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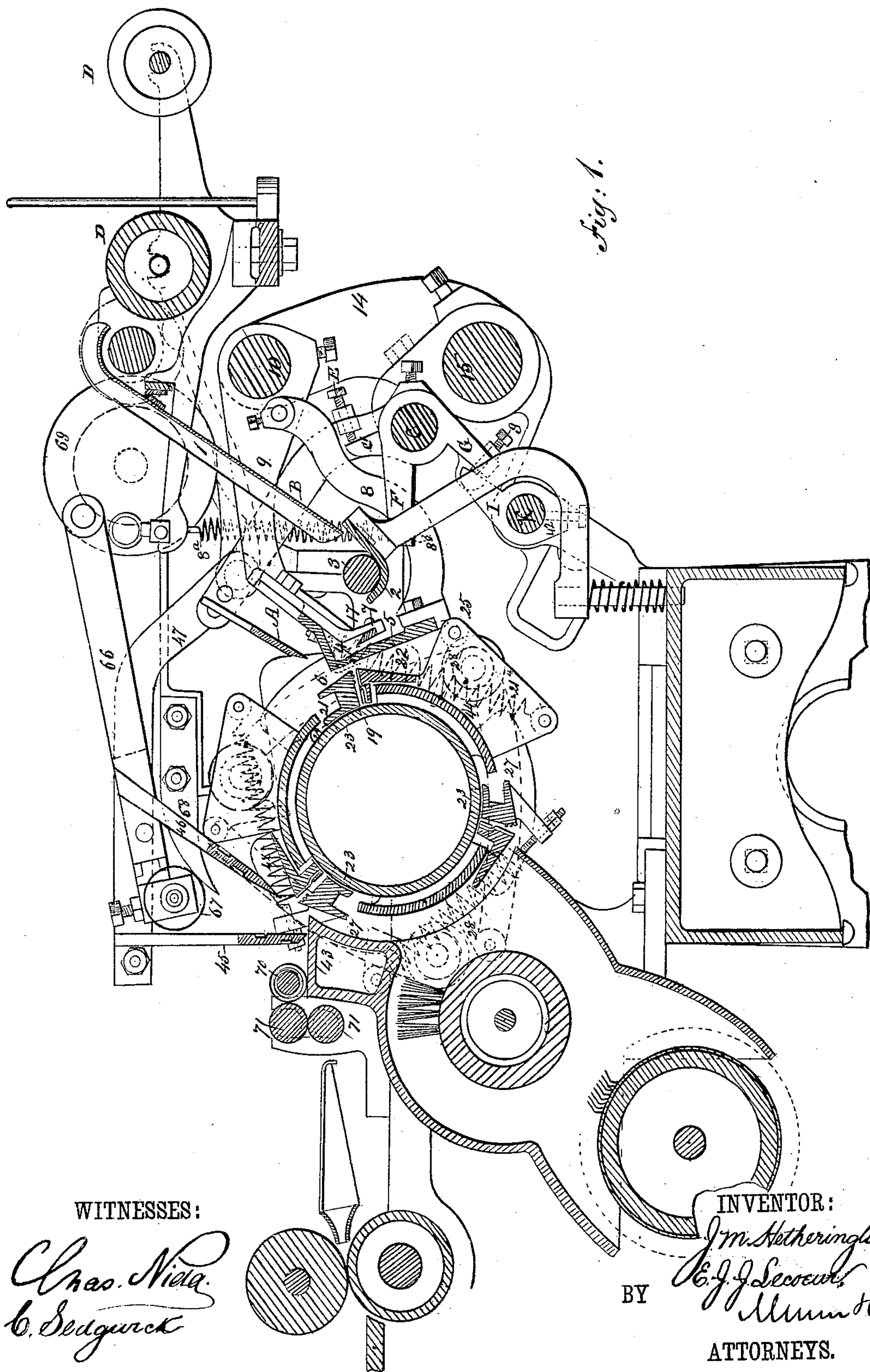
8 Sheets—Sheet 1.

J. M. HETHERINGTON & E. J. J. LECOEUR.

MACHINE FOR COMBING COTTON.

No. 246,770.

Patented Sept. 6, 1881.



WITNESSES:

*Chas. Nida*  
*C. Sedgwick*

INVENTOR:

*J. M. Hetherington*  
*E. J. J. LecoEUR*  
*Munn & Co*  
BY  
ATTORNEYS.

(No Model.)

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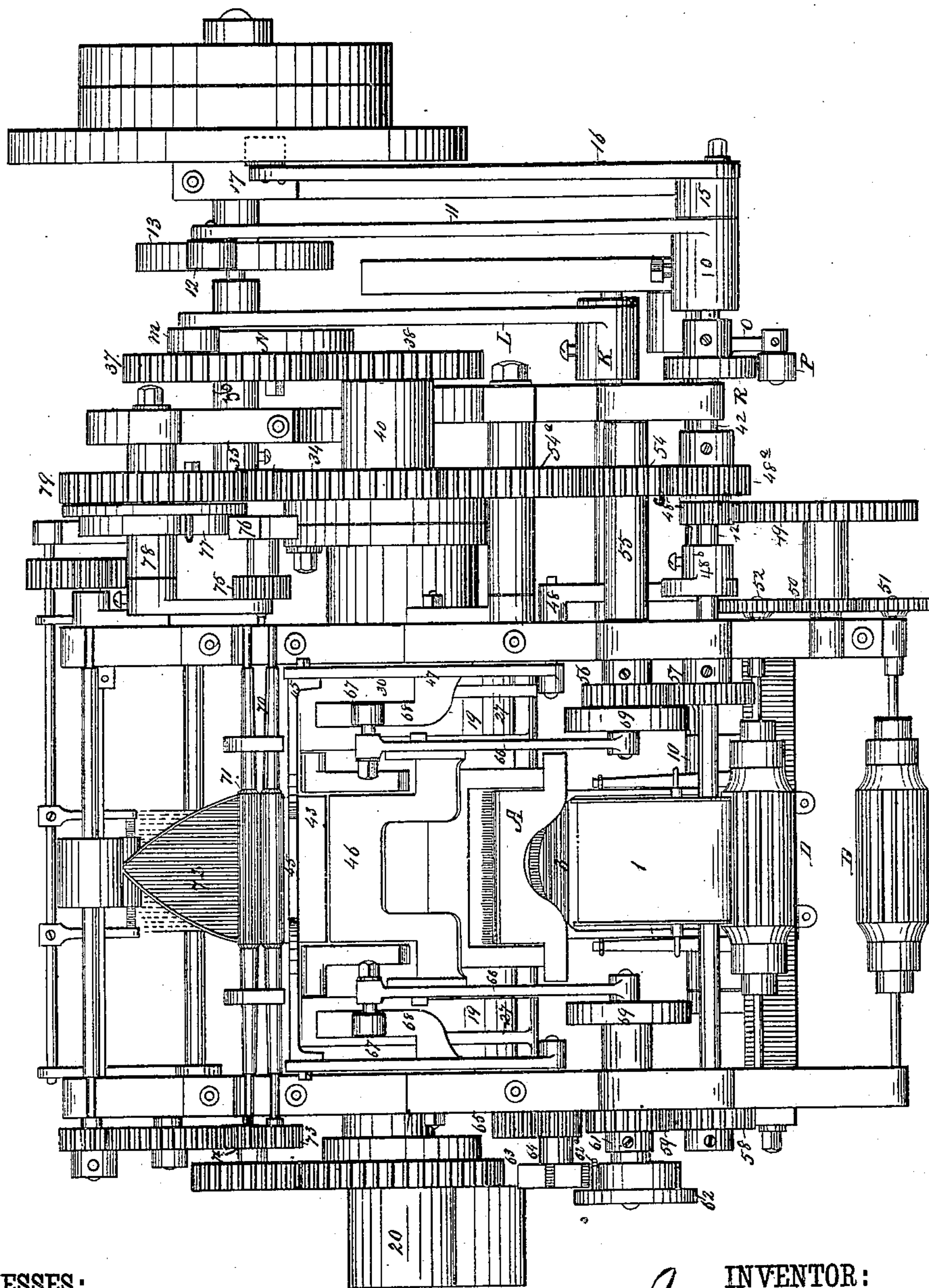
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Fig. 1.



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(No Model.)

