

(No Model.)

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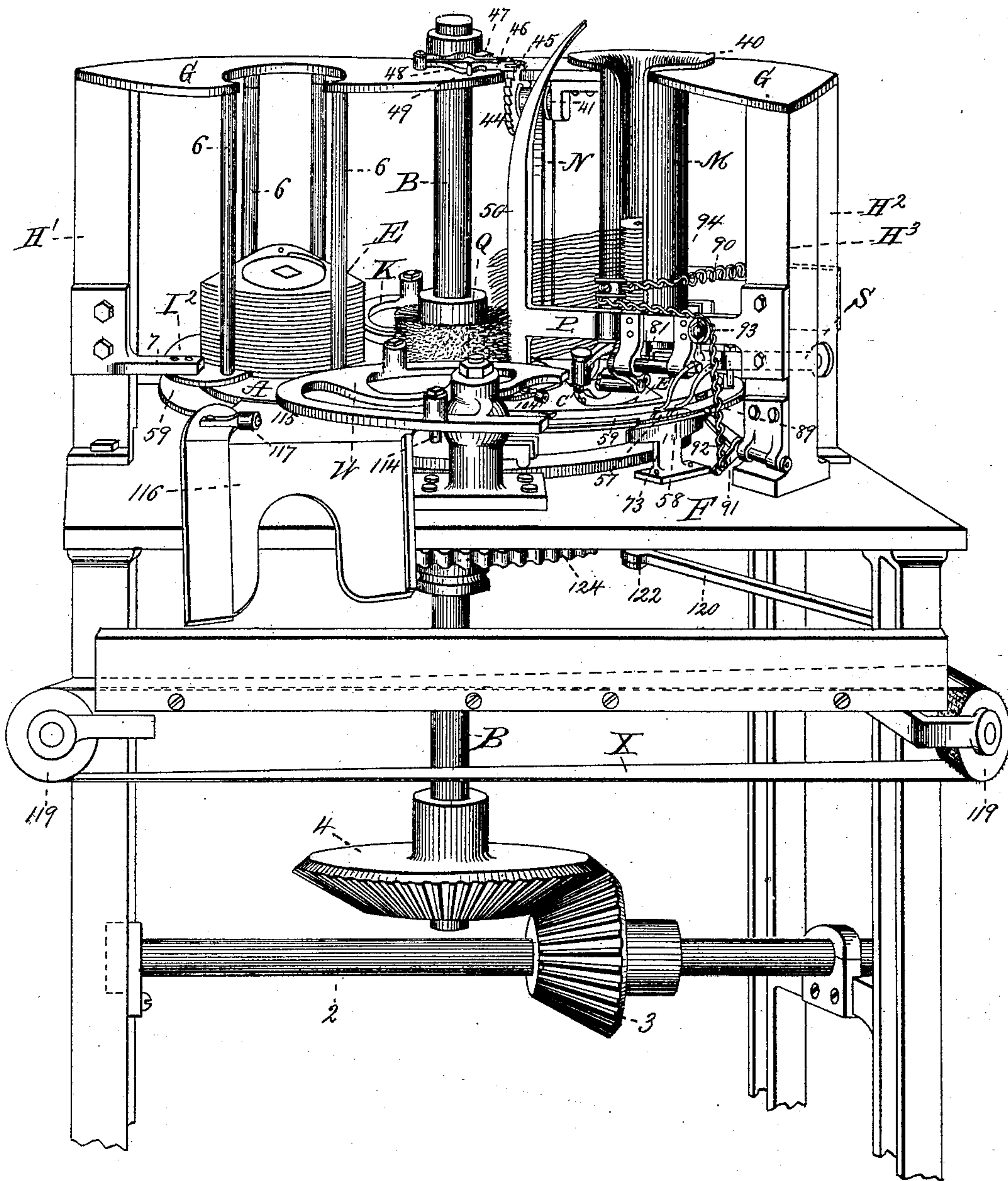
R. WEISS.

MACHINE FOR REMOVING BOBBINS FROM CARRIAGES OF LACE MACHINES,
INSERTING THEM THEREIN, AND THREADING THE CARRIAGES.

No. 354,280.

Patented Dec. 14, 1886.

Fig. 1.



Witnesses
Wm A Schoenborn
Wm Rheem

Inventor
Rudolph Weiss by
A. Pollok his attorney

7 Sheets—Sheet 2.

MACHINE FOR REMOVING BOBBINS FROM CARRIAGES OF LACE MACHINES,
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Witnesses
 Wm A Schoenbone
 Wm Rheem

Inventor
Rudolph Weiss
by A. Pollok
his attorney.

(No Model.)

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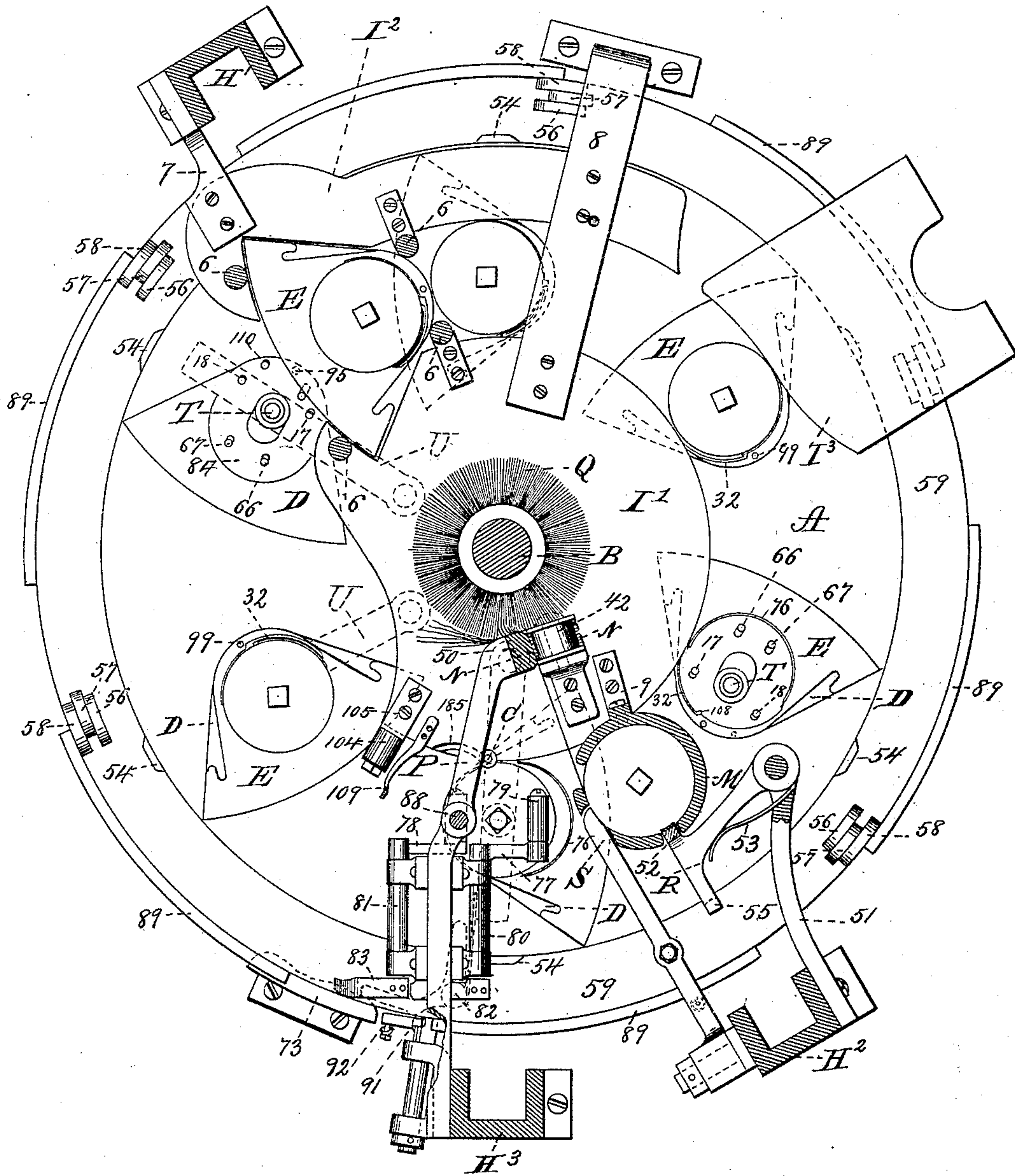
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Fig. 3.



Witnesses
Wm. A. Schomburg
Wm. Rhein

Inventor
Rudolph Weiss by
A. Pollok
his attorney.

(No Model.)

7 Sheets—Sheet 4

R. WEISS.

MACHINE FOR REMOVING BOBBINS FROM CARRIAGES OF LACE MACHINES,
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Fig. 10.

