

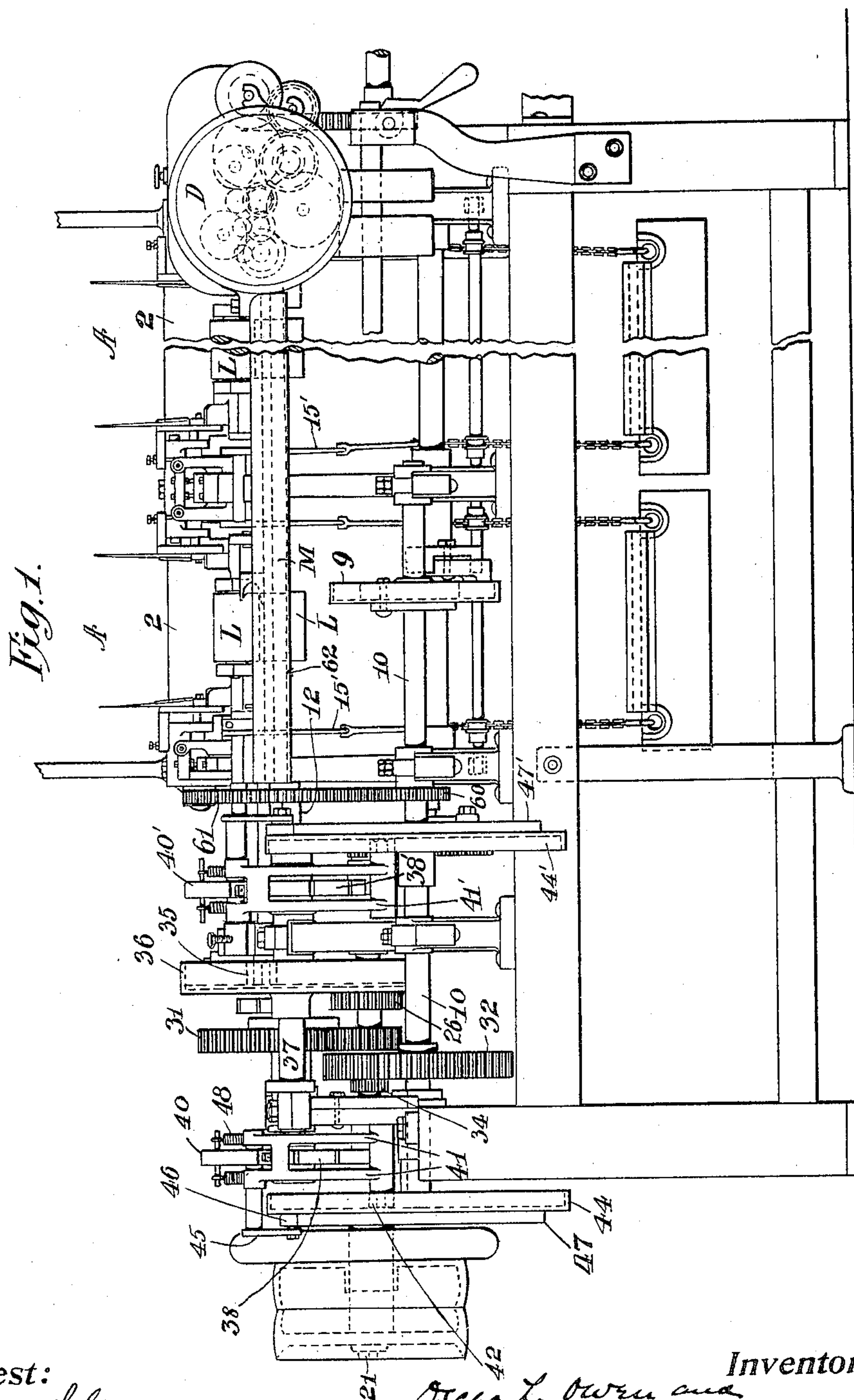
No. 822,549.

PATENTED JUNE 5, 1906.

O. L. OWEN & E. H. ROONEY.  
COTTON COMBING MACHINE.

APPLICATION FILED AUG. 10, 1905.

6 SHEETS—SHEET 1.



*Attest:*

Attest:  
Edgeworth Burns  
J. E. Kimball

*Inventors.*

Oscar L. Brown and  
Elwin H. Rooney  
by

Attys.

No. 822,549.