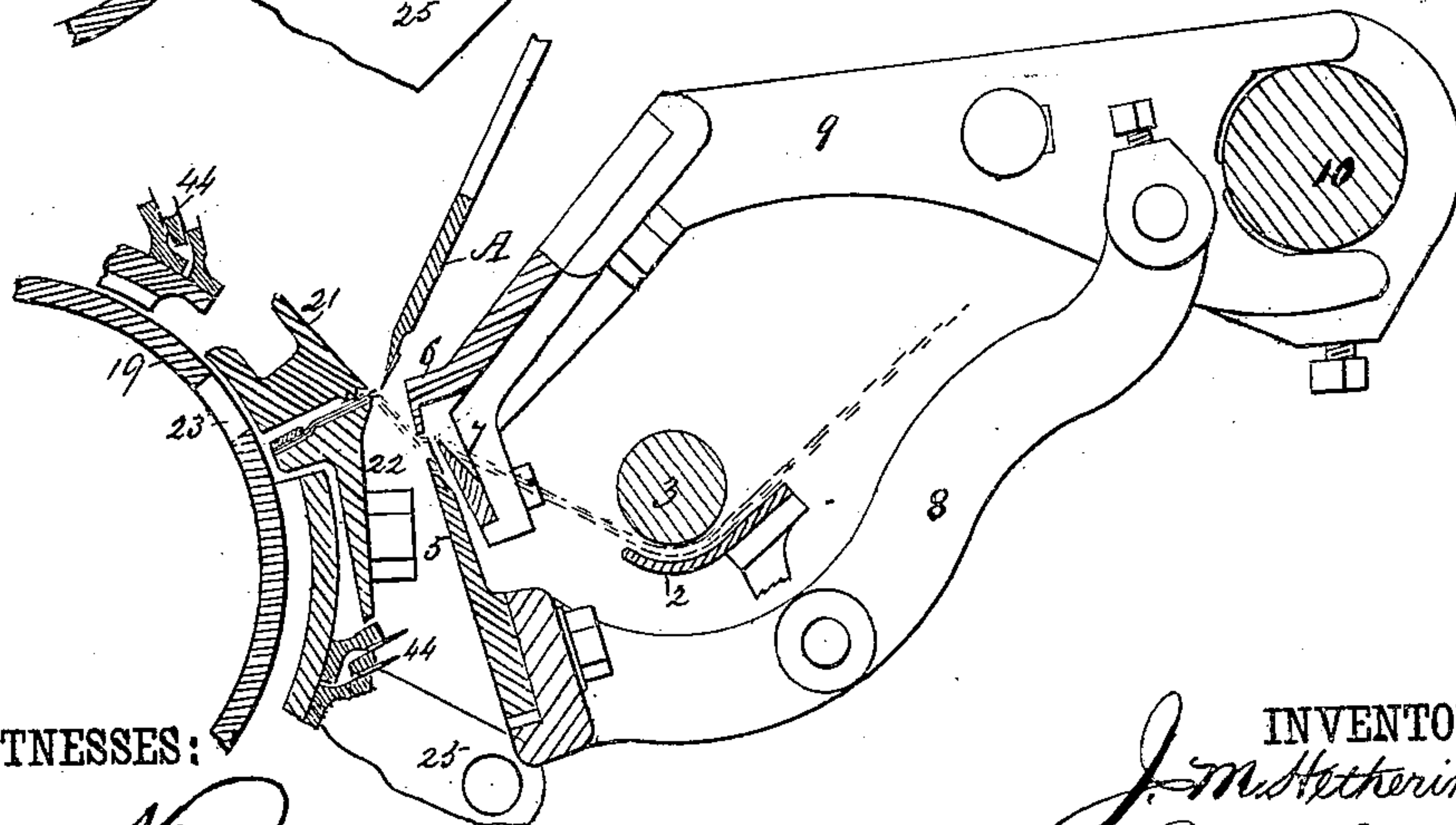
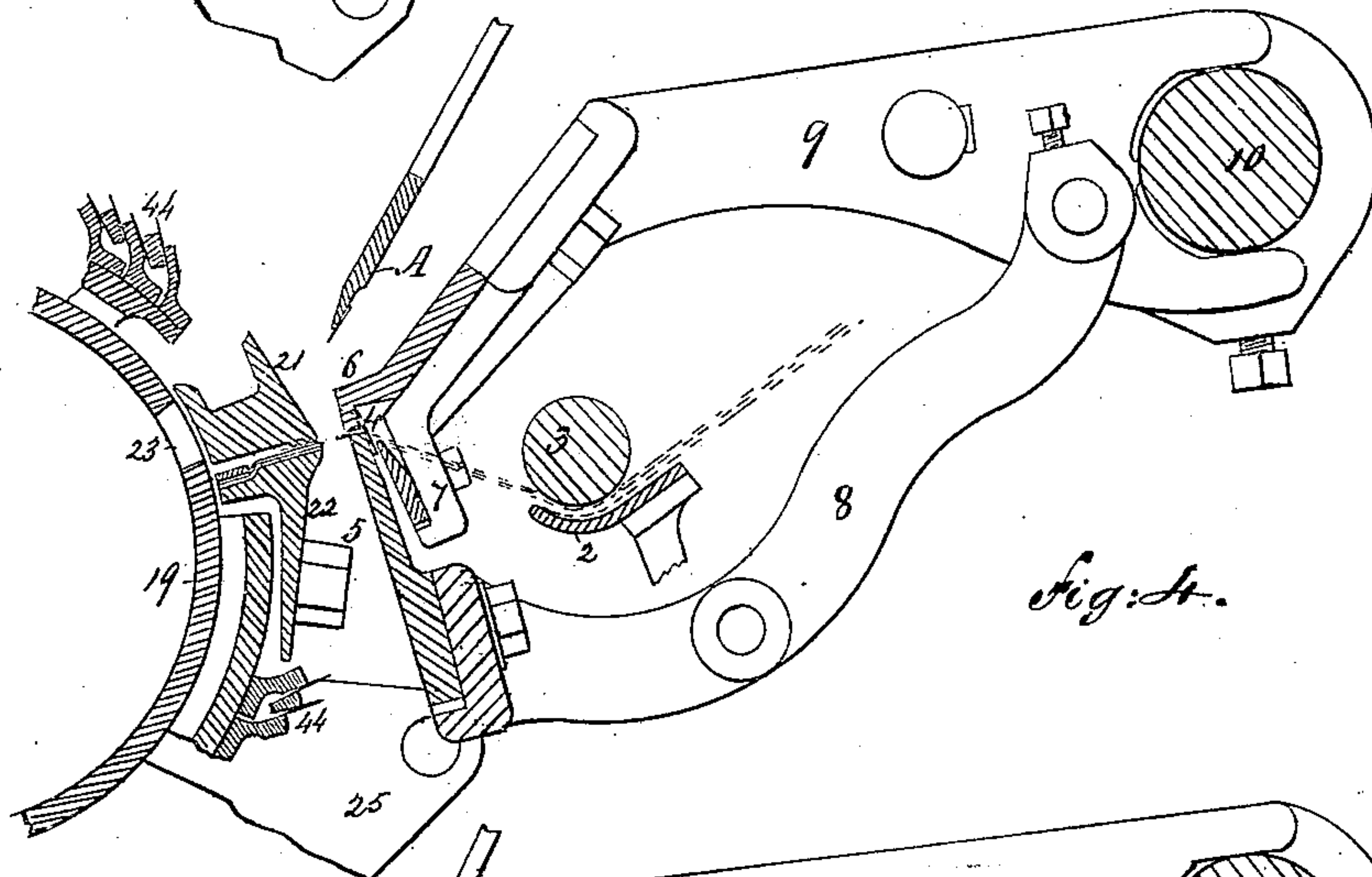
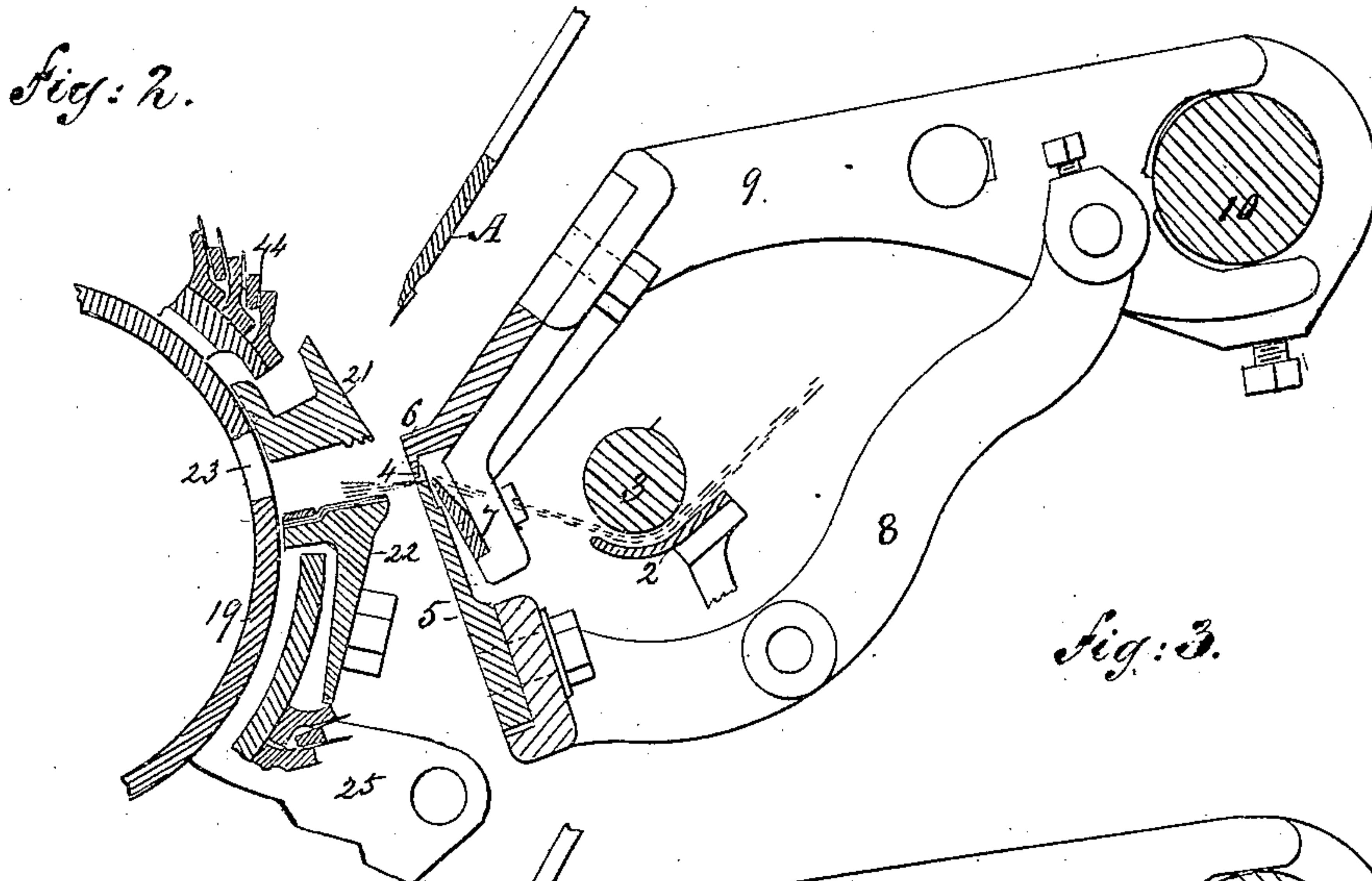
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(No Model.)

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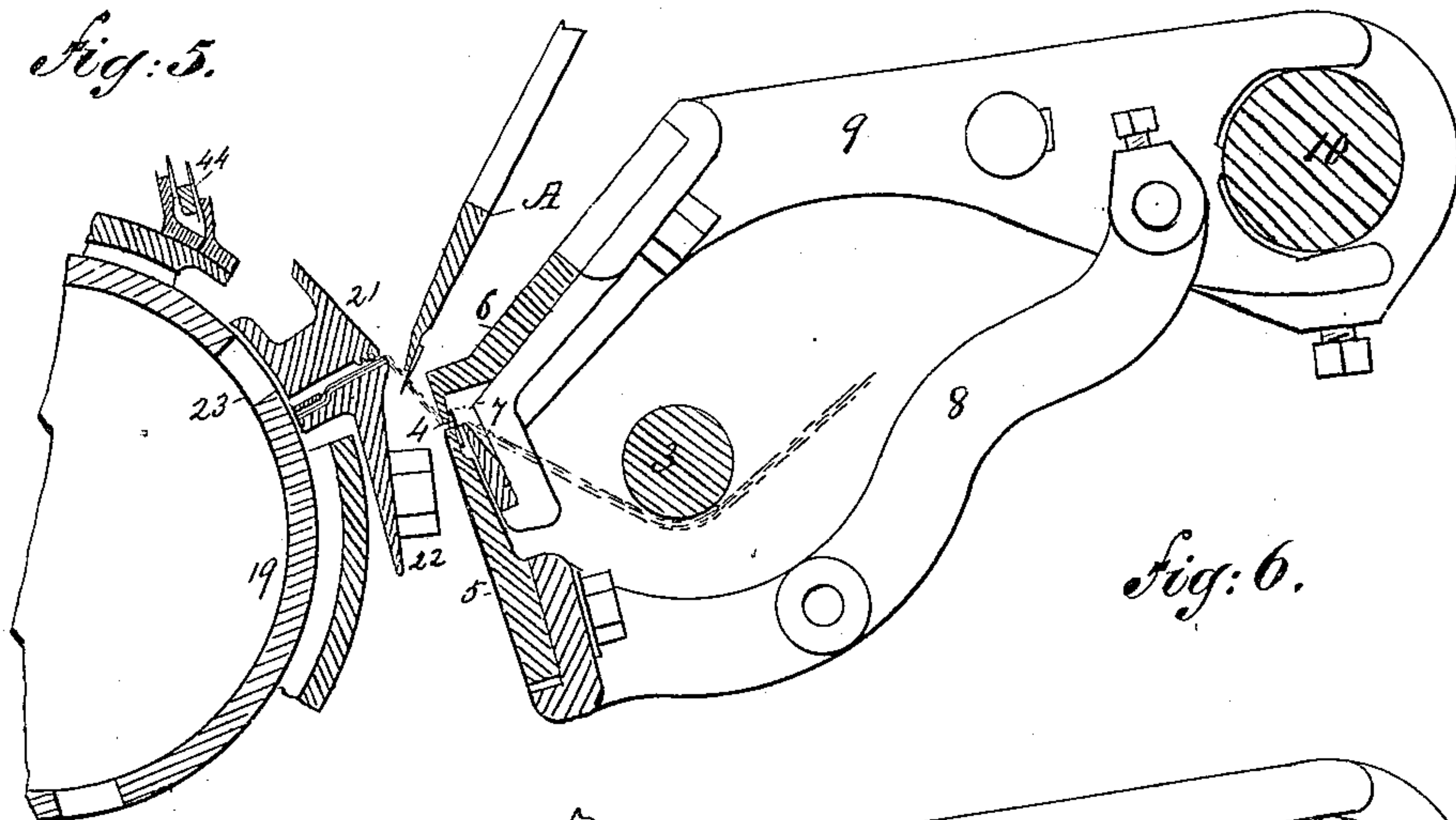
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MACHINE FOR COMBING COTTON.

