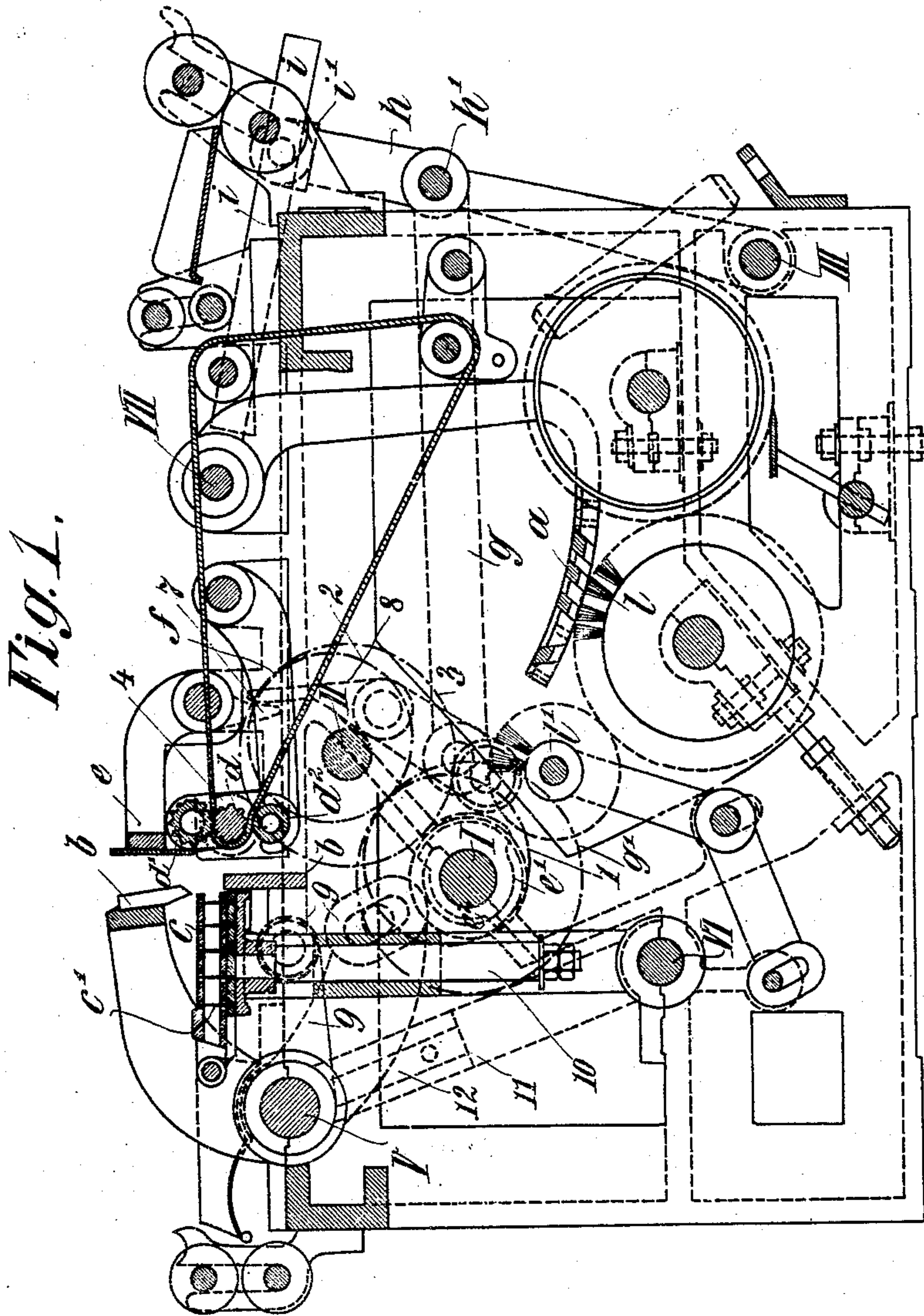


C. KRÖGER.
COMBING MACHINE FOR TEXTILE MATERIALS.
APPLICATION FILED MAR. 28, 1907.

915,194.

Patented Mar. 16, 1909.
2 SHEETS—SHEET 1.



