

No. 666,041.

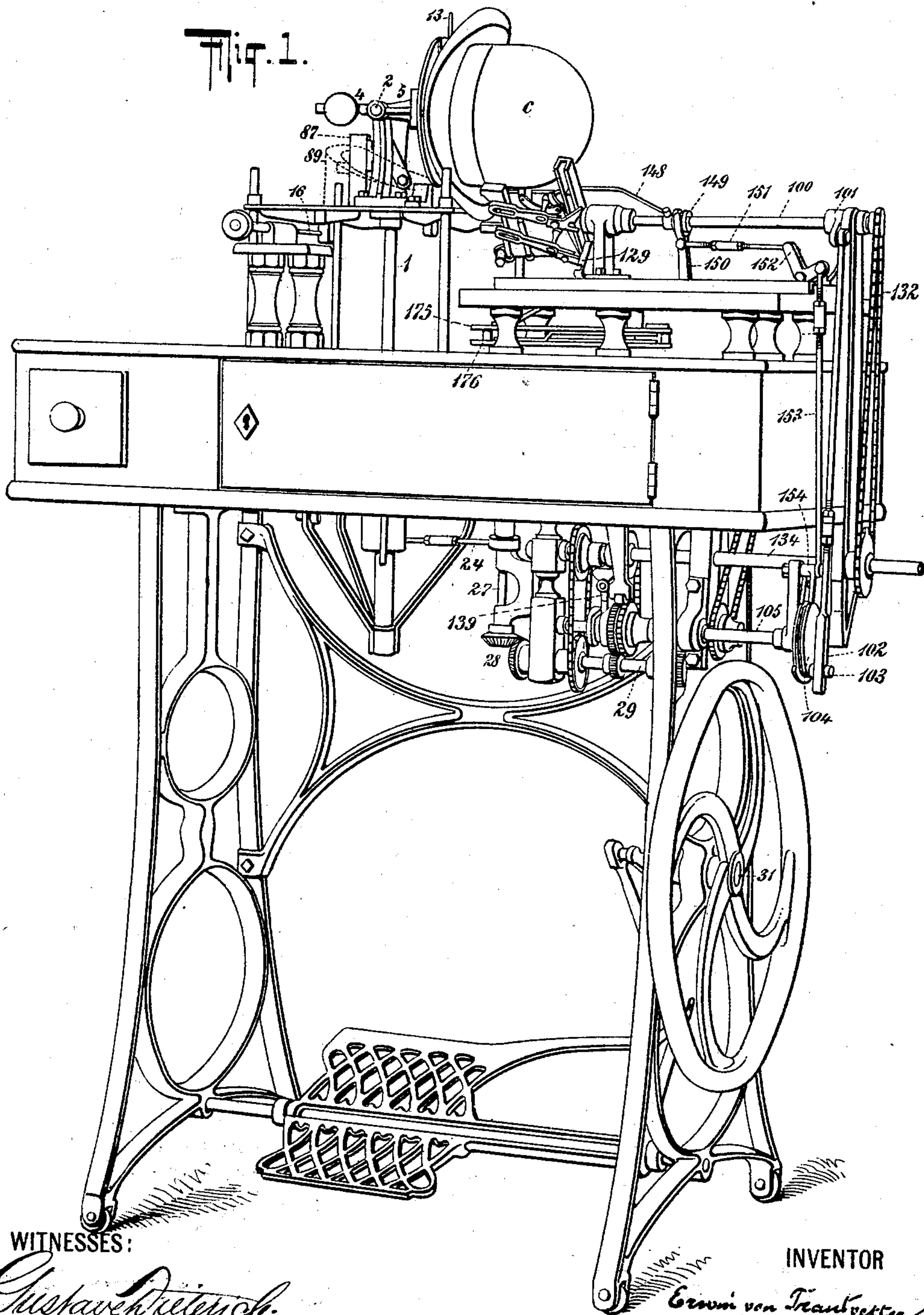
Patented Jan. 15, 1901.

E. VON TRAUTVETTER.
HAT BINDING SEWING MACHINE.

(No Model.)

(Application filed Jan. 11, 1900.)

25 Sheets—Sheet 1.



WITNESSES:

Gustave Dietrich
Ed. Thomas

INVENTOR

E. von Trautvetter

BY *Briesen Thoma*

ATTORNEYS

No. 666,041.

Patented Jan. 15, 1901.

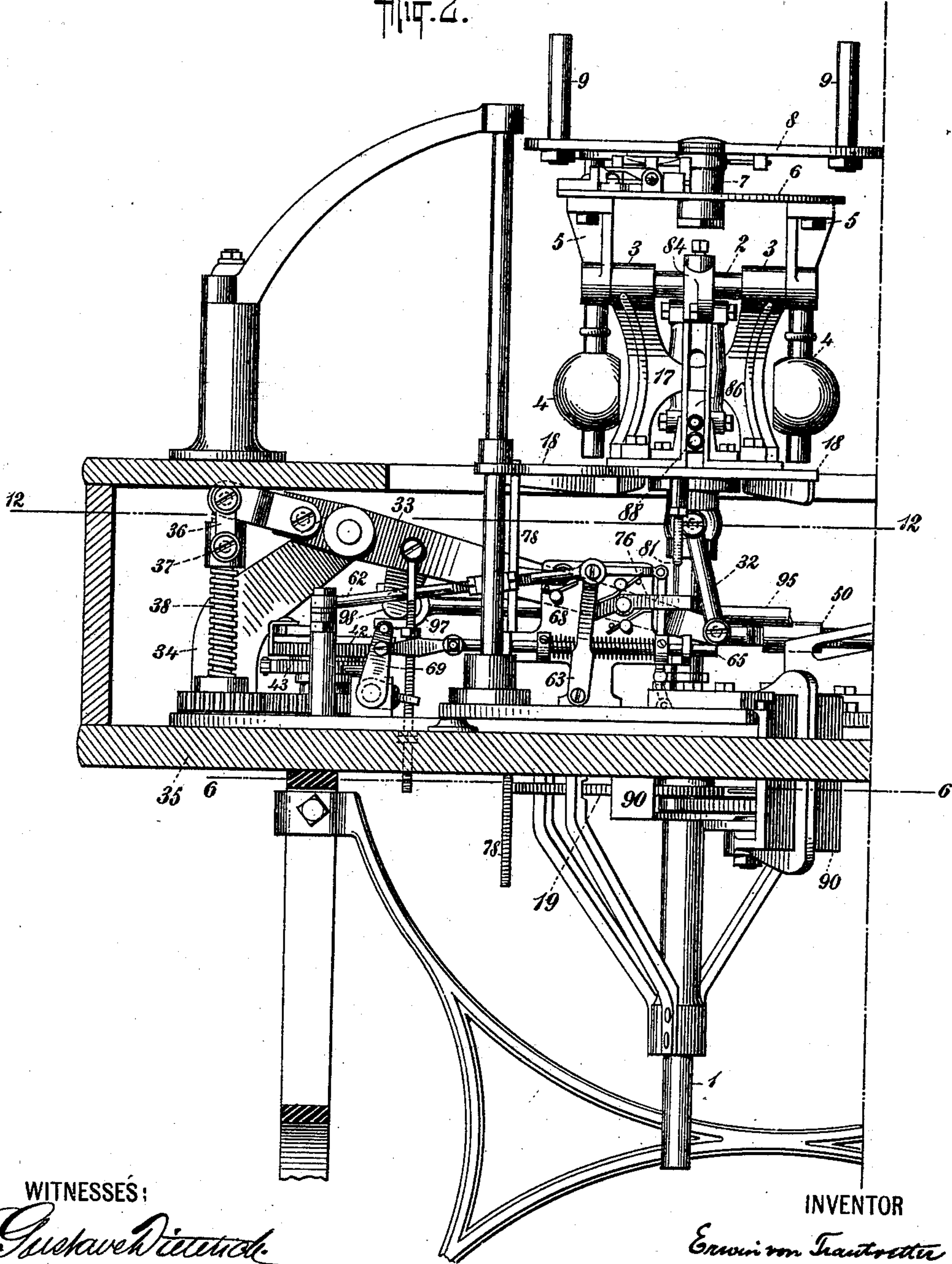
E. VON TRAUTVETTER.
HAT BINDING SEWING MACHINE.

(No Model.)

(Application filed Jan. 11, 1900.)

25 Sheets—Sheet 2.

Fig. 2.



WITNESSES:

Gustave Dietrich
Ed. A. H. H. H.

INVENTOR

Erwin von Trautvetter

BY *Briesen Knaute*

ATTORNEYS

No. 666,041.

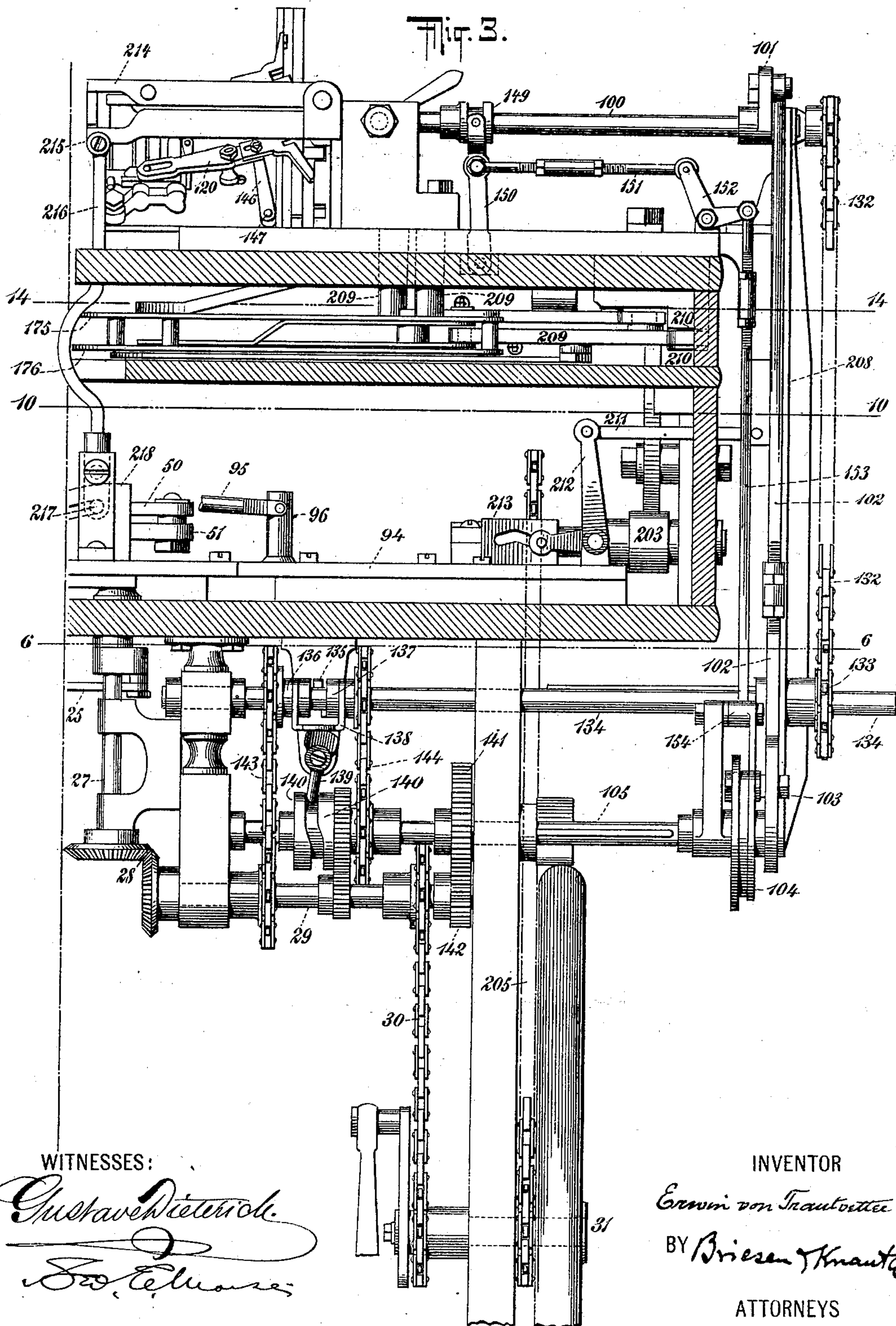
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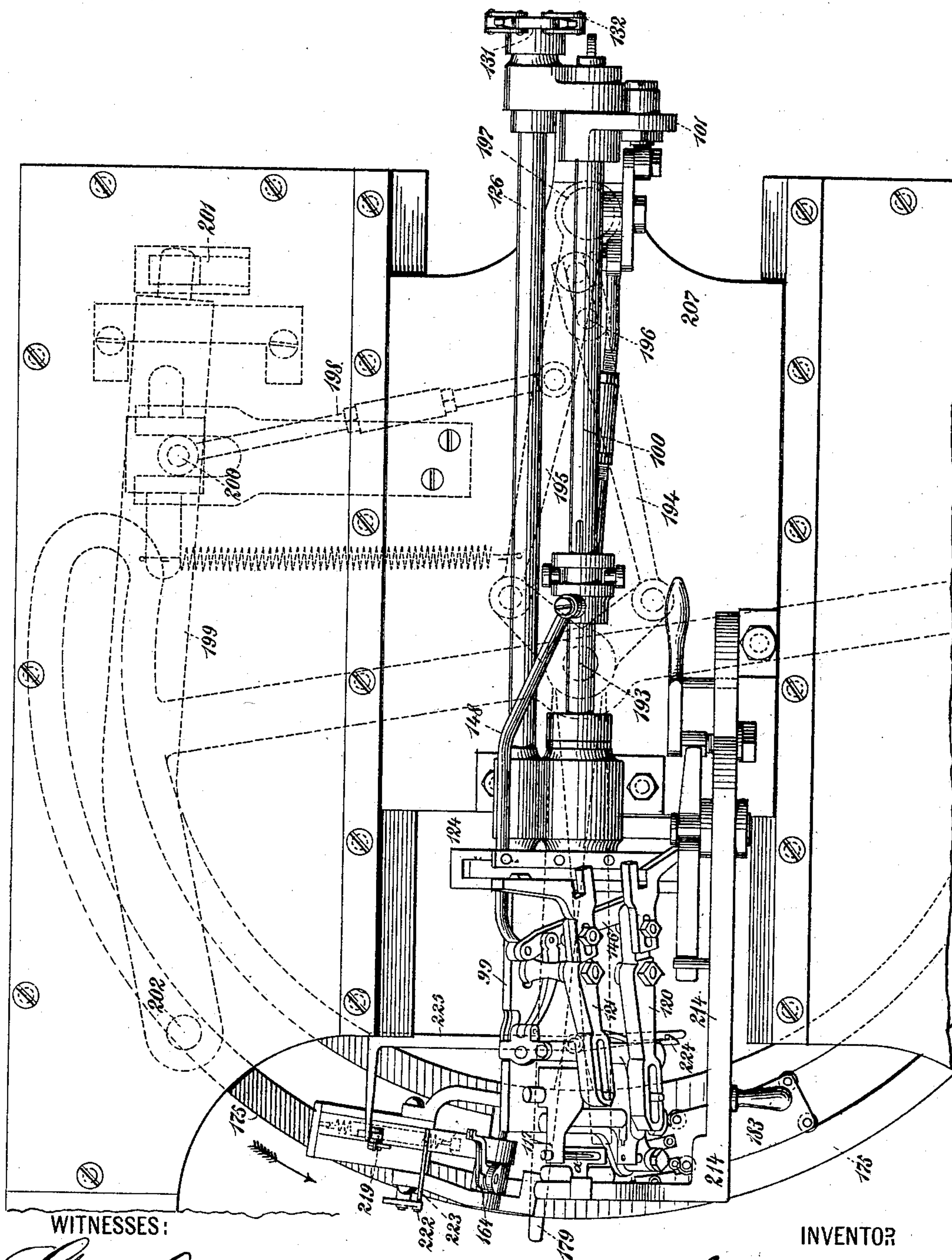
Patented Jan. 15, 1901.

E. VON TRAUTVETTER.
HAT BINDING SEWING MACHINE.

(No Model.)

(Application filed Jan. 11, 1900.)

25 Sheets—Sheet 4.



WITNESSES:

Gustave Dietrich
Geo. E. Knapp

Fig. 4

INVENTOR

E. von Trautvetter

BY *Brian Knautz*

ATTORNEYS

No. 666,041.

Patented Jan. 15, 1901.

E. VON TRAUTVETTER.
HAT BINDING SEWING MACHINE.

(Application filed Jan. 11, 1900.)

(No Model.)

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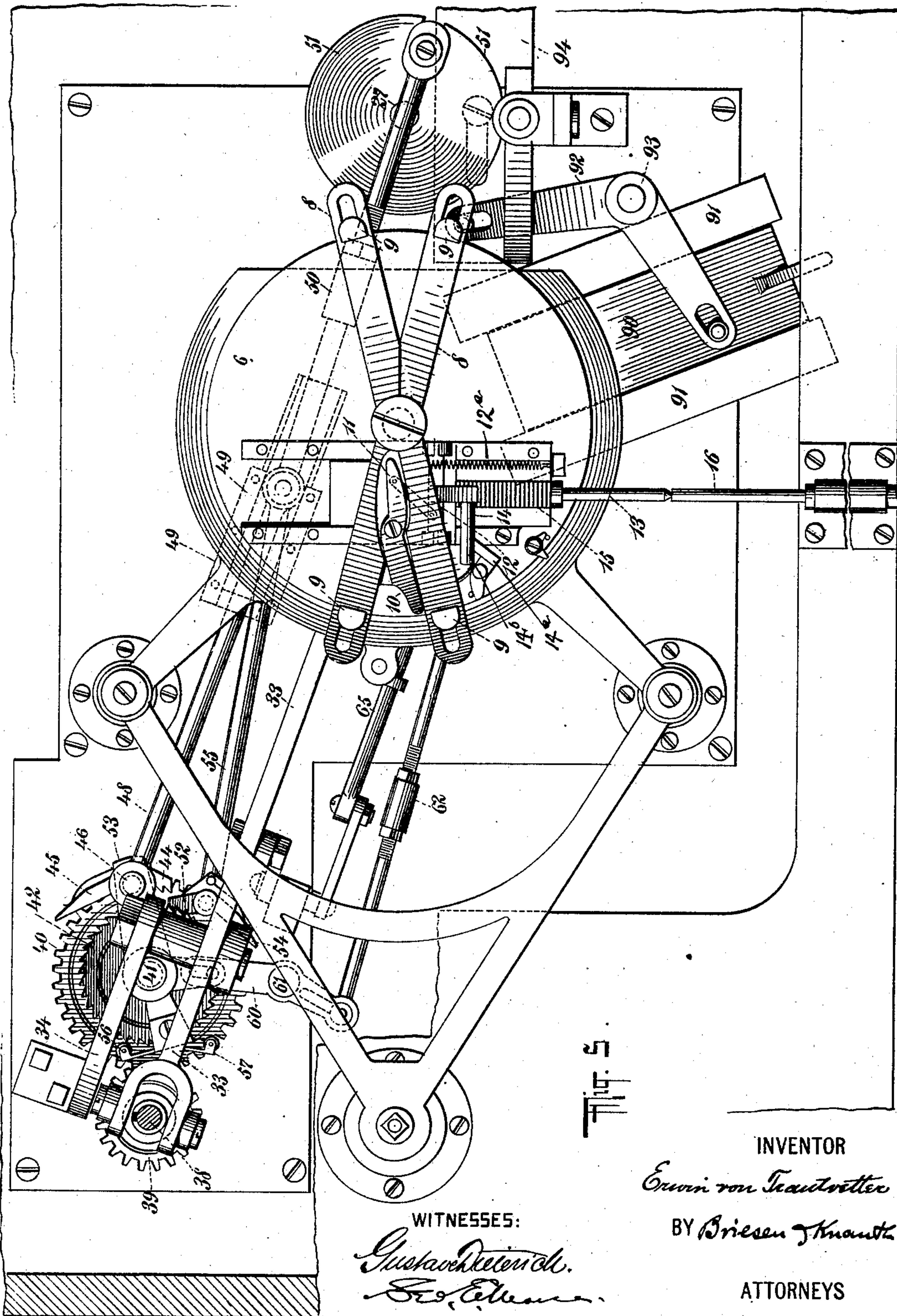


Fig. 5

INVENTOR

Erwin von Trautvetter

BY Briesen & Knauth

ATTORNEYS

WITNESSES:

Gustav Ketenich.
Er. Ketenich.

No. 666,041.

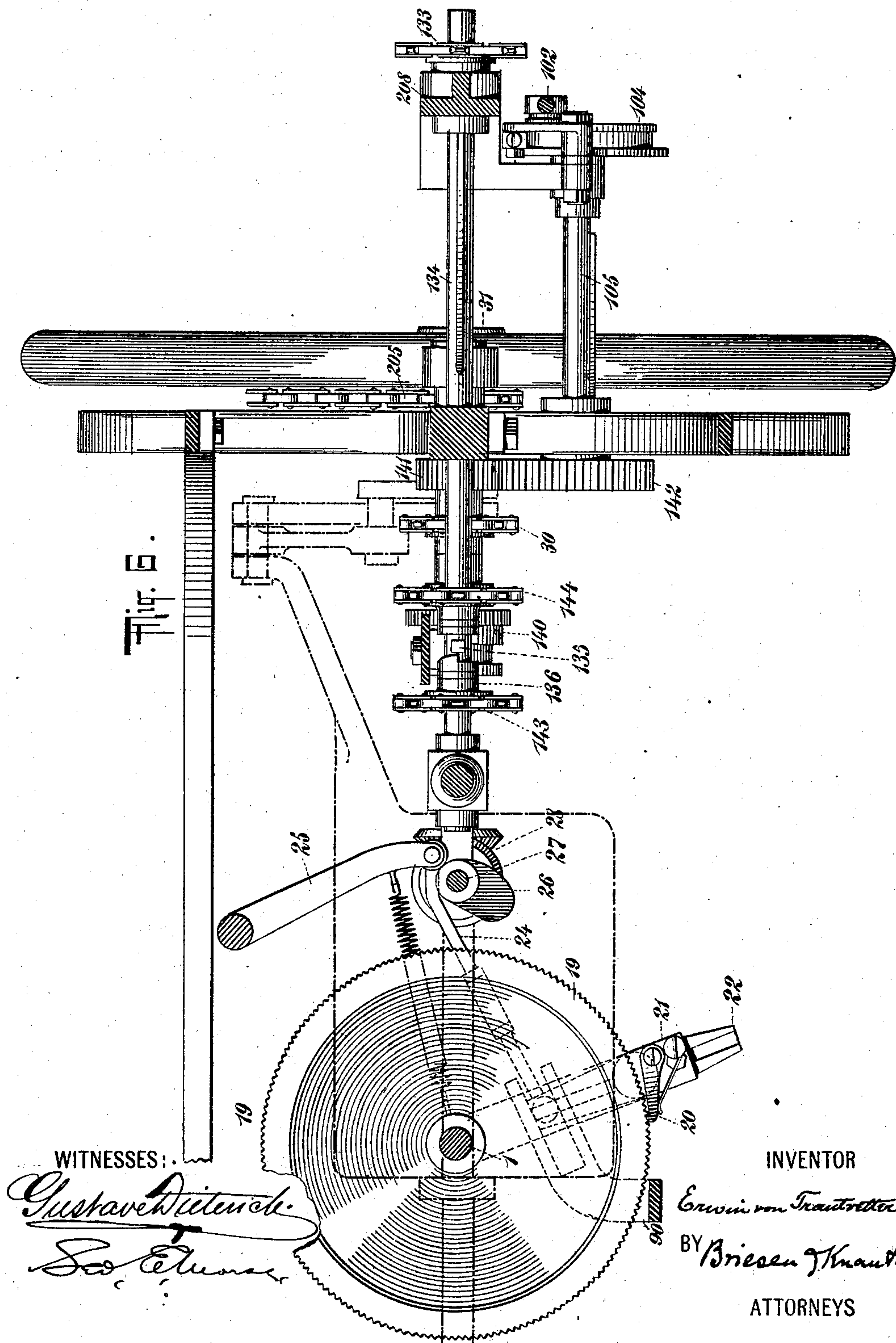
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E. VON TRAUTVETTER.
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(No Model.)

(Application filed Jan. 11, 1900.)