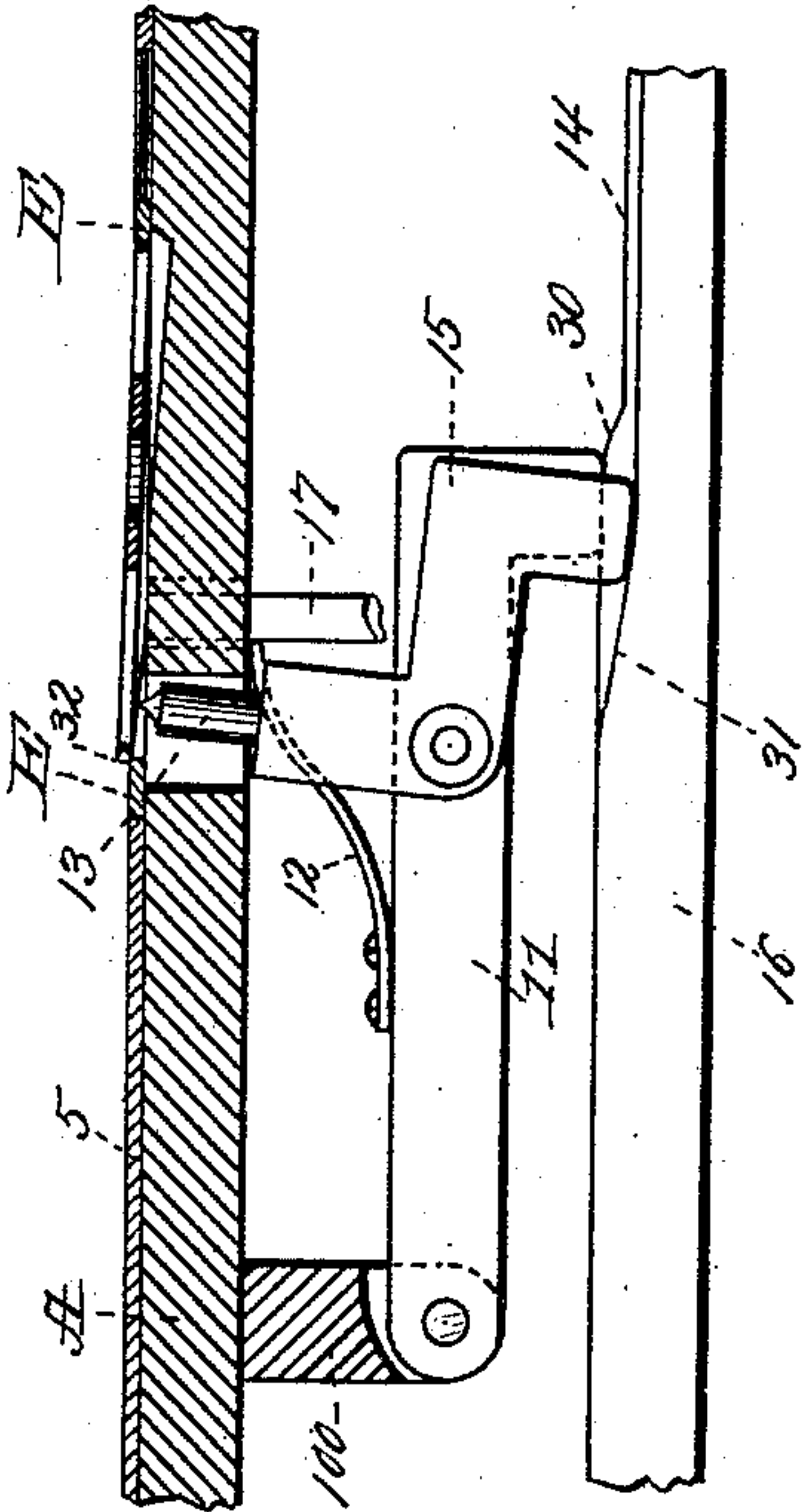


Fig. 11.

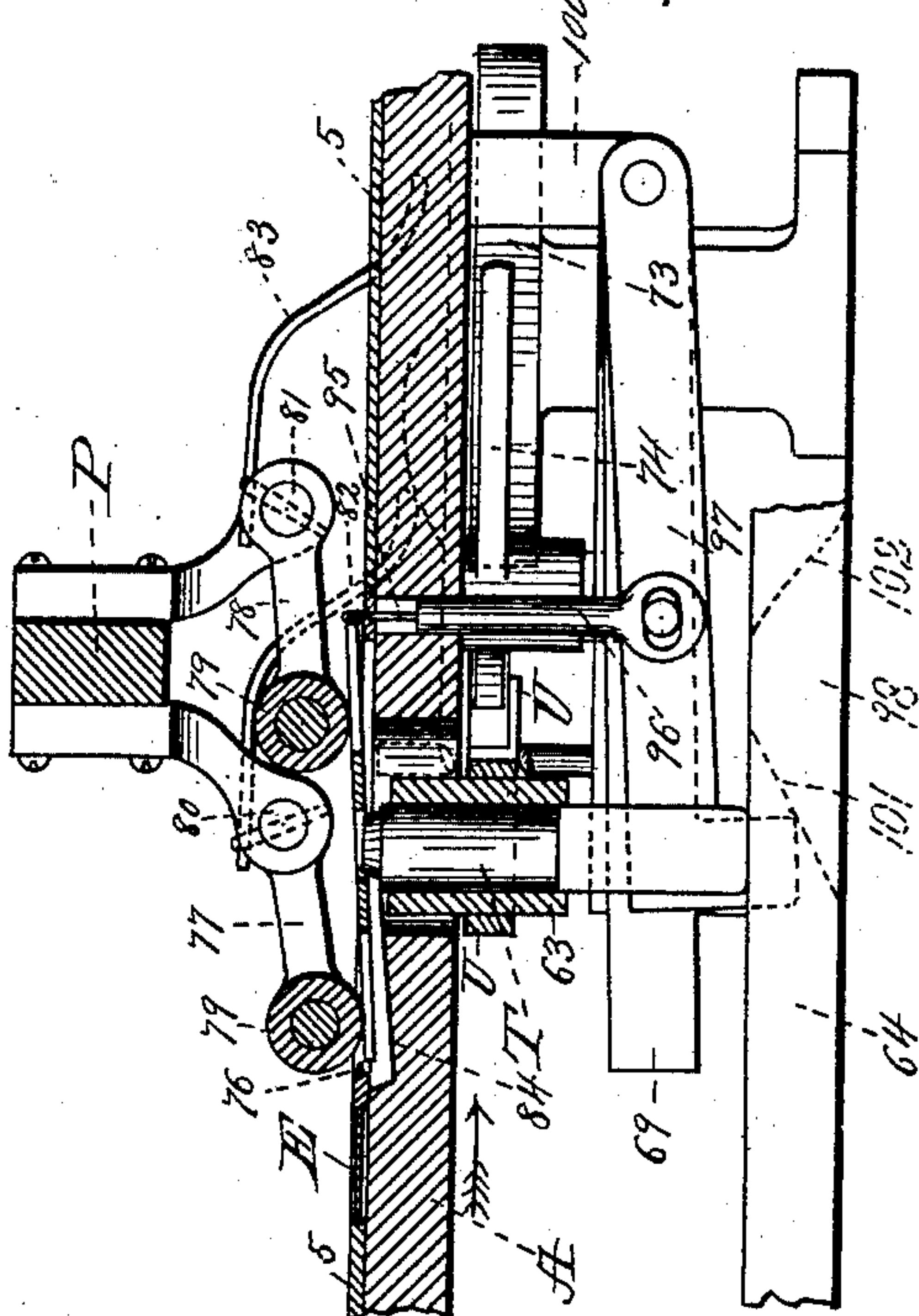
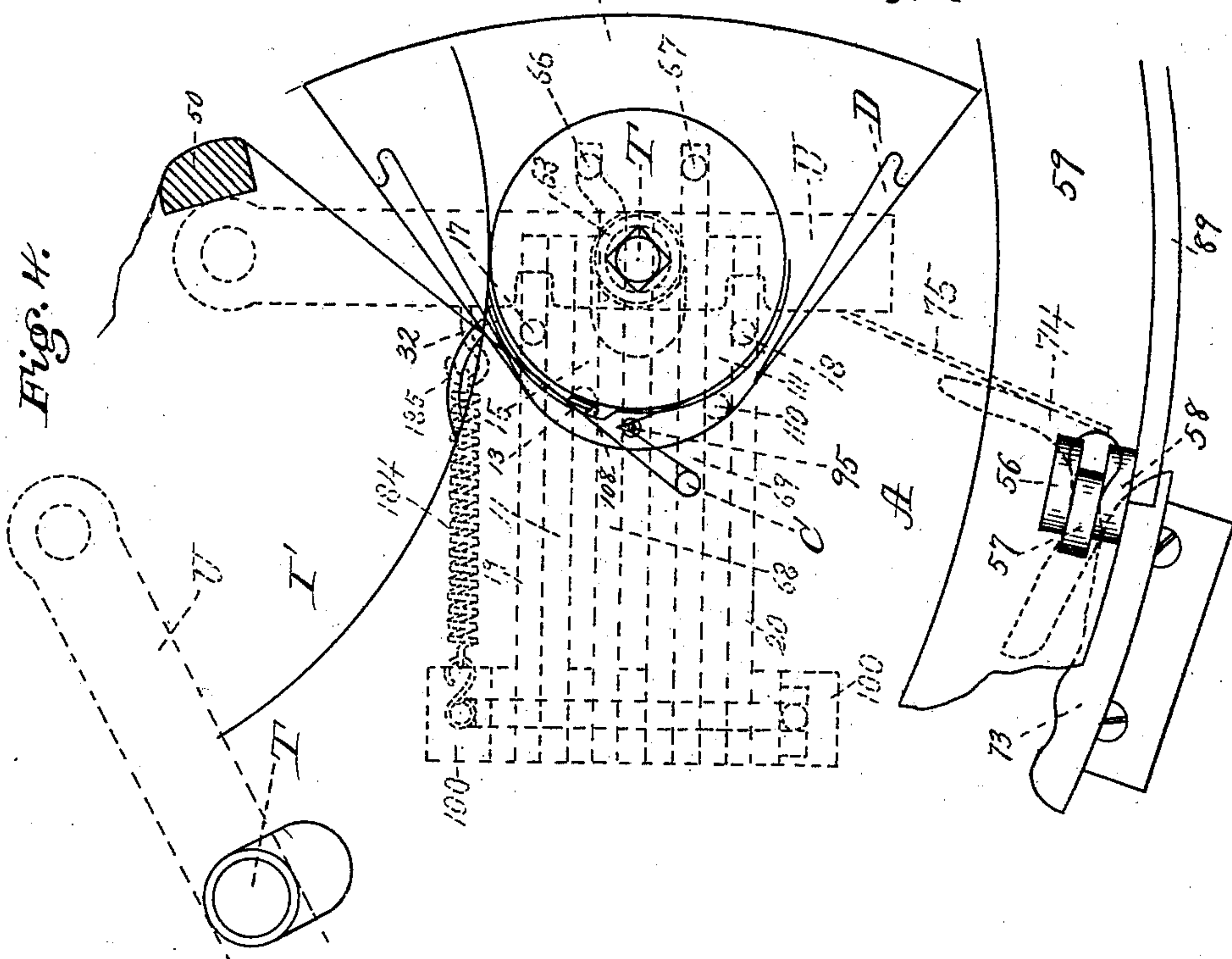