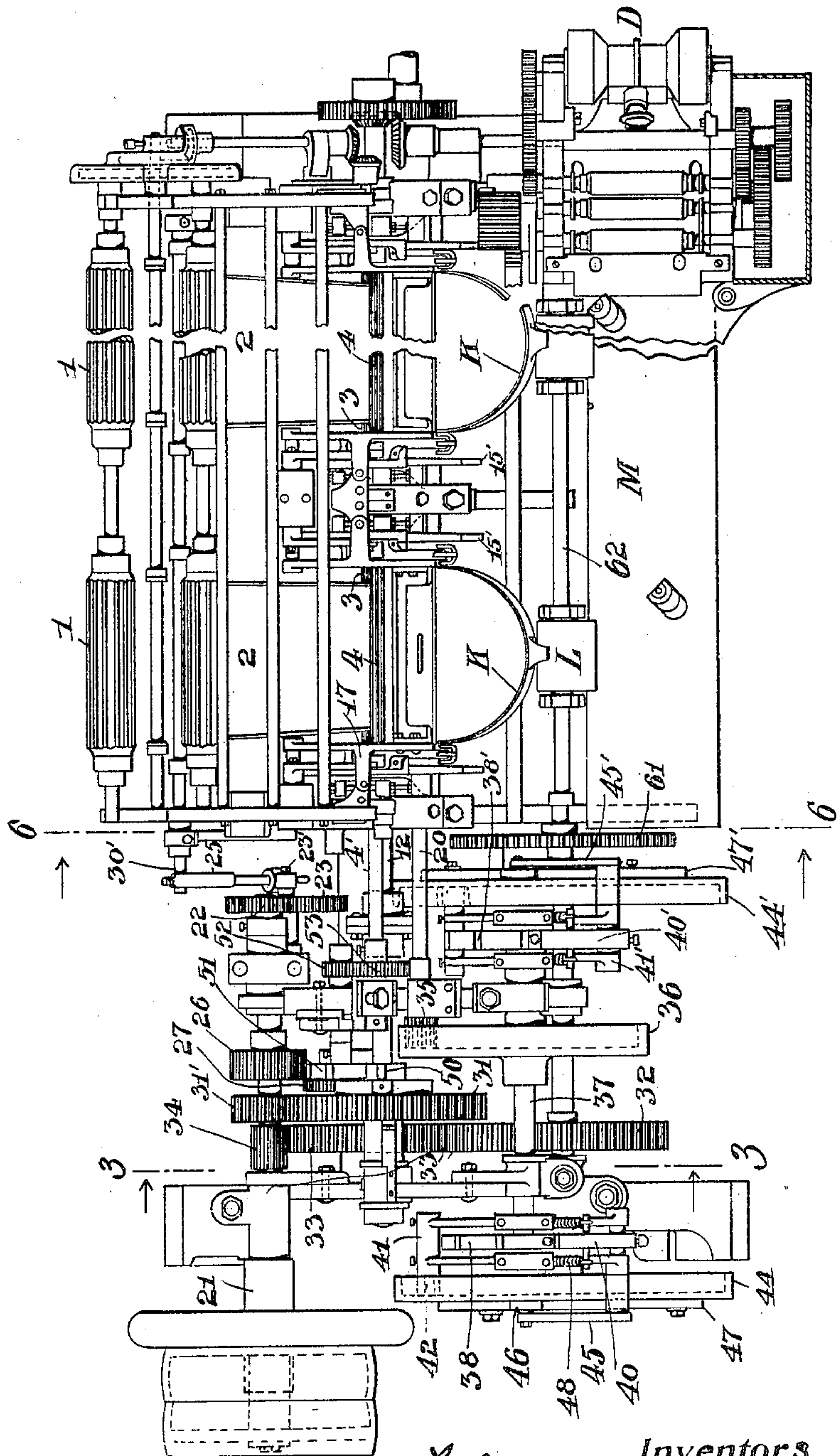
PATENTED JUNE 5, 1906.

O. L. OWEN & E. H. ROONEY.  
COTTON COMBING MACHINE.

APPLICATION FILED AUG. 10, 1905.

6 SHEETS—SHEET 2.

Fig. 2.



Attest:  
*Edgeworth*  
*H. H. H. H.*

*O. L. Owen and* Inventors  
*Edwin H. Rooney*  
by *Arthur J. Jones* Attys.



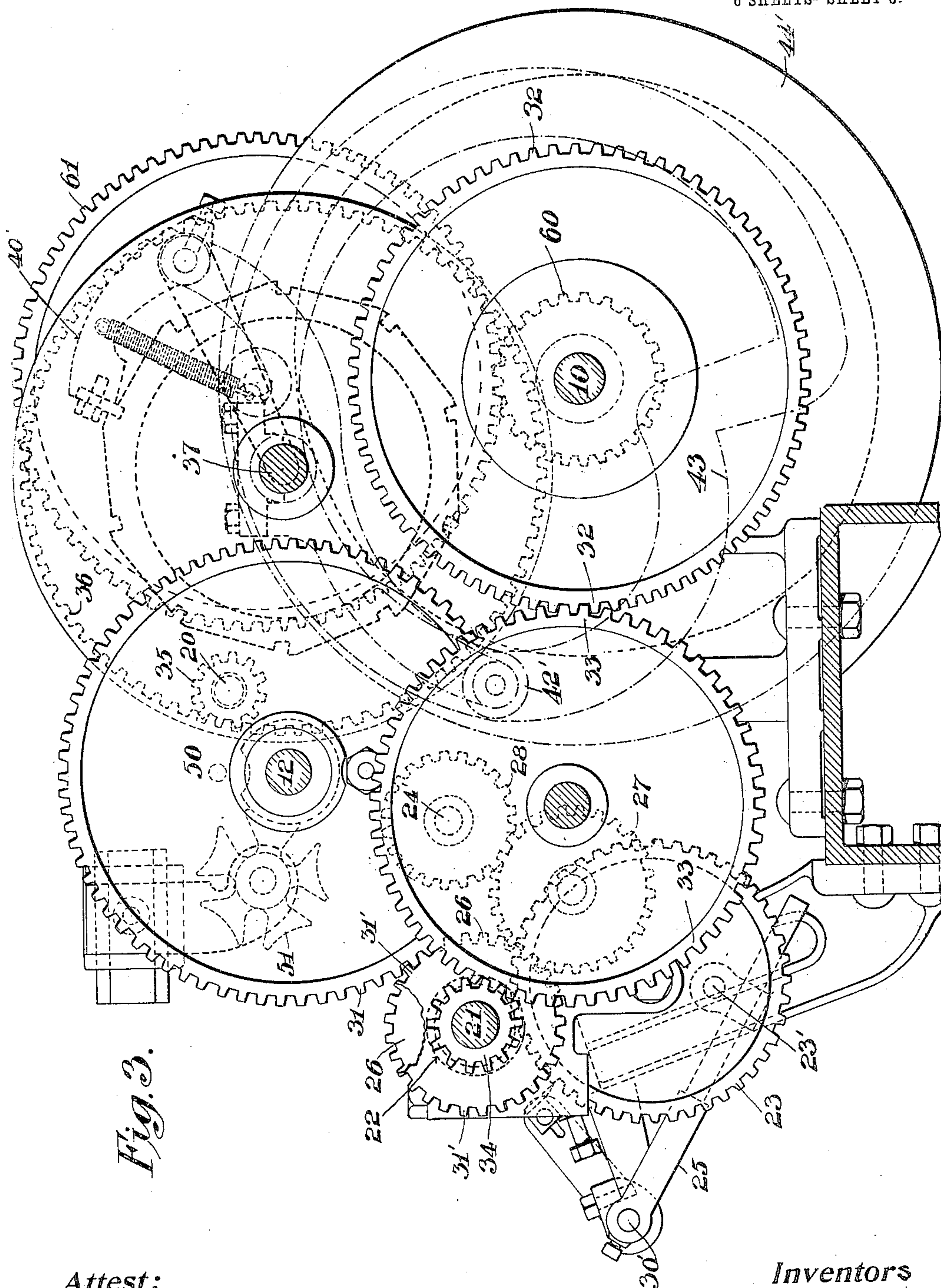
No. 822,549.