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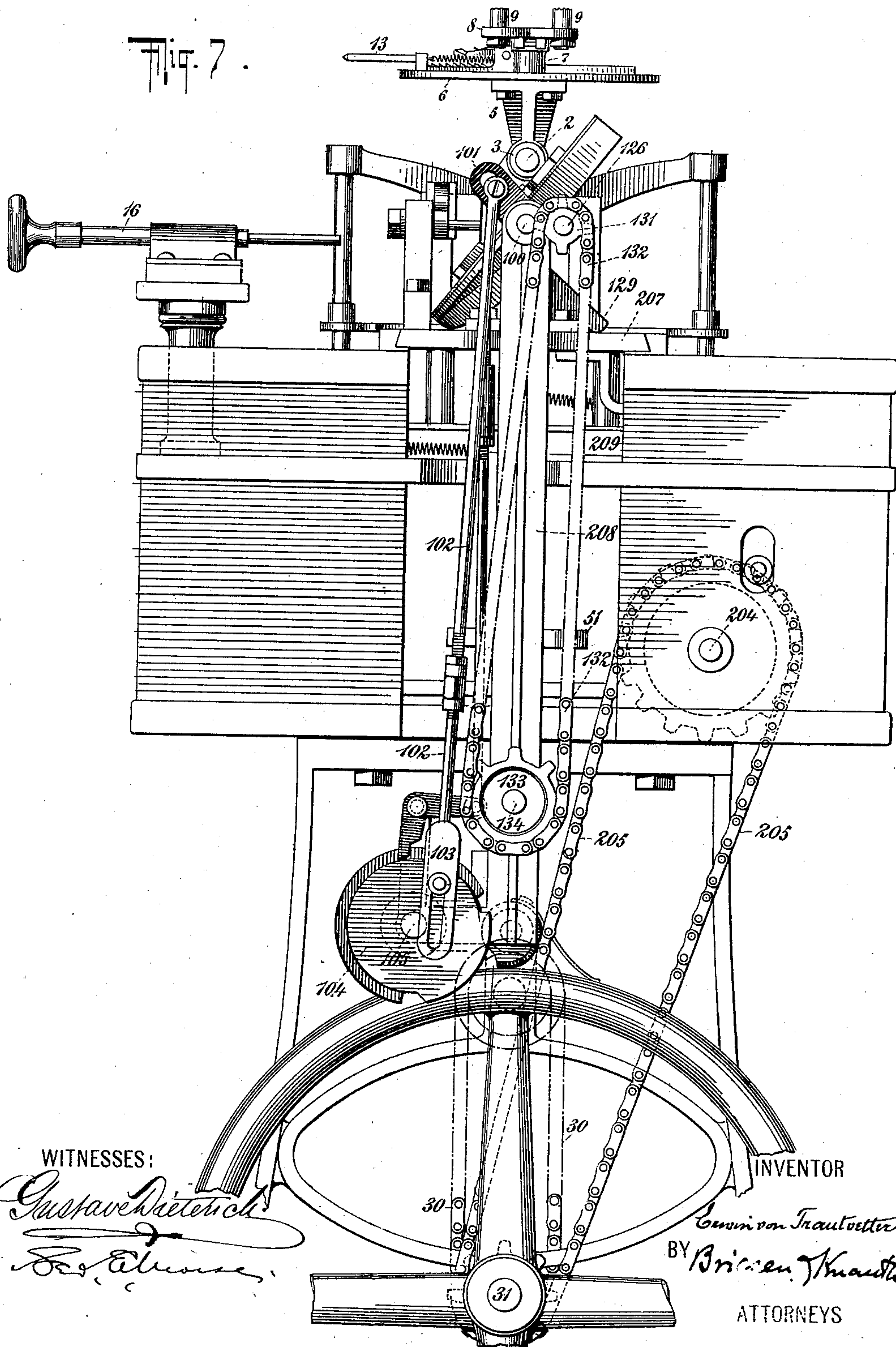
Patented Jan. 15, 1901.

E. VON TRAUTVETTER.
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(No Model.)

(Application filed Jan. 11, 1900.)

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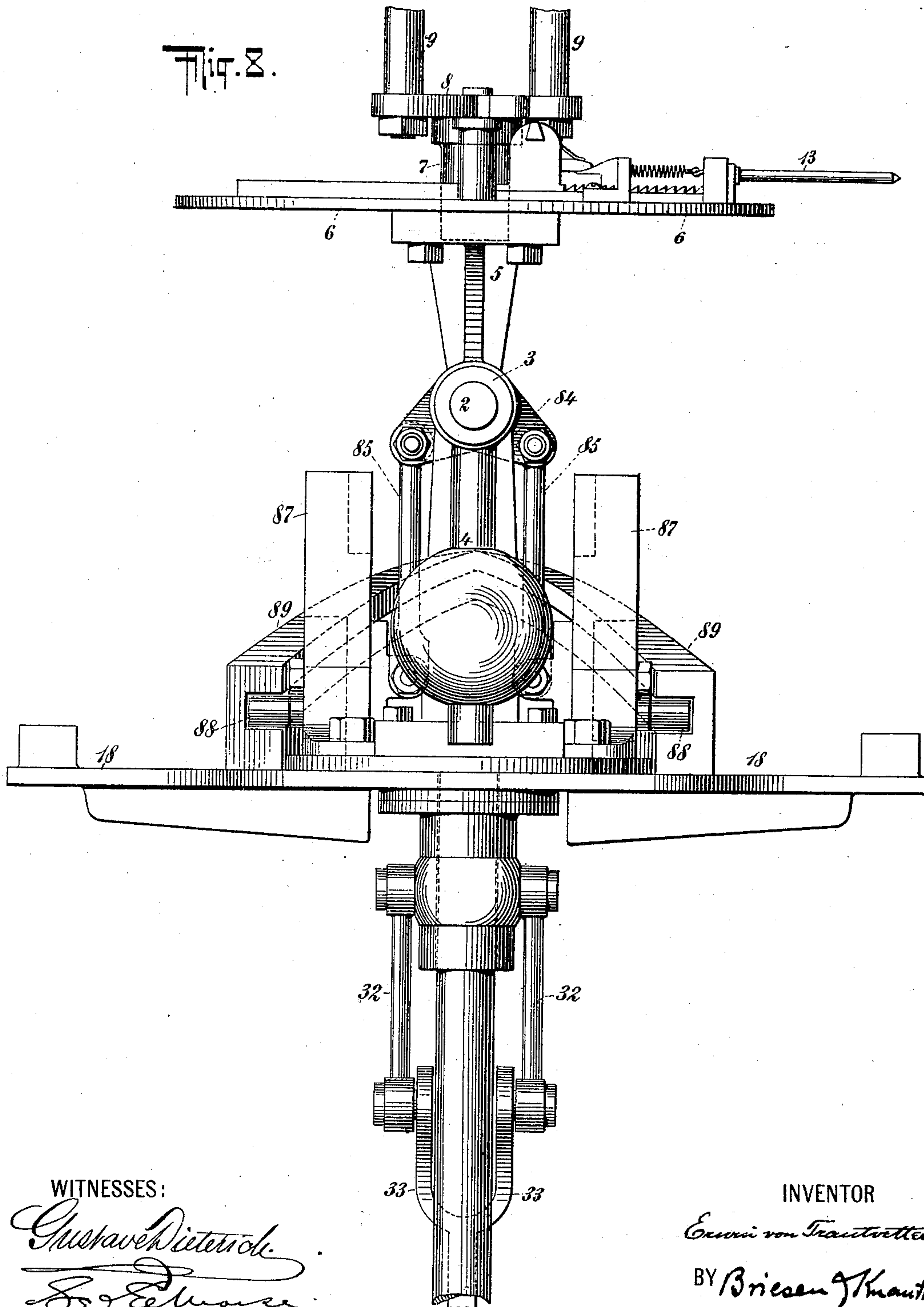
Patented Jan. 15, 1901.

E. VON TRAUTVETTER.
HAT BINDING SEWING MACHINE.

(Application filed Jan. 11, 1900.)

(No Model.)

25 Sheets—Sheet 8.



WITNESSES:

Gustave Dietrich
Edw. Schumacher

INVENTOR

E. von Trautvetter

BY *Briesen & Knauth*

ATTORNEYS

No. 666,041.

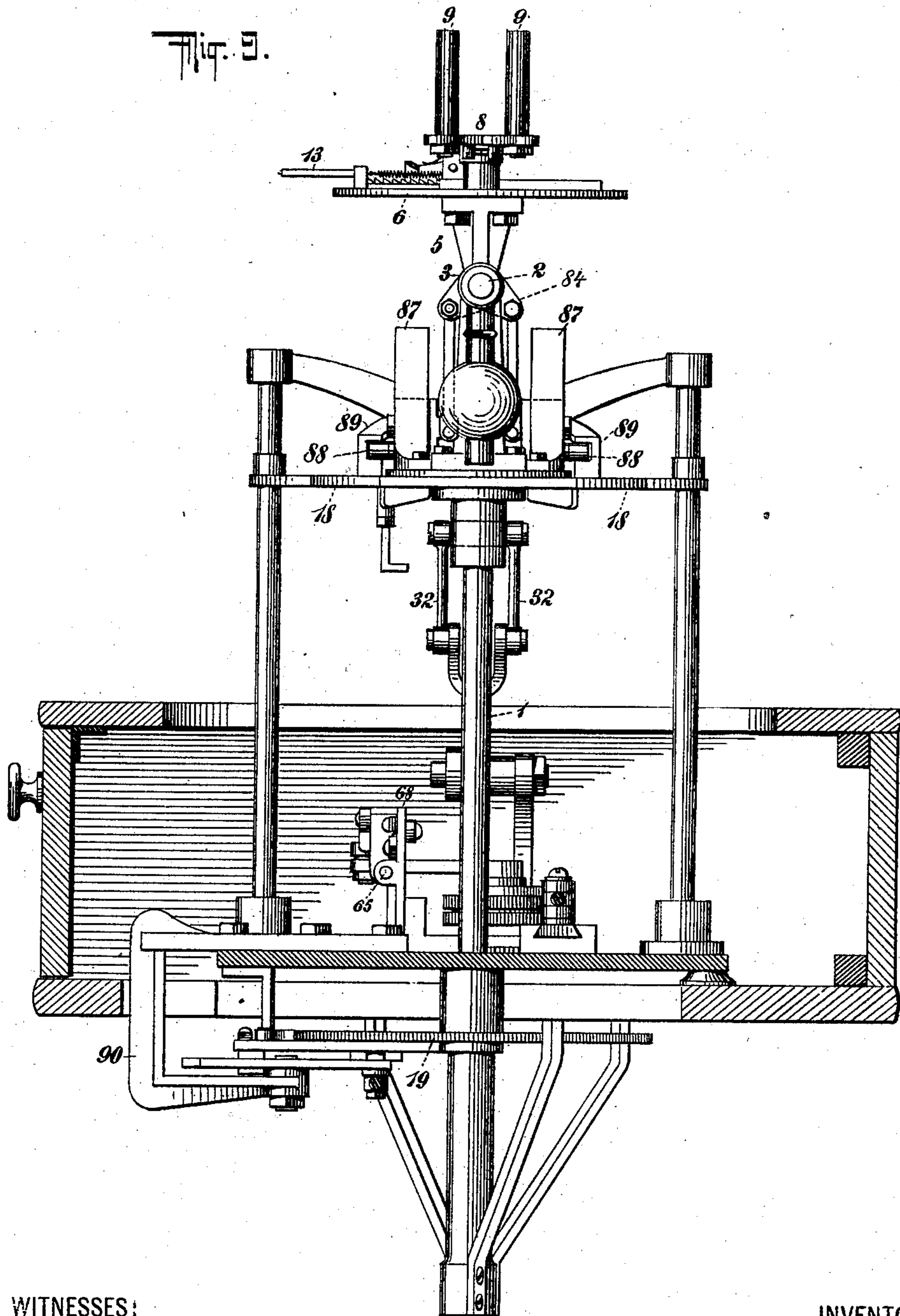
Patented Jan. 15, 1901.

E. VON TRAUTVETTER.
HAT BINDING SEWING MACHINE.

(No Model.)

(Application filed Jan. 11, 1900.)

25 Sheets—Sheet 9.



WITNESSES:

Gustav Dietrich
Geo. Ahn

INVENTOR

E. von Trautvetter

BY *Briesen Knauth*

ATTORNEYS

No. 666,041.

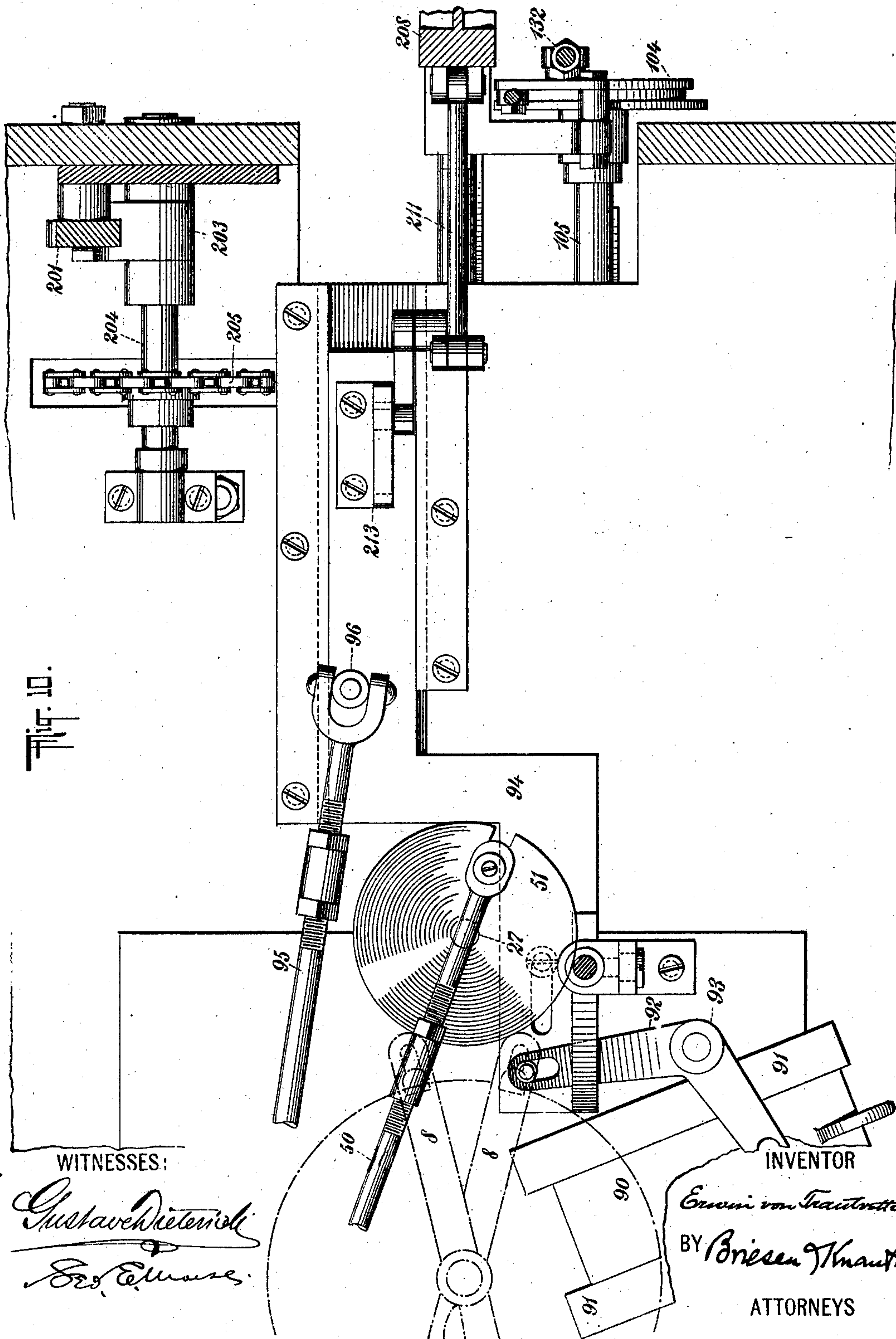
Patented Jan. 15, 1901.

E. VON TRAUTVETTER.
HAT BINDING SEWING MACHINE.

(Application filed Jan. 11, 1900.)

(No Model.)

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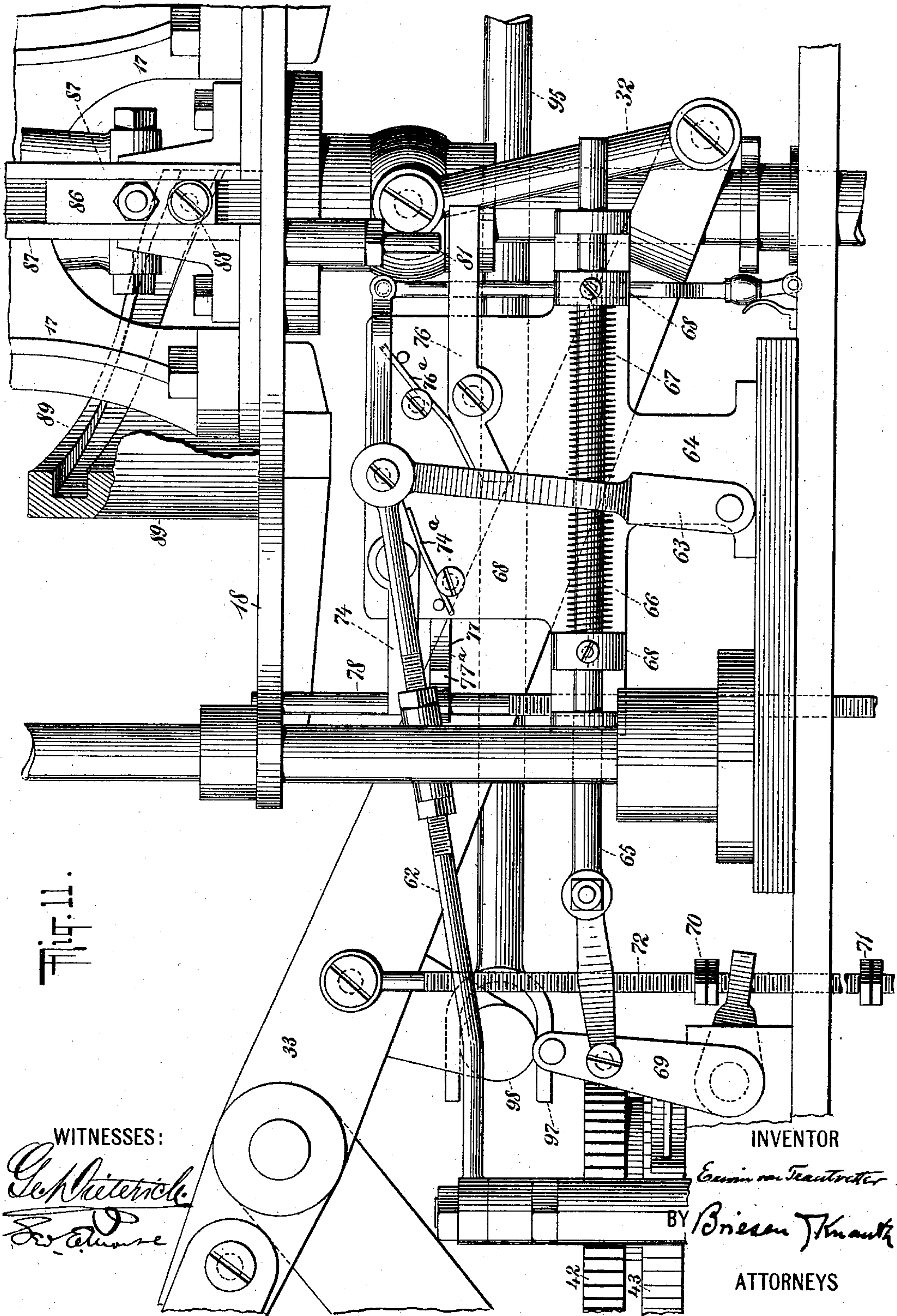
Patented Jan. 15, 1901.

E. VON TRAUTVETTER.
HAT BINDING SEWING MACHINE.

(Application filed Jan. 11, 1900.)

(No Model.)

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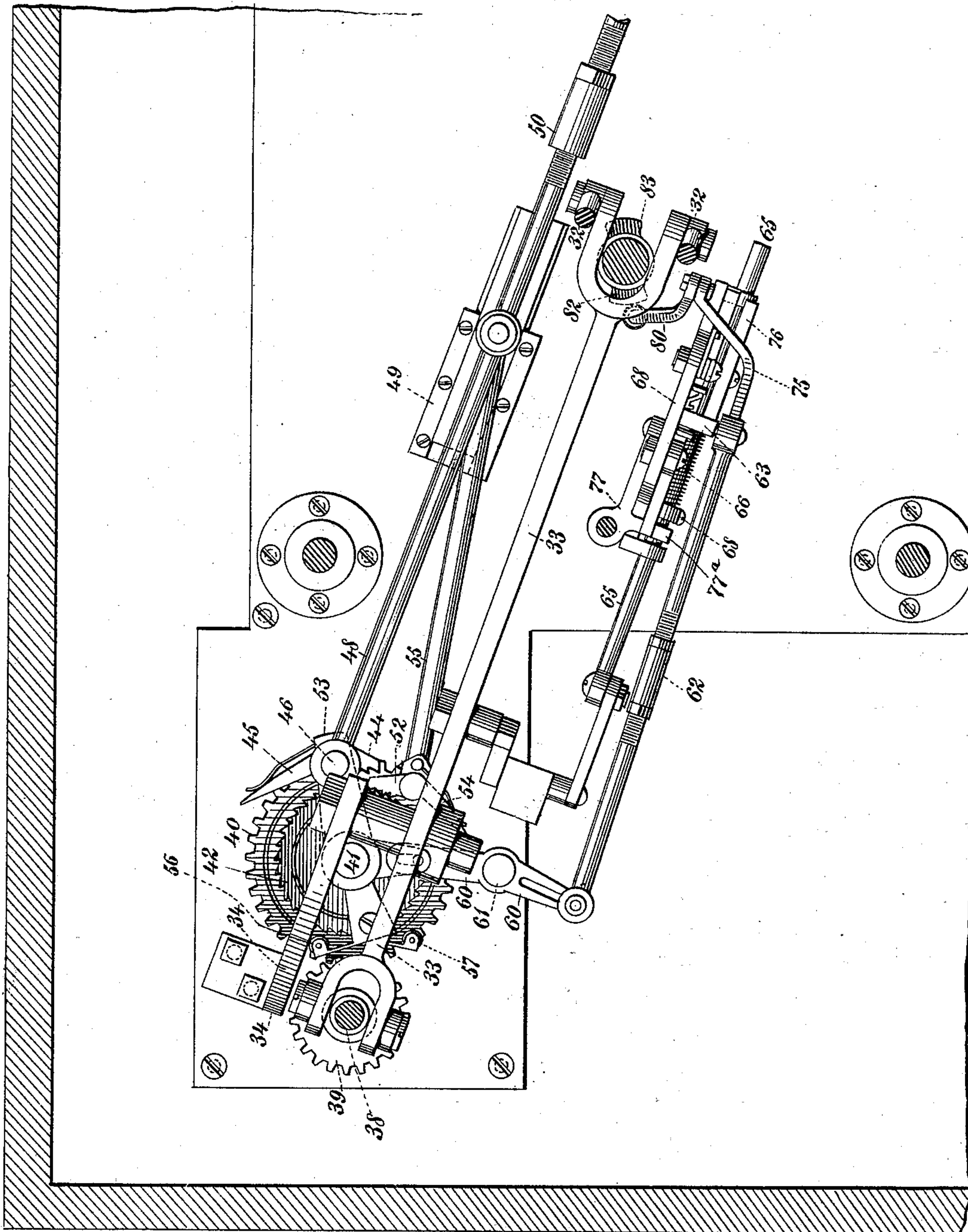
Patented Jan. 15, 1901.

E. VON TRAUTVETTER.
HAT BINDING SEWING MACHINE.

(Application filed Jan. 11, 1900.)

(No Model.)

25 Sheets—Sheet 12.



WITNESSES:

Gustave Kretsch
Edw. Thomas

Fig. 12.

INVENTOR

Erwin von Trautvetter

BY *Briesen Thma*

ATTORNEYS

No. 666,041.

Patented Jan. 15, 1901.

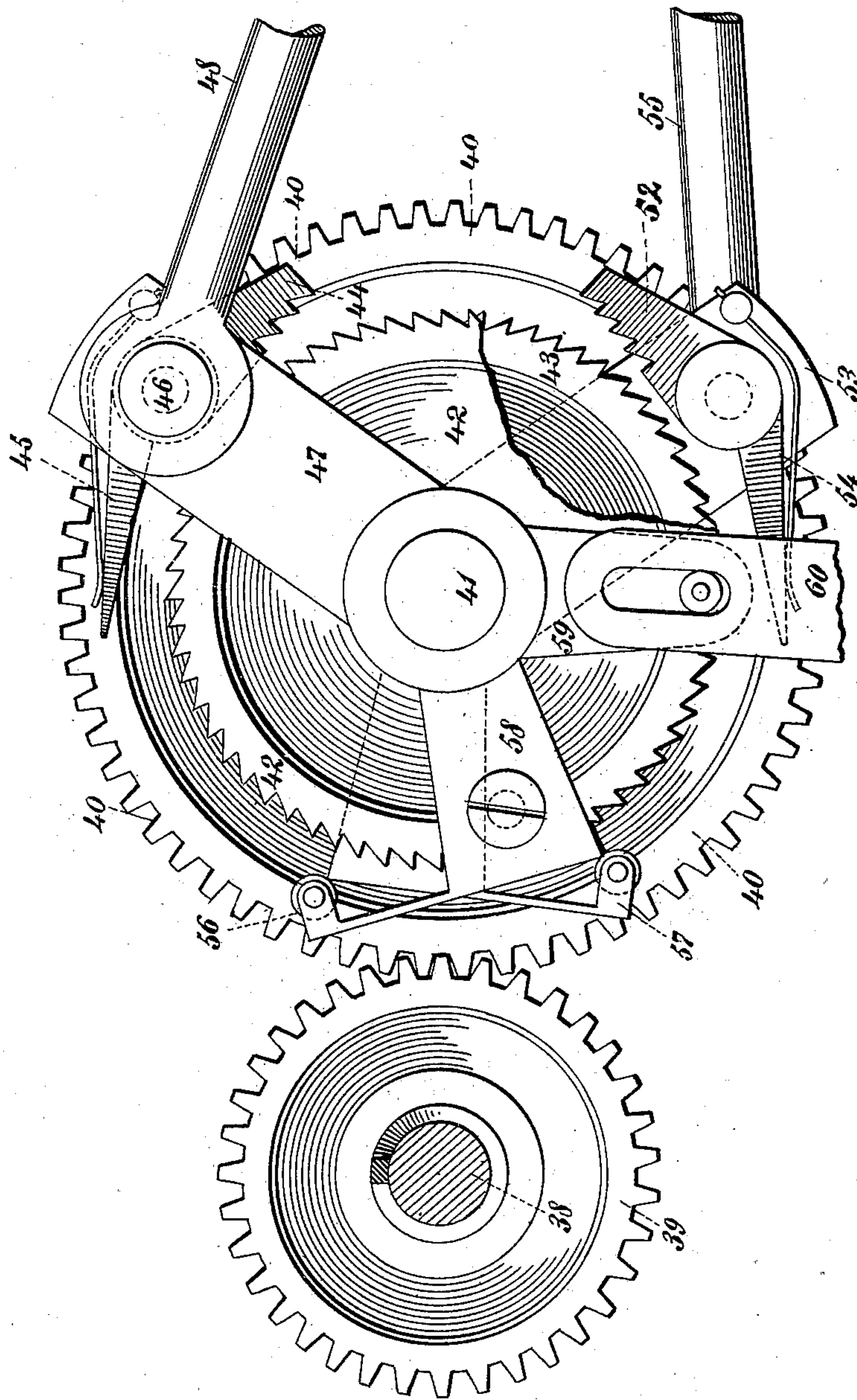
**E. VON TRAUTVETTER.
HAT BINDING SEWING MACHINE.**

(Application filed Jan. 11, 1900.)