Fig. 12.



Witnesses
Wm. Rheem
Wm. A. Schenck

Inventor
Rudolph Weiss by
A. Pollok
his attorney.

(No Model.)

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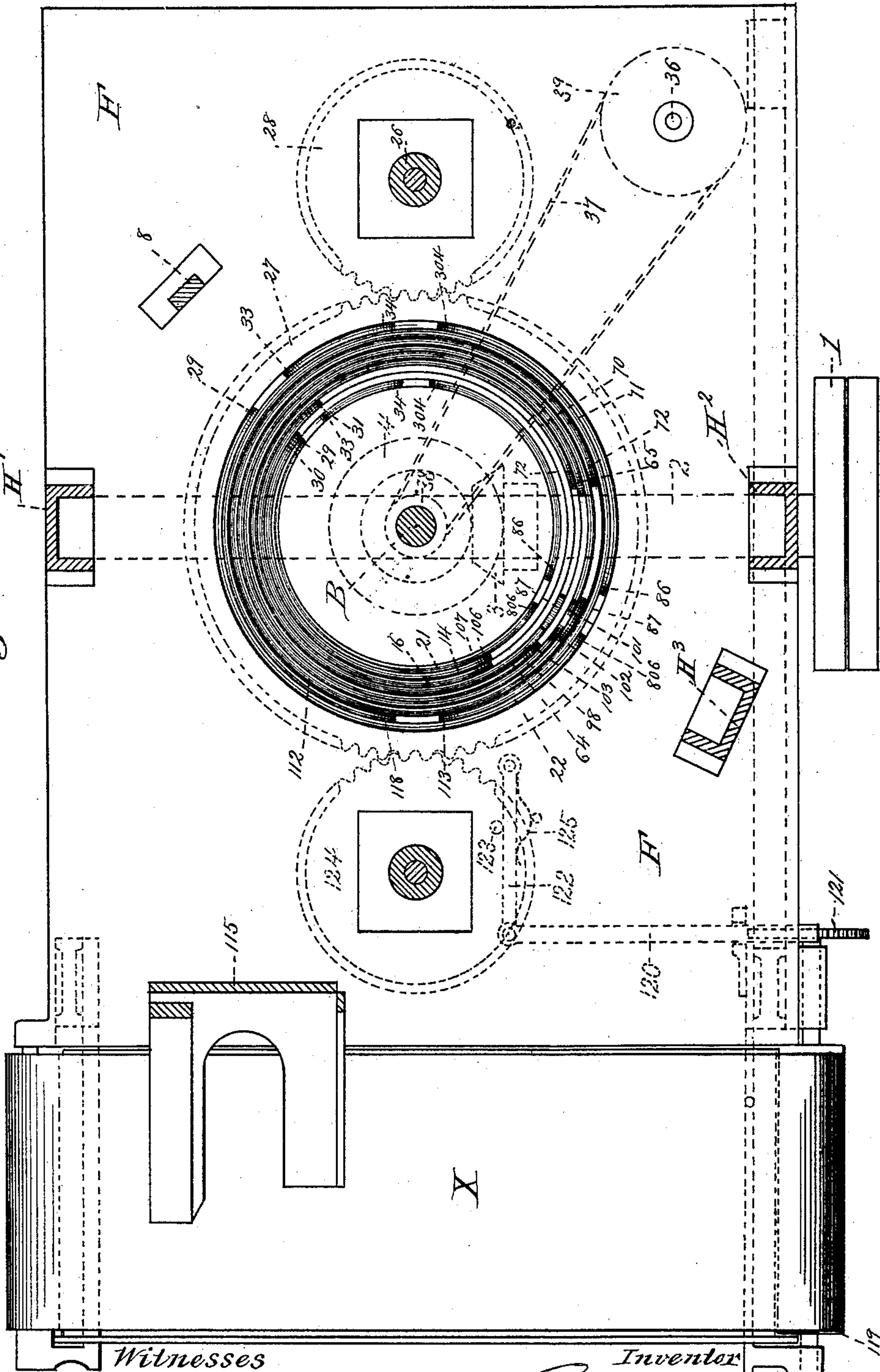
R. WEISS.

MACHINE FOR REMOVING BOBBINS FROM CARRIAGES OF LACE MACHINES,
INSERTING THEM THEREIN, AND THREADING THE CARRIAGES.

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Patented Dec. 14, 1886.

Fig. 5.



Witnesses
Wm. Rheem
Wm. Schoenborn

Inventor
Rudolph Weiss by
A. Pollok his attorney.

(No Model.)

