes the course of the drawing device to vary according to necessity.

The "nipper," properly called, is formed of two jaws, *m m'*, which are carried on levers *l l'*, pivoted on centers *i i'*, the said levers being operated to separate the jaws from each other by means of the cam *l''* on the shaft *a*. The lower jaw, *m'*, of this nipper carries with it two pairs of rollers, *c'*, which have for their object to finish the weldings commenced by the pressure of the nipper. A pair of rollers, *c''*, preceded by bell-mouth guide, compress the fleece as it comes from the rollers *c'*, and forms of it a ribbon, which passes through another pair of rollers, *c'''*, with bell-mouth guides, situated at the front of the machine. An endless leather apron, *n*, envelops the upper jaw of the drawing-nipper and passes around a cylinder, *n''*, carried on the upper part of the jaw *m*. After each act of drawing the apron is slightly displaced, in order to be cleaned under a cylinder, *n'''*, covered with cloth.

The nipper, heretofore called "fixed," Figs. 1 and 3, is composed of two parts, *p p'*, the part *p'* being fixed and the upper part, *p*, movable. This movement takes place by means of an eccentric and a lever. (Not shown in the drawings.)

The feeding mechanism is an ordinary gill-box similar to those of other combing-machines.

B, Figs. 1, 2, and 3, is the circular comb, mounted upon two parallel levers, *G*, oscillating around the axis *v*, and receiving an ascending and descending movement by means of a cam or eccentric, *q'*, placed upon the shaft *q*.

*u* is the presser, which combines with the comb, and which is shown on a larger scale in Figs. 2 and 3. This device, which we will describe hereinafter, forces the filaments on the front of the fleece to enter between the teeth.

D' is the cleaning-brush of the circular comb B, journaled in the lever *G*. This brush



meshes with the circular comb, which arrangement permits the latter to employ in combing the time which it would have spent in being cleaned if the brush were not so meshed with it, and also to expose to the front of the fleece a greater number of comb-teeth.

The brush itself is cleaned upon the toothed cylinder F', which is freed from the débris, which it takes from the brush by a detaching-comb, as is done in other combing-machines, the said brush being brought in contact with the cylinder in the manner hereinafter described.

C is the wiper-comb, (nacteur,) mounted upon the compound lever H and L. The lever H is actuated by means of a connecting-rod, H', and a friction-lever, H'', which is actuated by a cam or eccentric,  $q^2$ , mounted upon the arbor  $q$ . The other lever, L, receives its movement from a cam or eccentric,  $r'$ , mounted upon the arbor  $r$ . These double levers and their cams or eccentrics afford the means of giving to the wiper-comb C the movement necessary to place it in front of the fixed nipper, and also to support it against the brush D. Once there the comb C (nacteur) remains stationary during a certain length of time, and the little brush E, which turns around the larger one, rises until it is in front of the teeth of the comb.

The little and the large brushes E and D in turning around their axes clean the teeth, as the forefinger and thumb of the hand would do. The small brush is cleaned upon the large one, and the latter is cleaned by the toothed cylinder F'.

N is a little bar, designed, on the return of the seizing-nipper  $m m'$ , to push down the end of the filaments of one bunch of fleece in order that they may be presented under the filaments of the front of the next bunch of fleece.

The presser  $u$  (represented in detail, Figs. 2 and 3) is a roller or cylinder mounted on the shaft  $u'$  and having longitudinal grooves  $u''$  for the reception of the teeth of the comb B, the spindle  $u'$  being journaled in supports 1 at each side of the combing-cylinder B, and held by means of the nut 2 against the arm G, which carries the circular comb. The presser  $u$  is used to force the fleece onto the teeth of the comb-cylinder B. The regulation of the position of the presser is effected by displacing the presser-carrying support 1, Fig. 2, in such manner as to vary the penetration of the presser into the teeth. This is accomplished by the nut 2 being unfastened, and the screw 4, which works in a projection, 4', on arm G, screwed or unscrewed to raise or lower the supports 1, and with them the presser  $u$ , as the case may be, and then the nut 2 refastened.

The presser  $u$  is driven from the comb-cylinder B by a toothed wheel, of which 5 represents the outer circumference. This wheel is keyed upon the arbor 6 and meshes with smaller toothed wheel, 5', keyed upon the presser-shaft  $u'$ . The movement of the circular comb is thus transmitted to the presser.