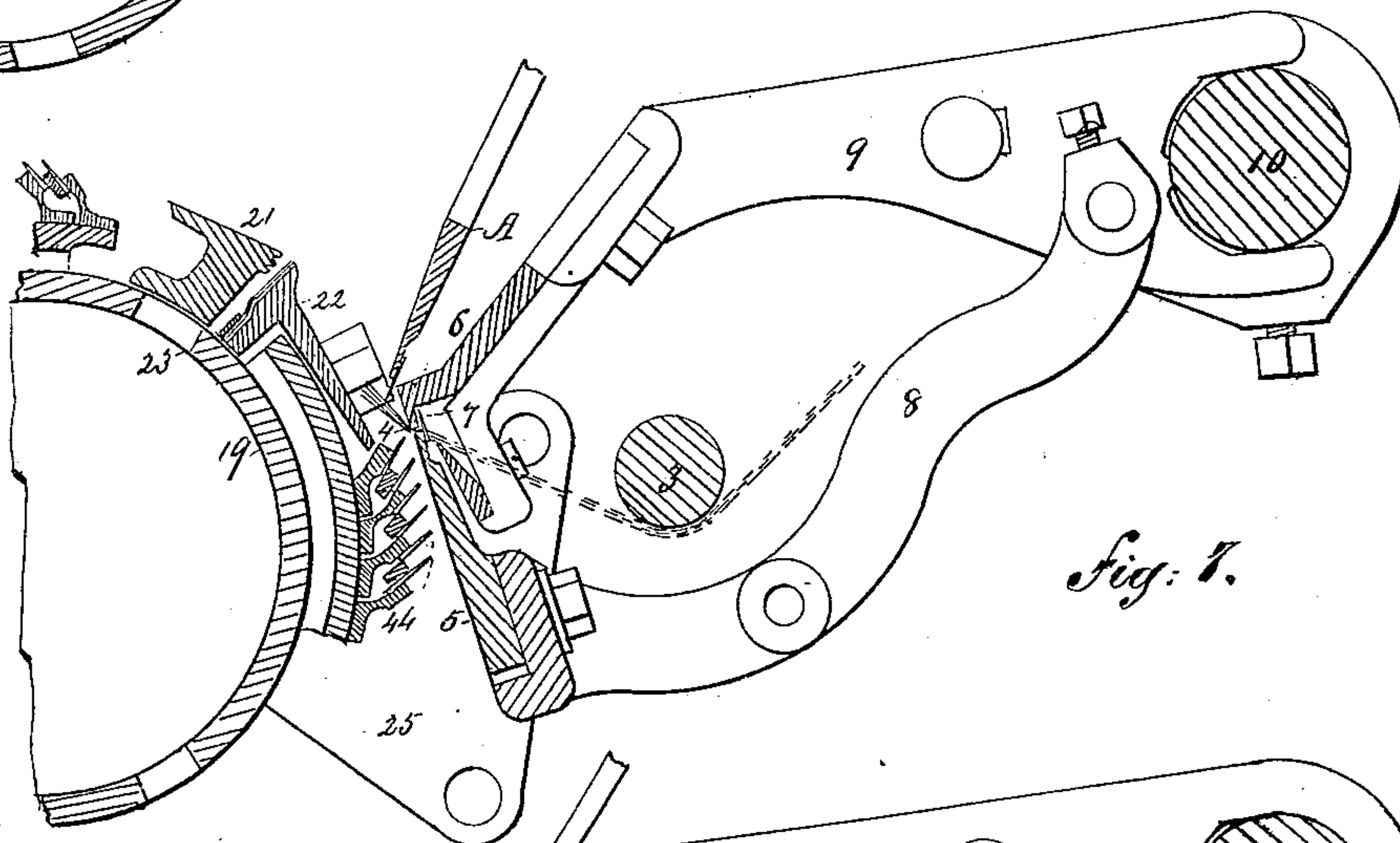
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Patented Sept. 6, 1881.

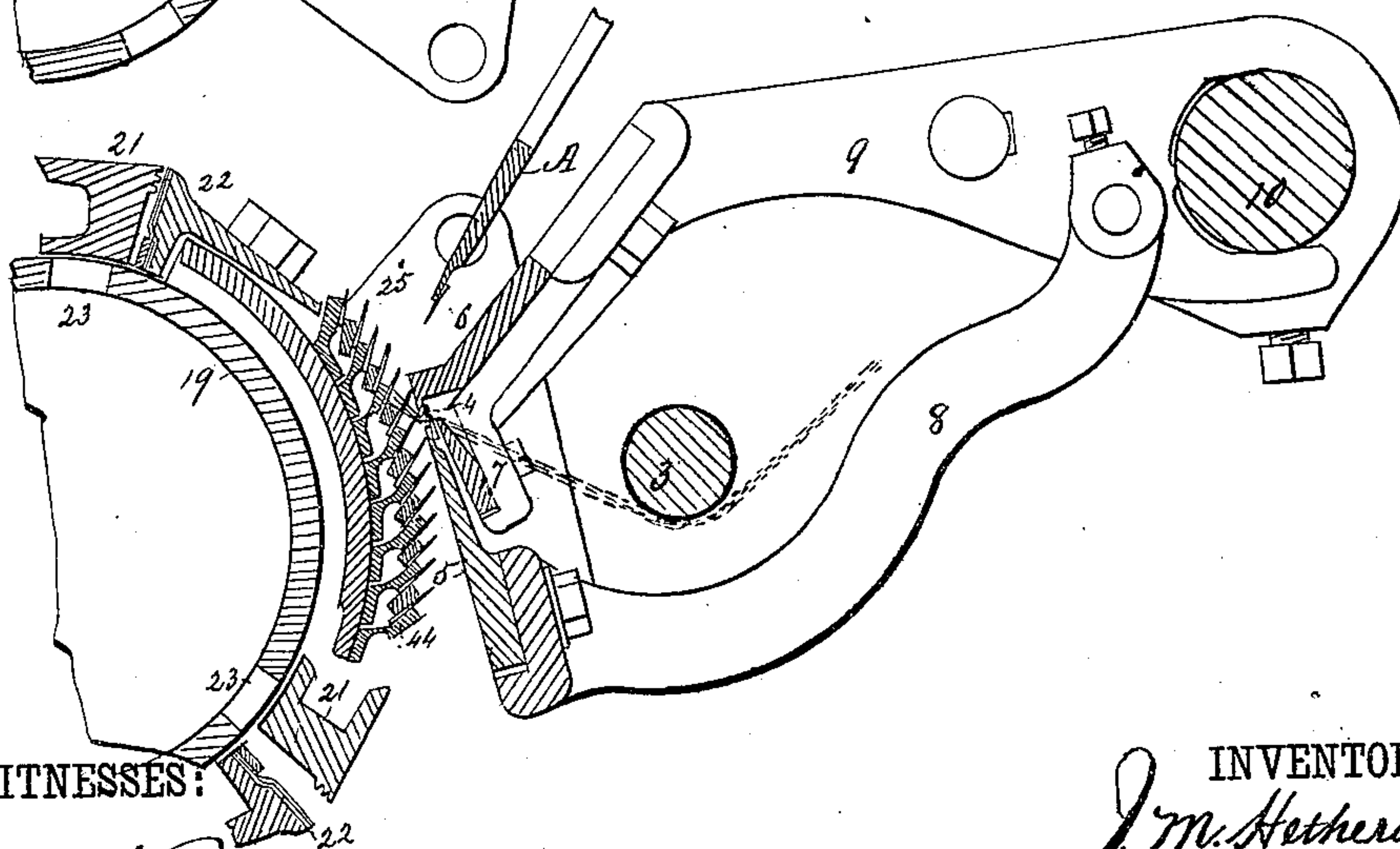
*Fig: 5.*



*Fig: 6.*



*Fig: 7.*



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8 Sheets—Sheet 5.

