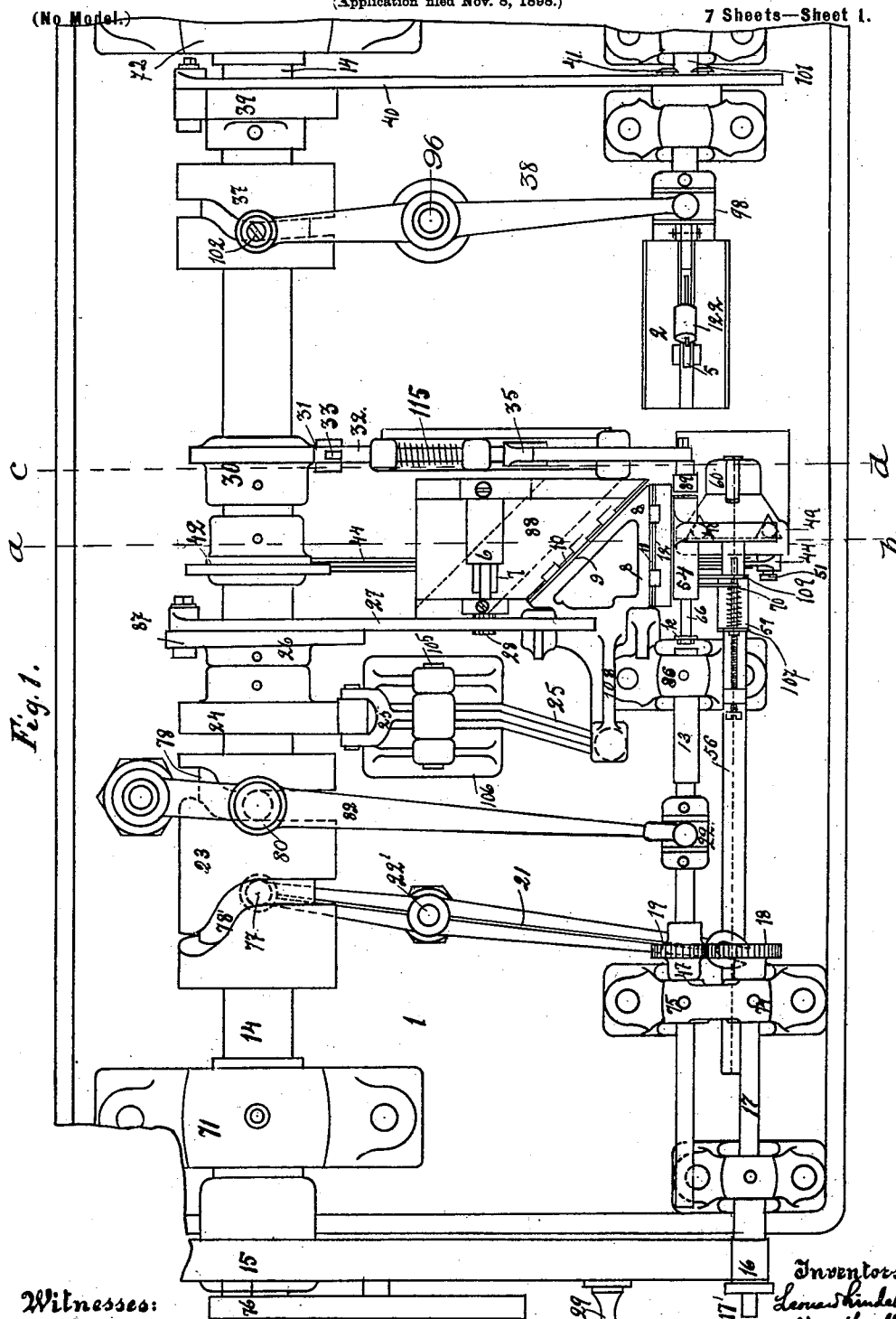


G. A. HAGELBERG & L. LINDELÖF.

MACHINE FOR MAKING PAPER MOUTHPIECES AND INSERTING THEM IN
TUBES OF CIGARETTES.