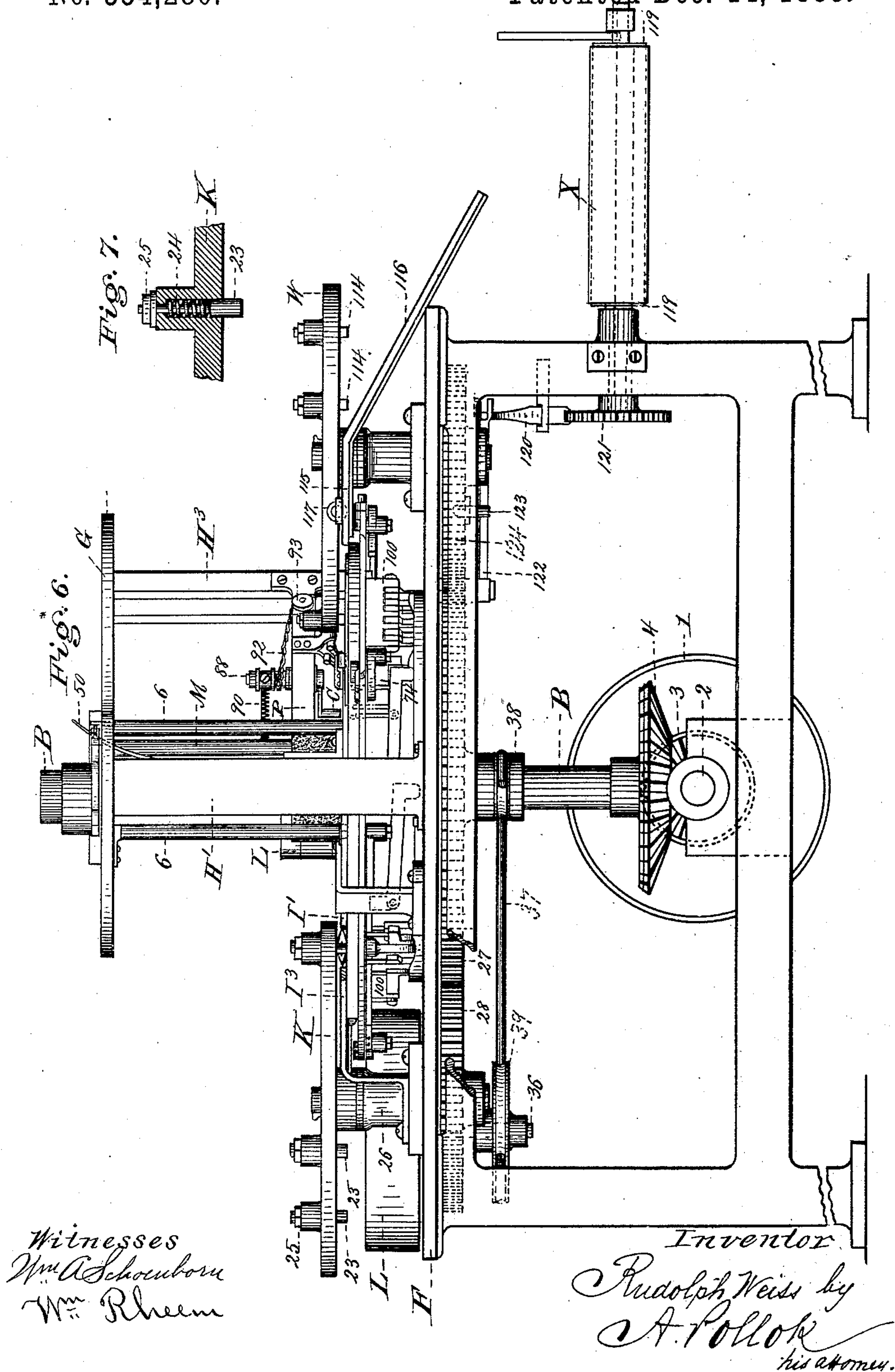
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R. WEISS.

MACHINE FOR REMOVING BOBBINS FROM CARRIAGES OF LACE MACHINES,
INSERTING THEM THEREIN, AND THREADING THE CARRIAGES.

No. 354,280.

Patented Dec. 14, 1886.



Witnesses
Wm A Schauborn
Wm Rheem

Inventor
Rudolph Weiss by
A. Pollok
his attorney.

7 Sheets—Sheet 7.

MACHINE FOR REMOVING BOBBINS FROM CARRIAGES OF LACE MACHINES,
INSERTING THEM THEREIN, AND THREADING THE CARRIAGES.

Patented Dec. 14, 1886.

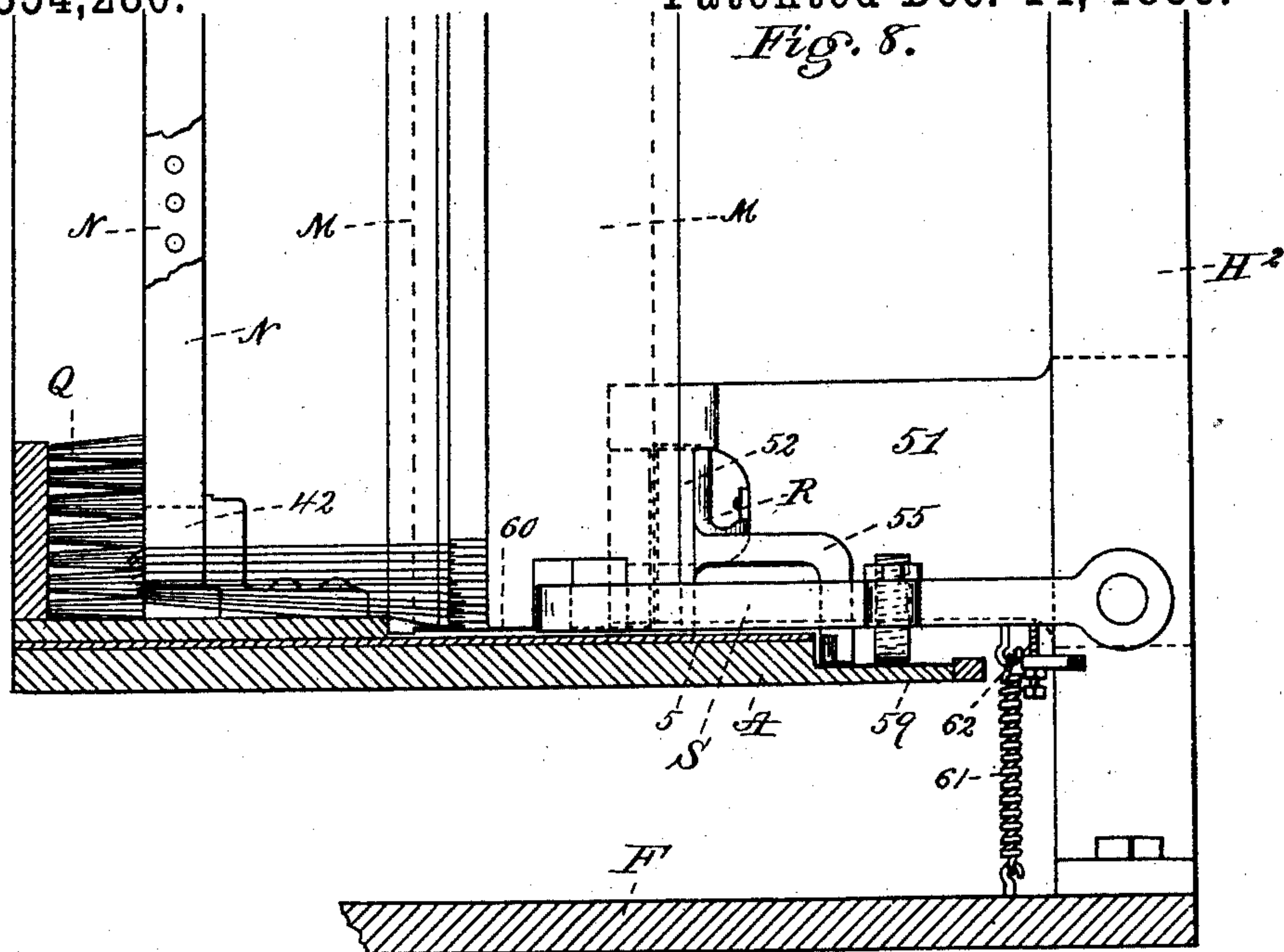
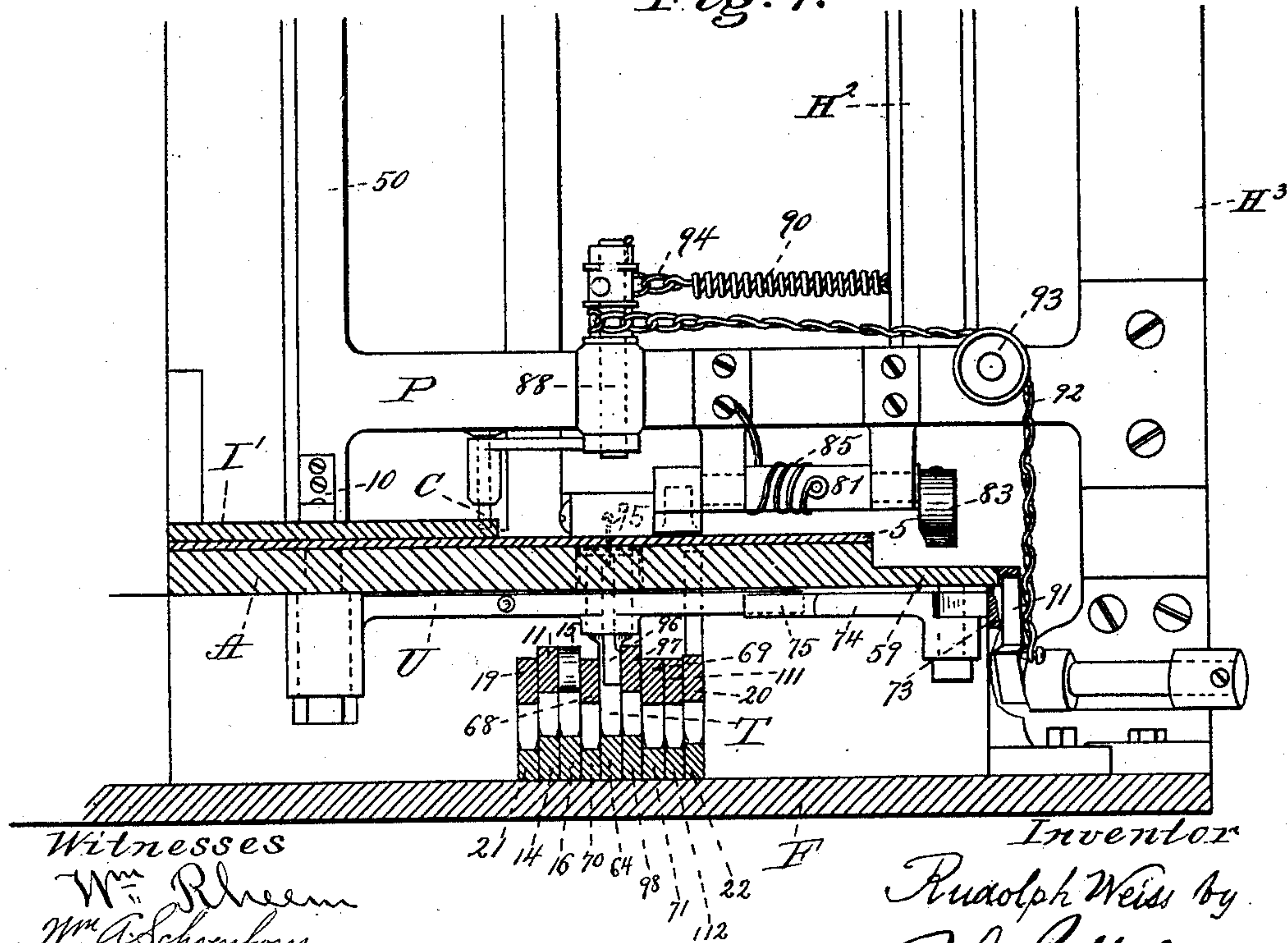