(No Model.)

25 Sheets—Sheet 13.

Fig. 13.



WITNESSES:

Gustav Dietrich
John Thomas

INVENTOR

E. von Trautvetter

BY *Briesen Thau*

ATTORNEYS

No. 666,041.

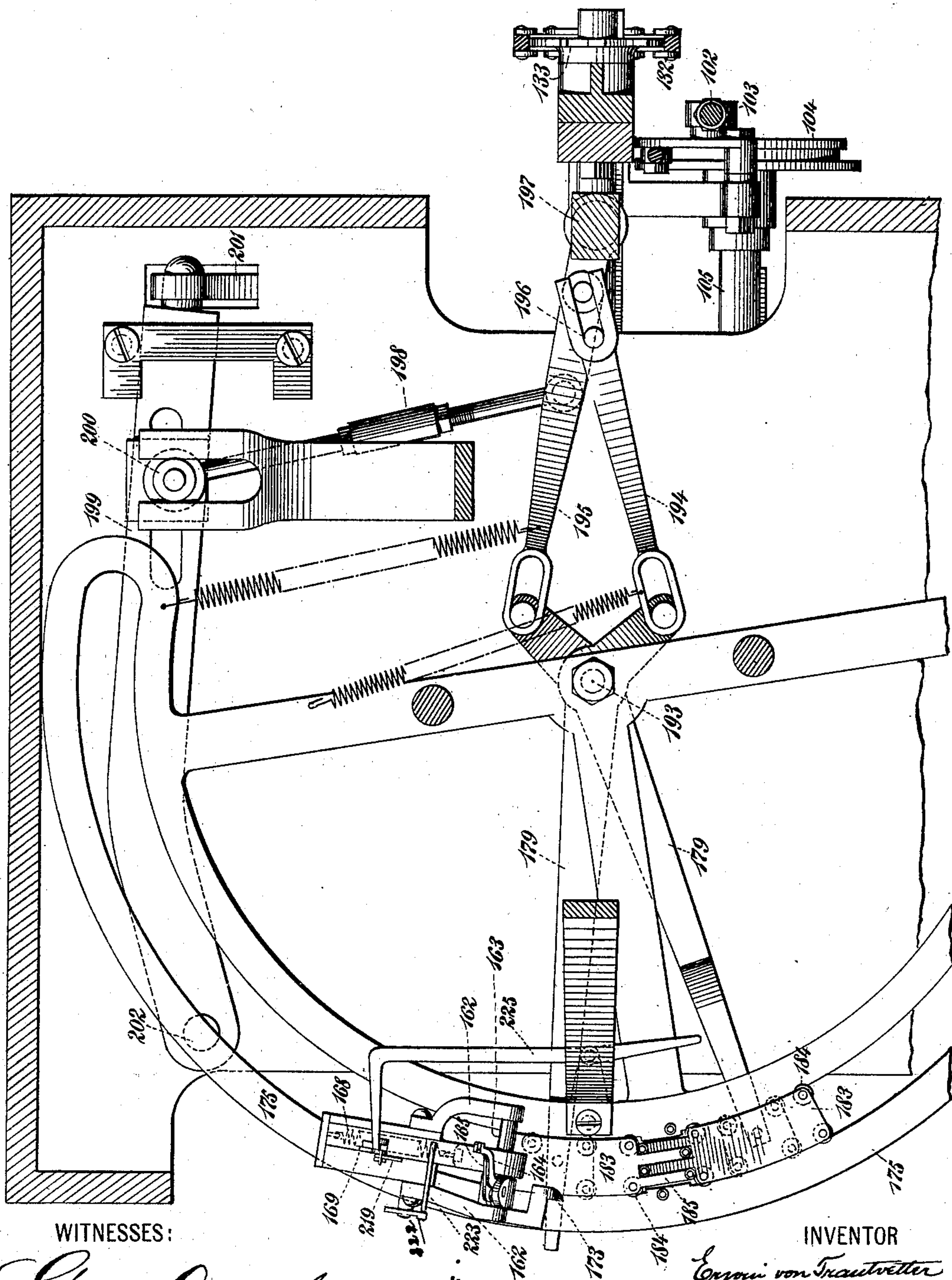
Patented Jan. 15, 1901.

E. VON TRAUTVETTER.
HAT BINDING SEWING MACHINE.

(No Model.)

(Application filed Jan. 11, 1900.)

25 Sheets—Sheet 14



WITNESSES:

Gustav Dietrich
Edw. E. Brown

Fig. 14

INVENTOR

E. von Trautvetter

BY *Briesen Knauth*

ATTORNEYS

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Patented Jan. 15, 1901.

E. VON TRAUTVETTER.
HAT BINDING SEWING MACHINE.

(Application filed Jan. 11, 1900.)

(No Model.)

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Fig. 15.

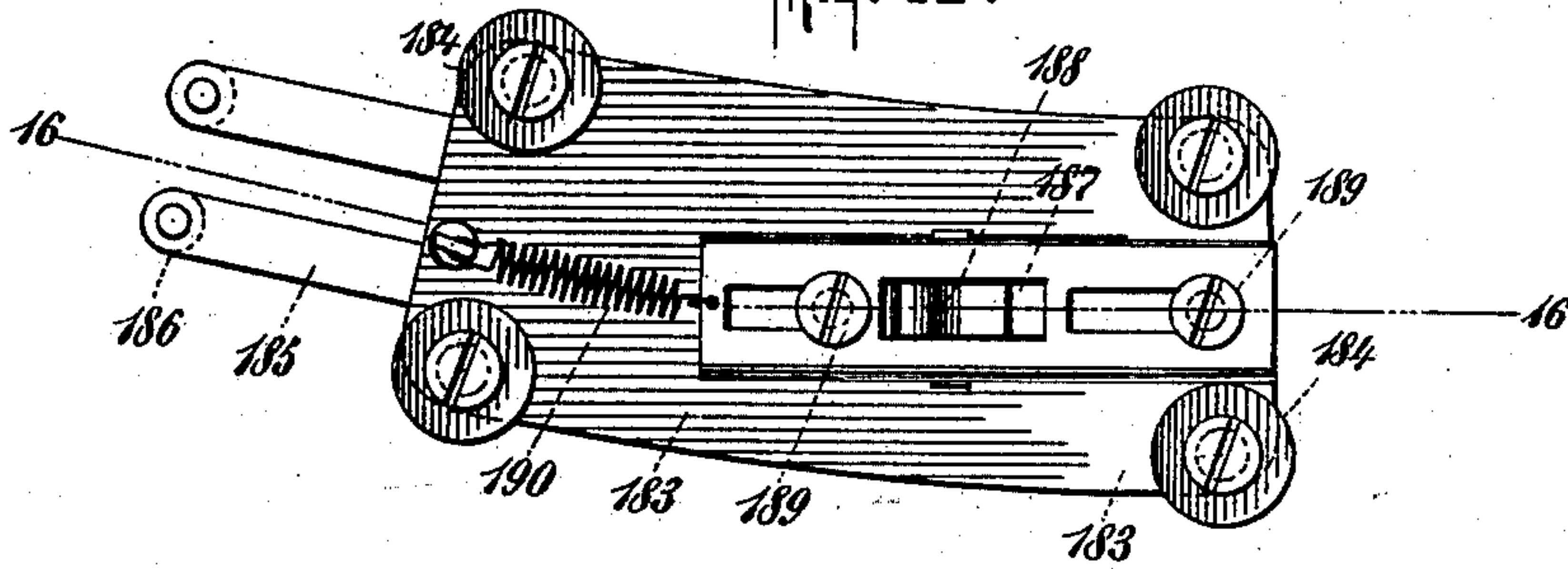


Fig. 16.

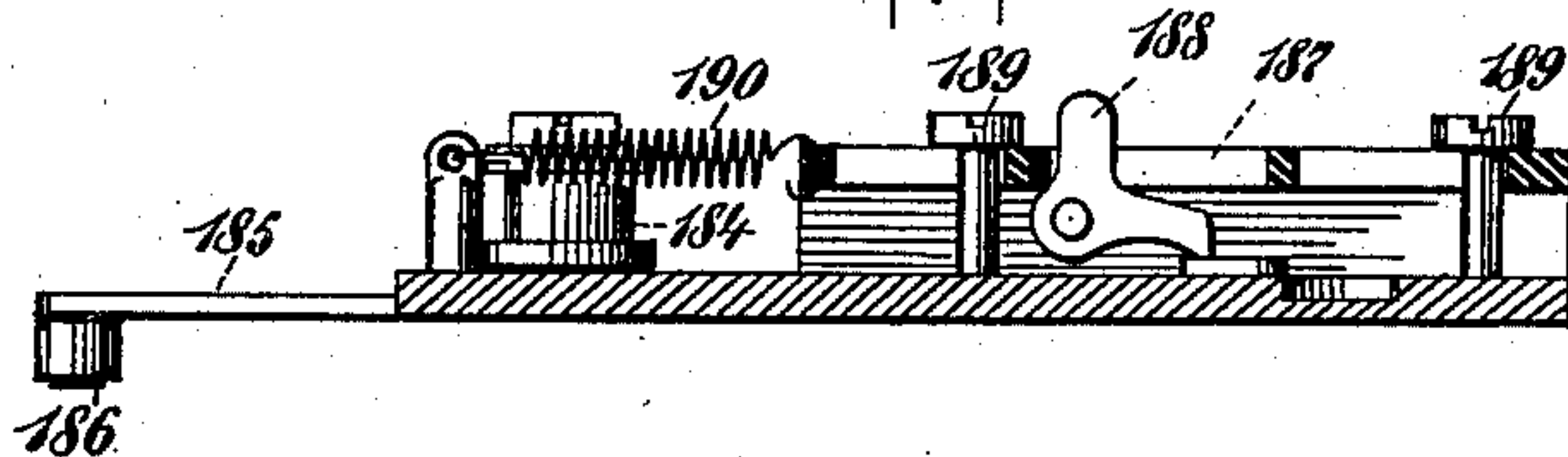


Fig. 17.

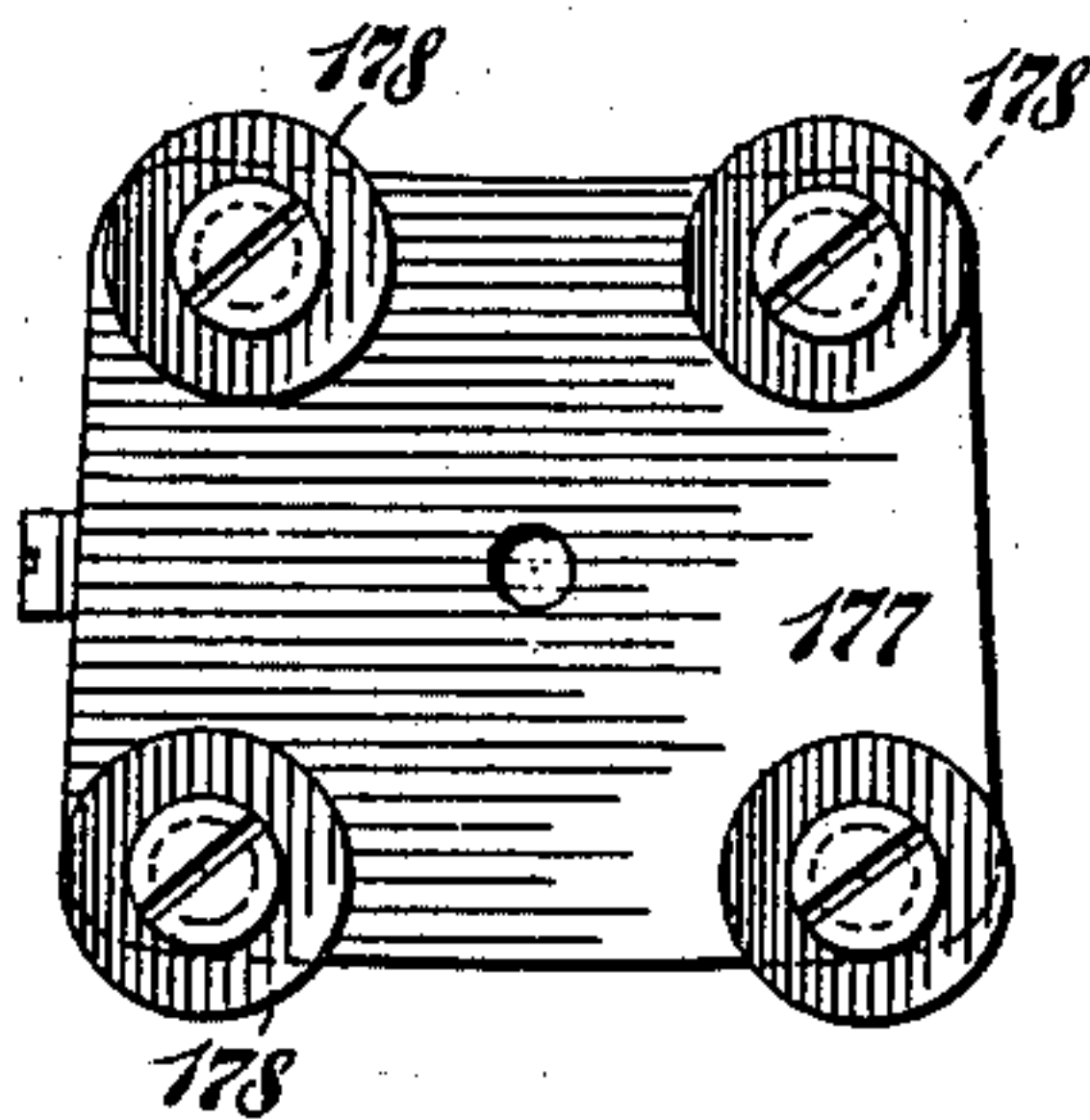


Fig. 19.

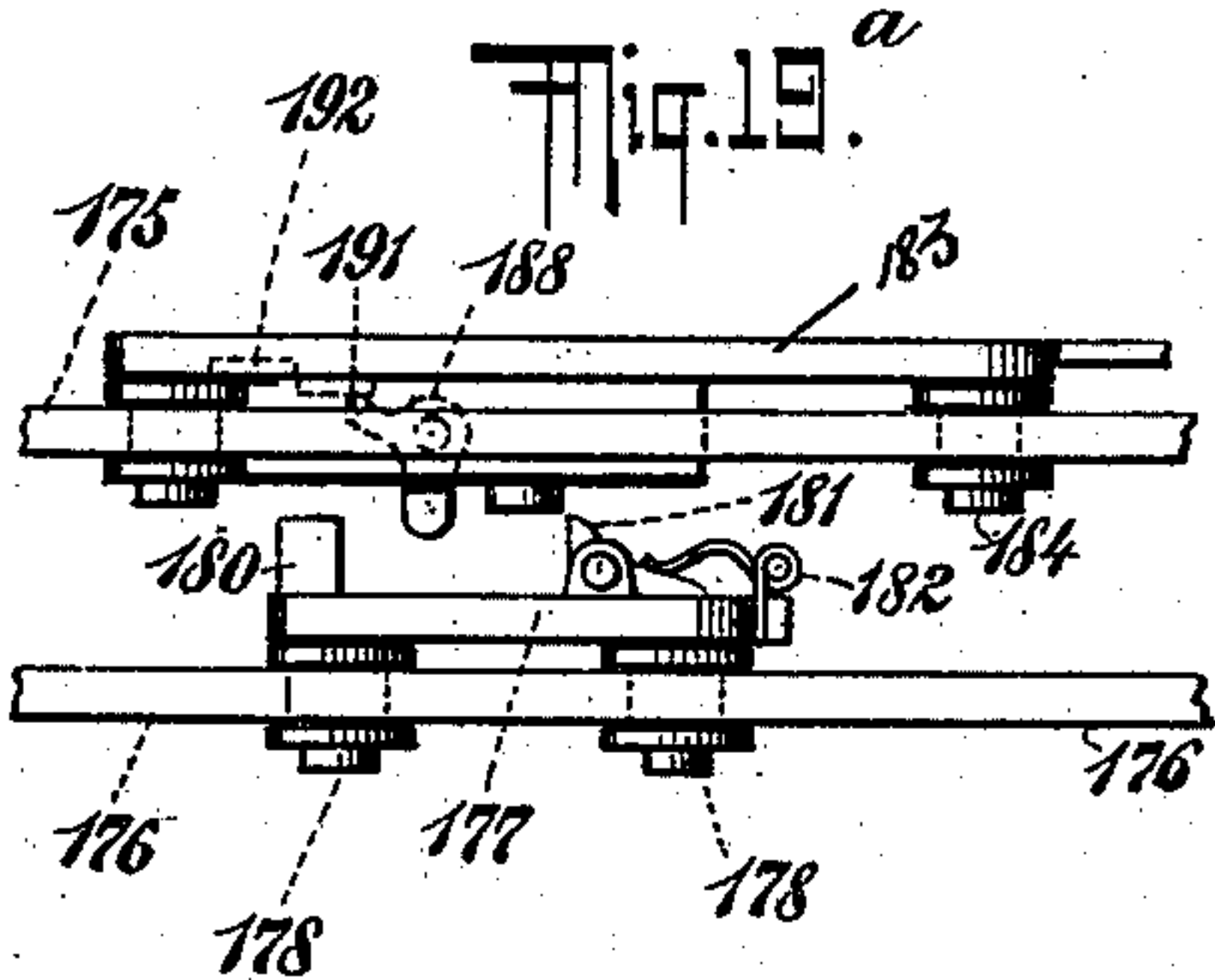


Fig. 18.

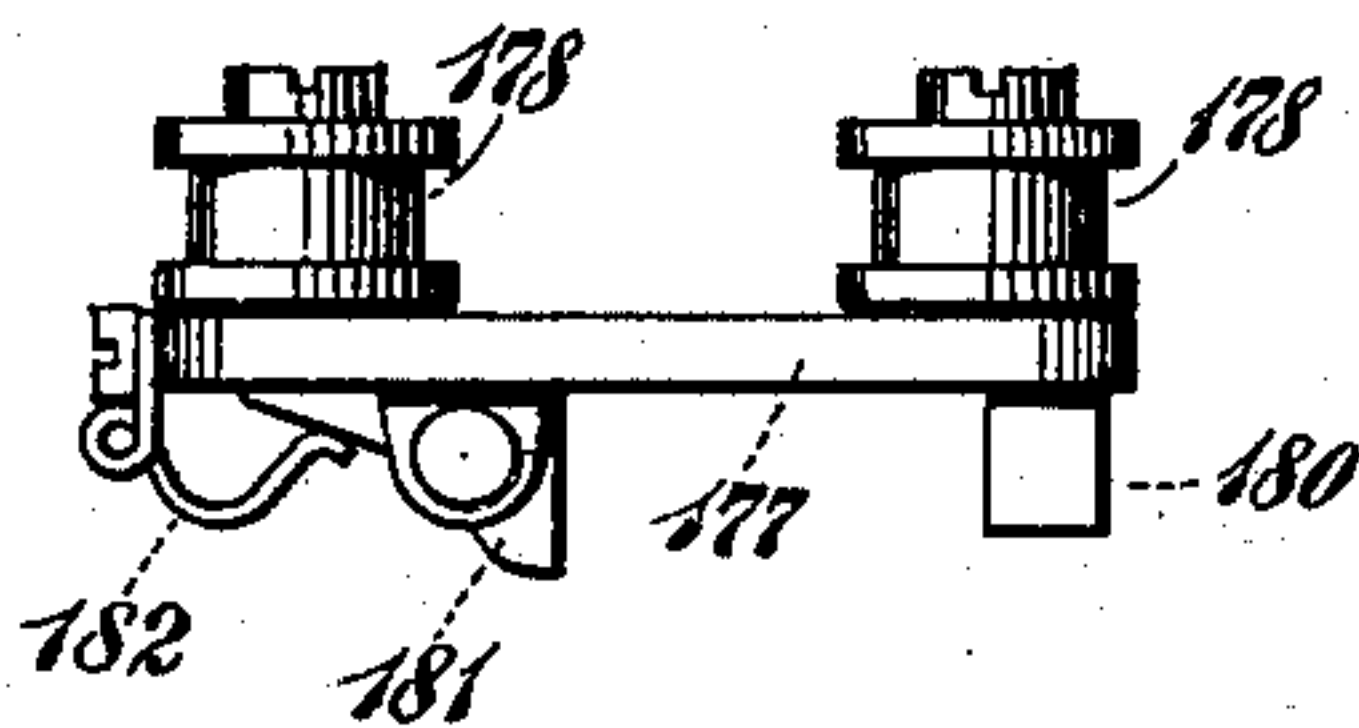
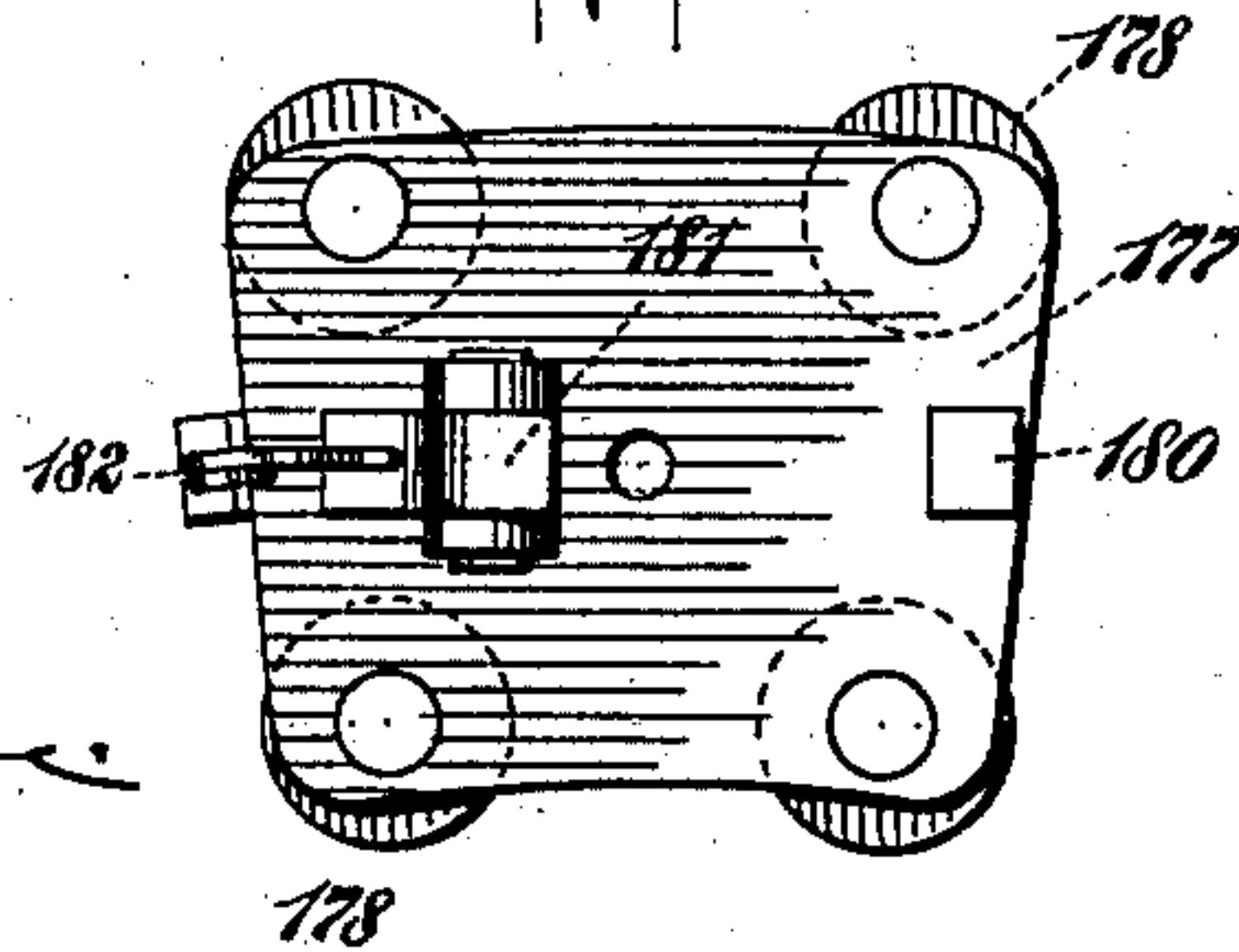


Fig. 19.