(Application filed Nov. 8, 1898.)

7 Sheets—Sheet 1.



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No. 676,538.

Patented June 18, 1901.

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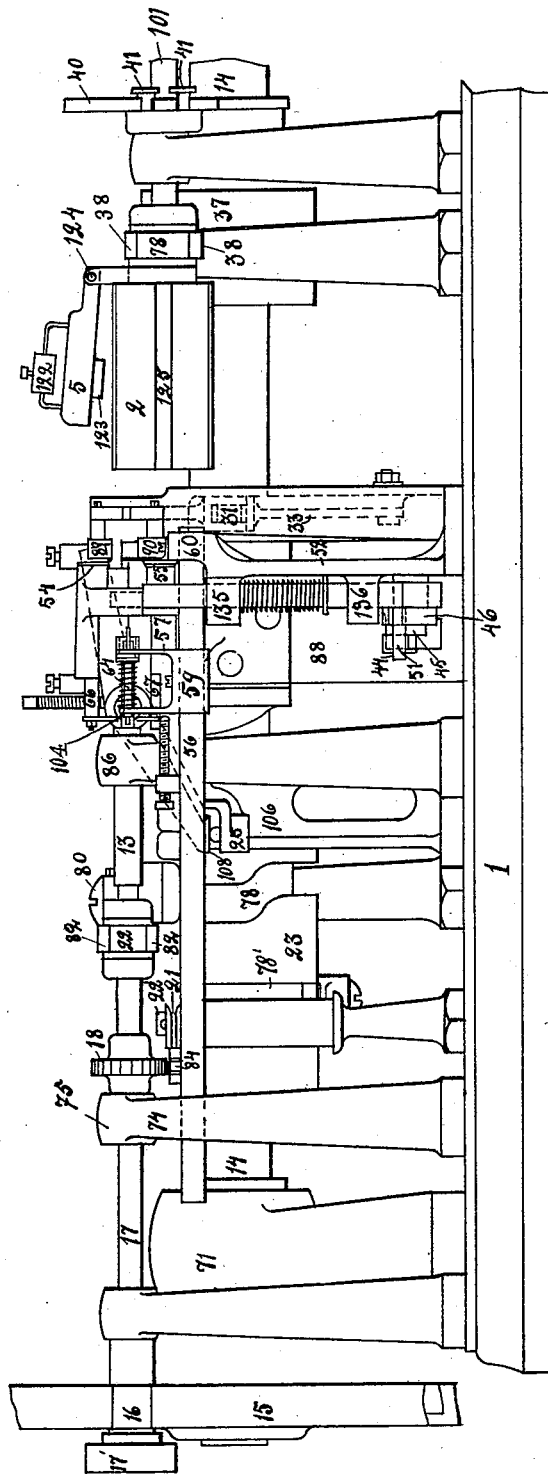
MACHINE FOR MAKING PAPER MOUTHPIECES AND INSERTING THEM IN
TUBES OF CIGARETTES.

(Application filed Nov. 8, 1898.)

(No Model.)

7 Sheets—Sheet 2.

Fig. 2.



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7 Sheets—Sheet 3.