Fig. 9.



Witnesses
Wm Rheem
Wm Schoonborn,

Inventor
Rudolph Weiss by
A. Pollok
his attorney.

UNITED STATES PATENT OFFICE.

RUDOLPH WEISS, OF NOTTINGHAM, ENGLAND, ASSIGNOR TO THE WILLCOX
& GIBBS SEWING MACHINE COMPANY, OF NEW YORK, N. Y.

MACHINE FOR REMOVING BOBBINS FROM CARRIAGES OF LACE-MACHINES, INSERTING THEM THEREIN,
AND THREADING THE CARRIAGES.

SPECIFICATION forming part of Letters Patent No. 354,280, dated December 14, 1886.

Application filed May 10, 1886 Serial No. 201,699. (No model.)

To all whom it may concern:

Be it known that I, RUDOLPH WEISS, a citizen of Switzerland, residing at Nottingham, England, have invented a new and useful Machine for Removing Bobbins from Carriages of Lace-Machines, Inserting them Therein, and Threading the Carriages, which invention is fully set forth in the following specification.

This invention relates more particularly to machinery for automatically removing the empty bobbins from the carriages of lace (bobbinet) machines, supplying full bobbins, and threading the carriages with the thread on the full bobbins by a series of consecutive operations, but it is or may be applied, at least in part, to machinery for performing separately one or more of these operations, or for other purposes.

The invention consists, first, in a traveling holder or holders for the carriages, which will carry the carriages to or over suitable devices and permit a bobbin to be removed by the action of said devices from a carriage or inserted into the same, or to be removed and replaced by another while the carriage is retained in the holder.

The invention consists, secondly, in a retractor or provided with a pin for insertion behind the carriage-spring and mechanism whereby said retractor is actuated to lift the spring on the carriage away from the bobbin so that it does not interfere with the removal of the bobbin; also, in the combination, with a traveling carriage holder or holders, of a bobbin lifter or lifters for pressing the top of the bobbin beyond the carriage so that it can be slipped out, and an extractor for withdrawing the bobbin from the carriage. These appliances are operated by appropriate mechanical means, such, for example, as cams and connections.

The invention consists, thirdly, in the combination, with a traveling carriage-holder, or a series of such holders, of the following appliances for effecting or assisting in the insertion of the bobbins, namely: bobbin-holding mechanism for supporting the bobbin in proper relation to the carriage so that by an edgewise motion it can be slipped into the carriage; a bobbin-insertor or bobbin-inserting mechanism for giving the requisite edgewise motion

to the bobbin, and a carriage-spring replacer, or means for applying the carriage-spring to the bobbin. Practically the same devices which retract the spring for removing a bobbin are or may be employed to restore the spring when a bobbin is inserted.

The invention consists, fourthly, in the combination, with the traveling carriage-holder, or a series of such holders, of means for delivering bobbins as they are required for insertion in the carriages or bobbin-delivery mechanism.

The invention consists, fifthly, in tension appliances, consisting of a belt, movable step by step, and a horn, between which the threads may be placed for holding the threads from full bobbins so as to prevent their becoming entangled with one another or with certain parts of the machine, such as the brush.

The invention consists, sixthly, in the combination, with a traveling carriage-holder, or a series of such holders, of means for threading the carriages, or carriage-threading mechanism. Practically a hook, traveling with the carriage-holder, or with each of a series of such holders, for drawing the thread through the eye or thread guide on the carriage, and a thread-carrier for placing the thread in the hook, are used for the purpose, said hook and thread-carrier being operated by suitable mechanical means, such, for example, as cams and connections.

The invention consists, seventhly, in the combination, with a traveling carriage-holder, or a series of such holders, of carriage-delivery mechanism, or means for delivering carriages to the carriage-holders.

The invention consists, eighthly, in the combination, with a traveling carriage-holder, or a series of such holders, of means for removing the carriages from the holders or carriage-removing mechanism.

The invention further comprises the combination, with each other, of two or more of the before-mentioned means, mechanisms, or appliances, and also certain special constructions, combinations, and arrangements of parts, as hereinafter set forth.

It is designed to unite in one machine all the parts, improvements, and combinations

included within the invention; but it is evident that this is not essential, some parts of the invention being susceptible of use separately.

The following is a description of what is considered the best mode of applying the principle of the invention, reference being had to the accompanying drawings, which form a part of this specification.

Figure 1 is a perspective front view of a machine constructed in accordance with the invention; Fig. 2, a plan view of the same; Figs. 3 and 5, views in horizontal section on different planes; Fig. 4, a partial view in horizontal section; Fig. 6, an end elevation, and Figs. 7 to 11 partial views in vertical section on different planes.

Like letters and reference-numbers indicate like parts on all the figures.

A movable bed, A, shown in the form of a horizontal revolving disk, is mounted upon and turns with an upright shaft, B. It is provided with recesses D, of a form and depth adapted each to receive a carriage, E, flush with the upper surface of the bed.

The machine-frame is composed of the plate F, the legs and cross-pieces which support it, the top plate, G, and the pillars $H^1 H^2 H^3$, bolted to the plate F and supporting the top plate, G. The shaft B is journaled in bearings on the plates F G, and is revolved by a belt on pulley 1 through cross-shaft 2 and bevel-gears 3 and 4. The recesses in the bed or disk A are preferably formed by cutting openings of the right shape in a surface-plate, 5, (see Figs. 8 to 11,) of the same thickness as the carriages, as this avoids forming the recesses in the solid metal. The carriage-box is formed, as shown, by the rods 6, fastened at the upper ends to the top plate, G, and at the lower ends to the stationary carriage-holding plates $I^1 I^2$. These rods are so arranged that they keep the carriages from turning, and that when a pile of carriages is placed in the box or conduit formed by said rods, the bottom carriage will register with each recess in the bed when said recess comes below the mouth of the box. The top plate, G, and the holding-plates $I^1 I^2$ are cut away to permit the carriages to be introduced at the top and removed at the bottom of the carriage-box. The holding-plate I^2 is fastened by the bracket 7 to the pillar H^1 and to the plate F by the bracket 8. The holding-plate I^1 is fastened to the plate F, and holding-plate I^2 by bracket 8 to the bobbin-box M by the angle-piece 9, (see Fig. 3,) and to the bridge P by angle-piece 10. (See Fig. 9.) The holding-plate I^3 is itself bent, and has its foot fastened to the plate F. The holding-plates $I^1 I^2 I^3$ are placed just above the bed or disk A.