Witnesses:

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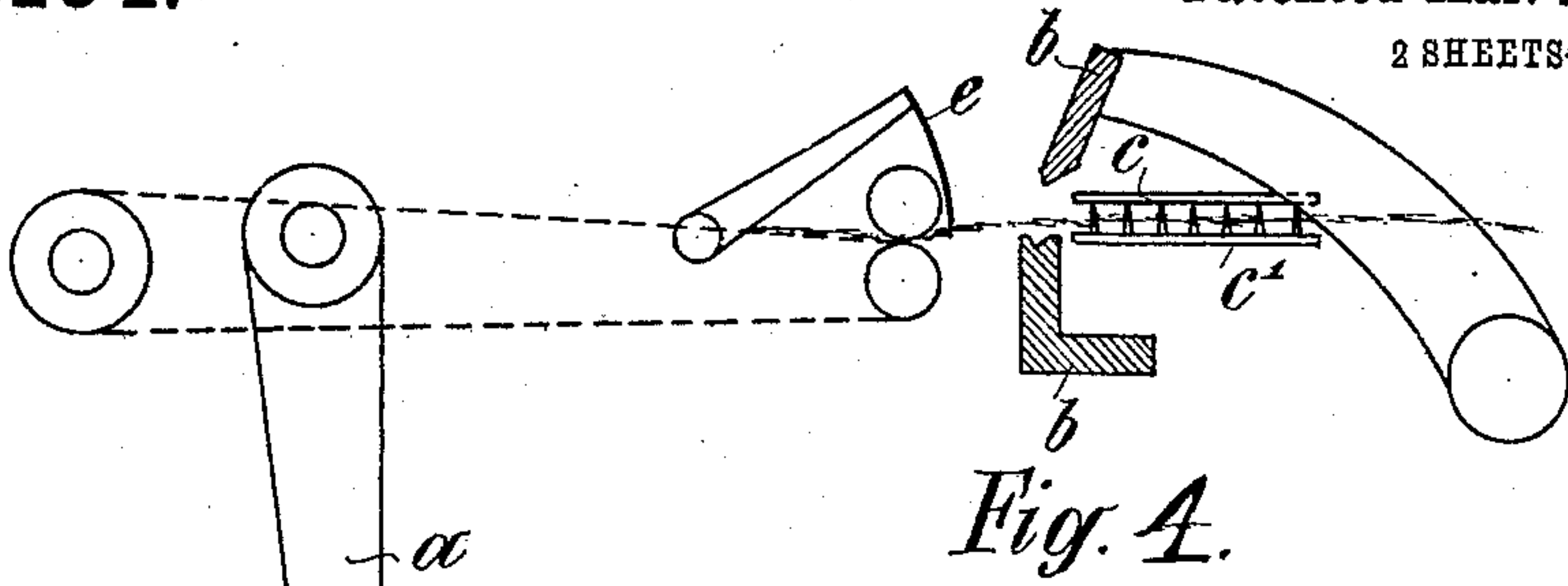


Fig. 4.