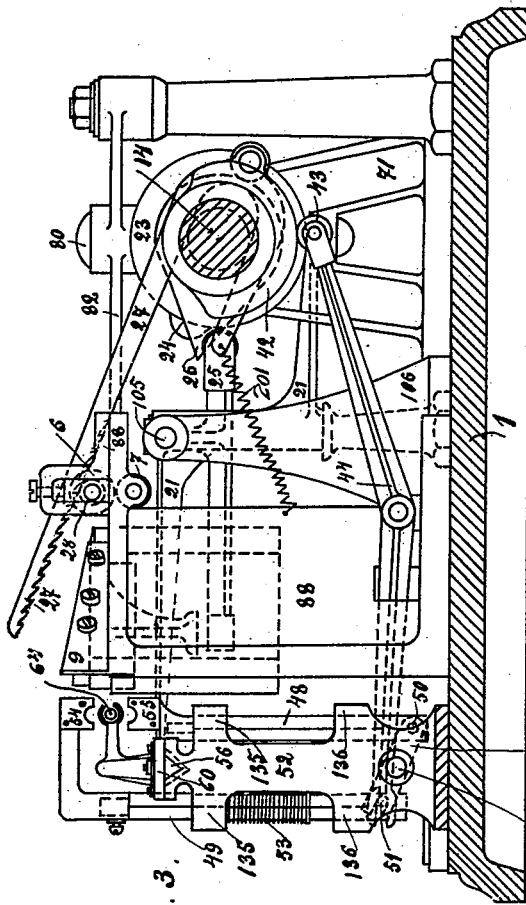


Fig. 3.

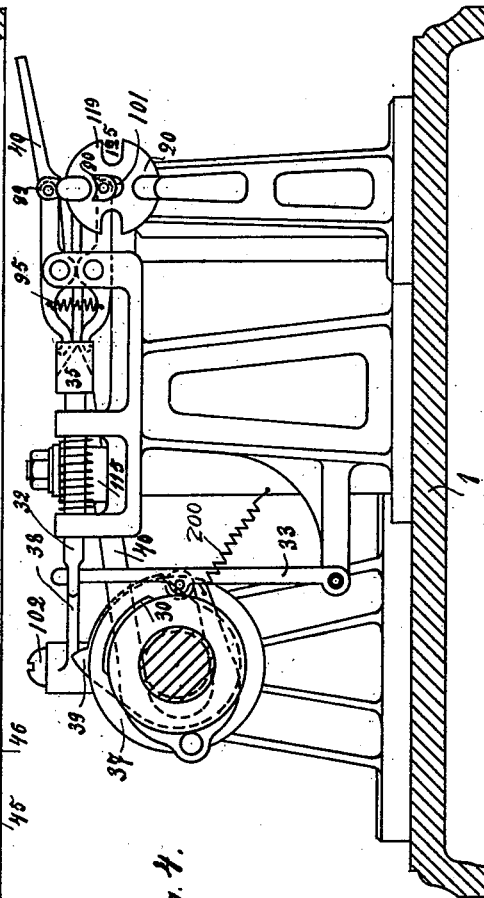


Fig. 4.

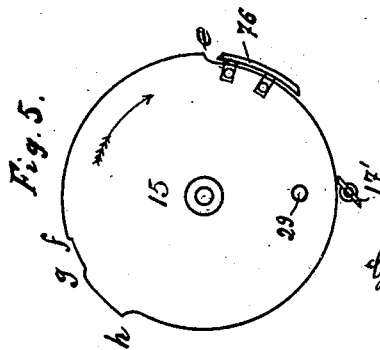


Fig. 5.