J. M. HETHERINGTON & E. J. J. LECOEUR.

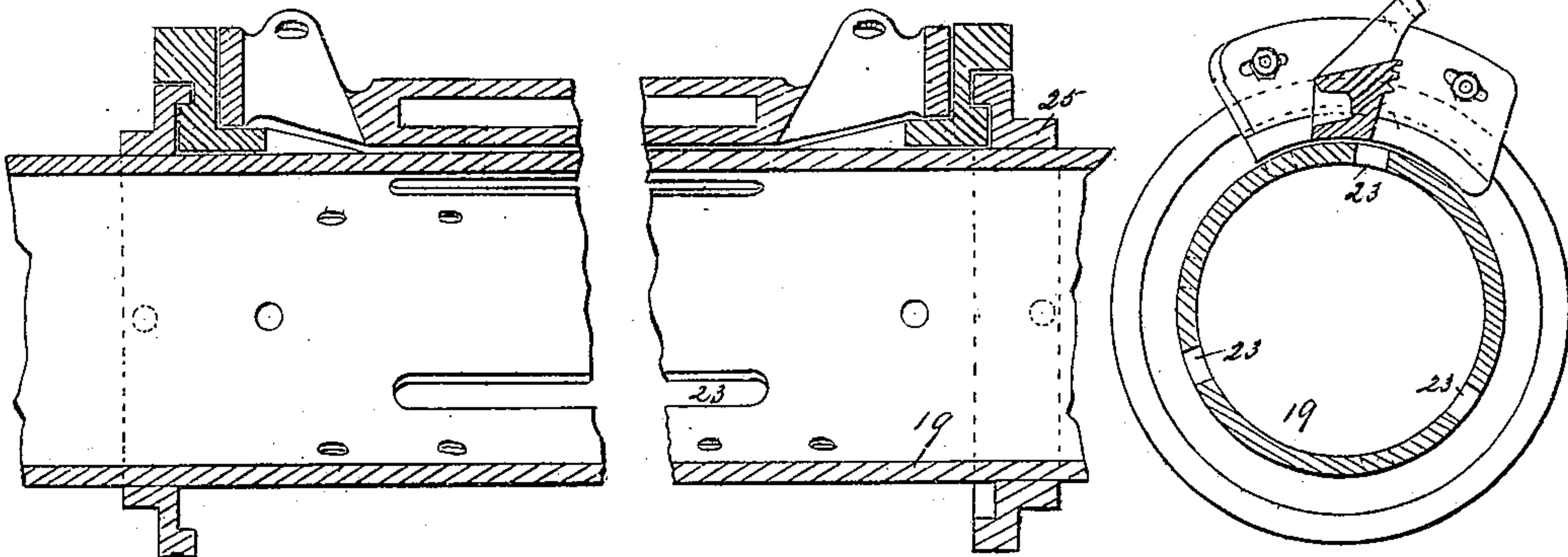
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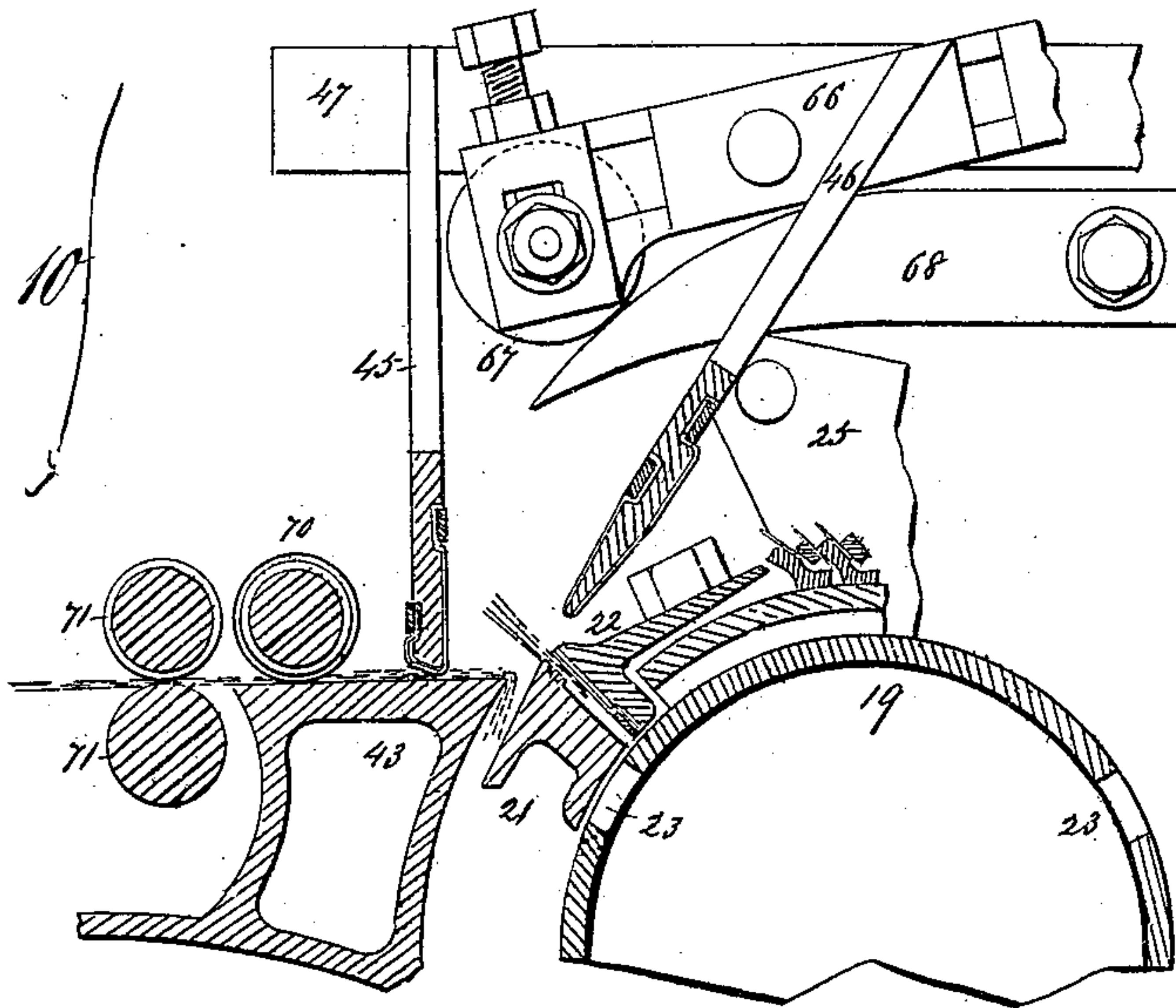
Patented Sept. 6, 1881.

*Fig: 8.*

*Fig: 9.*



*Fig: 10.*



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(No Model.)

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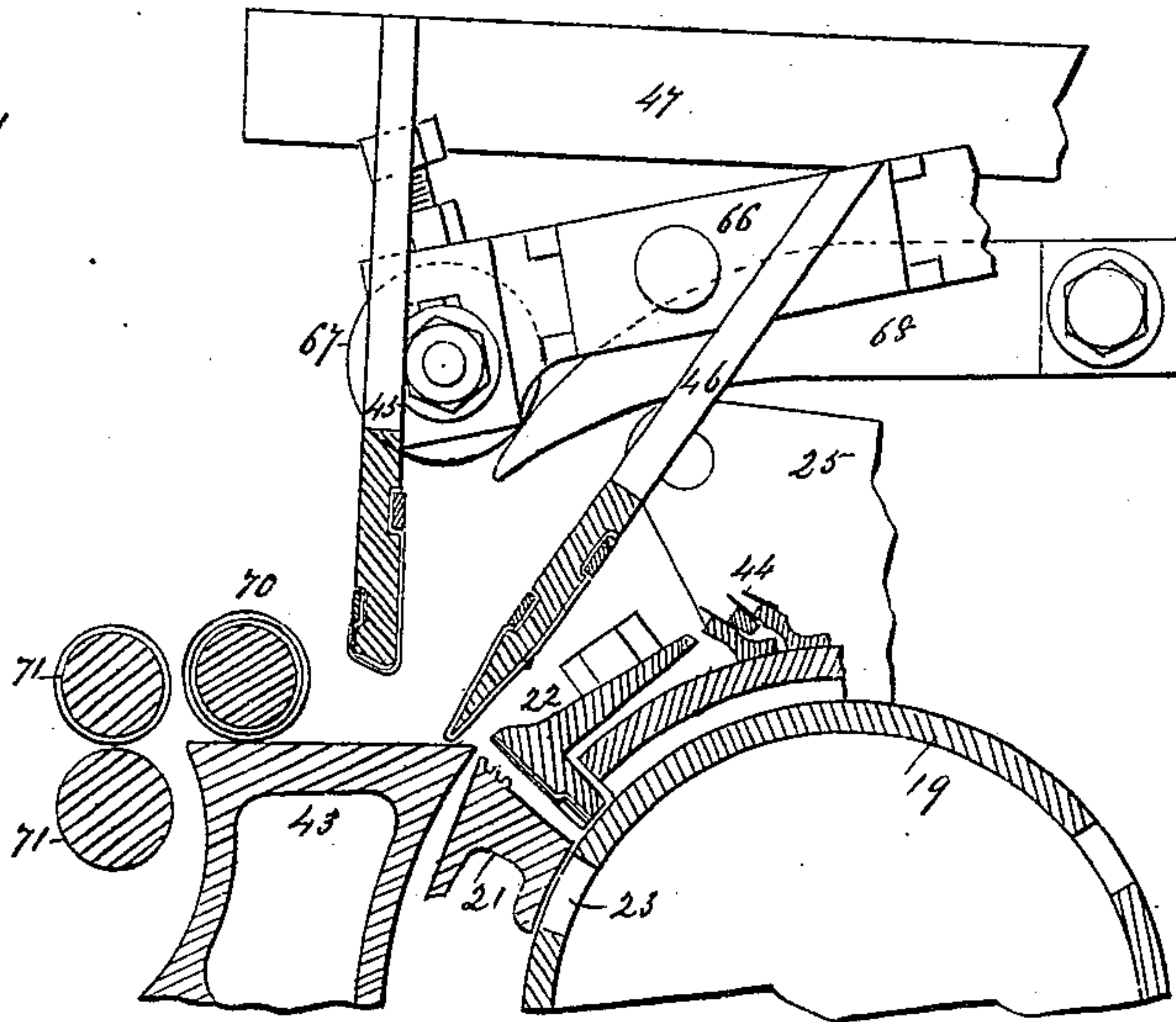
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MACHINE FOR COMBING COTTON.

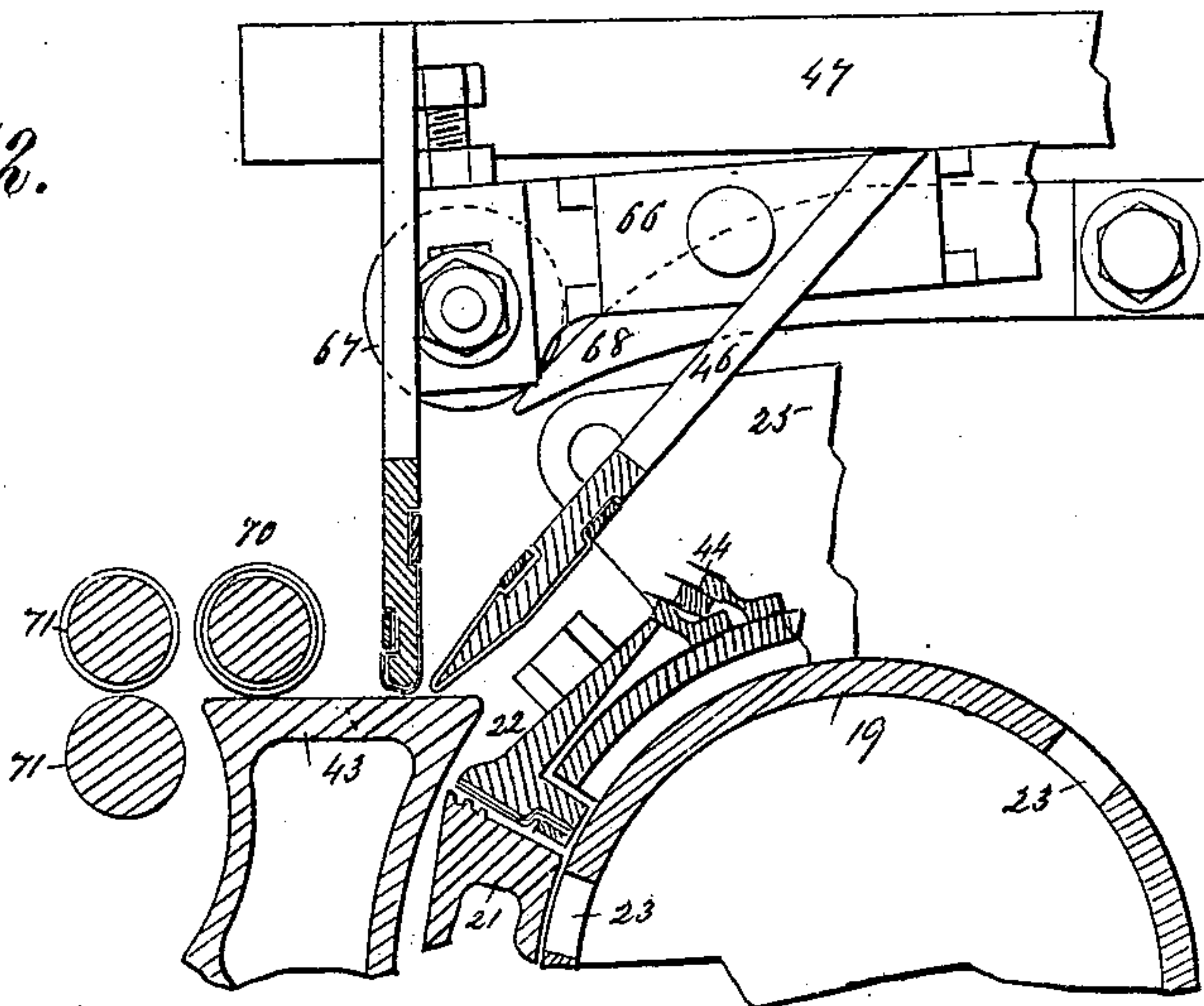
No. 246,770.

Patented Sept. 6, 1881.

*Fig. 11.*



*Fig. 12.*



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(No Model.)