A space whose width equals the diameter of the bobbins is left between the inner plate, I^1 , and the outer plates, $I^2 I^3$. When a recess comes under the carriage-box, the bottom carriage enters the recess and is carried along with the bed or disk under the plates $I^1 I^2 I^3$, which confine the carriages in the recesses. A series of traveling carriage-holders is thus

formed, the series extending in the direction in which the holders travel. The bobbins not being confined by the holding-plates can be removed or inserted.

A separate spring-retractor is used for each recess or carriage-holder. Each of these retractors is or may be duplicates of the others. As shown, each consists of a lever, 11, (see Fig. 10,) pivoted to the bracket 100 on the under side of the bed or disk A, a bell crank, 15, pivoted to the lever 11, and a pin, 13, at the upper end of the bell crank. This pin works through a slot in the bottom of the recess, and is provided with a blade or point, so that the upper end may enter easily between the spring and bobbin.

All of the levers 11 are actuated by the stationary cam-ring 14, and all of the bell-cranks 15 by the stationary cam-ring 16. A spring, 12, tends to force down each lever 11. The cam 14, by raising the lever 11 and allowing it to fall, raises and lowers the pin 13, while the cam 16, by causing the bell-crank 15 to rock on its pivot, gives to the pin a movement lengthwise of the slot. This compound-lever arrangement has been adopted as the most convenient mounting for the retracting device or pin 13.

The bobbin lifters for each recess or carriage-holder consist, as shown, of pins 17 and 18, at the ends of levers 19 and 20, respectively, the levers being pivoted to bracket 100 and resting at or near their front ends, the levers 19 upon the stationary cam-ring 21 and the levers 20 upon the cam-ring 22. The pins rise and fall through holes in the bottom of the recess, and when they rise they raise one edge of the bobbin above the carriage, so that it can be slipped out by an edgewise motion.

The bobbin-extractor is, as shown, in the form of a wheel, K, provided, near its periphery, with a series of depending pins, 23, each pin being combined with a spiral compression-spring, 24, (see Fig. 7,) for forcing it into the eye in the center of the bobbin when the pin is carried over it, and a nut, 25, for limiting the downward motion of the pin. The wheel K is mounted upon and turns with an upright shaft journaled in the bracket 26. It is revolved by the spur-gear 27, fixed on the shaft B, engaging the smaller spur-gear, 28, fixed on the shaft of wheel K. The gears are of such relative size that the extracting-pins 23 move faster than the bobbins, and are thus enabled to extract the bobbins from the carriages.

The operation in detail of retracting the spring and extracting the bobbin can now be understood. (See Figs. 5 and 10.) The bobbin-lifters 17 and 18 are first raised by the inclines 29 of cams 21 and 22 acting upon levers 19 and 20, and immediately thereafter, while the bobbin is still pressed out, the retractor-pin 13 is raised by the incline 30 of cam 14 acting upon the lever 11 until said pin touches the bobbin, and it is then advanced by the incline 31 of cam 16 acting upon bell-crank 15 until said pin engages the spring 32 of the car-

riage. The inclines 33 of cams 21 and 22 then allow the bobbin-lifters, and with them the edge of the bobbin, to fall, the end of the pin 12 entering between the bobbin and the spring. The pin 13 is then further advanced by incline 31 until the spring is fully retracted, as shown in Fig. 4. It may be kept in that position until the empty bobbin has been removed and a full bobbin inserted. As the bed or disk A continues to revolve, the bobbin-lifters are again raised by the inclines 34 of cams 21 and 29 and press out the bobbin at one edge. At this time the bobbin is under the extractor-wheel K, and one of the pins 23 enters the eye in the middle of the bobbin. As this pin moves faster than the carriage, it draws the bobbin out of the carriage, and, dragging it over the stationary platform 35, Fig. 2, whose upper surface is flush with that of the bed or disk A, delivers it into the empty bobbin-receiver L. The bobbin-lifters are then allowed to descend by inclines 304. The receiver L, as shown, is in the form of a round table provided with a raised rim, and is mounted upon an upright shaft, 36, which is revolved slowly by the belt 37, (see Figs. 5 and 6,) running on the pulleys 38 and 39, the larger one being fast on the shaft 36, the smaller one on the shaft B.

The bobbin-box M, in the form of a slotted tube, is suspended from and fastened to the top plate, G, by means of a flange, 40, (see Figs. 1 and 2,) the top plate being cut away to receive it. The endless belt N of the tension apparatus is stretched between the pulley 41, carried by the top plate, and the pulley 42, (see Figs. 3 and 8,) on the holding-plate I'. It is provided with holes or recesses to receive projections 43 (see Fig. 2) on the pulley 41, to prevent slipping. The pulley 41 is fastened to a ratchet-wheel, 44, and is driven by a reciprocating spring-pawl, 45, engaging the ratchet-wheel. This pawl is attached to the end of lever 46, which latter is vibrated by the cam 47, fast on shaft B, pushing it in one direction, and the spring 48 returning it. As shown, the spring is attached to the lever, and is confined between the lever and the stationary pin 49. The bridge P, bolted to the pillar H², is provided at its inner end with the upright horn 50, arranged close to the belt N, so that the threads inserted between them will be held in place and be carried downward as the belt revolves. When the full bobbins are placed in bobbin-box M, the ends of the threads are led through the slot in the side of the bobbin-box, and placed in the tension apparatus between the belt N and the horn 50. The brush Q is fast on the shaft B, and turns with the same. It acts upon the ends of the threads and keeps them taut, and thus serves also to prevent tangling.

The movable device R for upholding the pile of bobbins in the bobbin-box is, as shown, in the form of a lever-arm, pivoted to the bracket 51, which in turn is bolted to the pillar H². A projection, 52, on one side of

the lever-arm enters a slot in the side of the bobbin-box, and bears against the edges of a number of bobbins. The bearing-surface is faced with leather, rubber, or other soft material. A spring, 53, presses the lever-arm inward normally, so that it supports the pile of bobbins. At proper times, however, the lever-arm is drawn back by the cams or projections 54 (of which there is one to each recess) on the edge of disk A, and the pile of bobbins is allowed to descend. The cams or projections 54 act upon the tail-piece 55 of the lever-arm. The lever-arm R also operates as a brake to prevent the brush Q from unwinding the thread.

At the bottom of the bobbin-box is a removable stop, formed, as shown, by the inner end of lever S. This lever is pivoted at the outer end to the pillar H², and is raised at the proper times to allow a bobbin to pass out by the cams or projections 56, of which there is one to each recess. These cams 56, as well as those numbered 57 and 58, (whose function is to control a portion of the bobbin-holding mechanism, hereinafter described,) are placed on the top of a flat rim or annular extension, 59, of the disk A. They pass under the platform 35, and also under another platform, 115, whose function is explained below. The lower part of the bobbin-box M is cut away on one side, as shown at 60, Fig. 8, so that the bottom bobbin can be slipped out, provided the lever S is raised at the time. The spiral tension-spring 61 assists in holding down the lever, and a set-screw, 62, limits its downward motion. For each carriage holder or recess (see Fig. 11) there is a pin, T, which plays through a boss, 63, on or near the end of lever U, which is carried by the bed or disk A, and projects through a slot in the bottom of the recess. The lower ends of the pins T rest upon the stationary cam-ring 64. When a recess in the bed A comes under the bobbin-box, the pin T is raised by the incline 65, and its upper end enters the eye in the bobbin at the bottom of the pile. The stop-lever S being raised at this time, the bobbin is carried out of the box by the pin T.

Immediately before the pin T is raised the pins 66 and 67 or bobbin-levelers are lifted so as to bear upon the under surface of the bobbin and keep it level. These leveling-pins (of which there are two to each recess) are mounted upon levers 68 and 69, respectively, which levers are pivoted to the bracket 100. The outer ends of levers 68 rest upon the stationary ring 70; those of levers 69 upon the stationary cam-ring 71. They are raised just in advance of pin T by the inclines 72.

Each of the pins T forms a bobbin-insertor, it being given a lateral motion for inserting the bobbin by means of the stationary or bracket cam 73, which acts upon the bell-crank 74, and through the latter upon the lever U. (See Fig. 4.) The bell-crank 74 is pivoted to the bed or disk A, and is provided with a spring, 75, for acting upon the lever U, so that

if the motion of the pin T should be resisted the spring will yield and breakage be thus avoided. A spiral tension-spring, 184, returns the lever U when the insertion is completed. Before, however, the bobbin can be inserted it must first be adjusted, so that the ends of the semicircular verge 76 are opposite the space between the sides of the bobbin. This adjustment is effected by the bobbin-holding mechanism, which, as shown, consists partly of the movable bobbin-supporters on the bed or disk A—namely, the bobbin-lifters 17 and 18 and the bobbin-levelers 66 and 67—and partly of the bobbin-holder carried by the stationary frame of the machine and consisting of the lever-arms 77 and 78, each of which is provided with a bearing-roller, 79. These arms are fastened to the inner ends of short rock-shafts 80 and 81, journaled in brackets which depend from the bridge P.