PATENTED JUNE 5, 1906.

O. L. OWEN & E. H. ROONEY.  
COTTON COMBING MACHINE.

APPLICATION FILED AUG. 10, 1905.

6 SHEETS—SHEET 3.



*Attest:*

Edgeworth Grove  
H. E. Kimball

## Inventors

Oscar L. Stone and  
by Elwin H. Rooney  
Attorneys -

No. 822,549.

PATENTED JUNE 5, 1906.

O. L. OWEN & E. H. ROONEY.  
COTTON COMBING MACHINE.

APPLICATION FILED AUG. 10, 1905.

6 SHEETS—SHEET 4.

Fig. 5.

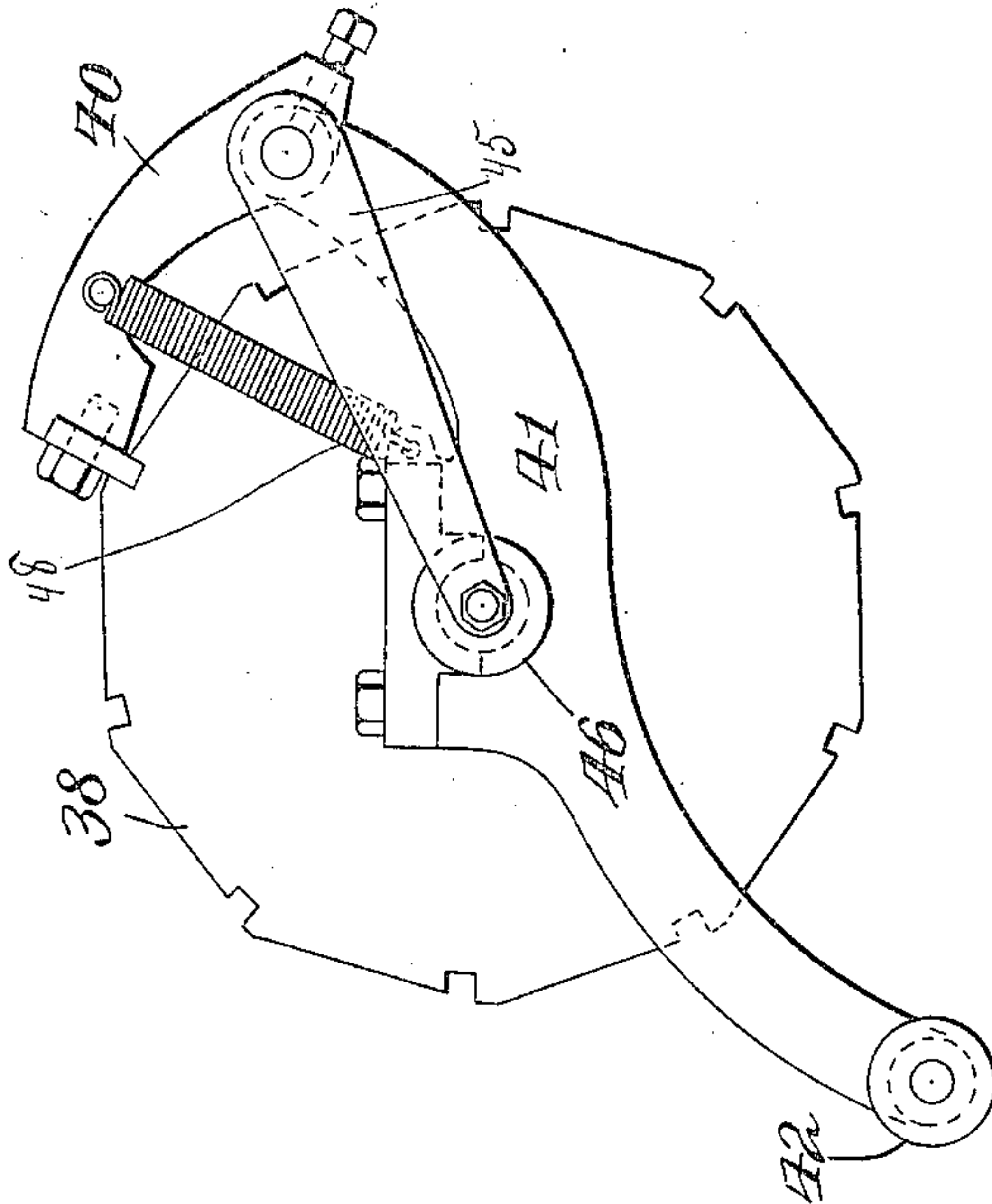
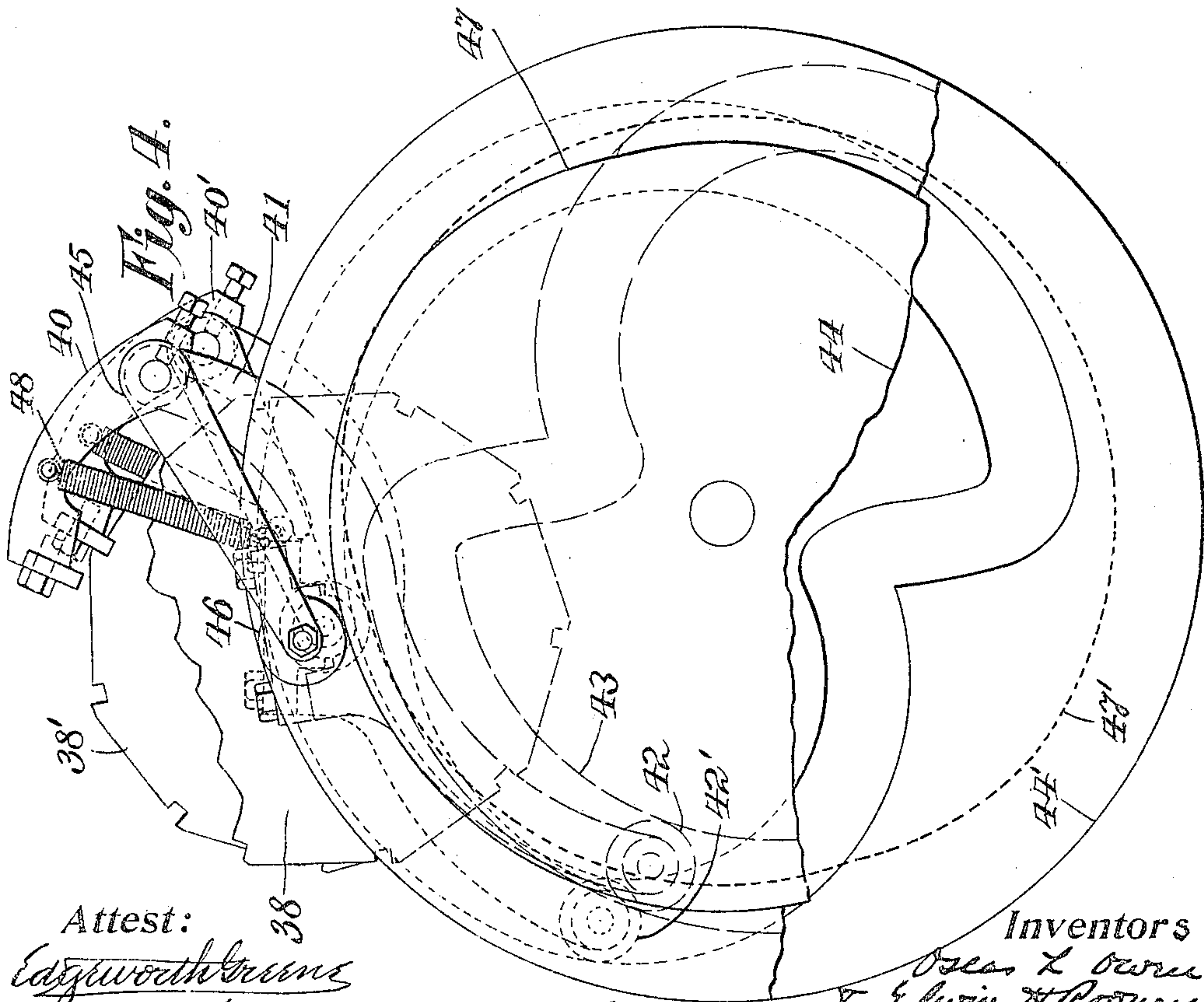