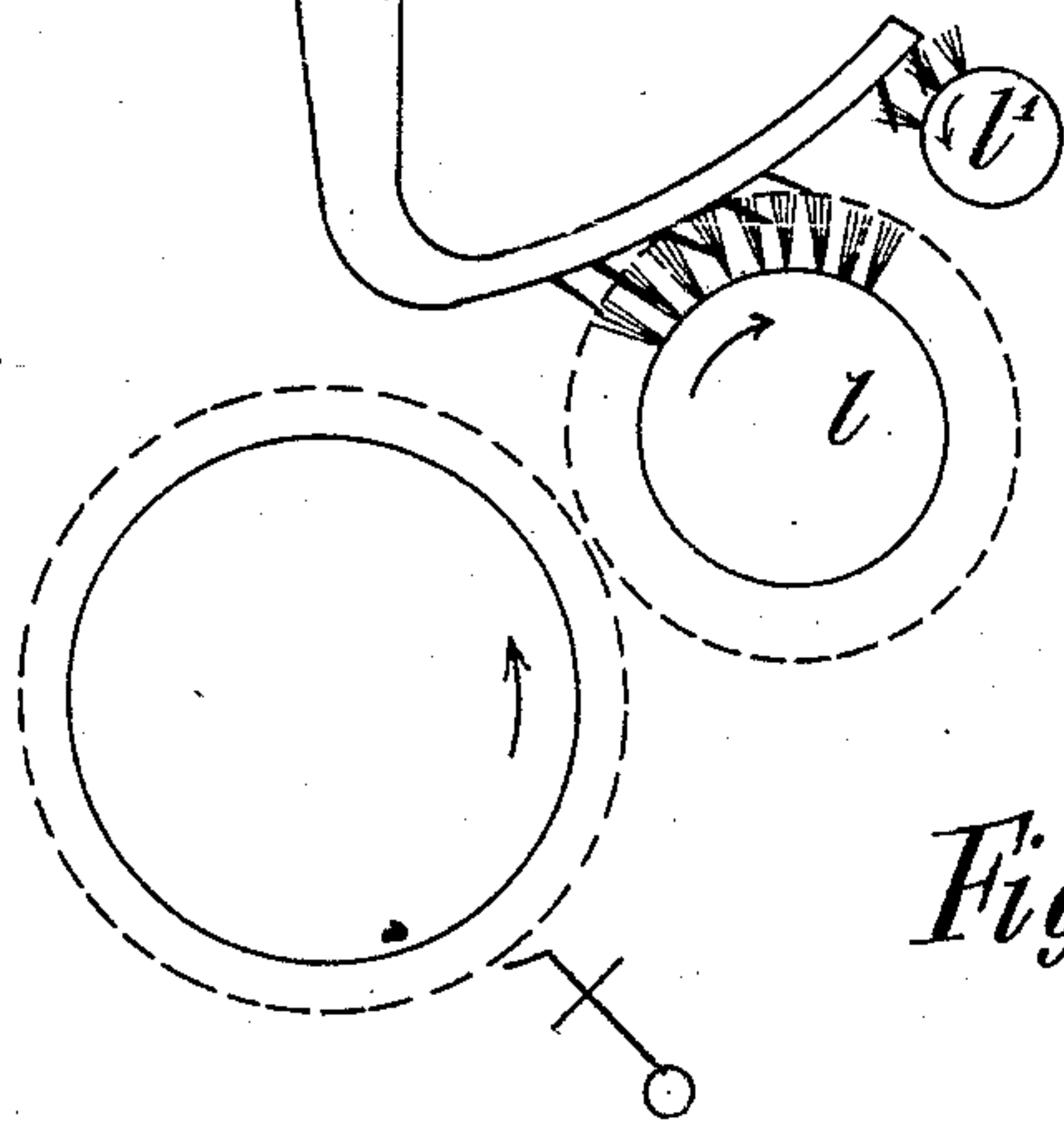


Fig. 2.