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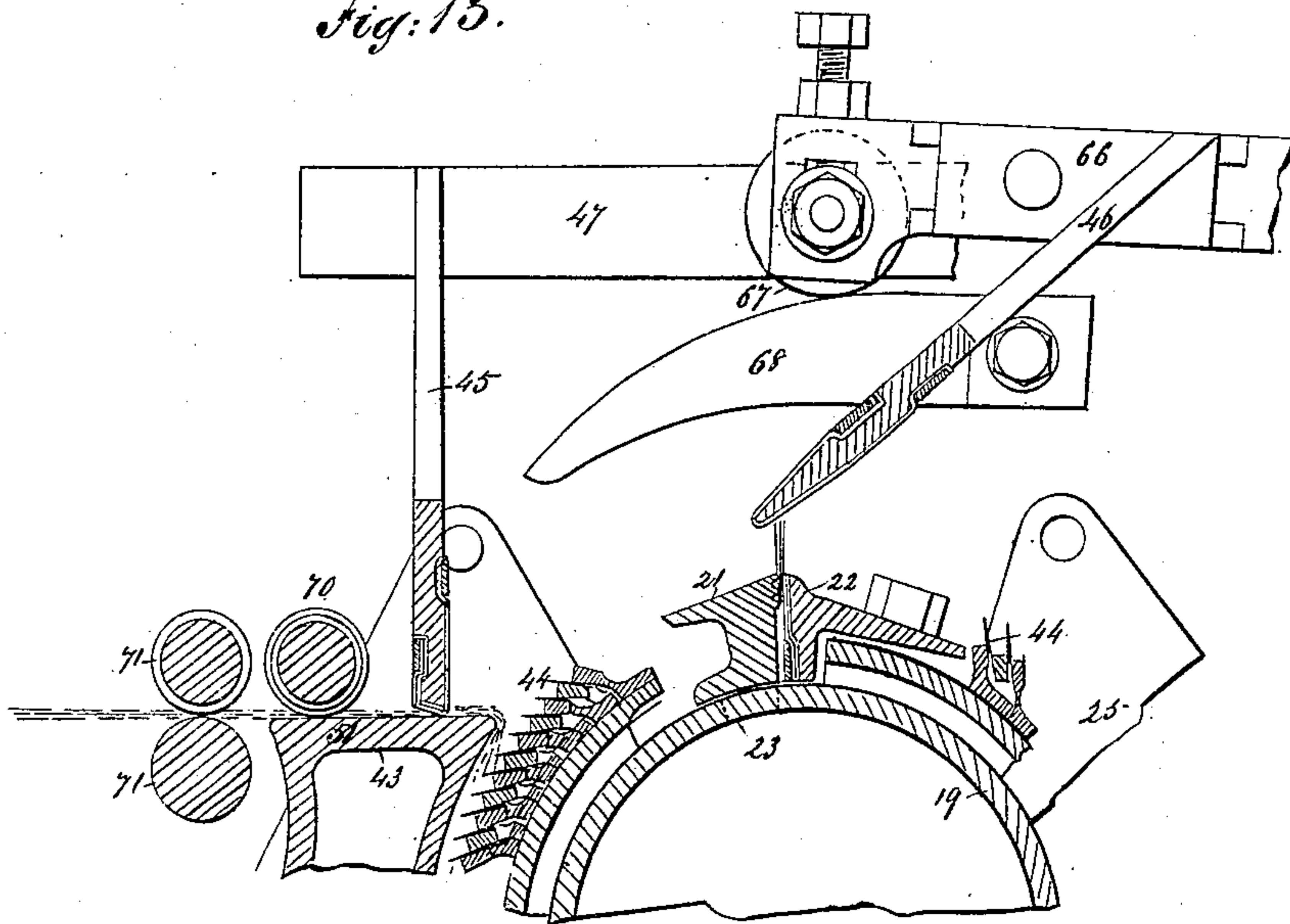
J. M. HETHERINGTON & E. J. J. LECOEUR.

MACHINE FOR COMBING COTTON.

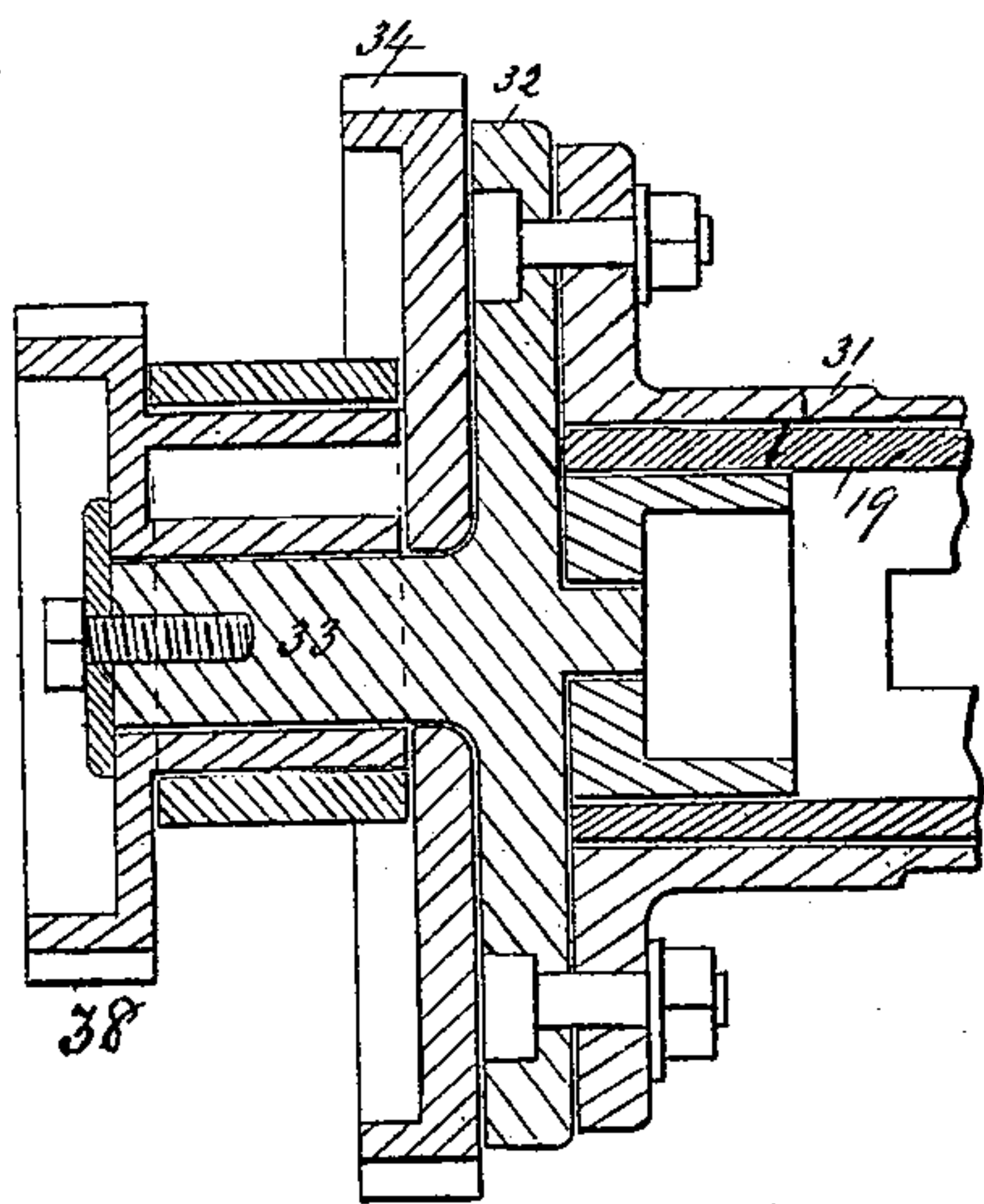
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Patented Sept. 6, 1881.

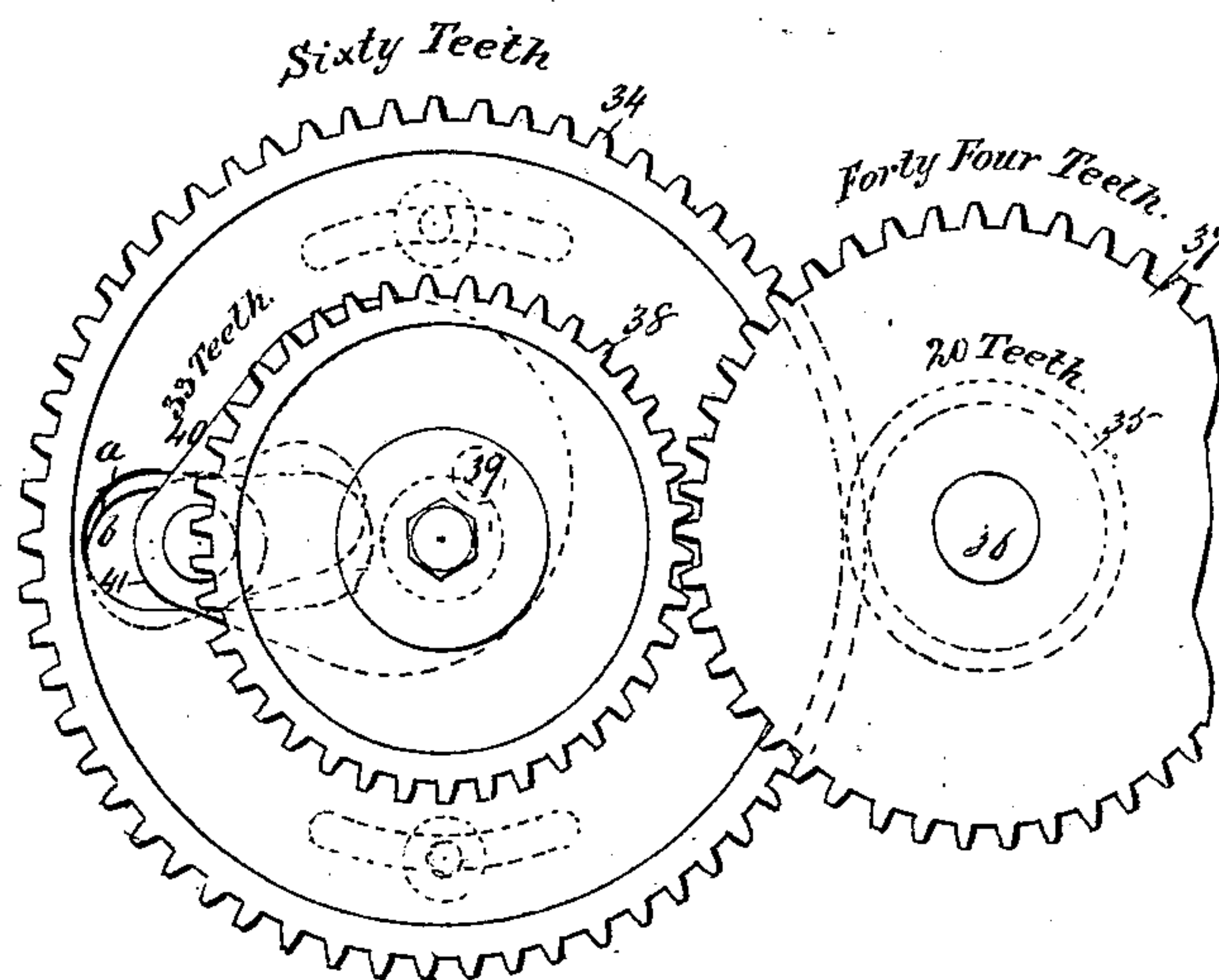
*Fig: 13.*



*Fig: 14.*



*Fig: 15.*



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(No Model.)