Fig. 4.



Attest:  
*Edgewood Burns*  
*H. E. Kimball*

Inventors  
*O. L. Owen*  
*E. H. Rooney*  
by *W. H. Mason* Attys.



No. 822,549.

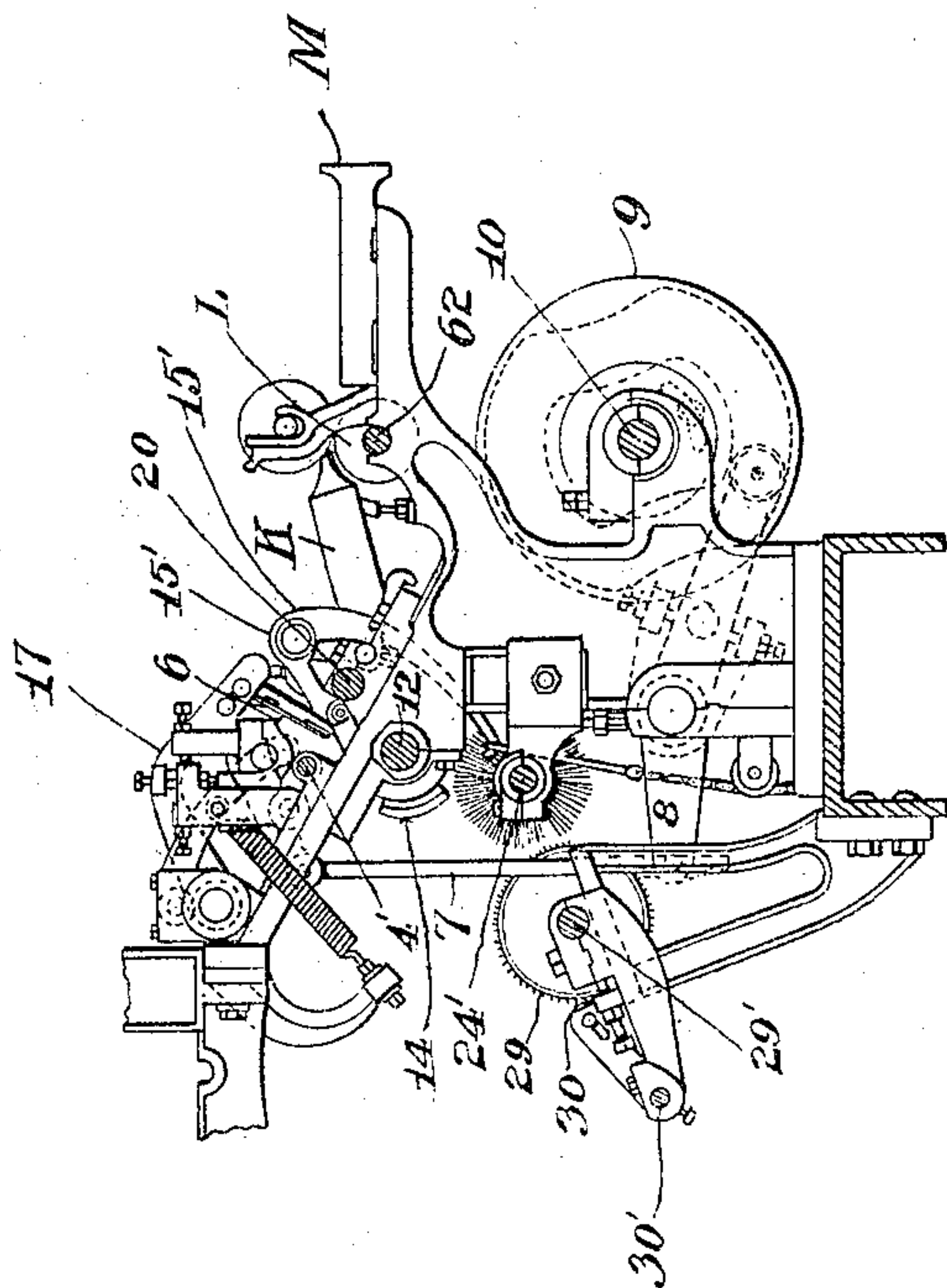
PATENTED JUNE 5, 1906.