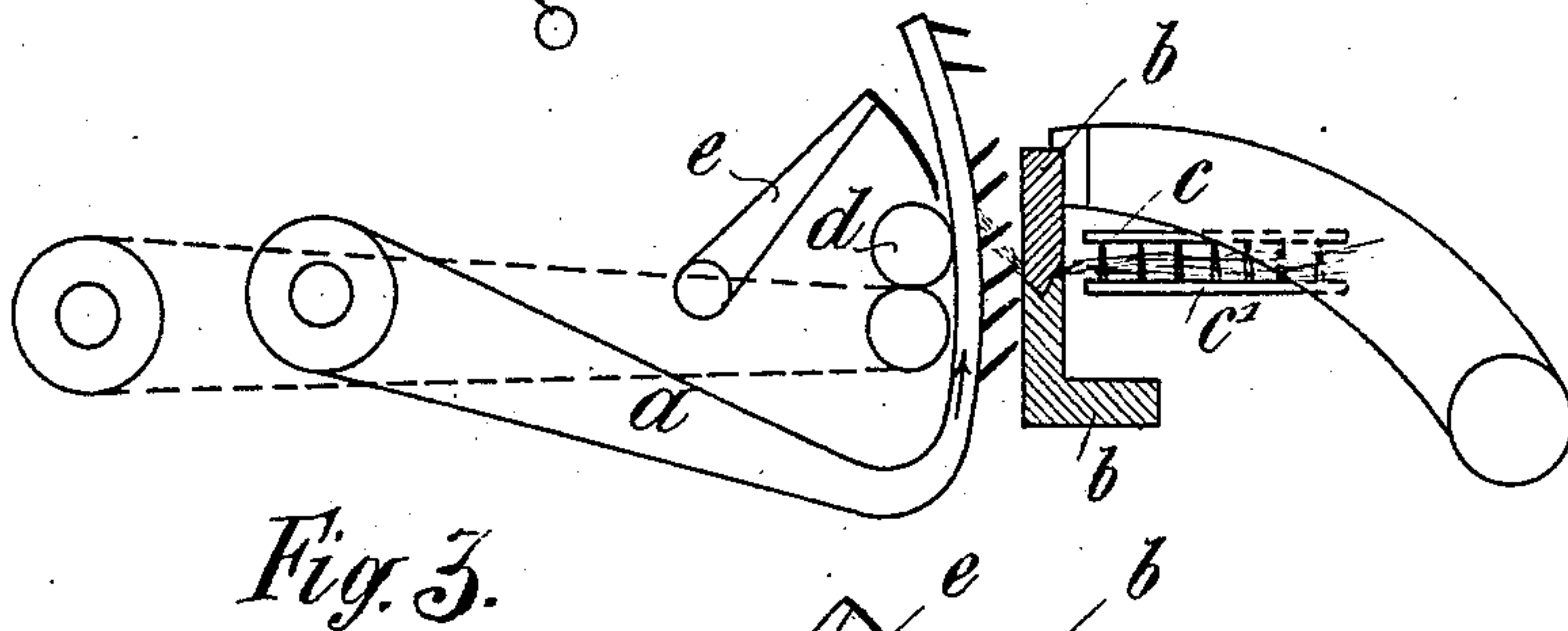
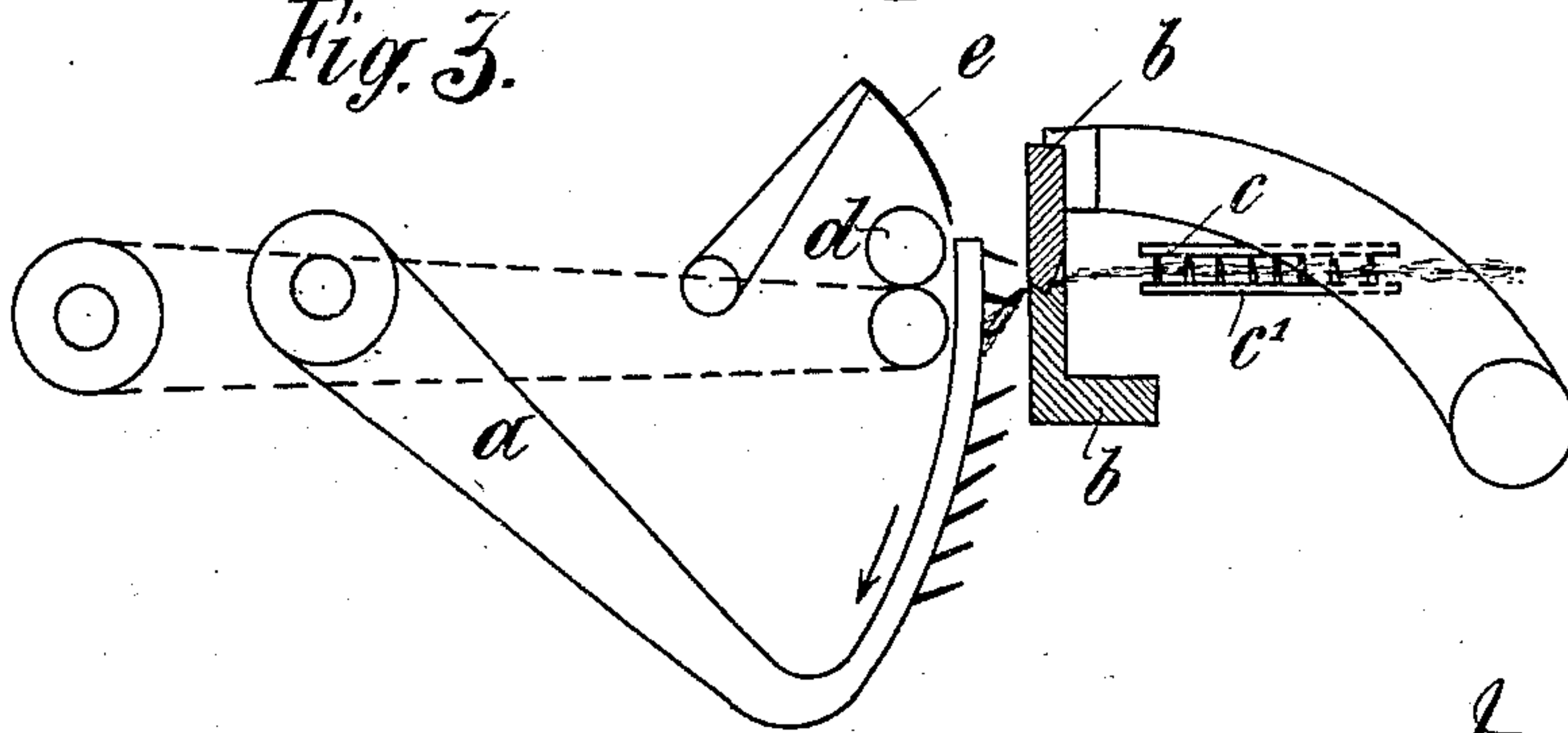