Fig. 3 shows in section the circular comb-cylinder B, which has longitudinal recesses in its surface to form seats in which the combs 9' are fastened, and at the back of said combs cross-bars 1<sup>b</sup> and 5<sup>b</sup> and 12<sup>b</sup>, of varying depth, are arranged. These cross-bars and combs are secured to the cylinder by means of screws 3, which pass through both the bars and combs and into the cylinder.

The points of the combs are all the same distance from the center of the cylinder, while the cross-bars 1<sup>b</sup>, 5<sup>b</sup>, and 12<sup>b</sup>, being of different depths, leave the projecting teeth of a set of combs having the cross-bars 1<sup>b</sup> of a different length from those having cross-bars 5<sup>b</sup>, and those of cross-bars 5<sup>b</sup> of different length from those of cross-bar 12<sup>b</sup>. From this it follows that when the first bar, 1<sup>b</sup>, attacks the front of the fleece with the first long teeth the space 9', arranged for the reception of the wool, is wider than the space 10 of the wider bar, 5<sup>b</sup>, and this latter space is wider than the space 11, which a still wider bar, 12<sup>b</sup>, with the shorter teeth, leaves as a passage for the wool in the groove of the presser  $u$ . It will be seen, therefore, that as the teeth become shorter the space for the wool in the groove of the presser diminishes, and hence the burrs and straws, becoming more crowded in their position, will be broken and crushed accordingly. The length of the teeth 9' can vary according to the necessity.

The functions of the various parts of our combing-machine having been thus described, it will be easy to understand the general operation.

The circular comb B, with the brush D', which meshes with it, has described the arc of a circle around  $v$  as a center, and has placed itself in front of the stationary nipper  $p p'$  in order to comb the front of the fleece. During this period of work the wiper-comb C is cleaned by the two brushes D E, and the drawing or seizing nipper  $m m'$ , which has opened, permits the two pairs of cylinders  $c'$  to draw toward them the combed fleece  $k$ . The endless leather apron is in the meanwhile advanced, in order to displace the surface which was used during the last drawing and bring the cleaning-cylinder or brush  $n'''$  into play on a new surface. After the combing of the front of the fleece, the upper jaw,  $p$ , of the stationary nipper rises, and the circular comb B, with the brush D', meshing with it, is lowered until the brush D' is brought in contact with the toothed cylinder F' to be cleaned by it. The drawing-nipper  $m m'$ , with the end of the combed fleece supported upon the lower jaw,  $m'$ , of this nipper, is moved toward the stationary jaw, in order to seize the front of the fleece. The bar N in the meanwhile pushes down the filaments of the back or end of the fleece in such manner that these filaments shall be presented under the filaments of the front of the fleece in the fixed jaw. The brush E describes an arc of a circle and occupies a new position, which allows the wiper-comb (nacteur) C to



be lowered in order to pierce the fleece. The seizing or drawing nipper *m m'* continues to approach the front of the fleece until the latter is engaged between the two jaws of the nipper *m m'* and ready to be drawn along. The bar *N* is raised and the drawing-nipper *m m'* closed. The comb *C* is now moved downward, so as to pierce the middle of the filaments of the front of the fleece. The seizing-nipper *m m'* is then drawn back, in order to detach from the fleece the filaments seized and force them during this movement to pass between the teeth of the nateur comb *C* in order to be cleansed by it. When the drawing of the filament through the comb *C* is finished, the comb retires and places itself in front of the brush *D*. The small brush *E*, describing an arc of a circle around brush *D*, takes up its former position, and, with the brush *D*, it effects the cleaning of the comb *C*. The stationary nipper *p* is lowered and the front of the fleece is ready to receive the action of the circular comb *B*, which resumes its ascending movement to recommence the same stages of work that we have just described.

Having now described my invention, what I claim is—

1. In a combing-machine, the cylinder *B*, having teeth *9'*, in combination with cross-bars of varying depths arranged against said teeth, forming different-sized spaces for the reception of the wool, substantially as described.

2. The combing-cylinder *B*, having teeth *9'*, in combination with the presser *u*, supports 1, adjusting-nut 2, screw 4, and arm *G*, substantially as described.

3. In a combing-machine, the presser *u*, having longitudinal grooves *u''*, in combination with cylinder *B*, carrying series of combs and cross-bars, the cross-bars serving to break and crush straws, &c., substantially as described.

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