O. L. OWEN & E. H. ROONEY.  
COTTON COMBING MACHINE.

APPLICATION FILED AUG. 10, 1905.

6 SHEETS—SHEET 5.

Fig. 6.



Attest:  
*Edgeworth Greene*  
*A. H. Kimball*

*O. L. Owen and* Inventors  
*E. H. Rooney*  
by *Wm. H. Kimball* Attys.

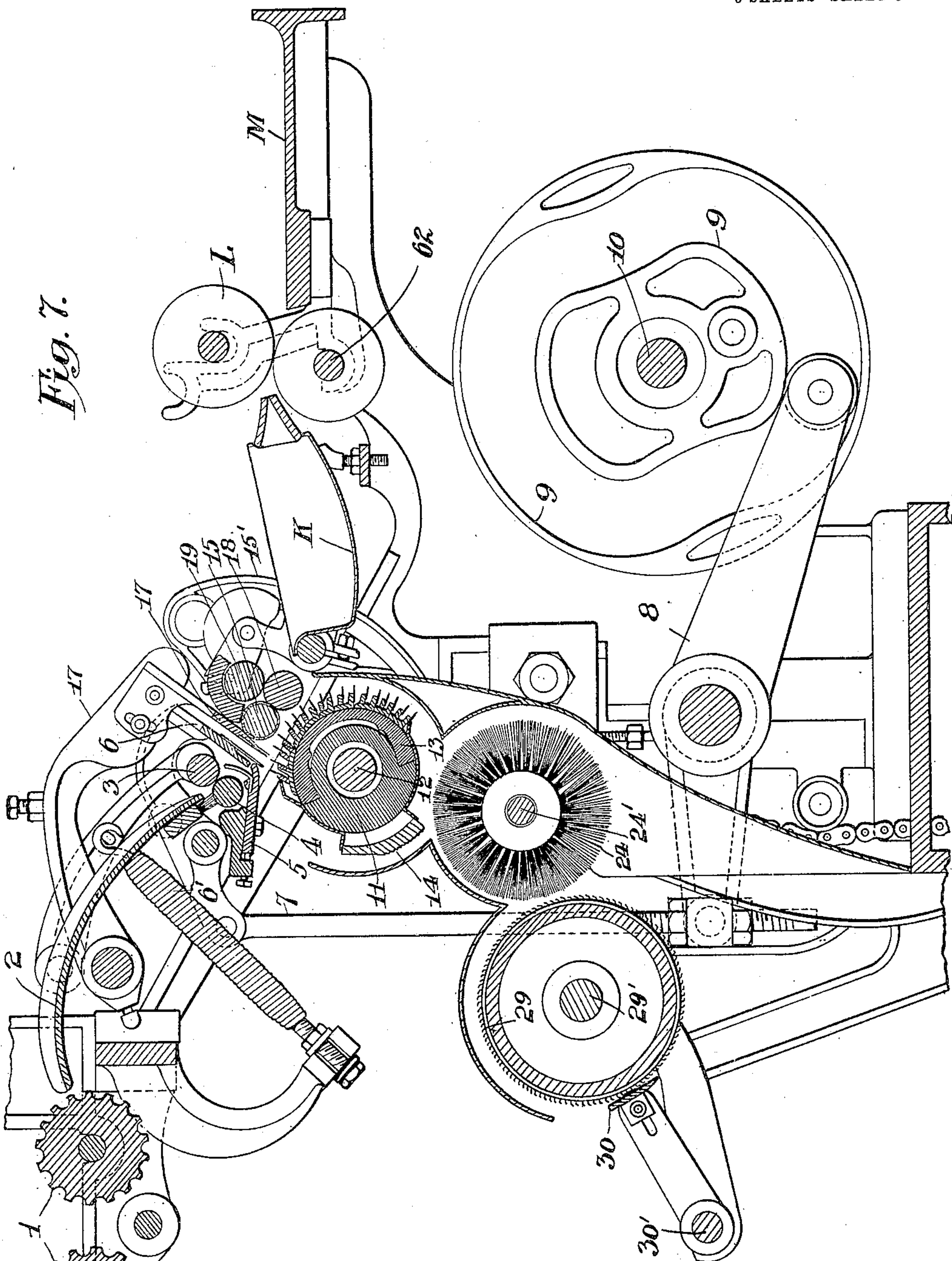
No. 822,549.

PATENTED JUNE 5, 1906.

O. L. OWEN & E. H. ROONEY.  
COTTON COMBING MACHINE.

APPLICATION FILED AUG. 10, 1905.

6 SHEETS—SHEET 6.



Attest:

*Edgeworth*  
*W. H. Humes*

Inventors  
*O. L. Owen and*  
*E. H. Rooney*  
by *W. H. Humes* Attys.



# UNITED STATES PATENT OFFICE.

OSCAR L. OWEN, OF WHITINSVILLE, AND ELWIN H. ROONEY, OF NEW BEDFORD, MASSACHUSETTS, ASSIGNORS TO THE WHITIN MACHINE WORKS, OF WHITINSVILLE, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

## COTTON-COMBING MACHINE.

No. 822,549.

Specification of Letters Patent.

Patented June 5, 1906.

Application filed August 10, 1905. Serial No. 273,533.

*To all whom it may concern:*

Be it known that we, OSCAR L. OWEN, residing in Whitinsville, county of Worcester, and ELWIN H. ROONEY, residing in New Bedford, county of Bristol, State of Massachusetts, citizens of the United States, have invented certain new and useful Improvements in Cotton-Combing Machines, of which the following is a full, true, and exact specification.