WITNESSES:

Guaranteed by:
Ed. E. E. E.

INVENTOR

E. von Trautvetter

BY *Briesen & Knauth*

ATTORNEYS

No. 666,041.

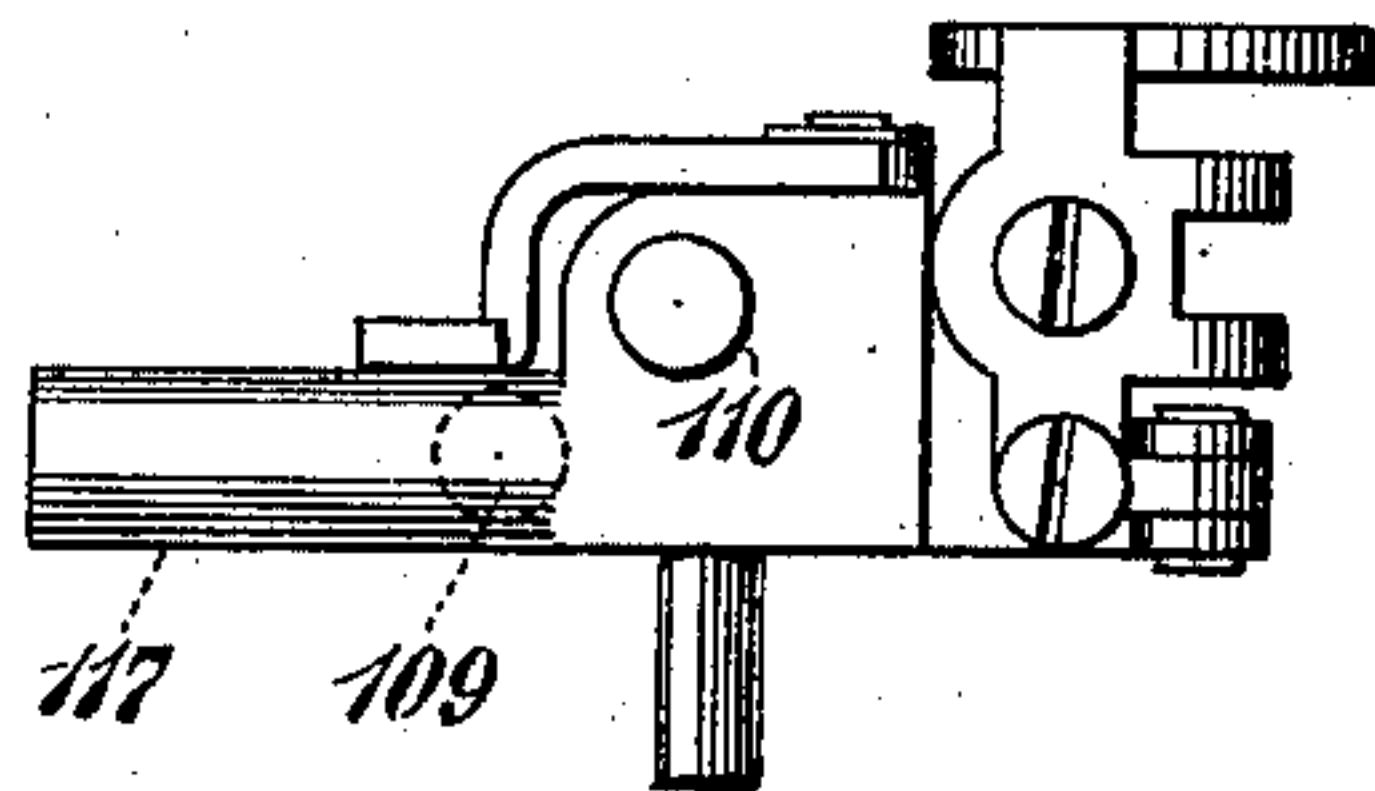
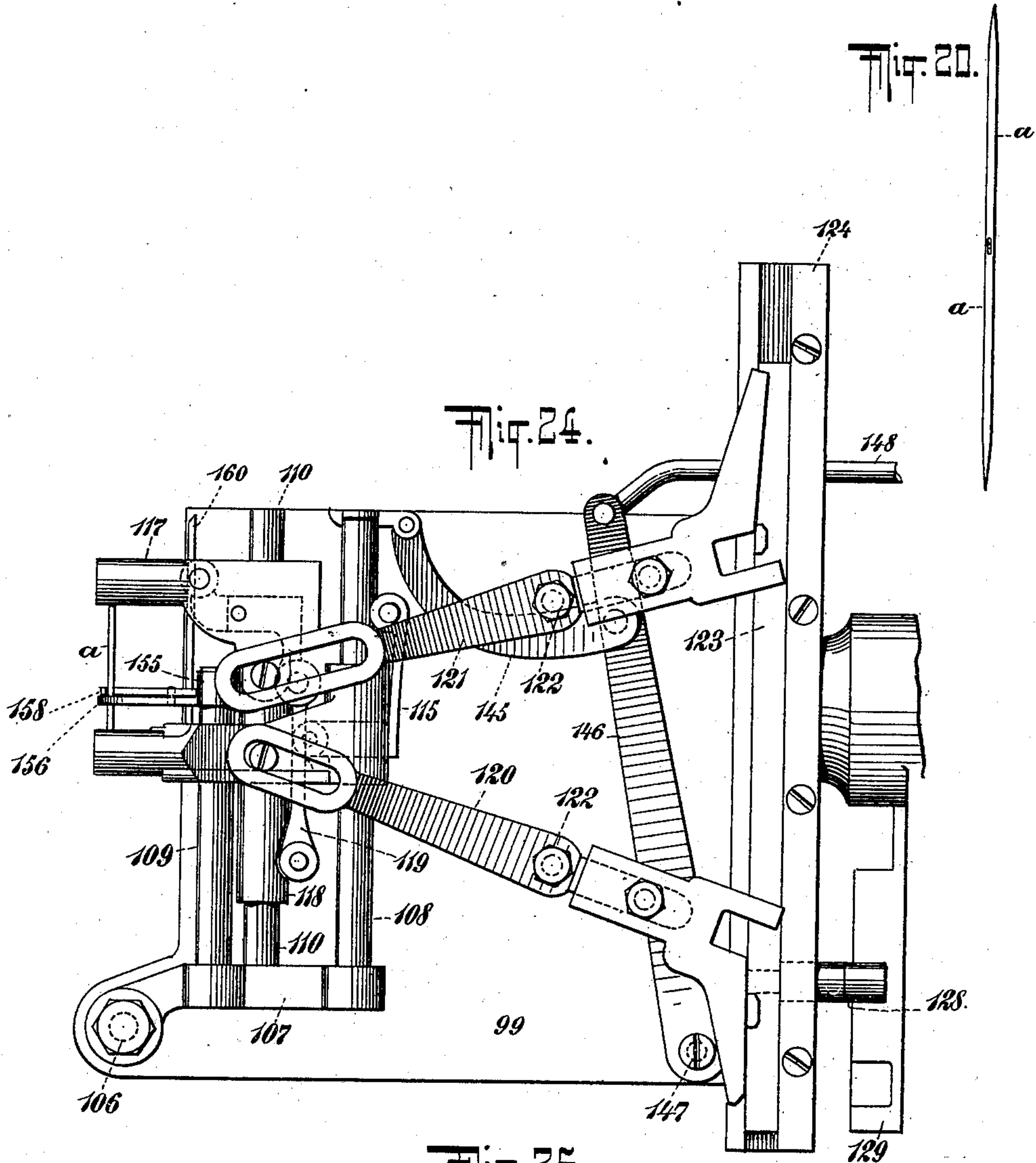
Patented Jan. 15, 1901.

E. VON TRAUTVETTER.
HAT BINDING SEWING MACHINE.

(No Model.)

(Application filed Jan. 11, 1900.)

25 Sheets—Sheet 16.



WITNESSES:

Gustav Dietrich.
Ed. E. E. E.

INVENTOR

E. von Trautvetter

BY *Briess & Knauth*

ATTORNEYS

No. 666,041.

Patented Jan. 15, 1901.

E. VON TRAUTVETTER.
HAT BINDING SEWING MACHINE.

(No Model.)

(Application filed Jan. 11, 1900.)

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Fig. 28.

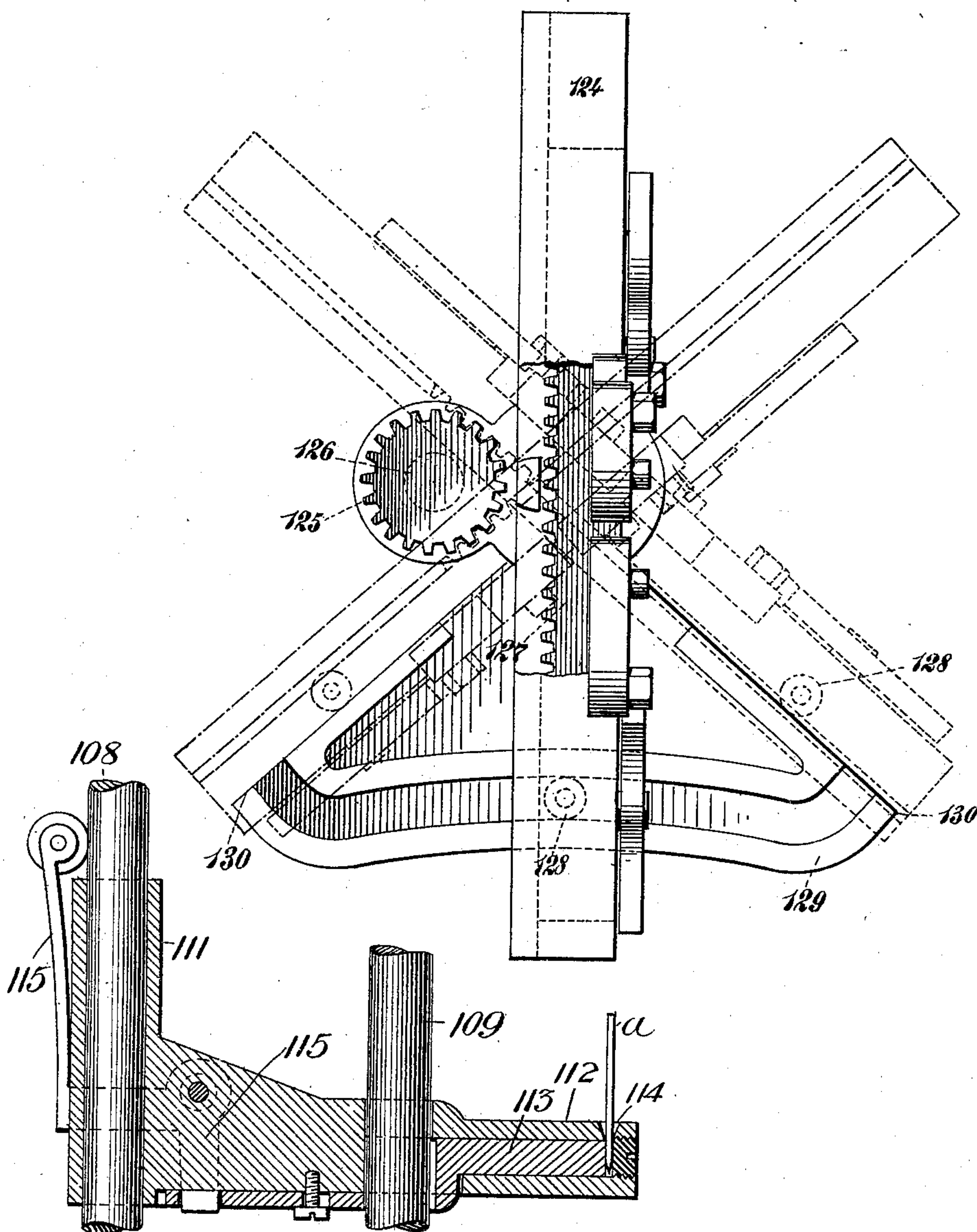


Fig. 21.

WITNESSES:

Gustav Duenich
Ed. A. House.

INVENTOR

Erwin von Trautvetter

BY *Briesen Thumt*

ATTORNEYS

No. 666,041.

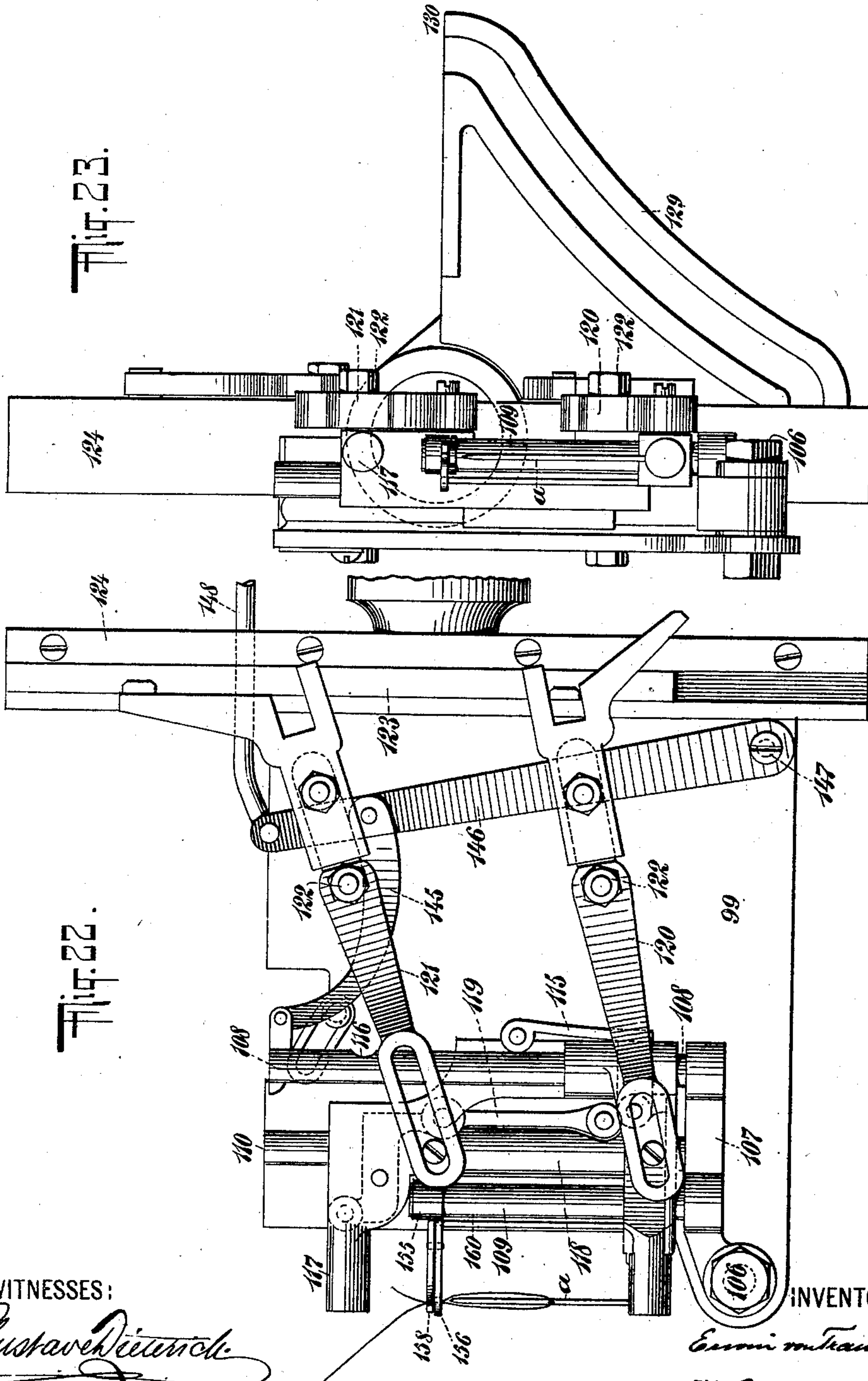
Patented Jan. 15, 1901.

E. VON TRAUTVETTER.
HAT BINDING SEWING MACHINE.

(No Model.)

(Application filed Jan. 11, 1900.)

25 Sheets—Sheet 18.



WITNESSES:

Gustav Dietrich
Geo. Lehmann

INVENTOR

E. von Trautvetter

BY *Briesen & Knautz*

ATTORNEYS

No. 666,041.

Patented Jan. 15, 1901.

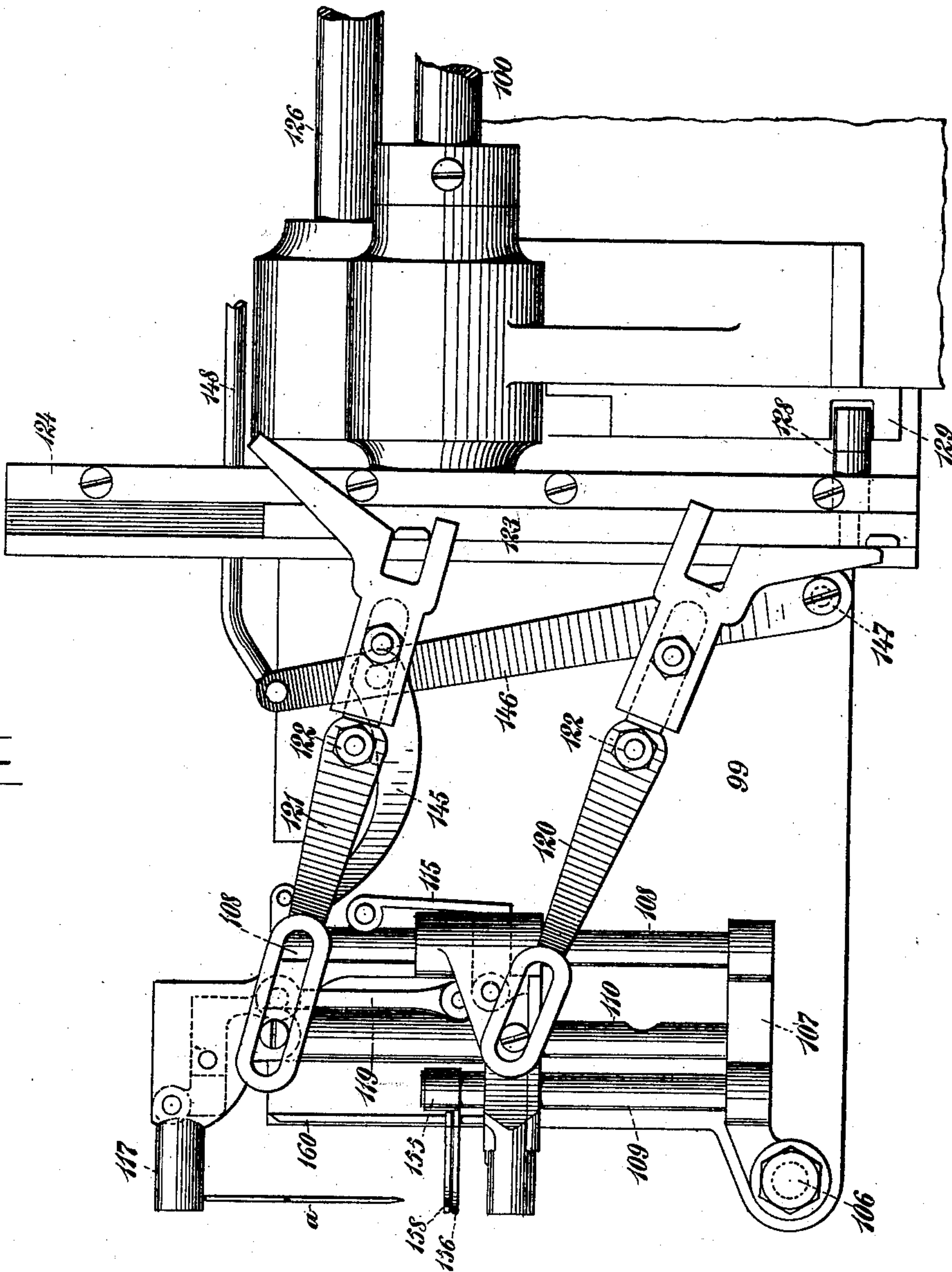
E. VON TRAUTVETTER.
HAT BINDING SEWING MACHINE.

(No Model.)

(Application filed Jan. 11, 1900.)

25 Sheets—Sheet 19.

Fig. 26.



WITNESSES:

Gustave Kautz
Ed. Kautz

Fig. 26.
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INVENTOR

E. von Trautvetter

BY *Briese Kautz*

ATTORNEYS

No. 666,041.

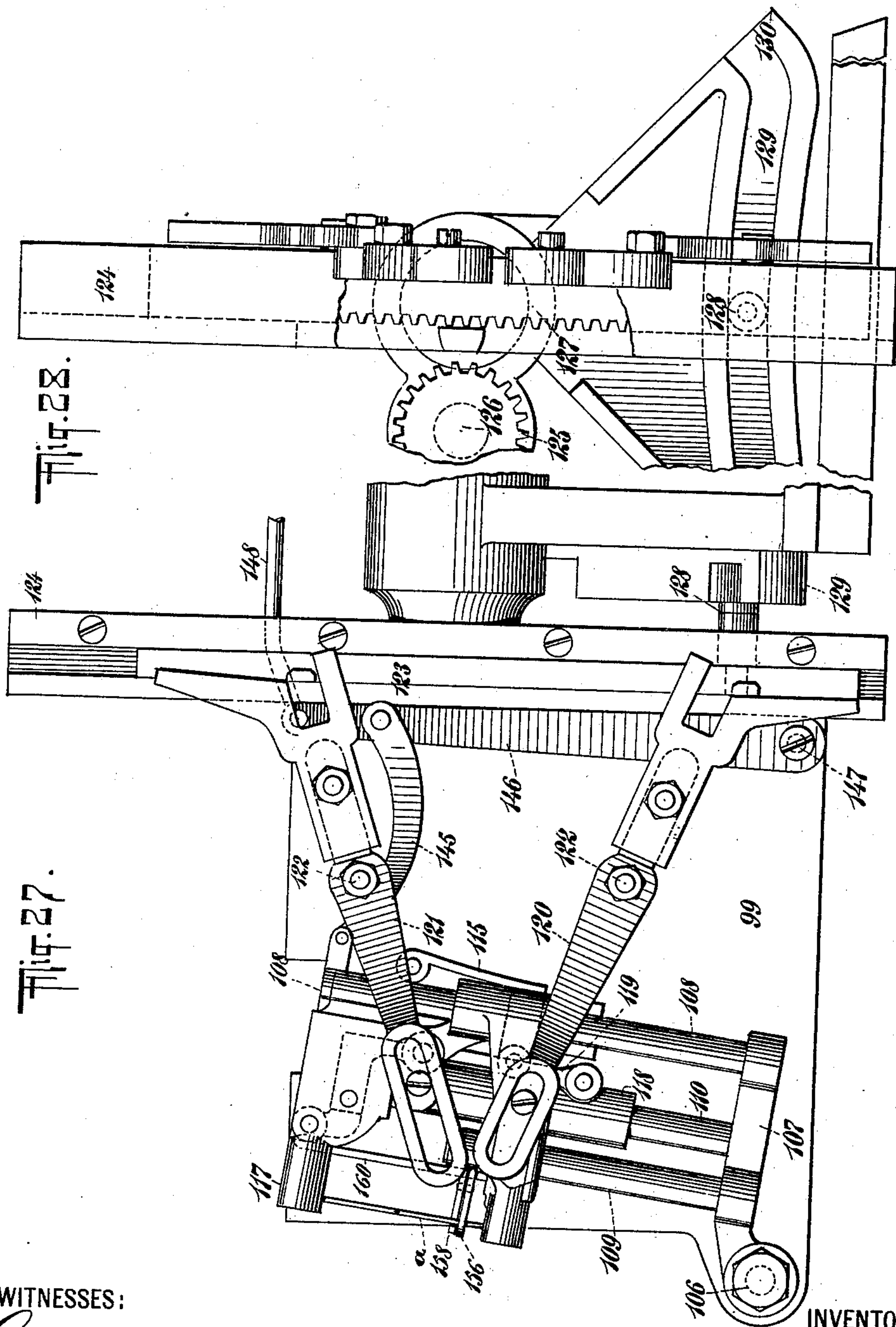
E. VON TRAUTVETTER.
HAT BINDING SEWING MACHINE.

Patented Jan. 15, 1901.

(No Model.)

(Application filed Jan. 11, 1900.)

25 Sheets—Sheet 20.



WITNESSES:

Gustave Dietrich
Geo. E. Thomas

INVENTOR

Erwin von Trautvetter

BY *Briesen & Krautz*

ATTORNEYS

No. 666,041.

Patented Jan. 15, 1901.

E. VON TRAUTVETTER.
HAT BINDING SEWING MACHINE.

(Application filed Jan. 11, 1900)

(No Model.)

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Fig. 29.