Fig. 3.



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UNITED STATES PATENT OFFICE

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COMBING-MACHINE FOR TEXTILE MATERIALS.

No. 915,194.

Specification of Letters Patent.

Patented March 16, 1909.

Application filed March 23, 1907. Serial No. 365,135.

To all whom it may concern:

Be it known that I, CARL KRÖGER, residing at Privatweg, in Delmenhorst, Duchy of Oldenburg, German Empire, and whose post-
office address is the same, have invented certain new and useful Improvements in or
Relating to Combing-Machines for Textile
Materials, of which the following is the specification.

10 All combing machines of the Heilmann system, have as the combing member, a circular comb which is arranged in front of the opening of the holding-clamps in such a manner that the center line of the upper jam
15 of the clamps intersects the comb and forms an approximately right angle with the jaw of the clamp. This arrangement of comb and holding clamps causes a series of drawbacks, the chief among which are as follows:—

1. The comb penetrates the material from below upward, the material, of course, getting out of the way as much as possible. The material therefore is not combed on the
25 upper side in as clean a manner as on the under side, which is facing the bottom of the needle bars. If clean combing is obtained by means of a pressing-in device then, in order solely to remove the impurities from
30 the upper side of the material, the whole fibrous material is pressed against the bottom of the needle bars, and a great strain is put upon it, to the disadvantage of the material and of the combs.

35 2. From the jamming point of the jaws up to the point of the material which has been sufficiently combed to be taken off, there remains a comparatively large length the short fibers of which are no longer held, and therefore become waste while the long fibers of
40 the said length, just because it has not been combed, have to remain still in the feeding device. In other words, more waste is produced than is necessary for the proper combing of the material. The smaller is this
45 length that is to say, the nearer the comb can be placed to the jamming point of the jaws, the greater will be the quantity that can be removed from the material, that is to say the
50 more can be produced.

3. The bottom jaw which has to withstand the great pressure of the upper jaw, required to hold the fibrous material fast, is limited by the comb in its thickness. This

easily results in a yielding of the bottom jaw 55 and a releasing of the fibrous material. This yielding increases with increasing width of the machine, and as the thickness of the jaws-plate cannot be increased, the width of the work, and thus the output of the machine, 60 are limited within narrow limits.

4. The upper and the bottom jaws must be mounted adjustably relatively to the comb, and there is left only a space of one half to three quarters of a millimeter between 65 the jaws and the needle point. A slight yielding of the jaws, caused, by thick portions of the band, knots or foreign substances, destroys the comb, and sometimes causes still greater damage to the machine. 70

In order to avoid one-sided combing out, it has been proposed to divide the combing by employing two comb segments which work in opposite directions. Moreover the jaws have been made so wide (thick, strong) 75 as to make any bending impossible, and thus it has been attempted to obviate the above drawbacks. In all such constructions, however, the jaws, the feeding device and the delivery device separately or together, make 80 comparatively large movements or oscillations, in order to bring the fibrous material first to the comb, and then to the delivery device and sometimes even special parts 85 have been provided to transfer the material from the jaws or feeding device to the delivery device.

In order to enable the jaws and delivery device to be firmly mounted, without the jaws being limited in their dimensions by the 90 comb, and in order to enable the two parts to be placed so close to each other that the feeding device can present the material to the delivery device immediately on the jaws being opened the comb according to the pres- 95 ent invention is made of such shape that it can reciprocate between the fixed jaws and the fixed delivery device. The distance of these two parts from each other corresponds to the length of the fibers which are to be 100 combed out, and represent the waste. The comb can either be provided with one group of needle series which comb the fibrous material only on one side, or it can be provided with two groups of needle series, the needles 105 of which are arranged in opposite directions, and which comb the fibrous material on both sides.