The present invention relates to machines for combing cotton and similar fibrous material, and has more particularly to do with certain hereinafter-described improvements in the construction and means of operation of single-nip combing-machines whereby the same are adapted for safe and efficient operation at high speeds; and the invention consists in the novel arrangement of the parts and the proportionment of the speed relations of the several driving means, as below described, and in the distribution of the work required of the said means, so that the several operating elements of the machine may be operated at high speeds without overtaxing the capacity of any of their actuating means and without detracting from the integrity and uniformity of the combed product.

Referring to the accompanying drawings, in which like reference characters designate like parts throughout, Figure 1 is a side elevation of a combing-machine embodying this invention, with the central portion thereof broken away for the sake of convenience of illustration. Fig. 2 is a plan view of Fig. 1. Fig. 3 is a transverse enlarged section taken on line 3 of Fig. 2 looking in the direction of the arrows and illustrating the relative arrangement of the gearing in the gear-head end of the machine. Fig. 4 is a similar detail view of the two actuating means for the piecing mechanism, in elevation, with parts broken away to show rearward constructions. Fig. 5 is a further detail, on the same scale, of the driven and driving elements of the clutching mechanism. Fig. 6 is a vertical transverse cross-section of the machine on line 6 6 of Figs. 1 and 2; and Fig. 7 is a slightly-enlarged vertical transverse section through one of the combing-heads of the machine, adapted to illustrate the principle of operation thereof.

The general arrangement and construction of the machine illustrated in the drawings will be recognized as that of the well-known Heilmann comber, which is usually comprised of a row of independent but similar combing-heads (represented by A) and operated by a number of longitudinal shafts which are common to each of them and receive their appropriate motions from the system of gearing shown at the left-hand end of the machine.

The general arrangement of a combing-head will be understood from an inspection of the cross-sectional view shown by Fig. 7, wherein the roll of lap is adapted to be carried upon a pair of wooden feed-rollers 1, and the layer of lap unwinding therefrom passes down the inclined feed chute or apron 2 into the nip of two spring-pressed lap-feed rollers 3 and 4. The lower lap-feed roller 4 is formed on or carried by one of the shafts which is common to the several combing-heads and is rotated at intervals to advance the lap into the jaws of the nipper mechanism. The latter consists of a frame adjustably secured at its ends to the intermediate frame-supports between combing-heads and carries a lower jaw or cushion-plate 5 and an upper pivoted jaw or nipper knife 6, which closes against the cushion-plate to nip and hold the end of the lap, which has been projected between them by means of the feed-rollers 3 and 4. The nipper knife 6 receives its properly-timed movement for this purpose by means of a connecting-link 7, which joins the tail ends of the nipper-knife arms 6' to a cam-crank 8, which in turn receives its motion from a double-throw cam 9, carried by the main cam-shaft 10, as indicated in the figure referred to.

The nipper mechanism is so located that the end of the lap which protrudes from the jaws thereof projects into the path of rotation of a single-nip combing-cylinder 11, which is carried by a combing-shaft 12, extending the length of the machine and receiving its appropriate rotary motion from the gear-head presently to be described. The cylinder 11 carries a needle half-lap 13, consisting of as many rows of combing-needles as can be conveniently located thereon and a detaching half-lap 14, which consists of a cy-



lindrical segment, usually fluted. The staple is encountered consecutively by the needle half-lap 13, being thereby combed in the usual manner, and then by the detaching half-lap 14, which presses their forward ends upwardly against the leather detaching-roller 15, which roller rotates with the said half-lap 14 to draw the staple from the nipper-jaws and through the depending teeth of a top comb 17, the tail ends of the staple being thereby straightened out in parallel relation or combed. The staple is thereupon carried forward and presented to the drawing-off and piecing mechanism, which comprises a fluted drawing-off roller 18 and a fluted clearing-roller 19, the former of which is formed on the longitudinal piecing-shaft 20, extending through the several heads of the machine and suitably actuated by the gear-head. The leather detaching-roller 15 is held by its usual stirrups 15' against the drawing-off roller, and the clearing-roller 19 is also in contact therewith, being preferably held in constant mesh therewith by its horsetails, so that both rollers 15 and 19 partake of the movement of the drawing-off roller 18. The latter has an intermittent rotation alternately in opposite directions, being rotated forwardly about two-thirds and backwardly about one-third of a revolution for each revolution or nip of the combing-cylinder. In rotating reversely the combed staple, which is then in the nip of the drawing-off roller, is carried back, so that its tail ends are left sticking out below the roller 15, and the succeeding detachment of combed staple, which has been detached and carried forward by the cooperating segment 14 and detaching-roller 15, is laid in overlapping relation upon the tail ends of the previous detachment. At this moment the drawing-off rollers are performing their forward rotation, which is at the same surface speed as the detaching half-lap, and jointly draw the overlapped or pieced detachments of staple forwardly toward the sliver-pan K. The ensuing reverse rotation leaves the tail ends protruding as before, and the next succeeding detachment, combed and detached as above described, is overlapped upon them in the same manner. The pieced staple emerges in the form of a continuous sheet from the drawing-off roller and passes into the sliver-pan K, and from thence through the calendar-rollers L onto the sliver-apron M, upon which it is fed along to the draw-head D in the usual manner. The foregoing series of operations is common in machines of this order, and further description will not be necessary, it being understood, of course, that the parts not specifically herein described are the same as usually employed and familiar to those skilled in this art.

The present invention is not directly concerned with the specific constructions of any of the above-mentioned parts of the combing-

heads; but the arrangement of the moving elements should, preferably, be such as to require but a minimum of motion in the accomplishment of their several functions. It is preferred to employ the invention shown and described in the patent application of E. H. Rooney, Serial No. 268,682, filed July 7, 1905, wherein the cushion-plate of the nipper mechanism is stationary and the teeth of the top comb 17 are disposed in permanent adjustment just clear of the detaching half-lap.