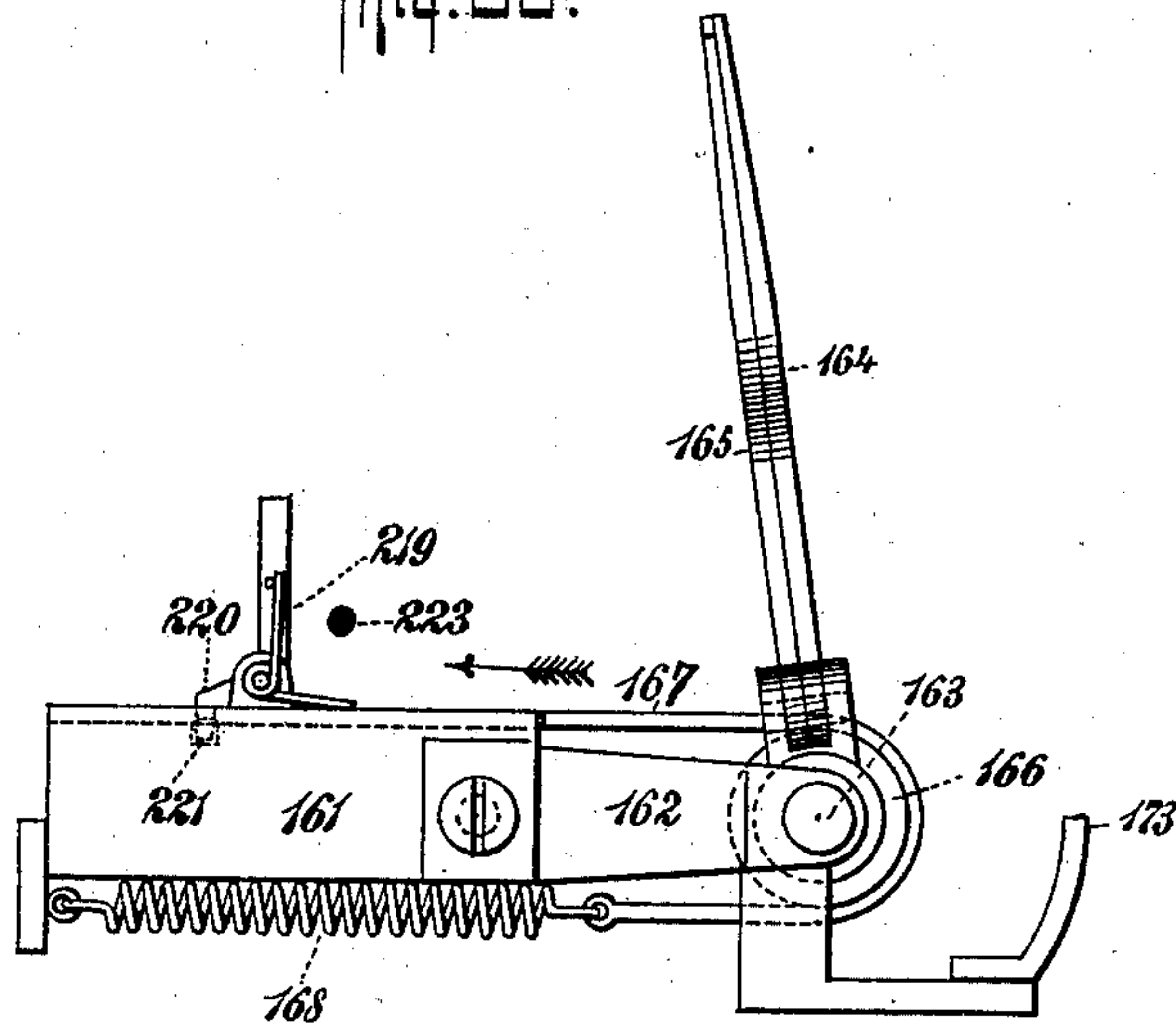
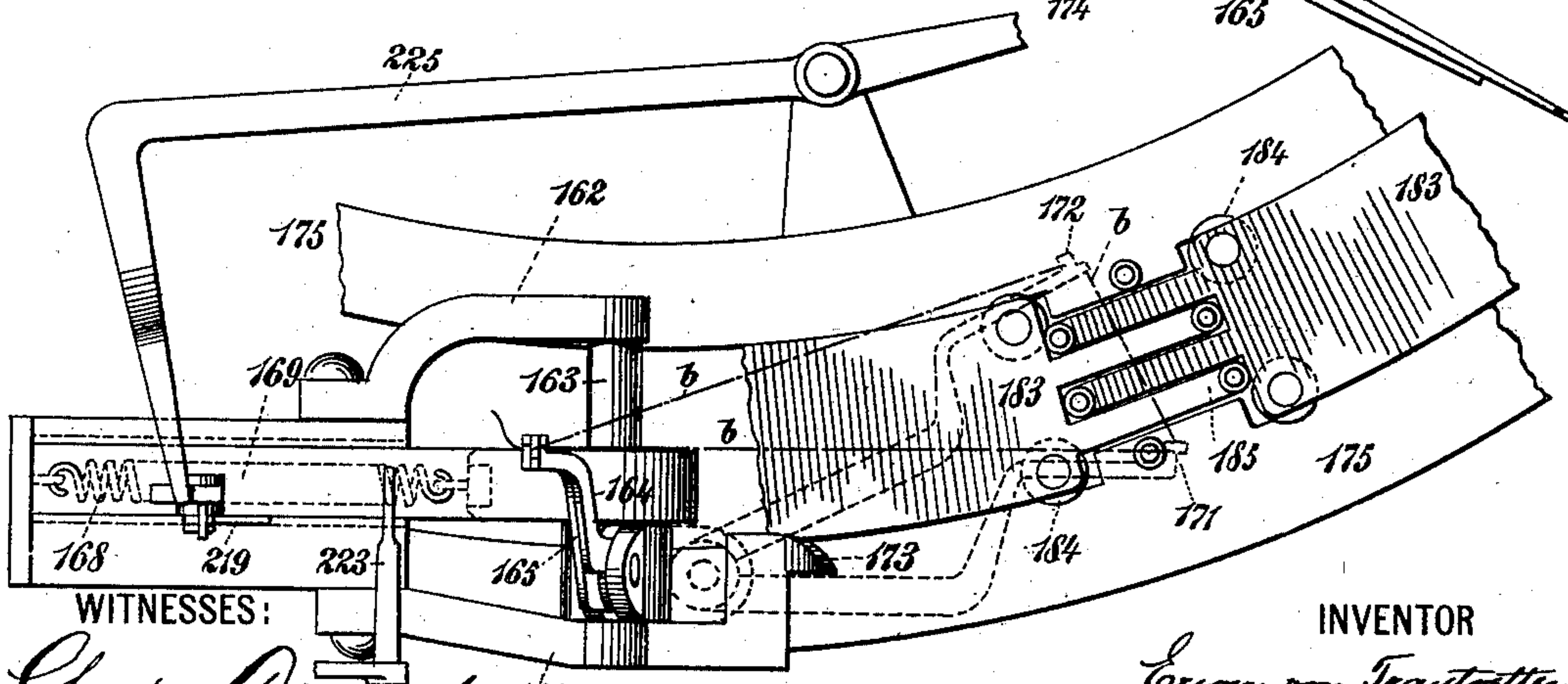
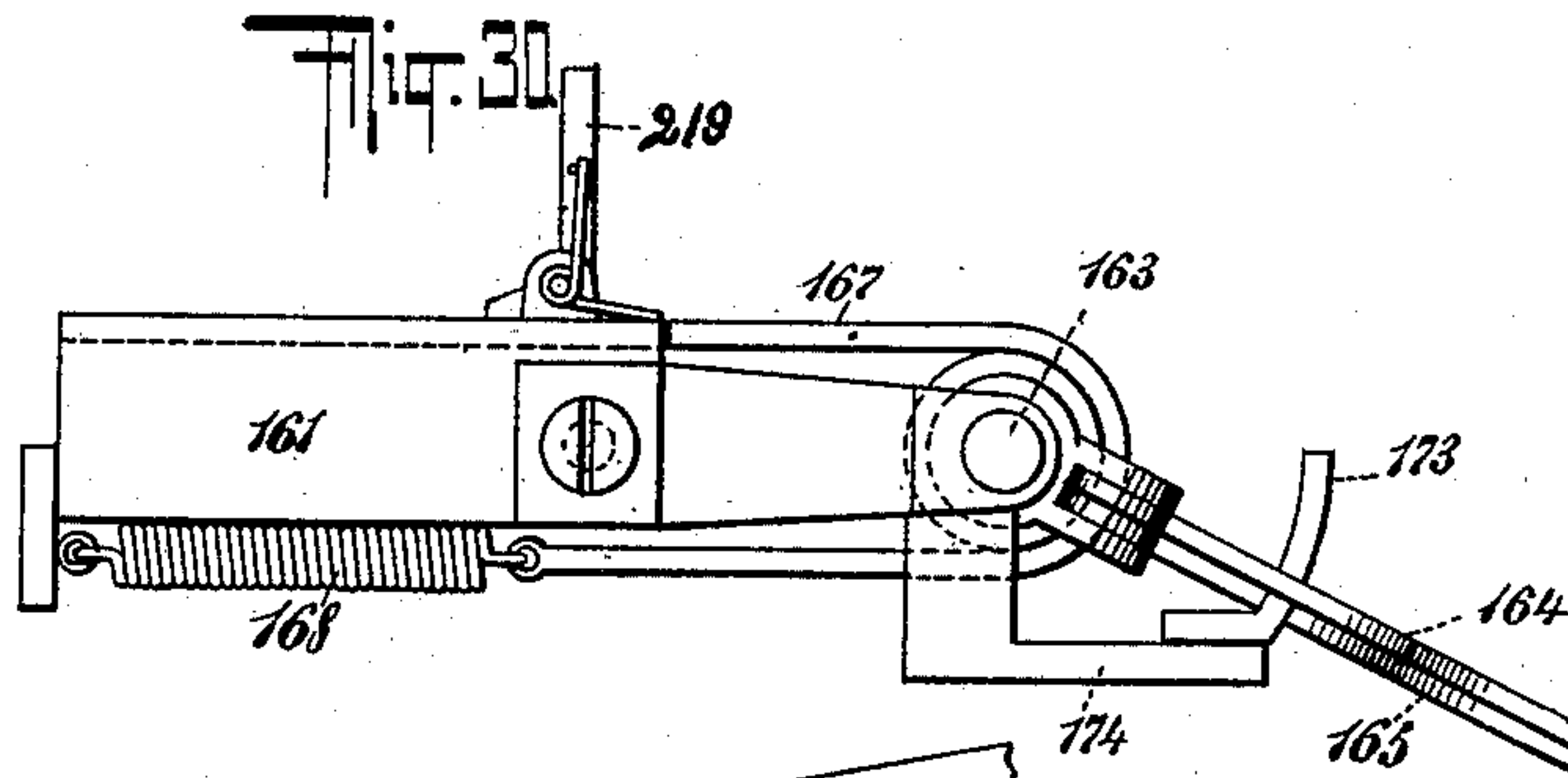


Fig. 31.



WITNESSES:

Gustave Dietrich
Ed. E. Moore

Fig. 31.

INVENTOR

E. von Trautvetter

BY *Briesen Knaut*

ATTORNEYS

No. 666,041.

Patented Jan. 15, 1901.

E. VON TRAUTVETTER.
HAT BINDING SEWING MACHINE.

(No Model.)

(Application filed Jan. 11, 1900.)

25 Sheets—Sheet 22.

Fig. 32.

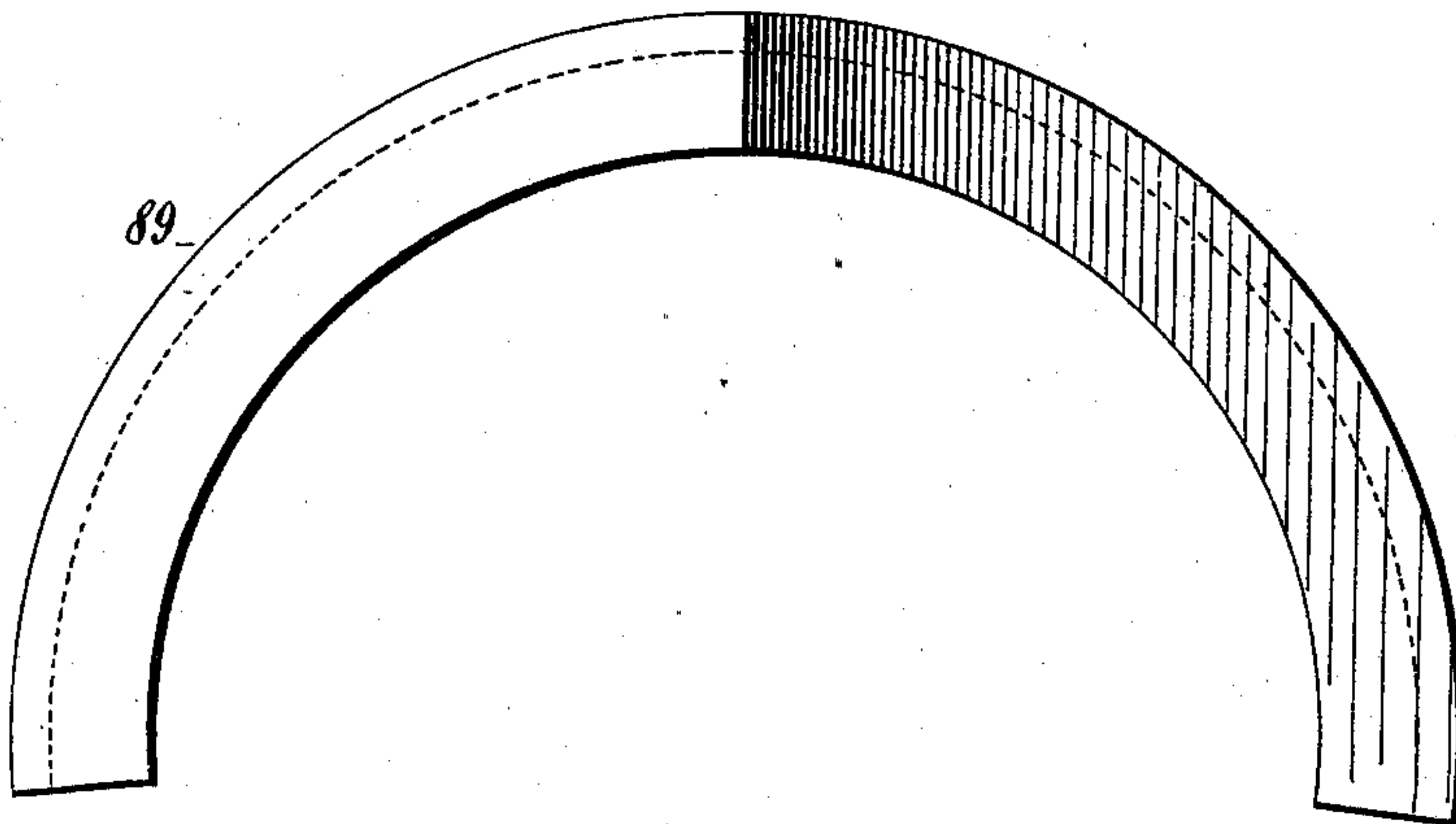
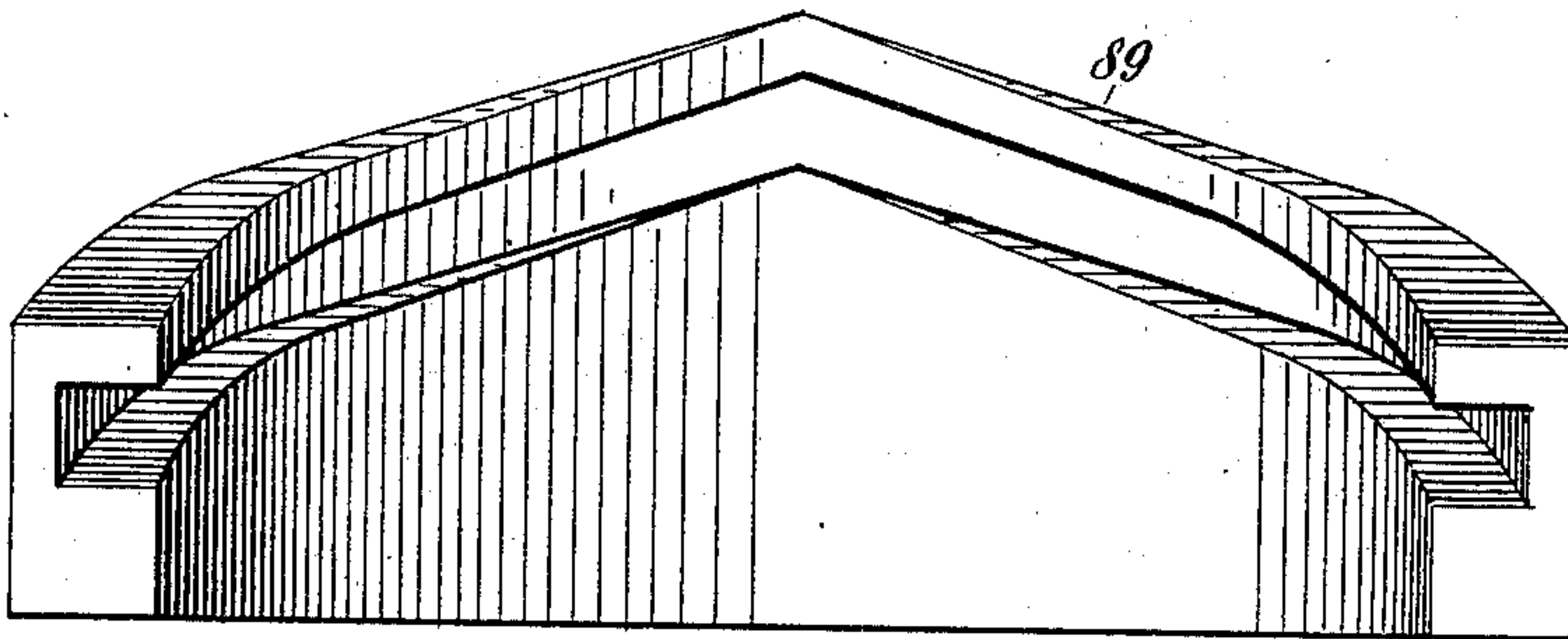


Fig. 33.



WITNESSES:

Gustave Dietrich
Ed. E. H. H. H.

INVENTOR

Erwin von Trautvetter

BY *Briesen Knauth*

ATTORNEYS

No. 666,041.

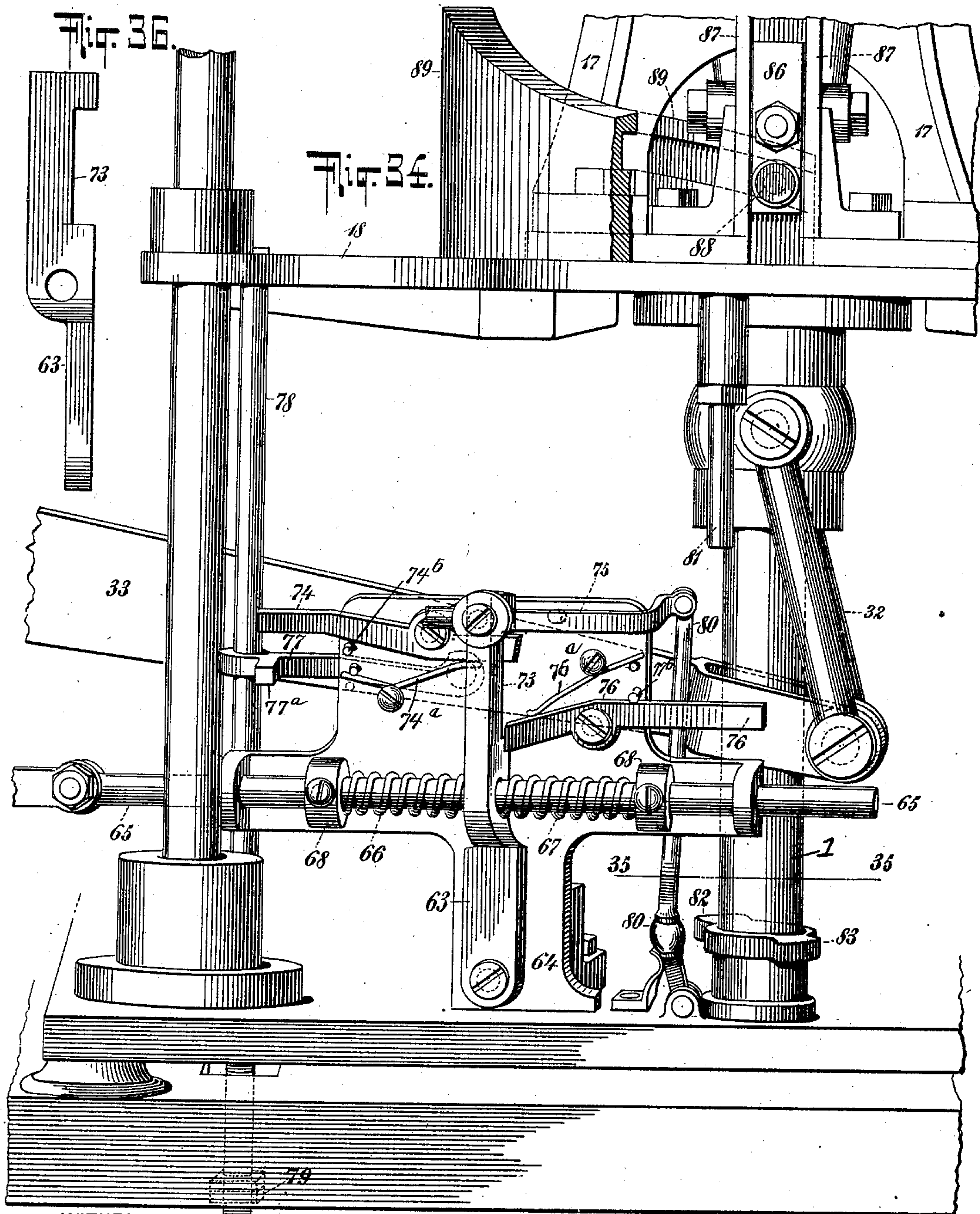
Patented Jan. 15, 1901.

E. VON TRAUTVETTER.
HAT BINDING SEWING MACHINE.

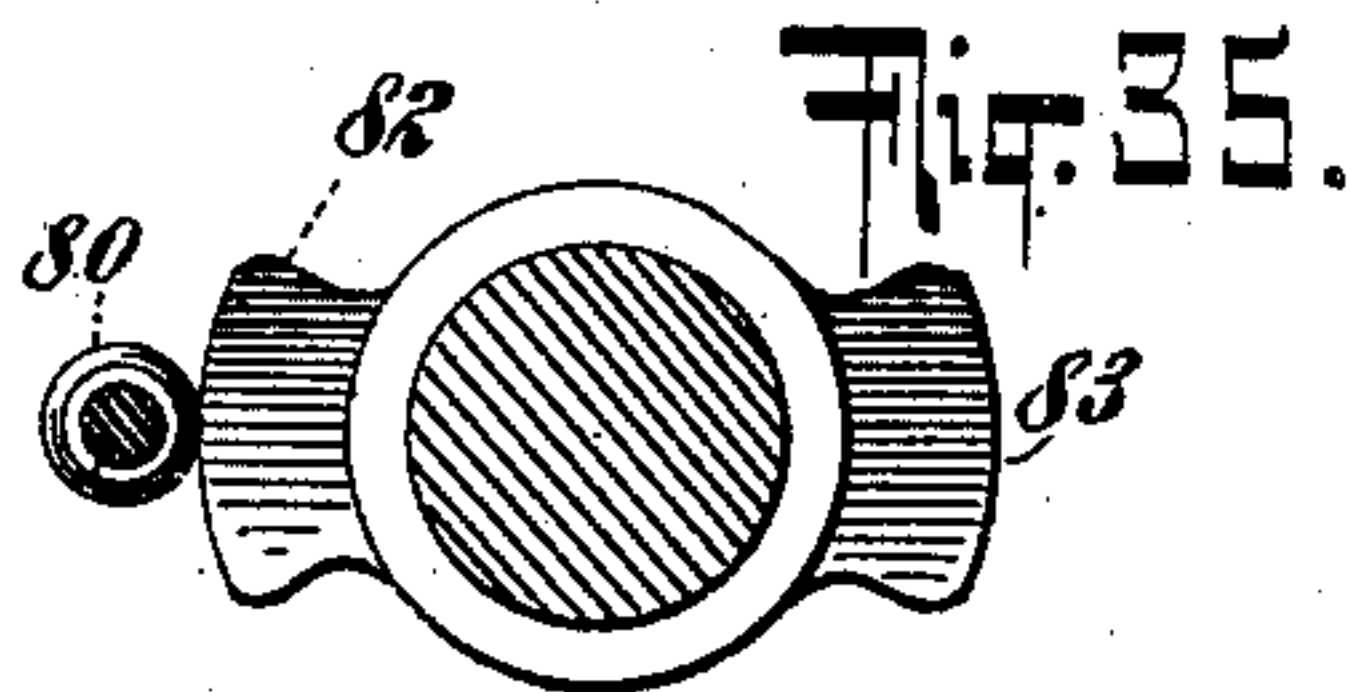
(No Model.)

(Application filed Jan. 11, 1900.)