In the accompanying drawings an embodiment of the present invention is illustrated by way of example.

In these drawings, Figure 1 shows the invention assembled with cooperating parts of a complete combing machine; Fig. 2 is a diagrammatic view showing the combination in its upward movement; Fig. 3 is a similar view showing the downward movement of the comb; and Fig. 4 shows the exterior lower movement of the comb to its position rest and the simultaneous feeding movement by the draw off rolls.

In Fig. 2 the jaws *b* are closed, and it can be seen how the sickle-shaped comb *a* swings upward between the jaws *b* and the delivery cylinders *d*, and combs the material from below. The fixed or front comb *e* is out of work in such a position, that the comb *a* swings completely independently of it.

Fig. 3 shows the comb *a* about to move downward out of the space between the jaws and the delivery cylinders. The jaws are still closed, and the comb *a* with its last needle series arranged in opposite directions to the others, combs the material from the top downward. The feeding gill *c'* has been lowered and moved with the feeding grating *c* to the length of the feed from the jaws over the fibrous band.

Fig. 4 shows how after the opening of the jaws, the feeding device has advanced the fibrous band, and how the material seized by the delivery cylinders, is drawn through the fixed comb *e*. The comb *a* is in its lower position and gives off the waste to a brush roller *l*, and a segment *l'* which conveys it away in a well known manner.

Fig. 1 shows a form of construction of a complete combing machine embodying the invention. The comb *a* has the shape of a sickle oscillating in front of the holding jaws *b*. The feeding device is arranged in such a manner that the feeding rake *c'* penetrates from below into the feeding grating *c*. The latter can be swung upward, and then the feeding rake is free. The two jaws are very wide and thick. The bottom jaw is firmly secured to the frame, so that it forms a portion of the same, and any yielding is impossible. In order to avoid any bending of the slender delivery or draw off cylinder *d*, the latter is mounted between two counter cylinders *d'* *d''* which in their turn rest in bearings and press uniformly from above and from below on the delivery or draw off cylinder. The fixed or front comb *e* is mounted with the delivery device on a carriage *f* which can be adjusted on the frame nearer to, or farther away, from the jaws.

The cleaning of the sickle-shaped comb *a* is effected by two brushes *l* *l'*, which transfer the waste in a well-known manner. The comb combs first from below upward, then vice versa. It is driven by means of a crank

device *g* with rod *h* and rod *i*, in such a manner that it stands stationary opposite the brush, leaves the same slowly and finally quickly moves up and down in front of the jaws. The brushes rotate but slowly, so as to thoroughly clean the comb.

An example of the manner in which the various parts may be operated is shown in Fig. 1. The draw-off roll *d* which bears against the supporting rolls *d'* *d''* is driven at an increasing and decreasing speed by means of two elliptical wheels 1 and 2 and two toothed wheels 3 and 4 in such manner that the highest speed occurs during the drawing off operation so as to obtain the greatest effect. The elliptical wheel 1 is keyed upon the shaft I while the wheel 2 with which it gears is secured to the toothed wheel 3. Both wheels 2 and 3 are mounted loosely upon the gudgeon II. A toothed wheel 4 keyed to the draw-off roll *d* is in mesh with the wheel 3.

The parts *g*, *h* and *i* serve for the driving of the comb *a* in the following manner: A crank disk *g'* fast upon the shaft I, is connected by its crank with the link *g* so as to give the same a horizontal reciprocating movement, the drawing showing said link in its extreme position to the right. A lever *h*, fulcrumed at III, is connected with the links *g* at *h'* and carries at its upper end a box *i'* with rolls which ride upon the arm *i* fast to the comb *a* near the pivotal point VII of said comb. As the crank disk *g'* rotates, the link *g* is drawn to the left and carries with it the lever *h*, the upper end of which rides along the arm *i* forcing the same downward with gradually accelerating speed due to the angle of said arm, thus causing the comb *a* to swing in the arc of a circle between the jaws *b* and the draw-off roll *d*, the highest speed being reached at the time the comb is at the upward limit of its movement and again gradually reducing as the link *g* again swings to the right and the comb drops to its position of rest as shown, at which time the arm *i* occupies a position tangent to a circle struck from the point III and having a radius equal to that of the lever *h*. The carrier of the fixed comb *e* is provided with a nose which is moved by engagement therewith of a two arm lever 8, acted upon by a cam *e'* fixed upon the shaft I. The feed gill or rake *c'* is carried upon the upper arm of an angle lever 9 which is fulcrumed upon a shaft V and is moved up and down by means of a cam *e''* on the shaft I, whereby also the feed rake rises and falls.