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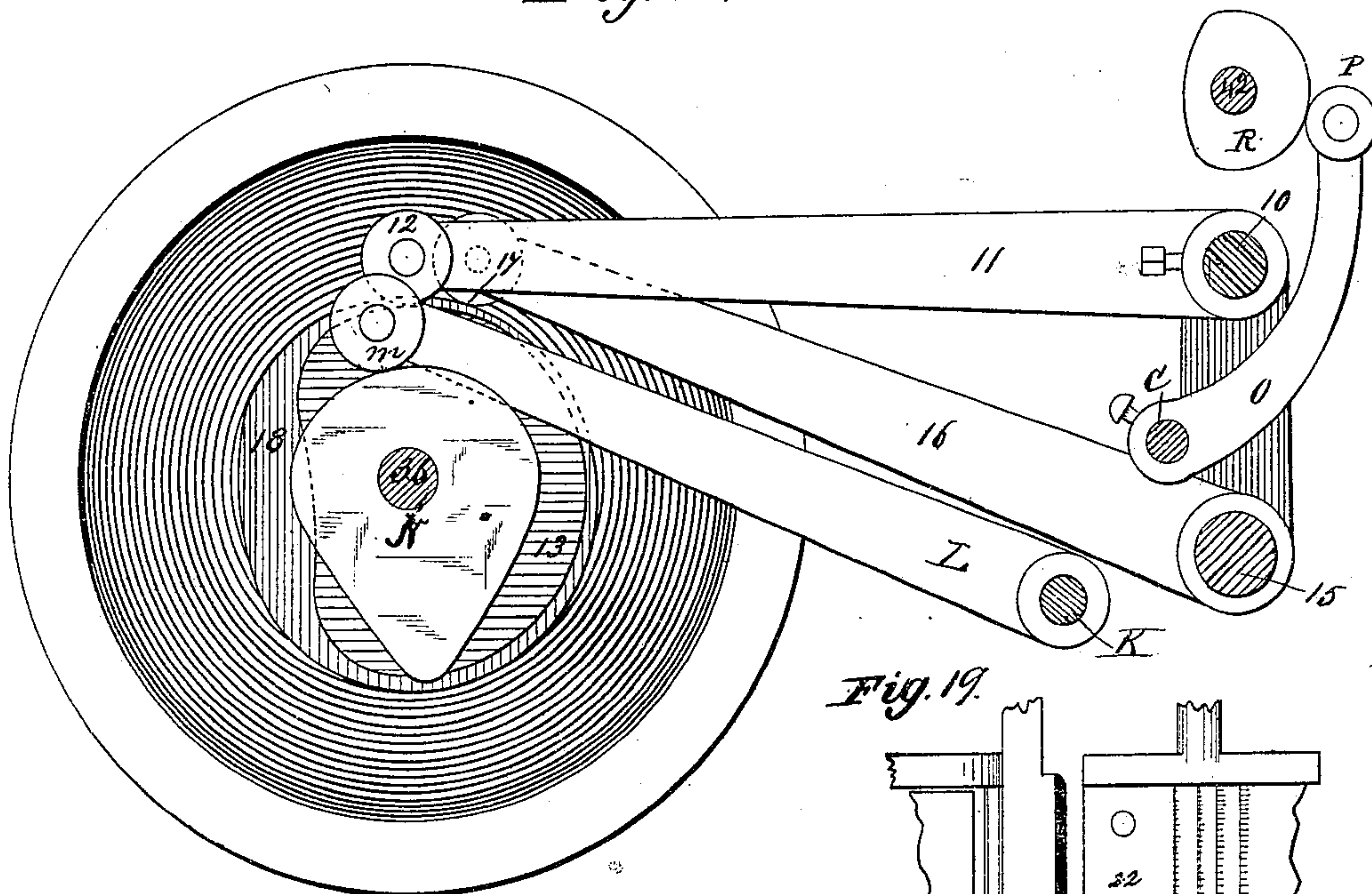
J. M. HETHERINGTON & E. J. J. LECOEUR.

MACHINE FOR COMBING COTTON.

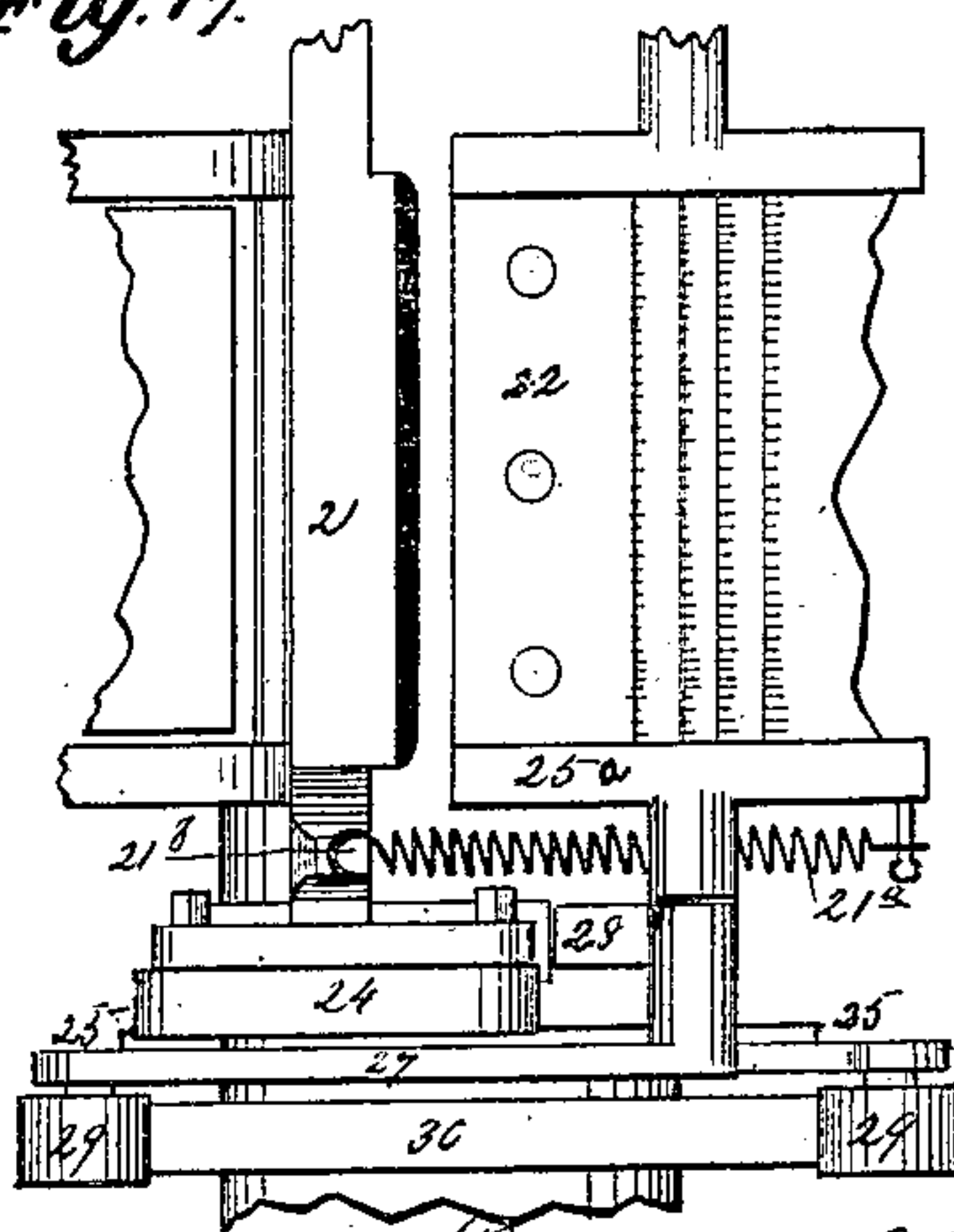
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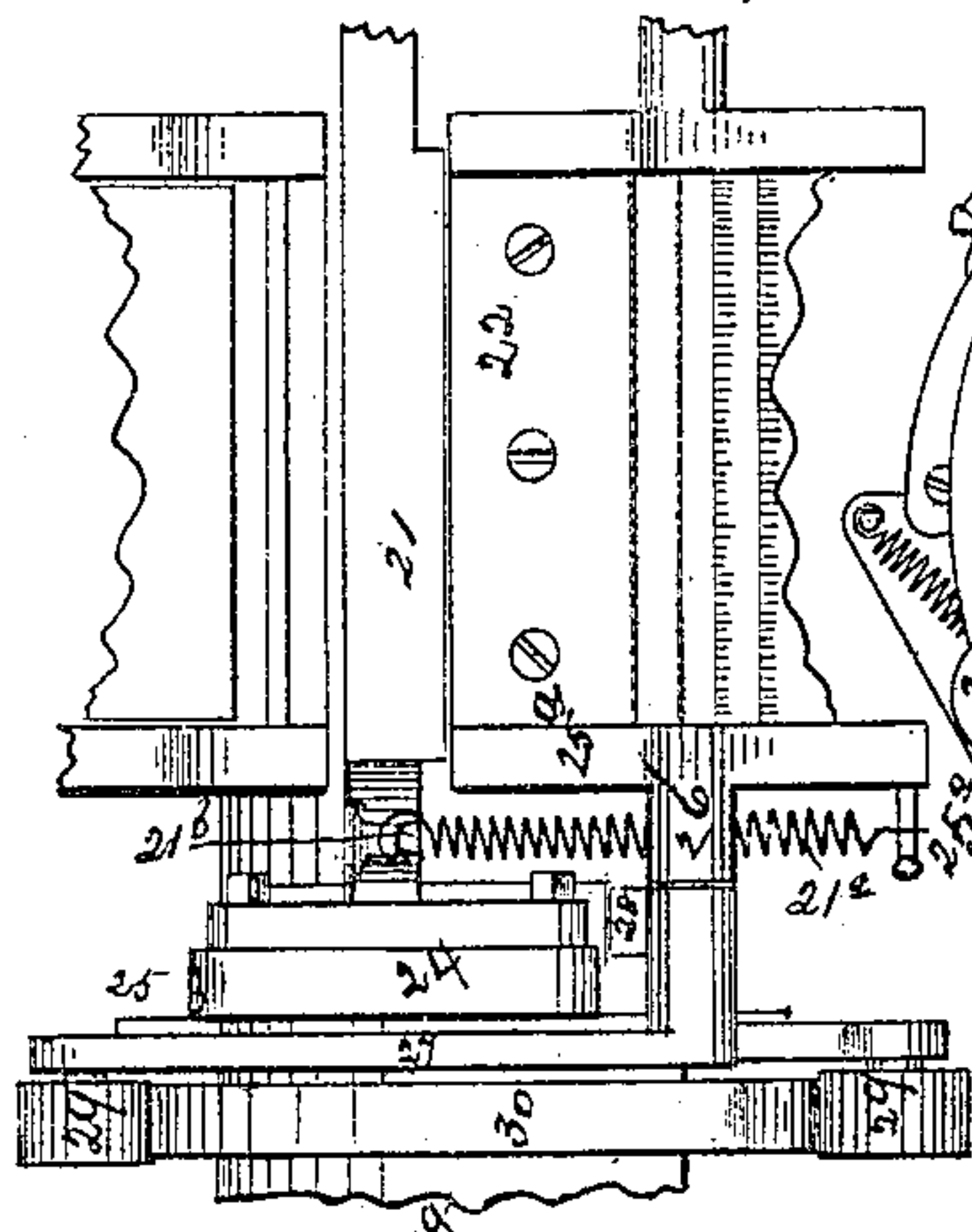
*Fig. 16.*