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WITNESSES:
Gustav Dietrich
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INVENTOR
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No. 666,041.

E. VON TRAUTVETTER.
HAT BINDING SEWING MACHINE.

Patented Jan. 15, 1901.

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Fig. 37.

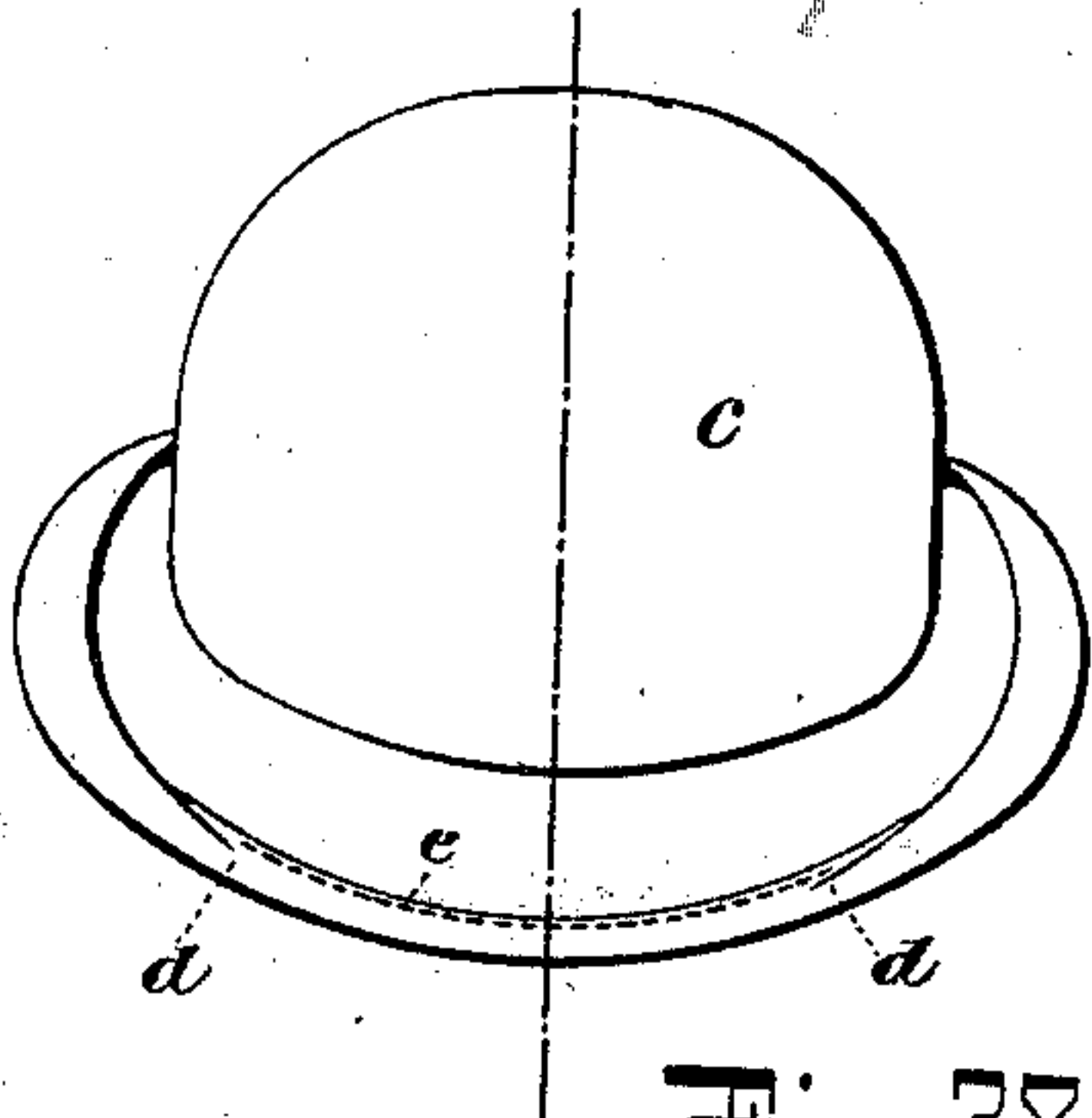


Fig. 38.

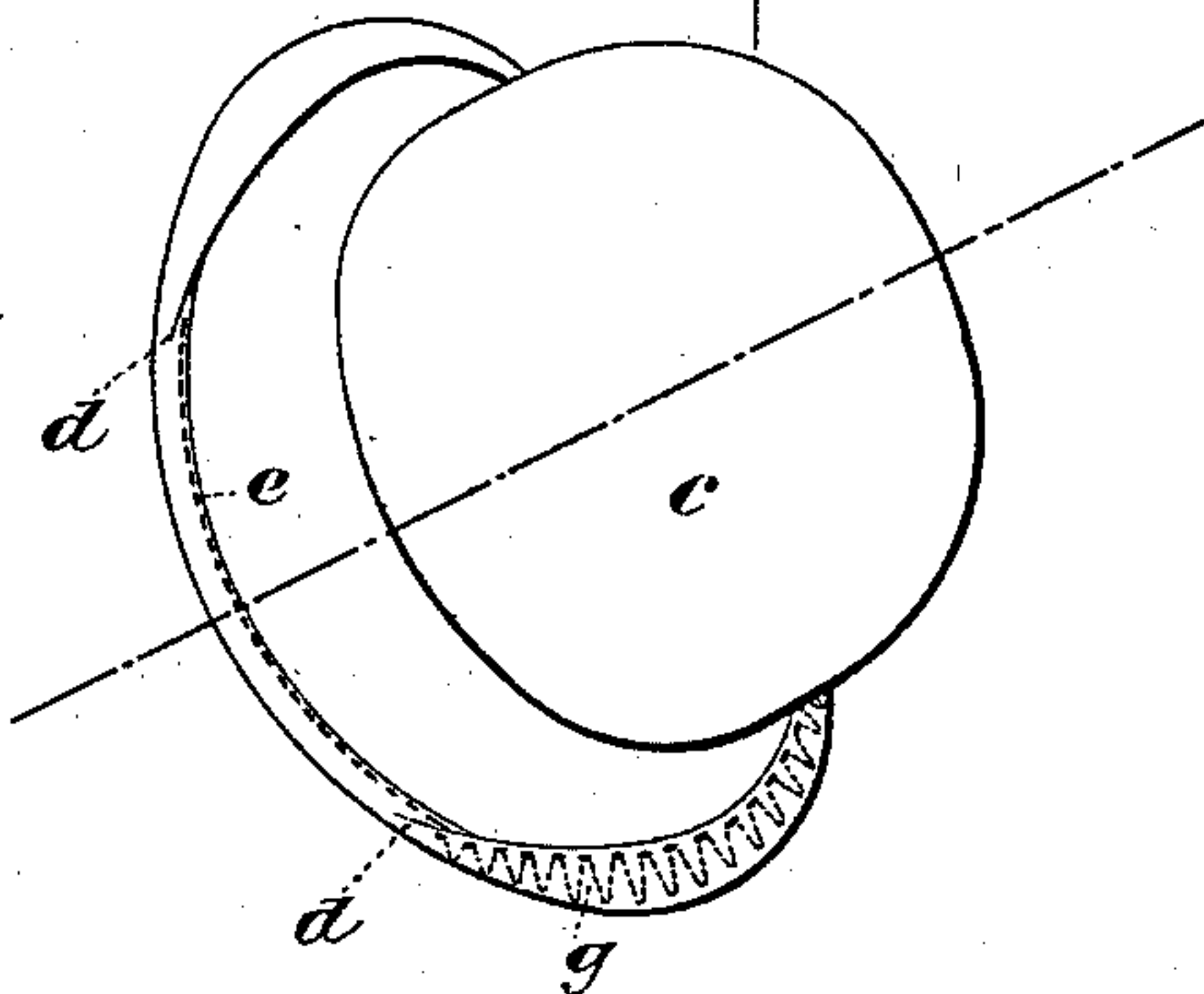


Fig. 42.

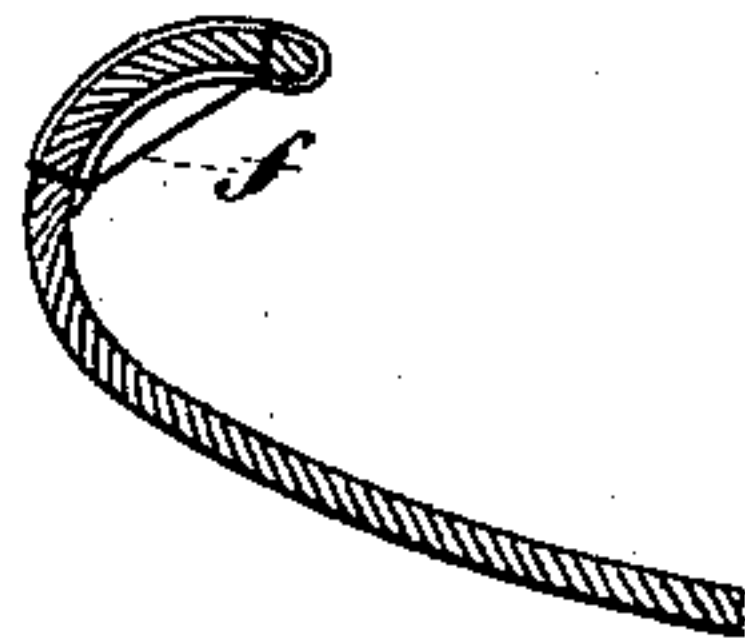


Fig. 41.



Fig. 39.

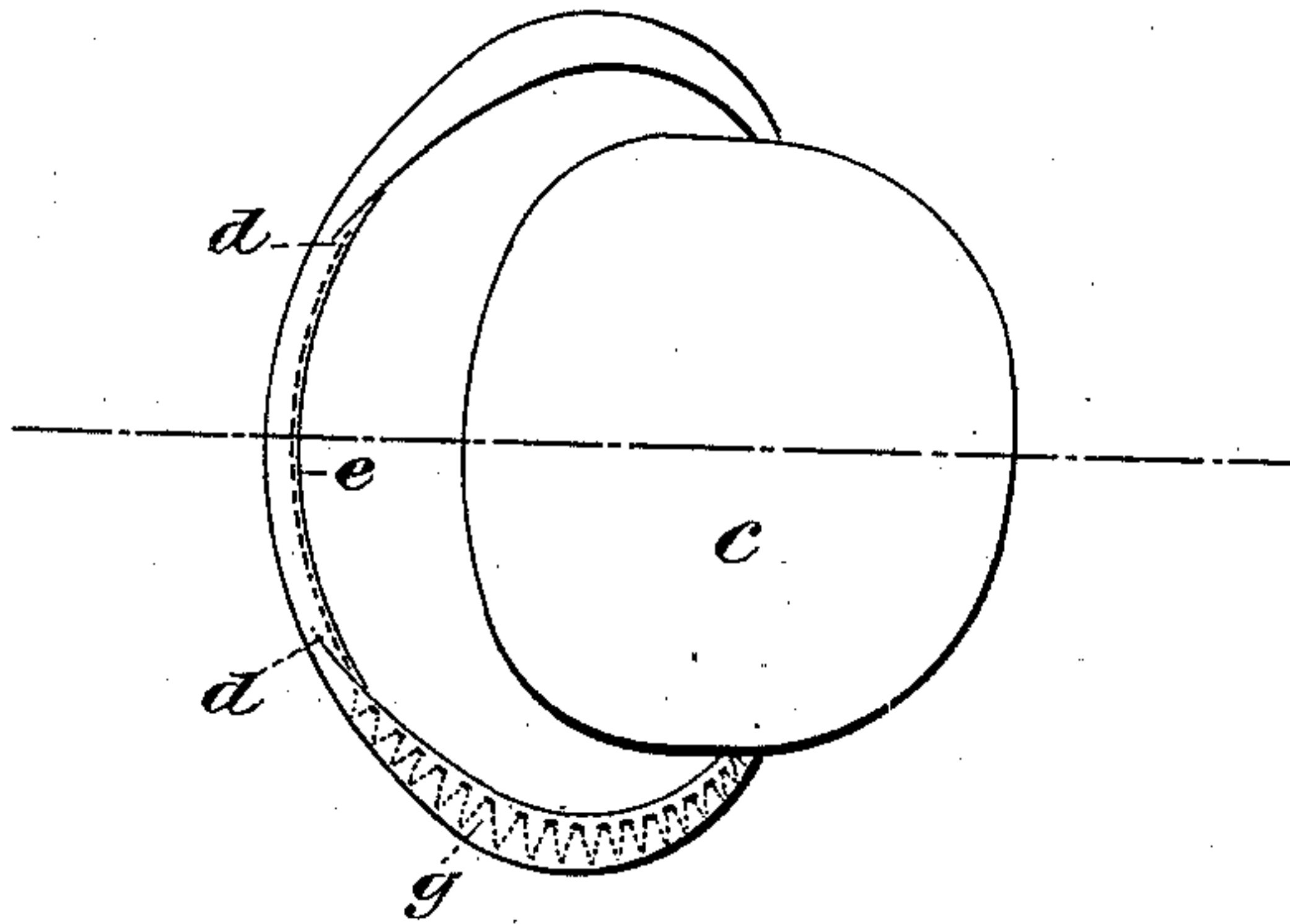
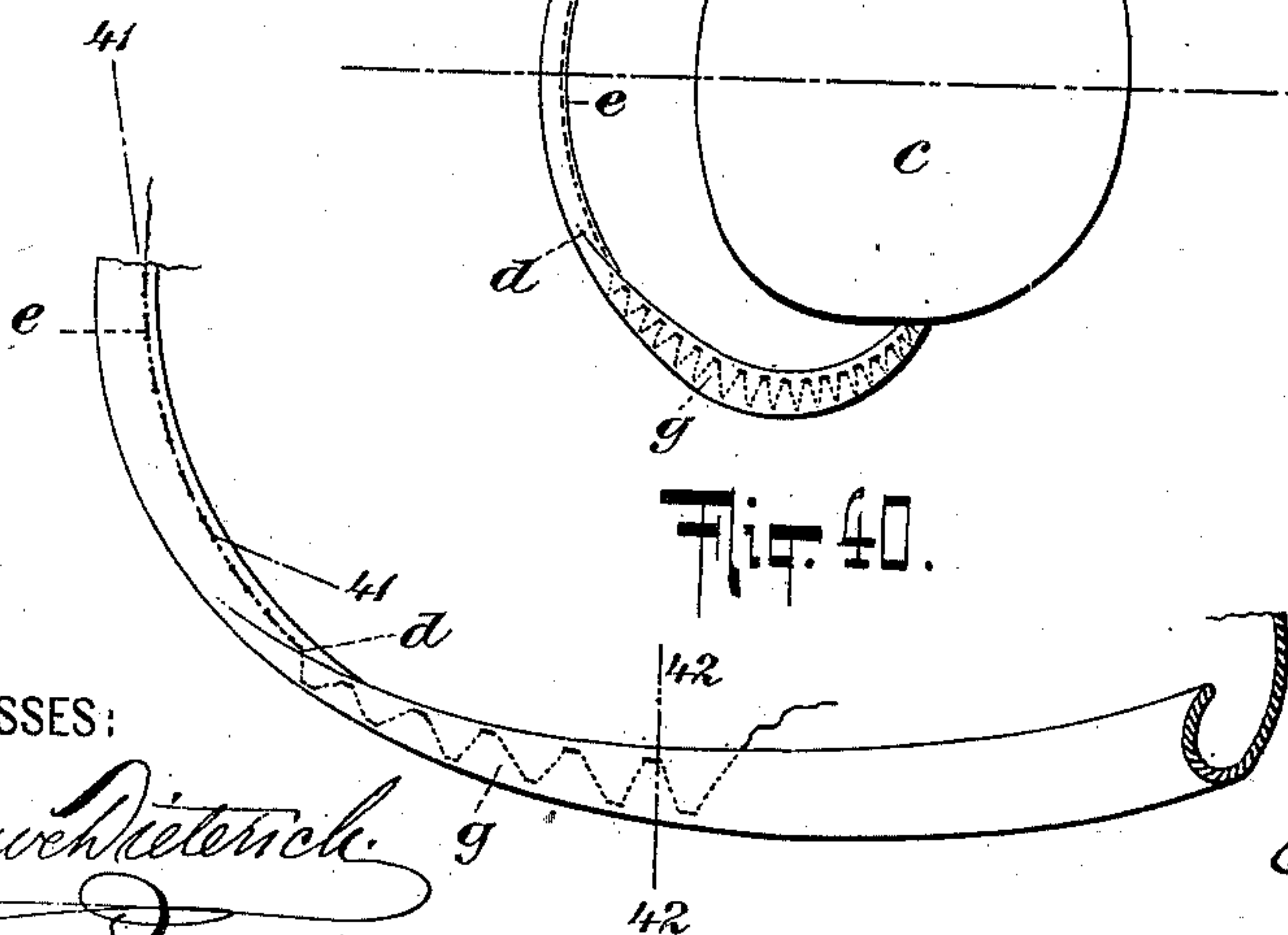


Fig. 40.



WITNESSES:

Gustav Dietrich
Ed. Elmer

INVENTOR

Erwin von Trautvetter

BY *Briesen Knauth*

ATTORNEYS

No. 666,041.

Patented Jan. 15, 1901.

E. VON TRAUTVETTER.
HAT BINDING SEWING MACHINE.

(No Model.)

(Application filed Jan. 11, 1900.)

25 Sheets—Sheet 25.

Fig. 43.

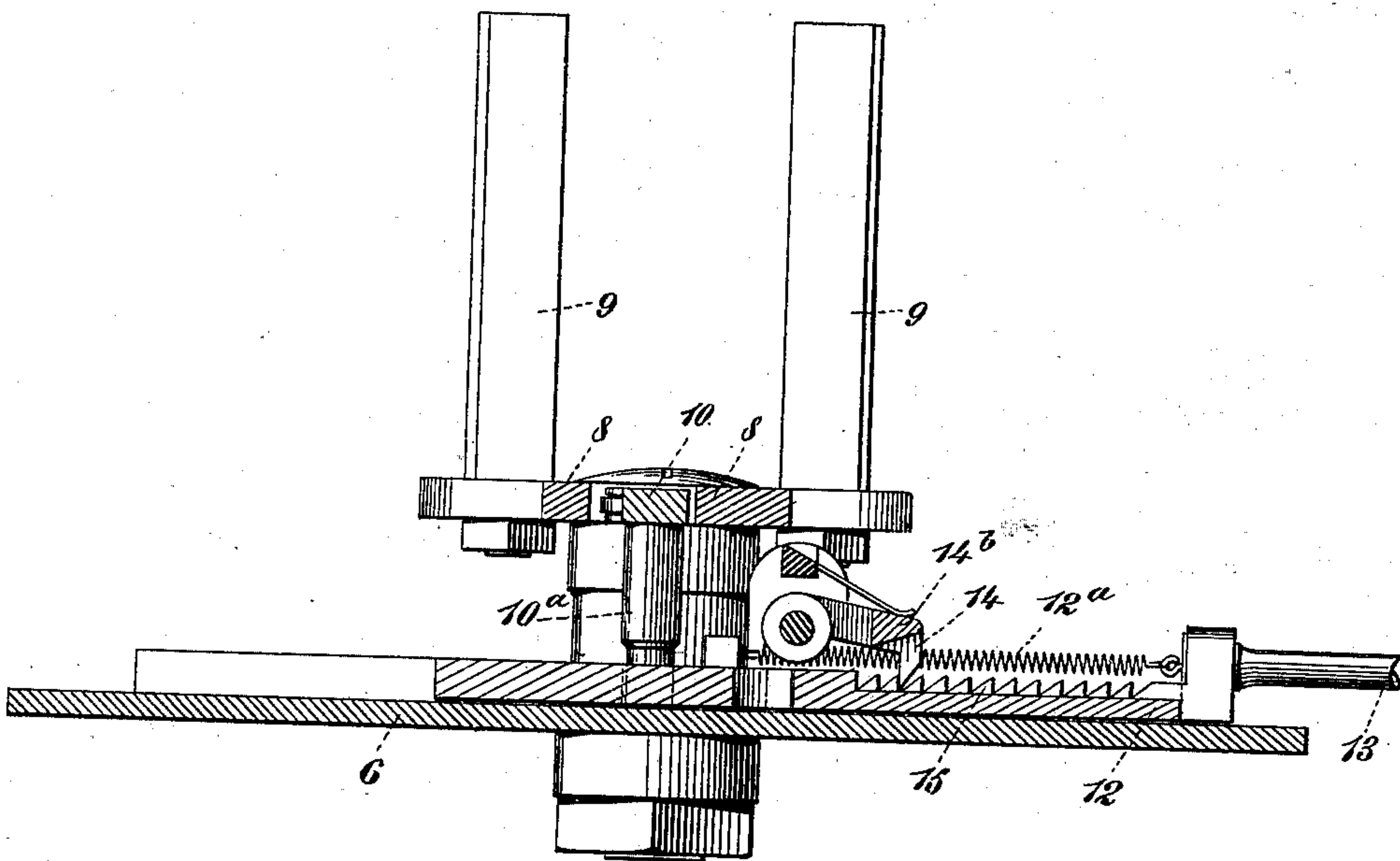
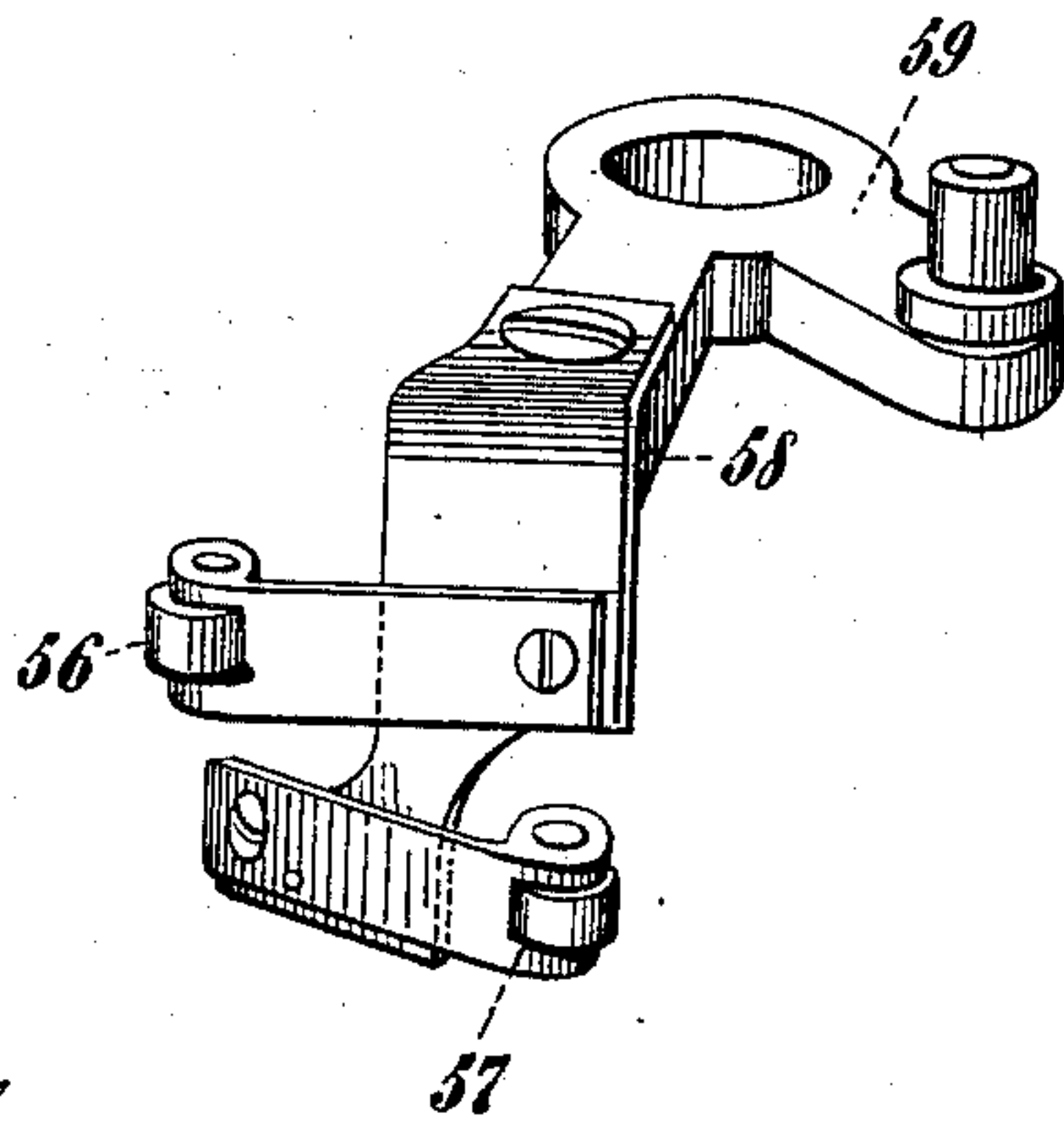


Fig. 44



WITNESSES:

Gustav Dietrich
Edw. E. Moore

INVENTOR

E. von Trautvetter

BY *Briesen Knaut*

ATTORNEYS

UNITED STATES PATENT OFFICE.

ERWIN VON TRAUTVETTER, OF CINCINNATI, OHIO, ASSIGNOR OF ONE-HALF TO CHRISTIAN R. HOLMES, OF SAME PLACE.

HAT-BINDING-SEWING MACHINE.