At the outer ends of the rock-shaft are elastic arms 82 and 83, which are acted upon by cams or projections 57 and 58 whenever a recess is under the bearing-rollers 79, to cause said rollers to press upon the bobbin. The rock-shafts are or may be combined each with a retracting-spring, 85. (See Fig. 9.) The bobbin-lifters 17 and 18 are raised by the inclines 86, and the bobbin-levelers 66 and 67 are allowed to fall by the inclines 87, while at the same time the bobbin is clamped by the bearing-rollers 79, so that the bobbin is held with the space between the sides of the bobbin opposite and on a level with the ends of the verge 76. At this time the lever U and insertion-pin T are given the lateral motion for pushing the bobbin into the carriage. As the insertion proceeds, the bobbin-lifters are carried over the inclines 86 and descend, the pressure of the clamping-arm 77 is diminished, and that of the arm 68 increased, so that the bobbin becomes more nearly horizontal as the insertion proceeds. The bottom of the recesses in the bed or disk A is inclined, as shown at 84, Fig. 11, so that the bobbin can be adjusted properly for insertion.

The thread-carrier consists, as shown, of a pin, C, mounted upon an arm of a vertical rock-shaft, 88, which is journaled in bearings of the bridge P, and is turned in one direction by the projections 89 (one for each recess) on the bed or disk A, and in the other by the spring 90. A bell-crank, 91, pivoted to a bracket on the pillar H³, is acted upon by the projections and draws down upon the chain 92, which runs over the pulley 93 on bridge P, and is wrapped partly around a hub on the rock-shaft 88, so as to turn the thread-carrier to the left. The spring 90 draws upon the chain 94, which is wrapped in the opposite direction around the said hub, and turns the thread-carrier to the right whenever the projections 89 release the bell-crank 91. The pin C enters the curved groove 185 in the holding-plate I' when it is turned, and as it moves to the left it engages the thread (stretched between the bobbin and the tension apparatus) and lays

it in a threading-hook, 95. Each of these hooks (of which there is one to each recess) is mounted on a carrier, 96, guided by a hole in the bed or disk A, and connected with the operating-lever 97, which latter is pivoted to the bracket 100 at one end, and at the other end rests upon the stationary cam-ring 98. During the inserting operation, as soon as the bobbin has uncovered the thread-eye 99 in the carriage, (see Fig. 11,) the incline 101 acts upon the lever 97 and thrusts the hook upward through the eye. When it is raised, the thread-carrier introduces the thread, and the incline 102 allows the hook immediately to descend and draw the looped thread through the eye 99. When the insertion of the bobbin is complete, the incline 103 allows the insertion-pin T to descend. The carriage, with the inserted bobbin, is carried by the revolution of the bed or disk A under the roller 104, mounted and turning upon a stud fixed to a stationary bracket, 105. At this time the inclines 106 and 107 allow the retractor-pin 13 to retire, and the carriage-spring is allowed to press upon the edge of a bobbin, its nib 108 (see Figs. 3 and 4) entering between the sides of the bobbin. The hook 109 prevents the thread from getting under the roller 104.

Each recess is provided with a carriage-ejector, 110, mounted upon a lever, 111, which is pivoted to a bracket, 100, and at the outer end rests upon the stationary cam-ring 112. The ejector works through a hole in the bottom of the recess under the front part of the carriage. The ejector is raised by the incline 113, and while raised the carriage is removed by the wheel W. It is or may be constructed and operated substantially as the bobbin-extractor wheel K, and therefore needs no further description. One of the pins 114 enters the eye in the bobbin and the rotation of wheel W draws the carriage from the recess, drags it over the stationary platform 115, onto the chute 116, down which the carriage slides to the endless belt X. As the carriage is removed from the bed or disk A, the looped thread is held by the hook 95, and the end of the thread is therefore drawn completely through the eye. As or before the carriage enters the chute 116 one edge passes under the roller 117 and is held back by it, so as to turn the carriage into the position shown in Fig. 2, with the thread-eye turned toward the bed or disk A. After the carriage has been removed, the ejector 110 is allowed to descend by the incline 118, so that it does not interfere with the entry of a new carriage into the recess when the latter passes under the carriage-box.

The endless belt X is stretched on rollers 119, and revolved at intervals by a reciprocating pawl, 120, engaging a ratchet-wheel, 121, on the shaft of one of the rollers. The pawl 120 is connected with the outer end of lever 122, (see Fig. 5,) pivoted to the plate F. The pawl is moved in one direction by the pin 123 on the gear 124, (which operates the wheel) and is returned by the spring 125. The upper

portion of the belt travels over a bed and serves as a carriage-receiver. When a number of carriages have collected on the belt, they are removed by the attendant.

5 The operation of the machine will be understood from the foregoing description, but a brief explanation of the operation as a whole, in the succession in which the different steps are or may be performed, may be useful.

10 The carriage-box 6 is supplied with carriages containing empty bobbins, the bobbin-box M with full bobbins, the ends of the threads being held by the tension apparatus N 50. Starting from a point where a recess, D, is under the carriage-box 6, and a carriage has dropped into it, the revolution of the bed or disk A through an angle of thirty-five degrees (35°) brings the carriage well under the holding-plates I' I², which confine the carriage in the recess. The bobbin-lifters 17 and 18 then rise and press the edge of the bobbin beyond the carriage, and at thirty-eight degrees (38°) the spring-retractor is lifted until the pin 13 touches, or nearly touches, the lower surface of the bobbin. From thirty-eight degrees (38°) to forty-five degrees (45°) the retractor-pin 13 advances to the periphery of the bobbin, whereupon the bobbin-lifters 17 and 18 fall and the blade of the retractor-pin 13 enters between the carriage-spring 32 and the bobbin. The retractor is then further advanced until the bed or disk A has turned through fifty degrees, (50°) by which time the spring 32 is fully retracted. During the next thirty-five degrees (35°) of revolution the parts remain as before, except that the carriage has passed from under the plate I², and is now held by the plates I' and I³. At eighty-five degrees (85°) the bobbin-lifters 17 and 18 again rise, and at ninety degrees (90°) one of the pins of extractor-wheel K enters the eye of the bobbin, and during the next four degrees, draws out the empty bobbin and delivers it into the receiver L. At ninety-five degrees (95°) the bobbin-lifter pins 17 and 18 fall. At one hundred and seventy-three degrees (173°) the bobbin-levelers 66 and 67 rise, and two degrees, after the carriage being nearly central under the bobbin-box M, the bobbin-supporter R is drawn back, allowing the bobbins to descend and rest upon the bobbin-lifters 17 and 18 and bobbin-levelers 66 and 67. The stop formed by lever S being down prevents the bottom bobbin from being drawn out by the friction. The insertion-stud T now rises, and at one hundred and seventy-eight degrees (178°) the carriage being now nearly central under the bobbin-box, enters the eye in the bobbin. The stop formed by lever S being lifted at this time, the bottom bobbin is slipped out from under the pile, which is now upheld by the bobbin-supporter R, its pressure having been almost immediately resumed. At two hundred and five degrees (205°) the bobbin-levelers 66 and 67 have fallen, and the bobbin-lifters 17 and 18 risen so as to bring the bobbin into an inclined position, with its edge opposite the ends of the

verge 76, and the roller 79 of the arm 77 then presses upon the bobbin.

Immediately the lateral motion of the insertion-stud T commences, and continues until the insertion is completed, which occupies two hundred and fifteen degrees, (215°). During this operation the bobbin-lifters 17 and 18 are allowed to drop, the pressure of the arm 77 is relieved, and that of arm 78 is applied, so as to assist the insertion. The thread-carrier C, which at two hundred degrees (200°) occupies the position shown in Fig. 2, at two hundred and five degrees (205°) has been advanced to the position shown in Fig. 3, and at two hundred and ten degrees (210°) it has laid the thread in the hook 95, (which was lifted just previously, say two degrees.) The hook 95 immediately sinks, drawing the loop through the thread 99 of the carriage. At about two hundred and twenty degrees (220°) the insertion-stud T descends, and at about two hundred and thirty degrees (230°) the retractor-pin 13 releases the carriage-spring 32. At two hundred and sixty-five degrees (265°) the carriage-ejector 110 rises. At two hundred and seventy degrees (270°) a pin of the wheel W engages the bobbin, and removes both it and the carriage from the recess D in the bed, and shortly after delivers it down the chute 118 on to the receiving-belt X. At two hundred and seventy-five degrees (275°) the carriage-ejector 110 descends, and the revolution of the bed or disk A is then continued until completed.