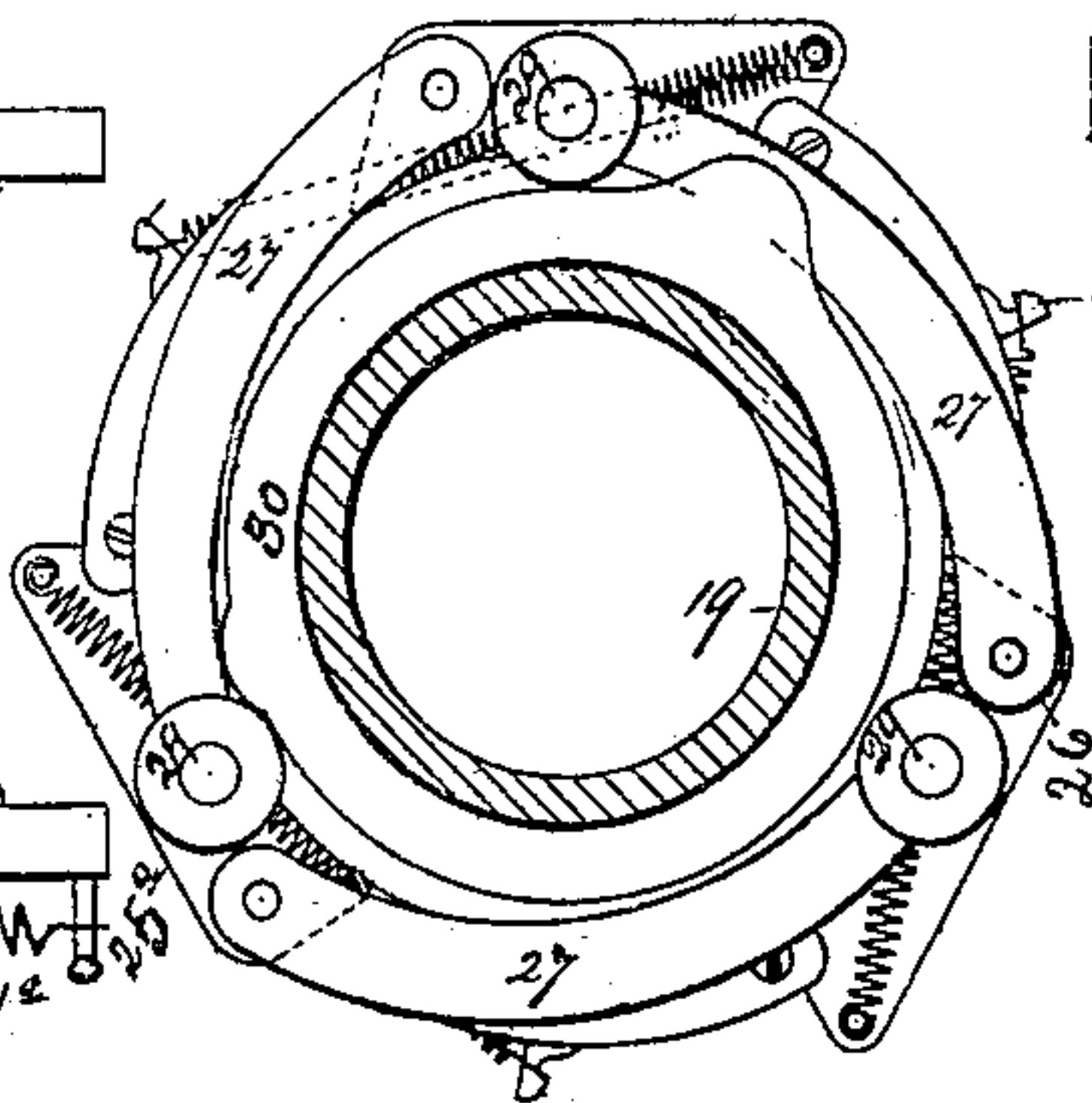
*Fig. 19.*



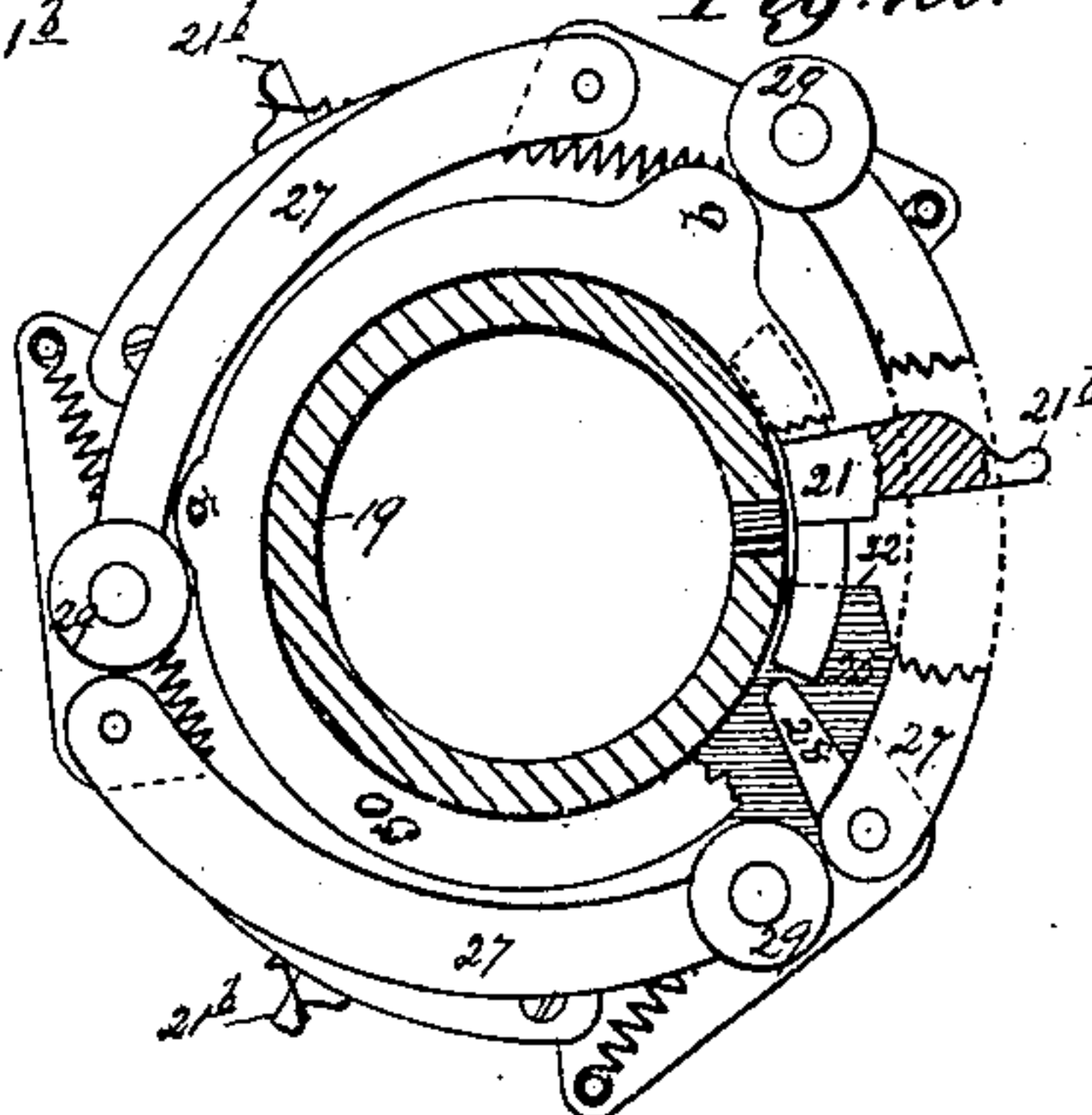
*Fig. 17.*



*Fig. 18.*



*Fig. 20.*



WITNESSES:

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ATTORNEYS.



# UNITED STATES PATENT OFFICE.

JOHN M. HETHERINGTON, OF MANCHESTER, COUNTY OF LANCASTER, ENGLAND, AND EDOUARD J. J. LECŒUR, OF ROUEN, FRANCE.

## MACHINE FOR COMBING COTTON.

SPECIFICATION forming part of Letters Patent No. 246,770, dated September 6, 1881.

Application filed October 13, 1880. (No model.) Patented in England January 21, 1876, and December 14, 1876.

*To all whom it may concern:*

Be it known that we, JOHN MUIR HETHERINGTON, of Manchester, in the county of Lancaster, England, and EDOUARD JULES JOSEPH LECŒUR, of Rouen, France, have invented a new and useful Improvement in Combing-Machines; and we do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 represents a sectional elevation of a machine containing our inventions; Fig. 1<sup>a</sup>, a plan view of the same; Figs. 2 to 7, detail drawings of the successive positions of the nippers; Fig. 8, a vertical longitudinal section of the cylinder; Fig. 9, a vertical transverse section of the same; Figs. 10 to 13, vertical longitudinal sections of the cylinder, pusher, holder, table, and delivery-rollers in different positions, as in course of operation. Fig. 14 represents a vertical transverse section of the cylinder and wheels attached thereto. Fig. 15 shows an elevation of the same. Fig. 16 is a detail drawing of the cams attached to the driving-shaft and the levers working thereon. Figs. 17 and 18 show plan and elevations of the working mechanism of the cylinder-jaws. Figs. 19 and 20 represent detail views of the construction, and show the mode of operation of the cylinder-jaws.

Our improvements relate to machines for combing cotton and other fibrous material.

The object of our invention is to construct a machine which shall more effectually comb cotton or other fibrous material than has hitherto been possible.

Our invention consists, first, in a particular construction of the rotating clamps; second, in a comb situated on or near the feed-plate, operating in connection with the aforesaid clamps; third, in a comb fastened on a lever and having a reciprocal and oblique movement; fourth, in a pusher having a forward and downward movement and a holder having a vertical movement, in combination with a table for receiving and piecing together in slivers the tufts of fibrous material; and, finally, in cer-

tain details of construction, all of which will be hereinafter more fully described.

In order that a clear comprehension of the mechanism may be had, such parts as are not necessarily dependent for operation upon their connection with the peculiar combination of mechanism employed will be merely adverted to in a general way and their exact connection with the elements of the invention will not be consecutively traced out.

The cotton, wool, or other fibrous material, after passing over the rollers D D, is received in a trough, 1, curved at the upper end and descending obliquely in a forward direction toward the curved plate 2, supported in any convenient way upon the frame-work of the machine.

3 is a roller, designed to feed at intervals the material to be operated upon to the nippers 5 6. The said roller 3 is given an intervallic movement by means of a train of wheels connecting the same with the driving-shaft of the machine, as will be hereinafter fully described. The fibrous material, after leaving the curved plate 2 and roller 3, passes between the teeth of the comb 4, secured to the nipper 5. This nipper, in combination with another, 6, holds the fibers prior to being grasped by the cylinder-jaws.

Attached by an arm to nippers 6 is a plate, 7, which serves to disengage the fibers from the comb 4 when the nippers are separated. These nippers 5 6 are attached to arms or levers 8 9, respectively, the lever 8 being pivoted to arm 9 or secured to shaft 10, and ordinarily held upward by spring 8<sup>a</sup>, attached to said lever and to the frame-work of the machine, and the arm 9 is secured to shaft 10. The nipper 5 is drawn down in the following manner: Loose upon the shaft C is a double finger, F G, the part F of which abuts against a pin, 8<sup>b</sup>, projecting from lever 8, and the part G bears a set-screw, g, which is in contact with a finger, I, that is fast upon a shaft, K.