Upon the shaft VI is pivoted a lever which carries upon its upper end the feeding grate *c* and the guide for the feeding rake. To this lever 10 a lever 11 is fixed which latter is connected by means of a slot and pin with a lever 12. The lever 12 is pivoted upon the shaft V and receives its move-

ment through the lever 9 from the cam e^2 on the shaft I.

While the holding jaws b are closed, the feeding rake c' sinks and together with the feed grate c moves to the left and thereby slips to the extent of the next feeding movement along the fibers held in the jaws. Thereupon the feed rake again rises impaling the fibrous band within the grate c . During this time the comb a has been reciprocated in the arc of a circle between the holding jaws and the draw-off roll to effect the combing of the fibers held in said jaws and is again returned to its position of rest. Thereupon the jaws open and the feed rake c' and grate c move forward to the right up to the jaw b feeding the combed fibers forward to the feed roll, by which they are caught and drawn forward as the jaws b again close. Following immediately upon this forward feeding movement and the retraction of the comb a , the comb e is interposed in front of the draw-off roll d passing with its teeth through the combed fiber, and as the fiber is drawn off by the roll d the rear portion of the fiber is combed by e . Thus it will be seen that the fore part of the bunch of fibers is combed from both sides by the comb a and that thereafter the small portion of the fiber which was held between the jaws d is combed by the teeth of the comb e passing entirely therethrough.

Having now particularly described and ascertained the nature of the said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. In a combing machine, the combination, with holding jaws, and a draw-off device arranged opposite the jaws, of a comb mounted to reciprocate between the jaws and draw-off device, means to alternately open and close the jaws, means to reciprocate the comb while the jaws are closed, and means to feed the material forward through the jaws into the draw-off device when the jaws are open.

2. In a combing device, the combination, with a holding device, a draw-off device, and a feeding device, of a comb arranged to reciprocate between the holding and draw-off devices, and a second comb arranged to interpose between the holding and draw-off devices when the first comb is withdrawn.

3. In a combing machine, the combination, with holding jaws, and a draw-off device arranged opposite the jaws, of a comb mounted to reciprocate between the jaws and draw-off device, means to alternately open and close the jaws, means to reciprocate the comb while the jaws are closed, means to feed the material forward through the jaws into the draw-off device when the jaws are

open, a second comb, and means to interpose the second comb between the jaws and draw-off device when the first comb is withdrawn and after the feeding movement.

4. In a combing machine, the combination, with a holding device, a draw-off device, and a feeding device, of a comb provided in different portions of its operative length with oppositely inclined teeth, and means to reciprocate the comb between the holding and draw-off devices.

5. In a combing machine, the combination, with a holding device, and a draw-off device, of means reciprocating therebetween and arranged to comb the fibers in both the to and fro movement.

6. In a combing machine, the combination, with holding jaws, a draw-off roll, and a feeding device, of a sickle shaped comb provided in different portions of its length with oppositely inclined teeth, and means to reciprocate the comb in the arc of a circle between the jaws and roll.

7. In a combing machine, the combination, with holding jaws, a draw-off roll arranged opposite the jaws, and a feeding device, of a sickle shaped comb, a second comb, means to alternately open and close the holding jaws, means to reciprocate the first comb in the arc of a circle between the jaws and roll while the jaws are closed, means to feed the material forward to the draw-off roll while the jaws are open, and means to interpose the second comb between the jaws and roll after the feeding movement.

8. In a combing machine, the combination, with a fixed and a movable holding jaw, a draw-off roll arranged opposite the jaws, and a feeding device comprising a feeding grate and a feeding rake, of a swinging sickle shaped comb provided in different portions of its operative length with teeth extending forward and backward at an inclination to the path of travel of the comb, a second swinging comb having teeth extending substantially in the direction of its path of travel, means to alternately open and close the holding jaws, means to reciprocate the first comb in the arc of a circle between the jaws and roll while the jaws are closed, means to feed the material forward to the draw-off roll while the jaws are open, and means to interpose the second comb between the jaws and roll after the feeding movement.

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

CARL KRÖGER.

Witnesses:

FRITZ C. KRÖGER,
FERDINAND REICH.