It will be understood that each recess in turn receives a carriage from the carriage-box, and that the empty bobbin is removed and delivered into the appropriate receiver L, a full bobbin inserted, the carriage threaded, and the threaded carriage with its full bobbin delivered to the carriage-receiver or endless belt X.

If the bobbin-box be not supplied with bobbins, the machine will simply remove the empty bobbins from the carriages, and the mechanism for inserting the bobbins acts idly. On the other hand, if the carriages placed in the carriage-box contain no bobbins, and the bobbin-box be supplied with bobbins, the mechanism for removing the bobbins will operate idly.

A particular and detailed description of the machine shown and its mode of operation has been given for the purpose of showing how the invention is or may be carried into effect, and to enable others to make and use the same; but the invention is not restricted to the precise details, either of construction or of operation, it being evident that modifications can be made without departing from the spirit of the invention, and that parts of the invention may be used separately.

No means have been shown for supporting the carriages in the carriage-box, as the bobbins are upheld in the bobbin-box by the movable device R, because the support of the carriage is considered unimportant; but it is evi-

dent that the supporting device R is applicable to the carriage-box as well as to the bobbin-box.

Having now particularly described and as-
5 certain the nature of my said invention, and the manner in which the same is or may be carried into effect, what I claim is—

1. The combination, with the recessed traveling bed and the gearing therefor, of the hold-
10 ing-plates for confining the carriages in the recesses, substantially as described.

2. The spring-retractor having a pin for entering between the bobbin and the spring, in combination with a carriage-holder and mech-
15 anism whereby said pin is moved transversely to the carriage to insert the said pin, and then parallel therewith to retract the spring, substantially as described.

3. The combination, with a traveling carriage-holder and gearing therefor, of the bob-
20 bin-lifters movable with said holder for pressing out the top of the bobbin and the stationary cams for moving said bobbin-lifters, substantially as described.

4. The combination, with a traveling carriage-holder, the gearing therefor, the bobbin-
25 lifters movable with said holder, and the stationary cams for operating the said bobbin-lifters, of the bobbin-extractor and mechanism for operating the same, substantially as
30 described.

5. The combination of a carriage-holder, a carriage-spring retractor having a pin for entering between the spring and the bobbin,
35 bobbin-lifters, a bobbin-extractor, and operating mechanism, substantially as described.

6. The combination, with a series of traveling carriage-holders and gearing therefor, the said series extending in the direction in
40 which the said holders travel, of bobbin-lifters for each carriage-holder, stationary cams for acting upon the bobbin-lifters, a bobbin-extractor, and mechanism whereby said extractor is operated to withdraw the bobbins
45 successively, substantially as described.

7. The combination of the recessed traveling bed, the gearing therefor, the holding-
50 plates, the bobbin-lifters traveling with said bed, the stationary cams for raising said bobbin-lifters, the bobbin-extractor, and the mechanism for operating said extractor, substantially as described.

8. The combination, with a traveling carriage-holder and gearing therefor, of bobbin-
55 supporters traveling with said carriage-holder and movable transversely thereto, stationary cams for operating said supporters, a bobbin-holder for pressing the bobbin against said supporters, a bobbin-insertor traveling with
60 said carriage-holder, and stationary cams for operating said insertor, substantially as described.

9. The combination of a carriage-holder, bobbin-supporters movable transversely to
65 said holder, a bobbin-insertor, a carriage-spring replacer having a pin for engaging said

spring, and operating mechanism, substantially as described.

10. The combination, with the series of trav- 70
eling carriage-holders and gearing therefor, the said series extending in the direction in which the said holders travel, of the movable bobbin-supporters for each carriage-holder, the stationary cams for acting upon the said 75
bobbin-supporters, the bobbin-holder for pressing the bobbins against said bobbin-supporters, the bobbin-inserters, one for each carriage-holder, and the mechanism operating the said bobbin-inserters in succession, sub- 80
stantially as described.

11. The combination of the series of traveling carriage-holders, the movable bobbin-sup-
85 porters, the bobbin holder, the bobbin-inserters, the carriage-spring replacers having each a pin for engaging the carriage-spring, and mechanism for operating all the said devices to insert bobbins into the carriage in each of said holders in succession, substantially as de-
90 scribed.

12. The combination, with the series of traveling carriage-holders, of the stationary bob-
95 bin-box, the bobbin-supporters, the bobbin-holder, the bobbin-inserters, and the operating mechanism for all said parts, substantially as described.

13. The combination, with the bobbin-box, of the tension belt and horn and mechanism for revolving said belt, substantially as de-
100 scribed.

14. The combination, with the bobbin-box, of the tension-belt, mechanism for revolving the said belt, the horn, and the rotary brush, substantially as described.

15. The combination, with the traveling 105
bed, the gearing therefor, and a box—such as the bobbin-box, for example—for containing a pile of flat objects and delivering them in succession to said bed, of a movable device arranged a short distance above the bottom of 110
said box for upholding the pile of objects therein, and mechanism operating at intervals to withdraw said device and permit the descent of said pile and the delivery of the bottom bobbin, and then to return said device 115
into position for upholding the balance of said objects, substantially as described.

16. The combination, with the traveling bed, the gearing therefor, and the bobbin-box, of the stop at the bottom of the box, remova- 120
ble to allow the bottom bobbin to be slipped out edgewise, and the mechanism for withdrawing and returning said stops, substantially as described.

17. The combination, with the traveling 125
bed, the gearing therefor, and the bobbin-box, of the movable stop for controlling the escape of bobbins from the box, the devices or pins for keeping the bottom bobbin level, the stud for engaging the bottom bobbin, and mechan- 130
ism for operating said stop, said pins, and said stud, substantially so described.

18. The combination, with a traveling car-

riage-holder and the gearing therefor, of the threading-hook movable with said carriage-holder, the stationary cam for operating the same, the thread-carrier, and the mechanism for operating said thread-carrier, substantially as described.

19. The combination, with a series of traveling carriage-holders, the series extending in the direction in which carriage-holders travel, and the gearing for moving said holders, of bobbin-delivery and bobbin-inserting mechanism, whereby bobbins are delivered to the carriages in the several holders in succession and are inserted in said carriages, substantially as described.

20. The combination, with the series of traveling carriage-holders, the series extending in the direction in which the carriage-holders travel, and the gearing for moving said carriage-holders, of bobbin-delivery and bobbin-inserting mechanism, whereby a bobbin is delivered to and inserted into the carriage in each holder as it is presented in its turn, the tension apparatus for holding the ends of the bobbin-threads, and the carriage-threading mechanism whereby the carriage in each holder is threaded in its turn, substantially as described.

21. The combination, with the traveling bed having recesses corresponding in form to the outline of lace-machine carriages so as to receive and retain the said carriages in a given position, of the carriage-box constructed and arranged to register with said recesses as they come beneath it and the gearing for revolving said bed, substantially as described.

22. The combination, with the series of traveling carriage-holders and gearing for moving the same, having holding devices which bear upon the carriages near the edges, leaving the bobbin-spaces exposed, of carriage-delivery mechanism for supplying a carriage to each holder in its turn, substantially as described.

23. The combination of the series of traveling carriage-holders, gearing for moving the

same, carriage-delivery mechanism, and the bobbin removing or extracting mechanism, substantially as described.

24. The combination of the series of traveling carriage-holders, gearing for moving the same, the carriage-delivery mechanism, and the bobbin-delivery and bobbin-inserting mechanisms, substantially as described.

25. The combination, with the series of traveling carriage-holders and gearing for moving the same, of the bobbin removing or extracting mechanism, the bobbin-delivery mechanism, and the bobbin-inserting mechanism, substantially as described.

26. The combination of the series of traveling carriage-holders, gearing for moving the same, the carriage-delivery mechanism, the bobbin removing or extracting mechanism, the bobbin-delivery mechanism, the bobbin-inserting mechanism, the tension apparatus, and the carriage-threading mechanism, substantially as described.

27. The combination, with the recessed traveling bed and the gearing for revolving the same, of the holding-plates, the carriage-ejectors movable with said bed, the cam for operating the same, and the mechanism for withdrawing the carriages, substantially as described.

28. The combination, in one machine, of the recessed traveling bed, the gearing therefor, the holding-plates, the carriage-box, the bobbin-extracting mechanism, the empty-bobbin receiver, the bobbin-box, the tension apparatus, the bobbin-inserting mechanism, the carriage-threading mechanism, and the carriage-receiver, substantially as described.

In testimony whereof I have signed this specification, in presence of two subscribing witnesses, this 22d day of April A. D. 1886.

RUDOLPH WEISS.

Witnesses:

CHAS. MILLS,

EDWD. GEO. DAVIES,

Both of 47 Lincoln's Inn Fields, London.