The shaft K has upon one end an arm, L, bearing on its extremity a roller, m, whose movement is controlled by the revolution of the cam N, borne by the driving-shaft 36. This



cam is provided with a single peripheral elevation, so situated as that the roller and the lever bearing it may be raised and the nippers 5 drawn down when said nippers are opposite and in closest proximity to the jaws of the cylinder, whereby the said jaws of the cylinder are enabled to secure a hold upon the tufts of fibrous material close to the nippers.

Shaft 10 is provided with an arm or lever, 11, having on its extremity roller 12, resting upon a cam, 13, attached to the main shaft, by which latter the vertical movement is given to the nipper 5; but in order to allow the jaws of the cylinder to obtain hold upon the fibers, close to the nippers, and at the same time to give the comb attached to the cylinder opportunity to comb out the succeeding tuft of fibers without coming in contact with the nippers, there is also a reciprocal movement given to said shafts or levers 8 9 by means of the lever 14, attached to shaft 15, the latter being provided with a lever, 16, having upon its extremity a roller, 17, engaging with and given motion to by a cam, 18, fastened on the said main shaft of the machine. From this it will be seen that the nippers open, seize the fragments of cotton, and carry the same forward toward the cylinder, where they are caught by the jaws of said cylinder and drawn from the nippers 5 6 by the rotation of said cylinder, as will be hereinafter explained. The cylinder 19, lying in close proximity to the aforesaid nippers, is of hollow construction and connected by the draft-chamber 20 with a fan. (Not shown.) Upon the periphery of said cylinder are formed a series of jaws, 21 22, between which (in their opened position) are the slots 23, so that when the jaws are opened the current of air induced by the aforesaid fan draws in the extremities of the fibers held by the nippers 5 6. The jaw 22 is attached immovably to the periphery of the aforesaid cylinder, but the jaws 21 have an intervallic movement imparted to them in the manner now described, to wit: The said jaws 21 have upon their extremities flanges 24, working in grooves formed in flanges 25 on the cylinder 19.

The flanges 25<sup>a</sup> are provided with projections or lugs 26, to which are pivoted segmental levers 27, provided on their inner ends with arms 28, said arms engaging with a lug on said flanges 24. On their farther or outer extremities are rollers 29, which are raised or lowered by the elevations and depressions of a cam, 30, fixed upon the frame of the machine. This cam is provided with two peripheral elevations, *a b*, as seen in Fig. 20, so situated as that the rollers 29, in passing over them, shall raise the levers 27, and so draw the jaws 21 away from jaws 22, as the said jaws are successively contiguous to the nippers 5 6 and delivery-table 43, respectively.

On either side of jaw 21 is an arm, 21<sup>b</sup>, connected by a spring, 21<sup>a</sup>, with the arm 25<sup>a</sup> of

the flange of the fixed jaws, and holding the said jaws together when not opened in the manner aforesaid. The intervallic movement of said cylinder is arranged to correspond with the presentations of the fibrous material in the following manner: Attached to cylinder 19 is a bush, 31, bolted to a plate, 32, bearing a stud, 33. Loosely mounted on said stud is a gear-wheel, 34, provided with sixty teeth. This wheel gears with a pinion, 35, upon the main shaft 36, having twenty teeth, and thus there are three revolutions of the driving-shaft to one of gear-wheel 34.

Secured to the shaft 36 is a second wheel, 37, having forty-four teeth, and this wheel engages with another, 38, provided with thirty-three teeth, so that the main shaft in making three revolutions causes the stud 33 to make four revolutions, or, finally, 38 revolves four times to once of 34.

Pivoted to 38 is an eccentric, 39, provided with a strap, 40, bearing on its outer extremity a roller, 41. The latter projects through a radial slot, *a*, in the wheel 34 and an oblique or inclined slot, *b*, in the plate 32. This roller would ordinarily be reciprocated once at each revolution of the wheel 38; but as the wheel 34 revolves in the same direction once to four revolutions of wheel 38, and carries with it roller 41, it will be seen that one of the reciprocating motions will be lost. The roller has two motions—a reciprocal and a rotary—and the great diameter of the slot *b* in the plate 32 is made to coincide with the path of the roller resultant from these two motions, so that during one-half of each reciprocation the roller traverses the oblique slot without imparting motion to the plate 32; and as said plate is secured to the cylinder it will be seen that thrice during each revolution of said plate there is a suspension of motion. This suspension is arranged to take place as the nippers and jaws come opposite each other, as hereinbefore stated. In the act of being drawn from nippers 5 6 the fibers are descended upon, divided, and combed by comb A. Said comb is secured to a lever, B, pivoted or journaled at its inner extremity to the shaft C, (said shaft pivoted to either side of the frame-work of the machine.)

Through the aforesaid lever B a set-screw, E, passes, abutting against a finger, *e'*, the latter fastened securely on the shaft C. Said shaft bears upon one extremity an arm, O, said arm bearing a roller, P, working on a cam, R, borne by the shaft 42. This cam is provided with a single elevation, so situated as that the comb may be raised when each new tuft of fibers is presented to the jaws 21 22 and returned to its depressed position in time to comb the fibers as they are carried away by the revolution of the cylinder. The successive relative positions borne by the jaws 21 22, the nippers 5 6, and the comb A are shown in Figs. 2 to 7, inclusive. Fig. 2 shows the position of



the jaws, nippers, and comb before the tuft of fiber is grasped by said jaws; Fig. 3, their position at the time of said grasping; Fig. 4, their position when the nippers are in the act of releasing the tuft; Fig. 5, their position while being drawn through comb A; and Figs. 6, 7, their positions before and while being combed by comb 44, the latter being operated as hereinafter described, and the aforesaid comb thereby rhythmically raised and lowered as the cylinder-jaws are opened and shut. After the fibers have been seized by the jaws 21 22 they are carried over toward the table 43, while at the same time the next tuft of fibers held by the nippers 5 6 have their outer ends combed by a series of combs, 44, attached to the cylinder. When the aforesaid tuft arrives at table 43 it is released by the passage of the roller 29 over the elevation *a* of cam 30, (whereby the lever 27 is raised and jaw 21 is drawn apart from 22,) and caught and pushed forward along said table by the pusher 46, and upon the latter releasing it the vertical moving holder 45 descends upon it and holds it in place till the arrival of the next tuft, and so on, as the jaws come into line with the top of the table 43.

The holder 45 is fastened to a curved lever, 47, whose interior extremities are pivoted to the frame-work of the machine, one of whose said extremities is provided with an arm, 48, (upon the outside of said supporting-frame,) whose outer extremity rests upon a cam, 48<sup>b</sup>, attached to the shaft 42, provided with a pinion, 48<sup>c</sup>, (said pinion moving the aforesaid feed-rollers D D by means of spur-wheel 49, pinion 50, and cog-wheels 51 52,) and a spur-wheel. (Not shown.) On the same shaft 42 is a wheel, 48<sup>a</sup>, engaging with a corresponding wheel, 54, on the shaft 55, which meshes with a gear-wheel, 54<sup>a</sup>, connecting it with wheel 34, and so with the driving-shaft.

Shaft 55 has upon its interior extremity a pinion, 56, gearing with another pinion, 57, whose shaft drives a train of wheels, 58 59, and a pinion. (Not shown.) The latter drives an axle, 61, bearing a circular disk, 62, to the inner side of which is secured a pin, 62<sup>a</sup>, said pin fitting into slots in a wheel, 63, whose shaft bears a pinion, 64, engaging with a wheel, 65, the shaft of the latter bearing the roller 3. By means of the Geneva gearing 62 62<sup>a</sup> 63 the roller 3 is given an intervallic movement, and this gearing is so constructed as to cause the movement of the roller 3 to be synchronous with those of jaws 21.

The pusher 46 is fastened upon a lever, 66, on whose outer ends are journaled two rollers, 67, working upon two guides, 68, and whose inner ends are pivoted upon pins borne by circular disks 69. These disks are provided with shafts whose outer extremities bear pinions. The pinion upon one side gears with wheel 57, upon the other with wheel 58. The fibers, after having been pushed forward, as aforesaid,

over the table 43, are caught by the rollers 70 65 and 71, connected by a suitable train of wheels with the driving-shaft of the machine, and delivered into the trough or funnel 72, from which the said fibers are conveyed off to be coiled.

The roller 70 is actuated by a pinion, 73, 70 meshing with another, 74, borne by the shaft of the lower of rollers 71. The opposite extremity of said shaft carries a pinion, 74, meshing with a wheel, 75, upon whose shaft is a slotted disk, 76. These slots coincide with pins upon a circular disk, 77, borne by shaft 78. Said shaft also bears a cog-wheel, 79, which gears with the pinion 35 upon the main shaft of the machine.

The operation of the machine is as follows: 80 The fibers, after passing between the ordinary rolls D, are conveyed by the trough 1 to the curved plate 2. Here they are forced forward by the roller 3 to the nippers 5 6, from which (after passing through the comb 4) they are seized by the jaws of the cylinders, drawn through the comb A and passed over to the table 43, where they are caught and pushed along said table by the pusher 46, and afterward descended upon and held by the holder 45. Subsequently they are released by said holder and pass between the rollers 70 71, by which they are forced into the ejecting trough or funnel of the machine.

What we claim is—

1. The combination, with the cylinder 19, having apertures 23, annular guide-flanges 25, movable jaws 21, provided with flanges 24, arms 21<sup>b</sup>, and mechanism for revolving the cylinder, of the springs 21<sup>a</sup>, the arms 25<sup>a</sup>, levers 27, rollers 29, and cam 30, substantially as specified, whereby the jaws 21 are moved and the apertures 23 opened, as set forth.

2. The combination, with the cylinder 19 and jaws 21 22, of the nippers 5 6, the levers 8 9, the spring 8<sup>a</sup>, the shaft 10, the pin 8<sup>b</sup>, pivoted double finger F G, finger I, shaft K, lever 14, shaft 15, and operating mechanism, substantially as described, whereby the nippers 6 7 are opened and shut and advanced toward and drawn back from the cylinder, as set forth.

3. The combination, with the jaws 21 22 and nippers 5 6, of the comb A, lever B, set-screw E, shaft C, finger *c'*, and operating mechanism, substantially as described, whereby the said comb is raised from and lowered toward the said nippers, as set forth.

4. The combination, with nippers 5 6 and mechanism for operating the same, of comb 4 and plate 7, substantially as described, whereby the fibers receive a preparatory combing, and are then lifted above the comb, for the purposes set forth.

5. The combination, with nippers 21 22 and table 43, of holder 45, pivoted levers 47 48, cam 48<sup>b</sup>, shaft 42, wheels 54 54<sup>a</sup> 35, and pusher 46, levers 66, disks 69, rollers 67, inclined

way 68, and wheels 56, 57, and 48<sup>a</sup>, substantially as described, whereby the slivers are pushed along, held upon the table, and pieced up, as set forth.

5 6. The combination, with the table 43, of the delivery-rollers 71, roller 70, wheels 74 73 75, disks 76 and 77, shaft 78, and wheels 79 and 35, substantially as described, and for the purposes set forth.

10 7. The combination, with the cylinder 19, of the plate 32, provided with oblique slot *b*, wheel 34, having radial slot *a*, roller 41, eccentric 39, wheels 37 38, pinion 35, and driving-shaft 36, substantially as described, whereby

the said cylinder is given an irregular motion, 15 as and for the purposes set forth.

JOHN MUIR HETHERINGTON.

EDOUARD JULES JOSEPH LECŒUR.

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*Notary Public, Manchester.*

W. T. CHEETHAM,

*Manchester.*

Witnesses to the signature of Edouard Jules Joseph Lecœur:

A. VRÉVOST,

PAUL LECŒUR.