SPECIFICATION forming part of Letters Patent No. 666,041, dated January 15, 1901.

Application filed January 11, 1900. Serial No. 1,060. (No model.)

To all whom it may concern:

Be it known that I, ERWIN VON TRAUTVETTER, a subject of the Emperor of Germany, residing at Cincinnati, Hamilton county, State of Ohio, have invented certain new and useful Improvements in Machines for Binding Hats, of which the following is a specification.

My invention relates to a machine for attaching bindings to the edges of hat-brims, and has for its object to produce a machine which will attach the said bindings preferably by sewing, although machines which apply the bindings to hat-brims otherwise than by sewing are likewise within my invention.

In the accompanying drawings I have illustrated in detail a machine embodying my invention. This machine is for binding stiff hats and is but one form of the many forms in which my invention may be clothed and is a sewing-machine.

The invention will be hereinafter more fully described with reference to this machine and the salient features of the invention pointed out in the claims.

The machine illustrated in the drawings, considered broadly, is provided with a hat carrier or support, for supporting a hat whose brim is to be bound, and brim-binding or hat binding attaching means, herein shown as a sewing organism. The hat-supporting means is likewise provided with means for causing the same to rise and fall, to bodily rotate, and to swing in order to bring the various parts of the hat-brim to be bound into coöperating relation with the needles of the sewing mechanism. To this end the machine is provided with means for rotating the hat-carrier, for raising and lowering the same, and for swinging the same, all operating in harmony with the needles of the sewing mechanism. The machine is likewise provided with means whereby the sewing mechanism is moved bodily, in addition to its ordinary movements, to form the stitches, the said bodily movement being effected in harmony with the movement of the moving mechanism for the hat-support, and preferably by means of a connection intervening between the sewing-mechanism, traversing means or means for bodily moving the same, and the mechanism for governing the movements of the hat-sup-

port. The machine shown in the drawings is likewise provided with means for taking up the thread, it being understood that the machine shown in the drawings employs short lengths of thread sufficient to bind a single hat. All these organisms operate in harmony with each other and with a means for regulating the length of the stitches, which last-mentioned means operates in harmony with the movement of the hat and with the traversing mechanism for bodily moving the sewing or stitch-forming mechanism.

In the drawings, Figure 1 is a general perspective view of the machine, the said view being designed mainly to illustrate and locate the various positions of the parts in the machine. Figs. 2 and 3, when taken together and placed side by side, illustrate, on an enlarged scale, the operating mechanism of the machine, Fig. 2 representing the left side of the machine, and Fig. 3 the right side of the machine, as will be apparent by placing the two views side by side and comparing them with the general view, Fig. 1. Fig. 4 is a plan view of the parts shown in Fig. 3. Fig. 5 is a plan view of the parts shown in Fig. 2. In each of these views the parts are shown on a slightly-enlarged scale. Fig. 6 is a horizontal section through the machine, taken on or about the line 6 6 of Figs. 2 and 3, and shows clearly the mechanism for directly effecting the rotation of the hat-support. Fig. 7 is a side elevation of the machine looking from the right side of Figs. 1 and 3. Figs. 8 and 9 are part-sectional elevations, taken from positions at right angles to each other, of the hat-support and its connections. Fig. 10 is a sectional plan view, on an enlarged scale, showing the means for traversing the sewing mechanism and for changing the length of the stitch as required. This figure should be read in connection with Figs. 5, 6, and 11, which last-mentioned figure is a side elevation, on an enlarged scale, of the parts for effecting the raising and lowering of the hat-support, the section being taken on line 10 10 of Fig. 3. Fig. 12 is a plan view, on a smaller scale, of certain of the parts shown in Fig. 11, the section being taken on line 12 12 of Fig. 2. Fig. 13 is an enlarged plan view of the pawl-and-ratchet mechanism for rotating the feed-screw

38, shown at the extreme left in Fig. 2, which operates to raise and lower the hat-support. The mechanism shown in Fig. 13 is reversible, the reversal being automatically effected, as will be described, the reversal being effectual to change the direction of reciprocation of the hat-support. Fig. 14 is a sectional plan view of the means for causing the take-up motions, the said figure being preferably read in connection with Figs. 3 and 4, which show the correlation between the take-up mechanism and the needle mechanism. The section is taken on line 14 14 of Fig. 3. Fig. 15 is an underneath plan view of one take-up carriage. Fig. 16 is a section on line 16 16 thereof. Fig. 17 is an underneath plan view of another carriage which moves the take-up carriage. Fig. 18 is a side elevation thereof. Fig. 19 is a plan view of the same. Fig. 19^a shows the carriages assembled. The needle preferably employed is shown in Fig. 20. The needle-operating mechanism is shown in detail in various positions in Figs. 21 to 28, inclusive, Fig. 26^a being an end view of the thread-gripper, and Fig. 28^a showing the various positions of the parts in dotted lines. Fig. 21 shows, on an enlarged scale, in longitudinal section one of the grippers for gripping the needle to pull it through the fabric. Fig. 22 shows the needle-operating mechanism in one of its positions. Fig. 23 is a side or edge view of the needle-operating-mechanism carrier. Fig. 24 shows the needle-operating mechanism in another position. Fig. 25 is a plan view thereof. Fig. 26 shows the needle-operating mechanism in another position. Fig. 27 shows the needle-operating mechanism in still another position. Fig. 28 is a broken-away detail edge view thereof, showing the pinion for driving the needle-actuating bar. The take-up mechanism is shown in part in Figs. 29, 30, and 31, in side view in Fig. 29, in side view in another position in Fig. 30, and in plan view in Fig. 31. Figs. 32 and 33 are plan and side views, respectively, of the cam for causing the swing of the hat-carrier when the said hat-carrier is revolved in order that the sewing mechanism may follow the contour of the brim of the hat. Fig. 34 is an elevation of the parts shown in Fig. 11, the direction of view being diagonal. Fig. 35 is a sectional plan view of the cam which operates to put the arm 63 in its middle position, the section being taken on line 35 35 of Fig. 34. Fig. 36 is a side view of the arm 63, which will be hereinafter fully explained. Fig. 37 represents the hat to be sewed in a horizontal position to sew the front and back of the brim. Fig. 38 shows the hat slightly inclined. Fig. 39 shows the hat further inclined. Fig. 40 is an enlarged detail view of the edge of the brim, showing the stitch. Fig. 41 is a section on line 41 41 of Fig. 40. Fig. 42 is a section on line 42 42 of Fig. 40. Fig. 43 is a sectional view of the slide and retaining-pawl of the hat-carrier; and Fig. 44 is a detail perspective view of the

arm 58, which carries the pawl-releasing rollers 56 57.

Referring now particularly to Figs. 2, 3, 4, 5, and 43, 1 is the shaft which supports the hat support or carrier. This shaft is shown as vertical and extends upward in the machine and carries a head 17, having sleeves 3, in which a rock-shaft 2 is journaled, which shaft supports weighted arms and upwardly-extending brackets 5, which support a table 6, from which rises a stud 7, which supports a pair of arms 8, (see Fig. 5,) which arms are provided with upwardly-extending fingers 9, adapted to enter and bear against the inside of the hat to be bound. The arms 8 are swung upon their pivots by a suitably-pivoted cam 10, which bears upon each of said arms and is operated by link 11, operated by a slide 12, actuated by suitable rod 13 and held in adjusted position by a suitable pawl 14, pivoted on the guides of the slide, engaging a rack 15 on the slide 12. (See Figs. 5, 7, 8, and 9.) The slide is retracted by a spring 12^a. The rod 13 is operated by a suitable plunger 16. (Shown most clearly in Fig. 7.) By pushing the plunger 16 the slide 12 is moved against the tension of its spring 12^a and by the slot 11 in slide 12 acting on the arm 10^a on cam 10 swings the cam 10 on its pivot, which cam, working against the arms 8, spreads them apart to engage the inside of the hat by the fingers 9. The pawl 14 engaging the rack 15 holds the parts in position. The pawl 14 may be released from the rack 15 by the pivoted cam-piece 14^a, (see Fig. 5,) which is adapted to be swung to bring its cam-face against the lateral extension 14^b of the pawl 14. The spring 12^a will then restore the parts to position. The head 17 has a free rotary motion upon the top plate 18 of the table. The shaft 1 receives, among others, an intermittent rotary motion. This rotary motion may be variously imparted to it. In the present instance the shaft 1 is provided with a finely-cut toothed wheel or ratchet 19, (for a clearer view thereof see Fig. 6,) with which meshes a pull-pawl 20, pivoted to a block 21, which slides freely upon an arm 22, which is hung upon the vertical shaft 1. The arm 22 is connected by pivoted link 24 to an arm 25, provided with a bowl which coöperates with a cam 26 upon a vertical shaft 27, operated by bevel-gearing 28 from a shaft 29, which may receive its motion by a sprocket-chain 30 from the main shaft 31 of the machine. In placing the last few parts reference can be most conveniently made to Figs. 3 and 6.

It will be understood that rotation of the shaft 31 will communicate continuous rotary motion to the shafts 29 and 27, and thereby cause the arm 22 to be swung, and thus by means of the pawl 20 step the wheel 19 and shaft 1 around step by step.

So far it will be seen that the hat-carrier may be opened and closed by hand by means of the plunger 16 and that one of its motions is a continuous rotary motion. The hat-car-

rier likewise receives a rising-and-falling motion, and for this purpose the shaft 1, which carries the said hat-carrier, receives an up-and-down motion. This up-and-down motion is in the machine shown in the drawings effected as follows, reference being had for the moment to Figs. 2, 5, 11, 12, 13, and 34 of the drawings: By referring to these figures it will be observed that the shaft 1 has connected thereto a yoke 32, to which is pivoted an arm 33, which is pivoted in a bracket 34 on the lower plate 35 of the machine. The rear end of the arm 33 is provided with a yoke 36, which is pivoted to a nut 37, which is carried upon and traverses a feed-screw 38, which carries a pinion 39. (Shown clearly in Figs. 5 and 12 and on an enlarged scale in Fig. 13.) A gear-wheel 40 meshes with the pinion 39 and is carried upon a shaft 41, which is provided with two oppositely-placed ratchets 42 43. One of these ratchets—to wit, the ratchet 42—is acted upon by a pivoted pawl 44, provided with a spring-pressed tailpiece 45 and pivoted at 46 upon an arm 47. The arm 47 receives a rocking motion from a reciprocating rod 48, which is shown in the plan view Fig. 5 as pivoted at one end to the arm 47 and at the other end to a slide 49, which slide is reciprocated by a rod 50, pivoted thereto and to a crank-plate 51, carried upon the shaft 27, which, as before stated, receives a continuous rotary movement from the main shaft of the machine. (See Fig. 5.) The other ratchet 43 is coöperated with by a pawl 52, which is pivoted upon an arm 53, hung upon the shaft 41, and is provided with a spring-pressed tailpiece 54. The pawls 45 and 52 are normally held out of engagement with their ratchets by leaf-springs, (shown in the drawings attached to the arms 47 and 53.) The arm 53 receives a swinging motion from a rod 55, which is pivoted at one end to the slide 49 and at its other end to the arm 53, and receives a reciprocating movement from the said slide. When the pawl 44 is in engagement with its ratchet 42, the movement of the arm 47 is effective to rotate the shaft 41 to the right—that is to say, in the direction of the hands of a watch—when viewed with reference to Fig. 13, and when the pawl 52 is in engagement with its ratchet 43 an opposite rotation of the shaft 41 will be effected. Rotation of the shaft 41 and its gear 40 in one direction will cause the ascent of the nut 37 upon the feed-screw 38, and an opposite movement will cause the descent of the said nut, thereby causing, respectively, the lowering and raising of the hat-carrier, it being remembered that the pinion 39 is rigid with the feed-screw 38. In order to effect the proper rotation of the shaft 41, it being remembered that both pawls constantly receive a swinging motion, it is necessary to engage one pawl or the other at the desired time with its ratchet. This can be effected by bringing the rollers 56 57 into the proper position. These rollers 56 57 are carried (see Fig. 44) upon an arm

58 (which swings upon the shaft 41) and are adapted to be swung one or the other into the path of the tailpiece 45 or 54 of the pawls 44 52, respectively, so as to engage one or the other with its ratchet when it is swung rearwardly by its carrier-arm. This adjustment of the rollers may be effected by the arm 59, which is connected to and moves the said arms 58 and itself receives motion from an arm 60. The connection of this arm 60 may be followed out on Figs. 5, 11, 12, and 13, from which it will be seen that the arm 60 is pivoted at 61 and is pivotally connected to a link 62, which is pivoted to an arm 63. (Shown clearly in Figs. 2 and 11.) The link 62 receives its motion from the arm 63 and communicates the same to the arm 60, so as to swing the arm 58 to engage one or the other pawl with its ratchet to produce an up or down movement of the shaft 1. The position of the arm 63 thus controls the up and down movements of the shaft 1, which movements occur simultaneously with the rotary movement already described. The positioning of the arm 63 also is effective to cause the up and down movements to entirely cease while the substantially straight front and back portions of the hat-brim are being bound. Thus it will be observed (see Figs. 2, 12, 13, and 34) when the arm 63 is in its extreme position to the right the parts will be positioned to raise the shaft 1, and when it is in its extreme position to the left the parts are in position to lower the shaft 1. When the arm 63 is in an intermediate position, the rollers 56 57 are in intermediate positions and will be ineffective to cause either pawl 44 or 52 to engage its ratchet. The positioning of the arm 63 may be effected by the following mechanism: The arm 63 is pivoted in front of the plate 64 and is apertured for the passage of a rod 65. The rod 65 is surrounded by two stiff opposing springs 66 67, which bear on the arm 63 and on oppositely-placed collars 68 on the rod 65. The rod 65 slides in bosses on the plate 64 and is linked at one end to a bell-crank lever 69, with which nuts 70 71 on a rod 72, hung from lever 33, are adapted to coöperate to move the same, and thereby swing the arm 63. The arm 63 is provided with a slot 73, through which the ends of pivoted latches 74 and 76 are adapted to project. These latches are adapted to fall behind solid parts of the arm 63 when they are swung into the proper positions. The latch 74, which is normally held by its spring 74^a against a stop 74^b in such a position as to position its forward end opposite a solid portion of the arm 63, is acted upon by a lug 77^a on arm 77, (see Fig. 12,) through which passes a rod 78, carrying a nut 79, which when the shaft is in its upper position contacts with arm 77, and thereby brings the lug 77^a against said latch 74 and swings the forward end of latch 74 downward (see Figs. 12 and 34) to enter the slot 73 of the lever 63 to unlock the same and permit it to move to the left. The latch 76 normally

rests opposite a solid portion of the arm 63, so as to serve as a stop therefor when the arm is in its extreme left position, being held in such position by a spring 76^a, which holds it against a stop 76^b. The latch 76 is adapted to be swung to bring the nose thereof opposite the slot 73 by a contact or abutment 81 on the plate 18 of the rising and falling hat-carrier. In addition to these latches the arm 63 is provided with a link 75, which is pivoted to an arm 80, which is operated by a double cam 82 83 on the shaft 1. These cams contact with the arm 80 when the hat-carrier presents the front and back substantially horizontal portions of the hat-brim to the binding-attaching means, herein shown as a sewing organism.

The operation of the devices just described is as follows: When the arm 63 is in the extreme left position, the latch 76 rests firmly behind the said arm, and the latch 74 is out of engagement therewith, having its nose entered into the slot 73. At this time the hat-carriage is descending. When the carriage has reached its lowest position, the contact 81 strikes the tail of the latch 76, and thus releases the arm 63, which is swung to the right by the nut 70 striking the bell-crank lever 69. The hat-carrier now rises. When it reaches nearly its highest point, the latch 74 is released by the contact of nut 79 with lever 77. At this instant the cams 82 and 83 operate to swing the arms 80 and 63 to the left against the tension of spring 66 until the said arm 63 occupies a position intermediate of its extreme right and left positions. This positioning of the lever 63 is effective to allow both pawls 44 54 (see Fig. 13) to swing clear of their ratchets, so that the hat-carrier will rotate in a horizontal plane so long as either cam 82 or 83 is in contact with arm 80, which will give the necessary movement for binding the front and back substantially horizontal parts or portions of the hat-brim. When the cam passes off the lever 80, the spring 66 restores the arm 63 to position, so as to continue the upward movement until the nut 71 contacts with the bell-crank lever 69, when the reciprocating motion will be reversed.

In addition to the movements just described the hat-carrier in the machine shown makes a swing to bring all portions of the brim successively in front of the needles. In order to effect this, the rock-shaft 2 is provided with a working beam 84, to which are pivoted links 85 85, which at their lower ends are pivoted to slides 86, which are adapted to slide up and down in guides 87 and are provided with bowls or rollers 88, which engage in a cam 89 on the plate 18. Only one of the rollers engages the cam at a time, and as the cam is of the shape of a hat-brim or half of one (see Figs. 32 and 33) the hat-carrier will be caused to move so as to present all parts of the brim accurately to the needles. The operation will be clearly traced from the drawings. It is likewise necessary to cause the rotating means for the

shaft 1 to give a greater or less throw of rotation to the shaft for every oscillation of the arm 25. (See Fig. 6.) For instance, when binding the front and back of the hat-brim the stitches are very short and when binding the sides of the brim the stitches are necessarily long. The length of the stitches is determined by the length of throw or rotary travel imparted to the shaft 1 through the pawl-and-ratchet mechanism. This adjustment of the throw is effected by adjusting the position of the pawl-carrier 21 (see Fig. 6) on the arm 22. These adjustments are effected in harmony with the needle motions as follows: The pawl-carrier 22 is connected to a slide 90, (see Fig. 10,) which is moved in ways 91 by an arm 92, pivoted at 93 and connected to a slide 94, which is connected to a sliding carriage, hereinafter fully described, which carries the sewing and take-up mechanism. The slide 94 is moved in one direction by a rod 95, which is pivoted to a stud 96 on the slide 94 and terminates in a yoke 97, (see Figs. 2 and 11,) which embraces a pin 98 on the arm 33. As the arm 33 rises to raise the hat-carriage the slide 94 will be proportionately moved, and thereby the throw of the pawl 20 varied to vary the extent of the step-by-step motions of the feed. All of the described motions of the carrier and its hat-carriage take place in harmony with the stitch-forming mechanism.

The stitch-forming mechanism will next be described. For the purposes of convenience this mechanism may be grouped as follows: the needle-operating mechanism and thread-gripping mechanism, the thread-take-up mechanism by which the stitch is set, and the mechanism for moving the carriage which carries the needle-operating mechanism. The carriage for the needle-operating mechanism is numbered 99 in the drawings (see Figs. 21 to 28) and is shown as in the form of a plate carried upon the end of a rock-shaft 100. The rock-shaft 100 is provided with an arm 101, which is connected, by means of a link 102, with a crank-pin 103, carried upon a crank-disk 104 on a shaft 105 below the bed-plate of the machine. This shaft 105 receives its motion by means of gearing from the shaft 29, which drives the shaft 27 and itself receives motion from the shaft 31. This rocking movement takes place at the proper predetermined time in harmony with the needle motions. Pivoted to the carriage 99 by a pivot 106 is an arm 107, provided with guides 108 109 110, the arm and guides constituting a frame. Sliding upon the guides 108 109 is a needle-gripper, a specimen of which is shown in Fig. 21. This needle-gripper is shown as comprising a collar 111, carrying a sleeve 112, within which operates a plunger 113. The forward end of the sleeve 112 is closed or plugged, and the sleeve is laterally apertured at 114 to receive one end of the needle *a*, this needle being shown in Fig. 20 as a double-pointed needle with the eye in the middle. This needle is designed to sew with a short

length of thread, after the manner of hand-sewing or the old-fashioned Swiss embroidering-machine, and is adapted to be gripped between the plunger 113 and the front of the sleeve 112 when the said needle has been entered into the aperture 114 in the side of the sleeve. The plunger 113 is reciprocated by a pivoted lever 115, whose rear end is shown as rounded and bearing upon the rod 108. The needle-gripper slides freely upon the rods 108 and 109, and the tail of the lever 115, bearing upon the said rod 108, is actuated to hold the gripper closed except when the said lever falls into the notch 116 on the rod 108. (See Fig. 22.) The upper gripper 117 is similarly constructed and is provided with a sleeve 118, upon which it is carried upon the rod 110. The said gripper is likewise provided with a lever 119, which bears upon the rod 110 and is similar in function and effect to the lever 115. The needle-grippers are moved back and forth upon their guides by arms 120 121, which are pivoted at 122 122 and receive movement from a slide 123, which moves freely in a channeled guide 124.

In Figs. 22 to 28, inclusive, and in Fig. 28^a I have shown the general construction and arrangement of the parts just described and have also shown the same in several positions. The guide 124 is carried rigidly by the plate 99, which, it will be remembered, is rigid upon the rock-shaft 100. This guide 124 is apertured at the rear to receive a gear-wheel 125, carried upon a shaft 126, (see Figs. 28 and 28^a), which is rotated alternately in opposite directions by means of mechanism presently to be described. The slide 123 is provided upon its rear with a rack 127, which is adapted to mesh with the pinion 125 to effect the reciprocation of the slide 123 in the guide 124. The slide 123 is likewise provided with a pin 128, which is adapted to cooperate with a cam 129, which is mounted rigidly upon the machine. This cam is provided with a pair of straight-edges 130, with which the pin 128 cooperates when the carriage is swung to one or the other of the dotted-line positions shown in Fig. 28^a, in which positions the rack 127 meshes with the pinion 125. The function of these straight-edges is to hold the needle-operating-mechanism carrier rigidly in its meshed position while the sewing is being effected. It will be understood that the rock-shaft 100 will swing and bring the rack alternately into gear with the pinion (see dotted positions, Fig. 28^a) and that the said pinion will receive a rotary motion first in one direction and then in the other, thereby producing a reciprocation of the slide 123 in one direction when the rack is in mesh with the pinion in one position and in the opposite direction when the rack is in mesh with the pinion in the other position. The means for effecting this movement of the pinion 125 will now be described.

As before stated, the pinion 125 is carried upon a shaft 126, (see plan view, Fig. 4.)

which is provided at or near its end with a sprocket-wheel 131, which is connected by a sprocket-chain 132 (see Figs. 1 and 3) to a sprocket-wheel 133 upon a shaft 134, which is provided with means for alternately driving it in opposite directions, as follows: A lug 135 is provided upon the shaft 134, which lug is adapted to strike abutments placed upon rotating sleeves 136 137, which rotating sleeves are secured to a yoke 138 and are free to rotate upon the shaft 134. The yoke 138 is provided with a pin 139, which works in a cam 140 on the shaft 105, which is driven by pinions 141 142 from the shaft 29 in the manner heretofore specified. The sleeve 136 is suitably connected by a sprocket-chain 143 to the shaft 29, and the sleeve 137 is likewise suitably connected by a sprocket-chain 144 to the shaft 105. These shafts rotate in opposite directions, and as they rotate the pin 139 will be effective to shift the sleeves 136 and 137 alternately into engagement with the lug 135, so that the shaft 134 will be driven alternately in opposite directions, thereby causing, through the gearing described, the pinion 125 on the shaft 126 to be driven alternately in opposite directions. The needle-operating mechanism is also provided with means for bodily swinging the frame constituted by the lever 107 and guides 108 109 110 upon its pivot 106 on plate 99. These means are shown in the present instance as a link 145, (see Fig. 26,) which is pivoted to an arm 146, itself pivoted at 147 on the plate 99 and pivotally connected by a rod 148 with a collar 149 on the shaft 100. This collar slides freely upon this said shaft and is slid bodily thereon by means of a lever 150, which is operated by a link 151, a bell-crank lever 152, a link 153, and a double lever 154 from the wheel 104, heretofore referred to, which wheel has a cam edge. The purpose of swinging the needle-operating mechanism on the pivot 106 is to enable the needle to be swung away from the work in a curvilinear path, which is useful to enable the said needle to be carried away from the hat-body without touching the same when the said needle is employed in sewing the edge of the rolled portion of the side of the hat-brim.

It is believed that the operation of the needle mechanism will be apparent from the foregoing description of the construction. The needle-mechanism carrier is swung into one of the dotted-line positions, Fig. 28^a, and the slide 123 suitably operated to cause one point of the needle to be passed through the fabric and to be gripped by the other gripper and the needle carried entirely through the fabric, the frame which carries the needle-grippers being suitably swung at the appropriate time.

The detailed operation of the needle-grippers will be apparent from an inspection of Figs. 22 to 27, inclusive. Fig. 22 shows the first position. In Fig. 24 the lower needle-gripper has ascended and has entered the

needle into the upper needle-gripper, whereat the upper needle-gripper closes and the lower needle-gripper opens. In Fig. 26 the upper needle-gripper is shown as carrying the needle and as having receded from the lower one to pull the needle through the fabric. In Fig. 27 the needle is being returned by the upper needle-gripper to the lower one. In this connection it is to be understood that the terms "upper" and "lower" are relative merely. It will further be observed that when the mechanism is moving from the third position (shown in Fig. 26) to the fourth position (shown in Fig. 27) the frame carrying the needle-grippers has been swung by the lever 146, which operation is effective to carry the needle out of the fabric in a curve. Conversely as the needle is being carried from the position shown in Fig. 27 back through another cycle of operations the frame is swung in the reverse direction to cause the needle to enter the fabric by pursuing an arc-shaped path or swing in the same manner as it was withdrawn from the fabric. As before stated, the needle sews with a short length of thread sufficient to bind a single hat, and as the needle-stroke is short some means must be provided for taking up or pulling the slack thread to tighten or set the stitch and also for effectively gripping the short end of the thread carried by the needle, so that the said short end of thread will not be pulled out of the needle. The last-mentioned means will now be described.