The combing-cylinder may, if desired, be of the usual type of construction, the detaching-roller 15 therefor being properly moved into and out of engagement with its fluted segment by any usual lifter mechanism; but it is again preferred, however, to employ the construction of cylinder and detaching-roller shown in the said application and indicated in Fig. 7 of the accompanying drawings, wherein the combing-cylinder is specially constructed so that the detaching-segment is radially higher thereon than the needle-points of the half-lap 13, and the leather detaching-roller 15 is mounted on end-supports in a substantially fixed position, wherein it escapes the needle-points, but is engaged by the detaching half-lap and cooperates therewith, as above described, to detach the staple from the lap and present it to the drawing-off mechanism. The forward edge of the segment 14 is beveled, so as to ride under the roller 15 and lift it very slightly without undue shock. In the case of either construction, however, the several successive operations effected upon the staple are carried out exactly as above described. The combings or noils are removed from the combing-cylinder by means of the rotary cleaning-brush 24, by which they are delivered to the doffing-cylinder 29 and removed from the latter by means of the oscillating doffer-comb 30, all operating in the usual and well-understood manner.

In the construction of machines as above outlined it will be understood that the lap-feeding mechanism, the nipper mechanism, and the detaching and piecing rollers are each called upon to make a complete operation for each revolution of the combing-cylinder or "nip" of the machine.

Referring now to the arrangement of the gearing, whereby the several parts above referred to are properly actuated in the performance of their functions, it will be observed, Figs. 2 and 3, that the power-shaft 21 is provided with four pinions, of which one pinion 22 gears with a spur-gear 23, which is provided with a wrist-pin 23' and crank-arm 25 for properly oscillating the shaft 30', upon which the doffer-knives 30, above referred to, are carried. Another pinion 26 on the said power-shaft is in mesh with an idle pinion 27, which pinion 27 drives the gear 28, carried by the shaft 24' of the cleaning-



brushes 24. (See Fig. 3.) The pinion 31' is in mesh with the large spur-gear 31, carried by the main combing-shaft 12, which, as above stated, is a shaft common to the several heads of the machine and drives the combing-cylinders thereof. The gear 31 carries a stud 50, adapted to cooperate with the star-wheel 51 of a Geneva stop-motion, Fig. 3, for intermittently rotating the spur-gears 52 and 53, the latter of which is fast on the shaft 4', which carries the lap-feed rollers 4. These parts are shown in the drawings in their usual relations, and they operate in obvious manner, so that further explanation thereof is not necessary, it being understood that the several gears referred to serve to drive the several feed-rollers, the cleaning apparatus, and the combing-cylinders.

The nipper-knife and the drawing-off and piecing mechanism are both actuated from the main cam-shaft 10, above mentioned, and, according to the present invention, this shaft is intended to be driven at a less speed than the combing-shaft 12, so that while it is making a complete revolution the combing mechanism above referred to will make at least two operations upon the staple, and the means for transmitting the motion of the cam-shaft to the piecing mechanism is divided up into several separate mechanisms automatically brought into driving connection therewith successively or in alternation. As shown herein, the gear 32 on the cam-shaft 10 is connected through the idle gear 33 with a pinion 34 on the power-shaft 21, so that it is driven at exactly half the speed of the combing-shaft 12, and the piecing-shaft 20 is connected to receive its motion from the cam-shaft as follows: The pinion 35 on the end of said piecing-shaft meshes with the internal gear 36, which is carried on the counter-shaft 37. This shaft also carries two notched wheels 38 and 38', one being shown at each end, which serve as driven clutch members therefor. Both wheels are alike, being respectively formed with ten straight-sided notches equidistantly disposed around their peripheries. The notches of the wheel 38 are adapted to be engaged by the pawl 40, which is pivotally carried on the end of the cam-lever 41 and constitutes the driving clutch member for the said wheel. The cam-lever 41 is a double-sided lever, as shown in Fig. 1, and is journaled on the counter-shaft on each side of its notched wheel, so as to swing concentrically therewith. At its lower extremity it is provided with a laterally-extending stud-roller 42, which engages in a groove 43 in the face of the cam 44, and the pawl 40 is mounted on a lateral rock-shaft which has a crank-arm 45, provided with a roller 46, which roller is held against the edge of a disk cam 47 by means of the two springs 48. The cam 47 is secured to the side of the face-cam 44, and the two together constitute,

in conjunction with the lever 41, a means for actuating the driving clutch member 40 of the notched wheel 38. As the wheel revolves the lever 41 is caused to swing to the left, Figs. 4 and 5, and when it has accomplished about half of its traverse in this direction the cam 47 permits the pawl 40 to descend under the pull of its springs into one of the notches of the wheel, and the continued movement of the lever thereupon rocks the counter-shaft and internal gear-wheel 36 in a backward sense, causing the piecing-shaft 20 and the drawing-off rollers 18 to perform their one-third backward rotation, above explained. During the entire return traverse of the lever 41 the pawl 40 remains in its notch, and, therefore, causes twice the extent of rotation of the piecing-shaft in a forward sense—that is to say, a two-thirds forward rotation—and at the completion of the return traverse of the lever 41 the cam 47 lifts the pawl out of the notch, and the counter-shaft and internal gear 36 are then free to be similarly actuated by means of the other independent clutching mechanism. The latter is located near the other end of the counter-shaft 37, as shown in Fig. 1, and is in every respect similar to that just described except for the fact that the notched wheel 38' is secured to the shaft 37 with its notches alternated in angular position with those of the wheel 38, and the driving-pawl 40' is adapted to be driven by its lever 41' and cams 44' and 47' in alternation with the driving-pawl 40. In Fig. 4 the relation of the two driving means is clearly indicated, and it will be seen that when one pawl is in driving connection with its notched wheel the other is elevated or idle, and vice versa, this alternate action being due to the angular adjustment of the two composite cams, as indicated. The pitch of the cam-grooves 43 and 43' is of course predetermined to cause a forward rotation of the drawing-off rollers at a surface speed equal to that of the detaching half-lap 14, so that these parts will work properly in unison and without rubbing. By reason of the fact that the work of operating the piecing mechanism is shared equally by the two composite cams the levers 41 and 41' and their spring-pressed pawls are permitted to have a more leisurely traverse back and forth than is the case when but a single actuating means is employed, and ample time is therefore provided for the pawls 40 and 40' to become securely seated in the notches of their respective wheels, notwithstanding the relatively high rate of speed at which the combing-cylinder and the rest of the apparatus are revolved.

It is desirable for the combing-cylinder to be of as small diameter as possible in order for it to effectively project the ends of the detached staple into the bite of the piecing-rolls, and it is also desirable for it to carry the greatest possible number of rows of



combing-needles, as under these conditions the combing can be accomplished in the most efficient manner and at the highest speeds. The employment of the foregoing  
 5 arrangement of gearing and cams with a single-nip cylinder revolving at twice the speed of the cam-shaft secures the advantage, among others, of a small-diameter cylinder, together with a relatively long half-lap, as  
 10 just explained, and thereby renders it possible to run the machine at very high speeds without liability of imperfect piecing and without impairing the thoroughness of the combing.

15 The cam-shaft 10 also drives, through a pinion 60, a spur-gear 61, which is fast on the calender-roll shaft 62, and the calendering-rollers L are thereby driven at the proper speed to conduct the sliver from the sliver-  
 20 pan K and deliver it to the apron M. The nipper-cam 9, which is also carried by the cam-shaft 10, is provided with a cam surface or groove which is appropriate to cause two actions of the nipper-knife for each complete  
 25 revolution of the cam, and inasmuch as the nipper-knife has but a short range of movement, by virtue of acting against a stationary cushion-plate, the groove in the said double-throw cam may be made of a com-  
 30 paratively gentle pitch and short throw, which permits the said shaft to be run safely at high speeds.

Having described our invention, what we claim, and desire to secure by United States  
 35 Letters Patent, is—

1. In a combing-machine, the combination with a single-nip combing-cylinder, and an intermittently-actuated drawing-off and  
 40 piecing mechanism adapted for a complete operation for each complete revolution of said cylinder, of a plurality of independent actuating means for said mechanism, adapted to have successive driving connection therewith.

2. In a combing-machine, the combination with a single-nip combing-shaft, and an intermittently-actuated drawing-off and  
 45 piecing mechanism adapted for a complete operation for each complete revolution of said combing-shaft, of a plurality of independent actuating means for said mechanism adapted to have successive driving engagement therewith, a shaft for driving said  
 50 actuating means and gearing for driving said shaft at a less rate of speed than said combing-shaft.

3. In a combing-machine, a single-nip combing-cylinder provided with means for detaching the staple, drawing-off and piecing mechanism for said staple adapted for a  
 60 complete operation once for each revolution of said combing-cylinder and actuating means for said drawing-off and piecing mechanism comprising normally disconnected driving clutch members and a shaft rotating  
 65 at a less speed than said combing-shaft and

geared to drive the said drawing-off and piecing mechanism through first one and then the other of said clutch members.

4. In a combing-machine, means for combing and detaching the staple comprising a  
 70 single-nip combing-shaft, a drawing-off roller adapted to be suitably actuated to effect the piecing of the staple, in combination with a pair of driven clutch members permanently geared with said roller, inde-  
 75 pendent driving clutch members therefor adapted to clutch alternately therewith and an actuating-shaft for said driving clutch members controlling the operation thereof, the said controlling-shaft being geared to  
 80 rotate at a less speed than the combing-shaft.

5. In a combing-machine, a combing-shaft, having thereon a single detaching half-lap, a drawing-off roller adapted to piece the detachments of the staple and actuating means  
 85 for said roller comprising a shaft geared to rotate at a less speed than said combing-shaft, a pair of independent levers alternately actuated by said shaft and a pair of driven clutch members both geared with said roller  
 90 and respectively actuated by said levers.

6. In a combing-machine, a single-nip combing-cylinder, a drawing-off and piecing mechanism adapted for movement alternately in opposite directions and means for  
 95 suitably actuating the same comprising two driven clutch members permanently geared with said mechanism, a spring-pressed driving clutch member for each of said driven members and means for permitting said  
 100 spring-pressed driving members to engage with their respective driven members in alternation with each other.

7. In a combing-machine, drawing-off and piecing mechanism adapted for movement  
 105 alternately in opposite directions and a plurality of independent actuating means therefor respectively comprising a driven clutch-wheel and a driving-pawl spring-pressed into engagement therewith, in combination with  
 110 a single cam-shaft for causing said pawls to engage with and drive their respective clutch-wheels in succession and a single-nip combing-cylinder geared to rotate a complete revolution for each complete operation of said  
 115 drawing-off mechanism.

8. In a combing-machine, a drawing-off and piecing mechanism and double actuating means therefor comprising two notched wheels in permanent driving connection with  
 120 said mechanism, a lever for each of said wheels mounted concentrically therewith, driving-pawls carried respectively by said levers spring-pressed into engagement with said wheels, in combination with a single  
 125 cam-shaft for actuating said levers and pawls alternately and a single-nip combing-cylinder rotating at twice the speed of said cam-shaft.

9. In a combing-machine, means for comb- 130



ing the lap comprising a single-nip combing-cylinder and nipper mechanism for holding the same while it is combed, a drawing-off roller adapted to be actuated alternately in opposite directions for each action of the nipper mechanism, a plurality of driven clutch members geared with said roller and a plurality of clutch-engaging means respectively adapted to drive the same, in combination with a driving-shaft for said means geared to rotate a half-revolution for each action of the nipper mechanism and causing said means to engage successively or alternately with their respective clutch members.

10. In a cotton-combing machine, a nipper mechanism, a single-nip combing-shaft and piecing mechanism adapted for intermittent alternate motion, a plurality of means for transmitting said motion to said mechanism, a driving-shaft therefor rotated at a less speed than said combing-shaft and suitably connected for driving said means alternately, in combination with a multiple-acting cam on said driving-shaft for actuating said nipper mechanism.

11. In a combing-machine, drawing-off and piecing mechanism, a plurality of means for actuating the same and a cam-shaft common to said means for alternately driving them, in combination with a nipper mechanism having a stationary jaw and a movable jaw, and a multiple-acting cam on said cam-shaft for operating said movable jaw.

12. In a combing-machine, means for nipping the lap comprising a stationary cushion-plate and movable nipper-knife, and a combing-cylinder and drawing-off roller, in combination with a cam-shaft rotated at half the speed of said combing-cylinder and geared to actuate the said drawing-off roller, and a double-throw cam on said cam-shaft for operating the nipper-knife.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

OSCAR L. OWEN.  
ELWIN H. ROONEY.

Witnesses:

R. E. LINCOLN,  
H. H. BULLOCK.