The guide 109, which, it will be remembered, is stationary with respect to the movable needle-grippers, is provided with a collar 155, which carries an arm 156, which is apertured at 157 (see Fig. 26^a) for the passage of the needle and its thread. Pivoted upon the arm 156 is an arm 158, which is apertured at 159 for the passage of a cam-rod 160, which cam-rod is beveled at its free end in order to permit the lever 158 to be swung by its spring to close or tend to close the aperture 157 in the arm 166, to thereby clamp or bind the thread in the said aperture when the needle is in its lowermost position, as clearly shown in Fig. 22, to thereby hold the free end of the thread firmly during the take-up movement.

In order that there may be no confusion in the matter, I would have it understood that the take-up is effective to set the stitch at the end of every other stitch only. This take-up may be variously constructed. In Figs. 29, 30, and 31 I have shown a form of take-up which may be conveniently employed in accordance with my invention.

I will first describe the means for bringing the loop to the take-up carriages and will then describe the construction and operation of the take-up carriages. Located in proximity to the needle-mechanism carriage 99 is a suitable guide 161, provided with arms 162, in which is journaled a shaft 163, which carries a pair of looper-fingers 164 165. The shaft 163 likewise carries a friction-roller 166,

which is embraced by a friction-band 167, connected at one end to a spring 168 and at the other to a slide 169, upon which is a spring-sustained pivoted latch 219. The forward ends of the looper-fingers 164 165 are provided with ribs 171 172. These looper-fingers are pressed toward each other by spring-pressure and are adapted to be opened by a cam 173, carried upon the arm 174, supported by the brackets 162. The slide 169 is provided with a spring-pressed pivoted latch 219, having a toe 220, adapted to engage in a recess 221 of the guide 161. When the slide 169 is released, it will be slid forward by its spring, thus swinging down the looper-fingers 164 165, which seize the thread by their nibs, and as they swing downwardly are separated apart by the cam 173, thereby pulling the thread through the fabric and bringing a length b of the same (see Fig. 31) into position to be pulled by the oppositely-moving take-up carriages. The mechanism for putting the spring 168 under tension and for operating the take-up carriages will now be described.

Located beneath the needle-operating mechanism is a double race 175 176. Suitable take-up carriages (clearly shown in Figs. 15 to 19 and 19^a) are adapted to slide in the race, the carriage shown in Figs. 17, 18, and 19 being the lower carriage and the carriage shown in Figs. 15 and 16 being the upper carriage. The lower carriage consists of a plate 177, provided with rollers 178, which take over the lower race 176 and between which one of the propelling-arms 179 passes and is secured pivotally to the lower part of the carriage-plate. The lower carriage is provided with a rigid lug 180 and with a pivoted pawl 181, provided with a spring 182 for restoring the same to position. The upper carriage consists of a plate 183, provided with rollers 184, which traverse the race 175. The upper carriage is likewise provided with arms 185, with upwardly-projecting rollers or fingers 186, and with a slide 187, to which is pivoted a pawl 188. The slide 187 is guided by suitable screws 189 and is spring-restored by means of the spring 190. The operation of this part of the mechanism will be obvious from Fig. 19^a, which shows two of the carriages engaging with each other, the direction of view being from the convex portion of the races 175 and 176. The carriages represented in Fig. 19^a are those which are moved by the arm 179, which is shown uppermost in Fig. 14, the other arm 179 being similarly provided with a pair of looper-carriages of the same construction, with the exception that the parts are slightly transposed in order to operate in a different direction. These carriages are traversed in the races by the arms 179 moving scissors fashion by mechanism hereinafter explained. For the present the detailed operation of two of these carriages with respect to each other will be described. The lower carriage 177 is propelled by the arm 179 and propels the upper

carriage. When moving from the side of the arc of the race toward the center, which is an idle movement, the abutment or lug 180 abuts firmly against the pawl 188 of the upper carriage. By these means the sets of carriages are brought together by the arms 179. When moving in the opposite direction, which is the active movement, the pivoted pawl 181 catches against the pivoted pawl 188, and thereby propels the upper carriage in the opposite direction. As soon, however, as the thread is taken up and becomes tight the slide 187 is put under tension and slides forward, permitting the tail 191 of the pawl 188 to drop into the aperture 192 and to thereby move out of the path of the pawl 181, which will have the effect of arresting the upper carriage 183.

Having described the detailed operation of the carriages, their general operation will now be described. The arms 179, which propel the same, are pivoted at 193 (see especially Fig. 14) and are pivoted at their rear ends to spring-restored levers 194 195, respectively, which levers are or may be pivotally connected at 196, the lever 195 being pivoted at 197. The lever 195, which is the driving-lever, is pivotally linked by means of a link 198 to a swinging lever 199, the connection being made by a suitable block or bowl 200 working in a slot in the lever 199. The lever 199 is pivoted at 202 and is adapted to be rocked by an arm 201, operated by a cam 203, carried upon a shaft 204, (see Fig. 10,) which is connected by a sprocket-gear 205 to the main shaft 31 of the machine. As will be obvious, rocking the arm 199 will have the effect of closing together the levers 179 and of bringing the take-up carriages into the position shown in the plan view, Fig. 31, wherein the rollers 186 of one take-up carriage 183 extend beyond the rollers of the other take-up carriage 183, so that when the arms 179 are again spread apart the thread will be pulled out in a zigzag fashion by a very short stroke or travel of the carriages. In this connection it is to be noted that the rollers 205 are stationary with respect to the carriages. The means for setting and releasing the slide 169, which governs the action of the looper-fingers 164 and 165, will now be described.

Pivoted to the side of the race 175 is a lever 222, whose lower end is adapted to be struck by the arm 179, which is on the right or upper side of Fig. 4 and whose upper end is provided with an arm 223, adapted to bear against the latch 219. When the arm 179 is moving in the direction of the arrow, Fig. 4, it will move the slide 169 in the direction of the arrow, Fig. 29, and will put the spring 168 under tension and permit the nose 220 to drop into the slot 221, thus holding the said spring under tension. When the needle-operating-mechanism carriage 99 has been turned into the position shown in Fig. 4, a cam-arm 224 will come into position to strike the tail of a lever 225, whose rear end is adapted to trip the latch 219. These parts are shown clearly

in Figs. 4 and 14. The arm 224 is actuated from the needle-gripper which is nearest to the pivot 106 of the swinging arm 107 108 109, and it is when this needle-gripper grips the needle and the thread-gripper grips the thread that the take-up motion is effected. It will of course be obvious that the release of the latch 219 will permit the spring 128 to actuate the looper-fingers to cause them to execute their movement. For the sake of clearness the cam-arm 224 has been omitted from Figs. 21 to 28, inclusive. It will of course be obvious that as the hat-brims are normally of a general elliptical shape some means must be provided whereby the sewing mechanism will be caused to follow the contour of the hat-brim, or vice versa. In the present instance I have preferred to move the entire sewing mechanism bodily, as I have found this to be an excellent mode of operation. It will be remembered that the slide 94 is moved laterally by the arm 95 in harmony with the upward movement of the hat-carrier, which, as the brim has a dip and roll, is in harmony with the rotary motion of the hat-carrier, it being remembered that the lowest points of the brim are at the front and back and the highest points of the brim of the hat are at the sides and that the least radius of the curvature of the hat-brim is in the front and the greatest at the sides.

Referring for the present to Figs. 4 and 7, it will be noted that the entire needle-operating mechanism and the shafts carrying the same are rigidly mounted upon a slide 207, which slide carries the bearings for the shafts 100 and 126. The driving-shafts for these shafts—to wit, the shafts 134 and 135—are splined or feathered in their gears, and both sets of shafts are rigidly united by a vertical frame or tie bar 208. All the parts of the take-up motion, including the parts shown in Figs. 29, 30, and 31, are supported by the same slide 207 which carries the needle mechanism, being connected thereto by studs 209 210. The bar 208 is moved laterally toward the right (considered with respect to Fig. 3) by a link 211, which is propelled by a bell-crank lever 212, which bell-crank lever receives a rocking motion from a cam 213, carried rigidly upon the slide 94. Therefore a movement to the right of the slide 94 under the impulse of the mechanism for raising and lowering the hat-carrier will move the entire sewing mechanism, including the needle mechanism and the take-up mechanism, to the right in harmony with the up-and-down movement of the hat. The return or reverse motion is effected by means of a strong spring, (omitted for the sake of clearness,) and the slide return motion is governed by the downward movement of the hat-carrier, the yoke 97 of the arm 95 bearing strongly against the pin 98 on the arm 33. (See Fig. 2.)

In addition to the foregoing mechanism it is sometimes advisable to provide a hat-guide, shown in the present instance as a fixed jaw

214 and a movable jaw 215, to which a link 216 is pivoted, whose lower end is provided with a pin 217, which works in a cam 218, carried by the slide 94.

5 The detailed operation of the machine is as follows: The hat is placed upon the hat-carrier and rotation and up-and-down movement imparted to the hat-carrier, the sewing devices being moved in harmony with the shape
10 of the periphery of the hat-brim, the up-and-down movement of the hat-carrier being arrested when the front and back edges of the brim are being sewed. All of these motions are controlled by the means hereinbefore described and take place in harmony with each
15 other. The movements of the hat and the character of the stitch are best shown in Figs. 37 to 40, inclusive. In these figures the hat *c* is represented first, Fig. 37, in its horizontal position, where the front or back portion of the brim intervening between the points
20 *d d* is sewed. These stitches are quite similar to the ordinary hand-stitch with a sewing-needle and are clearly represented in Fig. 40. At the point *d* where the brim begins to curl
25 the stitches *e* are automatically lengthened by the means heretofore described with respect to the stitch-regulating mechanism, the said stitches passing through the lower edge
30 of the hat-binding through the body of the brim and thence through the curled edge of the brim and the upper edge of the binding, as represented at *f*, Fig. 42. As this stitch is being effected the hat assumes the inclined position. (Shown in Fig. 38.) It will be remembered that the carriage for the needle mechanism is swung on the axis of its shaft through
35 a considerable angle between stitches, so that the stitches being executed in intersecting planes will be zigzag, as clearly shown at *g* in Fig. 40. This zigzag stitch continues until a straight portion of the brim has again been reached, whereupon the hat is brought level again, as shown in Fig. 37, and the stitches *e*
40 resumed.

In Fig. 39 the hat is shown in the position where the longest stitches are being taken, which stitches extend clear from the inner
45 portion of the brim to the upper edge of the curl or roll, (see *f*, Fig. 42,) the said stitches passing through the lower edge of the binding, the body of the brim, the upper edge of the brim, and the upper edge of the binding, as before, it being remembered that the upward stroke of the needle to withdraw it from
50 the fabric and the downward stroke of the needle to insert it in the fabric are executed on curved lines, due to the swing of the frame carrying the needle-gripper mechanism, in the manner heretofore specified with respect to the function and operation of the parts constituting the needle-operating mechanism. This motion just described is a close imitation of hand motion and forms a vital essential part of the mechanism shown, so that the
55 sewing which is effected thereby closely imi-

tates or simulates hand-sewing, but of course is executed at a greater rate of speed.

Having described my invention, what I claim as new, and desire to secure by Letters
60 Patent, is—

1. In a machine for binding the edge of the brim of a stiff hat, the combination of a rotating hat-carrier, sewing mechanism adapted to sew the binding to the hat-brim, comprised in part by a double-pointed needle employing a single thread and means for effecting successive needle movements in intersecting paths. 75

2. In a machine for binding the edge of the curled or turned-over brim of a hat, the combination of brim-binding mechanism, a hat-carrier, means for effecting a relative movement of rotation and a relative swinging movement between the brim-binding mechanism and the hat-carrier, whereby all parts of the edge of a curled brim may be bound. 80 85

3. In a stiff-hat-binding machine, the combination of a hat-carrier, a binding-attaching mechanism, adapted to attach a binding to the curled or turned-over edge of the brim of a stiff hat, and means for rotating and swinging the said hat-carrier so as to present all parts of the edge of the brim of the hat in succession to the hat-binding mechanism. 90 95

4. In a machine for binding the curled edge of a hat-brim, the combination of a hat-carrier, a brim-binding mechanism, and means for automatically effecting a relative rotary and swinging movement between the hat-carrier and brim-binding mechanism, the said means intervening between the hat-carrier and brim-binding mechanism so as to constitute with the hat-carrier and the brim-binding mechanism a single unitary structure. 100 105

5. In a stiff-hat-binding machine, the combination of a hat-carrier, a sewing mechanism adapted to sew a binding to the edge of a stiff-hat brim and means for rotating and swinging the said hat-carrier in accordance with the shape of the brim to present the edge of the brim of the hat to the sewing mechanism, substantially as described. 110

6. In a stiff-hat-binding machine, the combination of a hat-carrier with means substantially as described for rotating and swinging the said hat-carrier in accordance with the shape of the brim of the hat and sewing mechanism adapted to secure the binding to the brim of the said stiff hat and means for effecting a movement of the parts to present all portions of the brim of the hat successively to the sewing mechanism. 115 120

7. In a stiff-hat-binding machine, the combination of a hat-carrier, a sewing mechanism adapted to attach a binding to the edge of the brim of a stiff hat and means for rotating, raising and lowering and swinging the hat-carrier, in accordance with the shape of the brim of the hat, and for operating the sewing mechanism substantially as described. 125 130

8. In a stiff-hat-binding machine, the combination of a hat-carrier, means for rotating the said hat-carrier, a sewing mechanism adapted to secure a binding to the edge of a stiff-hat brim and automatic means for moving the sewing mechanism with respect to the hat-carrier so as to effect the brim-binding of a hat the perimeter of whose brim is oval.

9. In a stiff-hat-binding machine, the combination of a hat-carrier with means for rotating the same, means for reciprocating the said hat-carrier at an angle to the plane of rotation, means for causing the hat-carrier to move in substantially a single plane during the binding of the front and back substantially horizontal portions of the hat and means for attaching a binding to the brim of the said stiff hat.

10. In a stiff-hat-binding machine, the combination of a hat-carrier with means for rotating the same, means for reciprocating the said hat-carrier at an angle to the plane of rotation, means for causing the hat-carrier to move in substantially a single plane during the binding of the front and back substantially horizontal portions of the hat and sewing mechanism adapted to attach a binding to the edge of a stiff hat.

11. In a stiff-hat-binding machine, the combination of a hat-carrier with means for rotating the same, means for reciprocating the said hat-carrier at an angle to the plane of rotation, means for causing the hat-carrier to move in substantially a single plane during the binding of the front and back substantially horizontal portions of the hat and a sewing mechanism adapted to attach a binding to the edge of the said hat, and means for moving the same relatively to the carrier.

12. In a stiff-hat-binding machine, the combination of a hat-carrier with means for rotating the same, means for reciprocating the said hat-carrier, means for causing the hat-carrier to move in substantially a single plane during the binding of the front and back substantially horizontal portions of the hat, means for swinging the hat-carrier to bring the hat into position to present the curled side edge of the brim to the binding mechanism and a binding mechanism for attaching the binding to the edge of the said hat.

13. In a stiff-hat-binding machine, the combination of a hat-carrier with means for rotating the same, means for reciprocating the said hat-carrier, means for causing the hat-carrier to move in substantially a single plane during the binding of the front and back substantially horizontal portions of the hat and a sewing mechanism for attaching the binding to the edge of the hat comprising a double-pointed needle and grippers therefor with means for moving the grippers to pass the needle back and forth through the edge of the brim of the hat to effect the sewing thereof, substantially as described.

14. In a stiff-hat-binding machine, the combination of a hat-carrier with means for rotating

and reciprocating the same and a binding-attaching mechanism adapted to attach a binding to the brim of a stiff hat with means for moving the said binding-attaching mechanism in harmony with the movements of the hat to effect the binding thereof.

15. In a stiff-hat-binding machine, the combination of a hat-carrier and a sewing mechanism with means for effecting such a relative movement between the hat-carrier and sewing mechanism as to cause all portions of the edge of the brim to be presented successively to the sewing mechanism, the said sewing mechanism being comprised in part by a plurality of grippers with means for moving the said grippers to cause the same to engage and operate a double-pointed needle.

16. In a stiff-hat-binding machine, the combination with a suitable hat-carrier of a sewing mechanism comprised in part by a double-pointed needle, means for passing the needle back and forth through the edge of the hat-brim, a suitable thread-take-up mechanism, and means for presenting the entire edge of the hat-brim to the needle.

17. In a hat-binding machine, the combination of a suitable hat-carrier and a sewing mechanism comprised in part by a needle, means for passing the said needle through the fabric of the edge of the brim of a hat and means for swinging the needle away from the work without perforating the body of the hat.

18. In a stiff-hat-binding machine, the combination of a suitable hat-carrier and sewing mechanism adapted to sew the binding to the edge of the brim of the said stiff hat, automatic means for moving the hat-carrier to present all parts of the brim of the hat successively to the needle and a needle-operating mechanism for effecting the sewing of the brim of the hat, substantially as described and for the purposes set forth.

19. In a stiff-hat-binding machine, the combination of a suitable hat-carrier and sewing mechanism adapted to sew the binding to the edge of the brim of the said stiff hat, and automatic means for moving the hat-carrier to present all parts of the brim of the hat successively to the needle, the said sewing mechanism comprising a needle-operating mechanism for effecting the sewing of the brim of the hat and suitable take-up mechanism for taking up the slack thread.

20. In a hat-binding machine, the combination of a suitable hat-carrier, automatic means for moving the hat-carrier to present all parts of the edge of the brim of the hat successively to the needle, a needle-operating mechanism for effecting the sewing of the brim of the hat, suitable take-up mechanism for taking up the slack thread and a loop-carrier for bringing the loop to the take-up mechanism.

21. In a stiff-hat-binding machine, the combination of a suitable hat-carrier, automatic means for moving the hat-carrier to present all parts of the brim of the hat successively

to the needle, a needle-operating mechanism for effecting the sewing of the brim of the hat, and means for regulating the length of the stitches in harmony with the movement of the parts, whereby when the curled part of the brim is presented to the needle the stitches will be automatically lengthened, substantially as described.

22. In a stiff-hat-binding machine, the combination of a hat-carrier with means for imparting to the same a rotary movement, a reciprocating movement and a swinging movement, substantially as described, and means for attaching a binding to the edge of a stiff-hat brim.

23. In a stiff-hat-binding machine, the combination of a hat-carrier with means for rotating the same, means for swinging the said hat-carrier and mechanism for attaching a binding to the brim of the said stiff hat, operating in harmony with means for giving the movements to the hat-carrier.

24. In a stiff-hat-binding machine, the combination of a hat-carrier with means for rotating and swinging the same, a sewing mechanism operating in harmony with the said hat-carrier and a stitch-regulating mechanism likewise operating in harmony with the hat-carrier to regulate the length of the stitch, substantially as described.

25. In a stiff-hat-binding machine, the combination of a hat-carrier with means for rotating the same and for reciprocating the same at an angle to the plane of rotation, means for temporarily arresting the reciprocating movement of the hat-carrier to cause the same to rotate in substantially a single plane and means for attaching a binding to the brim of the said stiff hat.

26. In a stiff-hat-binding machine, the combination of a suitable brim-binding mechanism adapted to attach a binding to the brim of a stiff hat, a hat-carrier, and means for moving the same to present all parts of the edge of the brim to the brim-binding mechanism and means for traversing the brim-binding mechanism so as to traverse all parts of the hat-brim, substantially as described.

27. In a stiff-hat-binding machine, the combination of a rotating hat-carrier and a hat-brim-sewing mechanism adapted to attach the binding to the brim of a stiff hat comprised in part by a needle-operating mechanism and take-up mechanism and means for moving the sewing and take-up mechanisms in harmony with the rotation of the hat-carrier, whereby all the parts of the hat-brim will be successively presented to the hat-brim-binding mechanism.

28. In a stiff-hat-binding machine, the combination of a rotating hat-carrier, a sewing mechanism adapted to sew the binding to the edge of a stiff-hat brim and means for changing the position of the sewing mechanism between stitches to cause the said sewing mechanism to sew the brim of the hat in a zigzag fashion.

29. In a stiff-hat-binding machine, the combination of a rotating hat-carrier, a sewing mechanism adapted to sew the binding to the edge of a stiff hat, a carrier therefor and means for swinging the sewing-mechanism carrier between the stitches to effect a zigzag stitching.

30. In a hat-binding machine, the combination of a hat-carrier, a double-pointed needle, needle-operating mechanism and means for swinging the needle out of the work in a curvilinear path to avoid piercing the hat-body.

31. In a hat-binding machine, the combination of a hat-carrier and a sewing mechanism with means for effecting such a relative movement between the said hat-carrier and sewing mechanism as to cause the said sewing mechanism to traverse all parts of the hat-brim, the said sewing mechanism being provided with means for moving the same so as to effect a zigzag stitch.

32. In a hat-binding machine, the combination of a hat-carrier and a sewing mechanism with means for effecting such a relative movement between the said hat-carrier and sewing mechanism as to cause the said sewing mechanism to traverse all parts of the hat-brim, the said sewing mechanism being provided with means for moving the same so as to effect a zigzag stitch and means for withdrawing the needle from the work in a curvilinear path to avoid piercing the hat-body.

33. In a stiff-hat-binding machine, the combination of a rotating hat-carrier and a sewing mechanism adapted to sew the binding to the brim of a stiff hat with means for effecting such a relative movement between the said hat-carrier and sewing mechanism as to cause the said sewing mechanism to traverse all parts of the hat-brim, the said sewing mechanism being comprised in part by a double-pointed needle and means for gripping and moving the same to cause it to pierce the work.

34. In a machine for sewing bindings to the brims of stiff hats, the combination of a rotating and swinging hat-carrier, a double-pointed-needle sewing mechanism and suitable take-up mechanism.

35. In a machine for sewing bindings to the brim of stiff hats, the combination of a rotating and swinging hat-carrier, a double-pointed-needle-operating mechanism therefor, suitable take-up mechanism and a loop-carrier for carrying the loop to the take-up mechanism.

36. In a machine adapted to bind the edges of the brims of stiff hats, the combination of a double-pointed needle, operating mechanism therefor, and thread-gripping mechanism wholly independent of the needle operating in harmony with the needle motions to grip the thread.

37. In a machine adapted to bind the edges of stiff hats, the combination of a double-pointed needle, operating mechanism therefor, thread-gripping mechanism wholly in-

dependent of the needle operating in harmony with the needle motions to grip the thread and suitable take-up mechanism independent of the thread-gripping mechanism.

5 38. In a machine adapted to bind the edges of stiff hats, the combination of a double-pointed needle, operating mechanism therefor, thread-gripping mechanism operating in harmony with the needle motions to grip the
10 thread and means for swinging the needle-operating mechanism to withdraw the needle from the work without piercing the hat-body, and stitch-setting means.

15 39. In a sewing mechanism, the combination with a double-pointed needle of a plurality of grippers, recessed rods upon which the said grippers slide and operating-levers for the grippers adapted to cooperate with the recesses in the rods to open and close the
20 said grippers.

40. In a hat-binding machine, the combination of means for attaching a binding to the edge of the brim of a hat, a rotating and swinging hat-carrier and a cam for effecting
25 movement of the same, the said cam being substantially of the shape of the contour of a hat-brim.

41. In a hat-brim-binding machine, the combination of suitable means for attaching
30 the binding to the brim of a hat, a rotating hat-carrier and automatic means for reciprocating the hat-carrier at an angle to the plane of rotation.

42. In a hat-brim-binding machine, the
35 combination with suitable means for attaching the binding to the brim, of a rising-and-falling hat-carrier with automatic means for effecting the up-and-down movement and automatic means for arresting the up-and-down
40 movement to effect the binding of substantially level portions of the brim.

43. In a stiff-hat-binding machine, the combination with a suitable rotating and swinging hat-carrier of means for binding the brim
45 of the said hat comprised in part by sewing

mechanism including take-up mechanism, and means for moving the sewing mechanism in harmony with the contour of the edge of the hat-brim to be bound.

44. In a machine for binding the brims of
50 stiff hats, the combination of a suitable hat-carrier and sewing mechanism and a stitch-regulating mechanism for regulating the length of the stitches automatically operated from the mechanism for moving the hat-carrier, substantially as described. 55

45. In a hat-binding machine, the combination with a suitable hat-carrier of means for binding the brim of the said hat comprised in part by sewing mechanism including take-up mechanism, and means for moving the sewing mechanism in harmony with the contour of the edge of the hat-brim to be bound and stitch-regulating mechanism for regulating the length of the stitches operated
60 by the means for moving the sewing and take-up mechanisms. 65

46. In a machine for binding hats, the combination with a hat-carrier and needle-operating mechanism, of take-up mechanism comprising a plurality of take-up carriages with means for moving the same in opposite directions and means carried by each carriage for engaging the thread so as to draw the same out laterally in loops in two directions. 75

47. In a machine for binding hats, the combination with a hat-carrier and needle-operating mechanism of take-up mechanism comprising a plurality of take-up carriages with means for moving the same in opposite directions, means carried by each carriage for engaging the thread so as to draw the same out laterally in loops in two directions and a suitable loop-carrier for bringing the loop to the take-up mechanism. 80

ERWIN VON TRAUTVETTER.

Witnesses:

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OTTO V. SCHRENK,
EUGENE EBLE.