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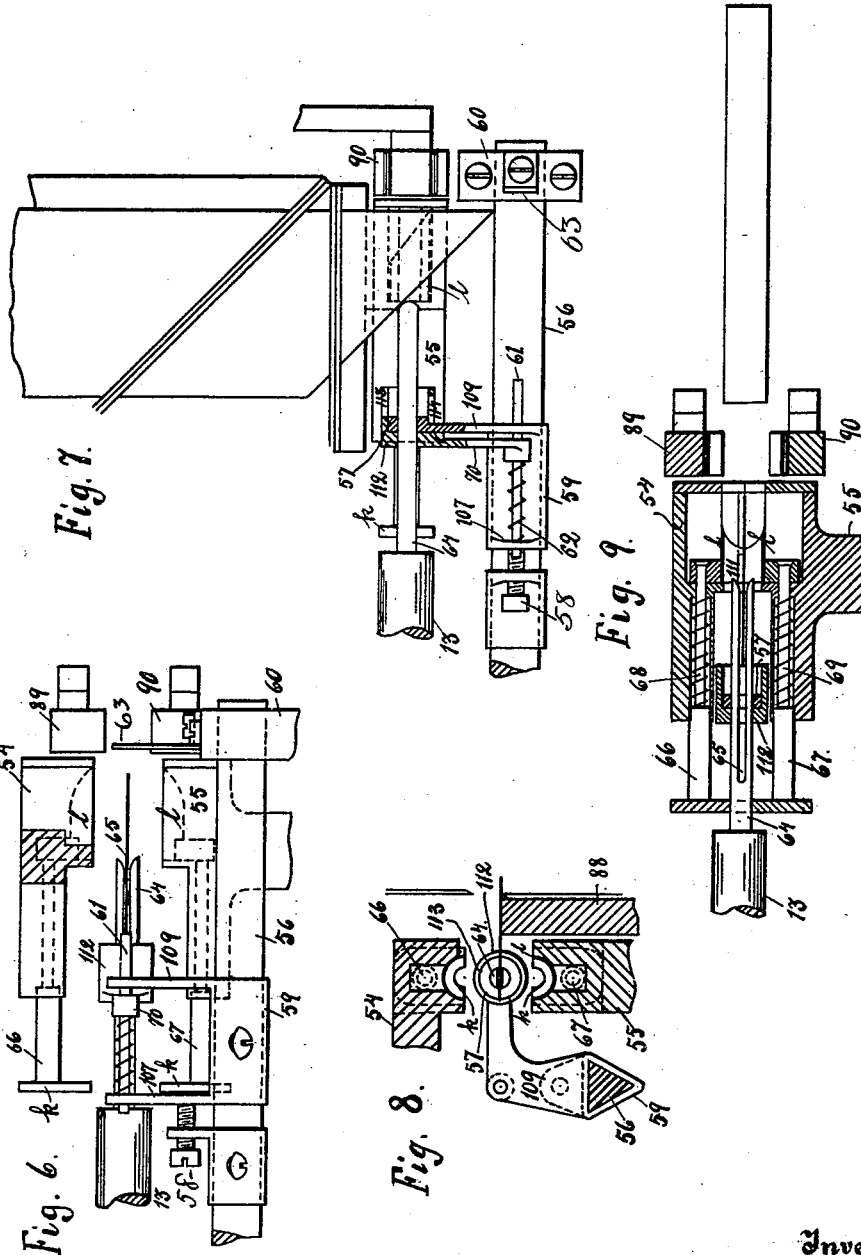
G. A. HAGELBERG & L. LINDELÖF.

MACHINE FOR MAKING PAPER MOUTHPIECES AND INSERTING THEM IN
TUBES OF CIGARETTES.

(Application filed Nov. 8, 1898.)

(No Model.)

7 Sheets—Sheet 4.



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MACHINE FOR MAKING PAPER MOUTHPIECES AND INSERTING THEM IN
TUBES OF CIGARETTES.

(Application filed Nov. 8, 1898.)

(No Model.)

7 Sheets—Sheet 5.

Fig. 14.

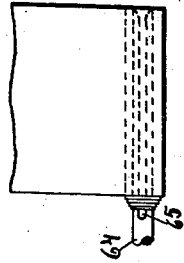


Fig. 15.

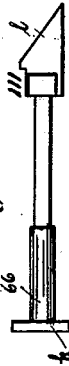


Fig. 16.

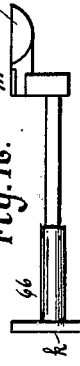


Fig. 17.

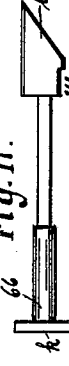


Fig. 18.



Fig. 11.

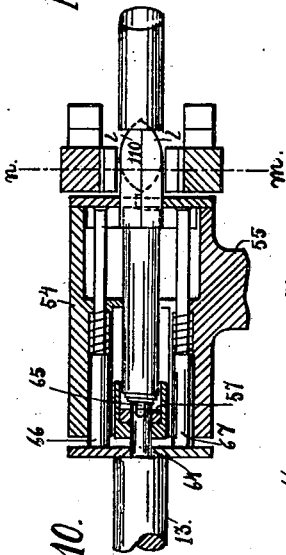
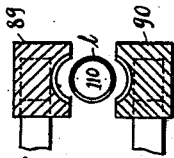


Fig. 10.

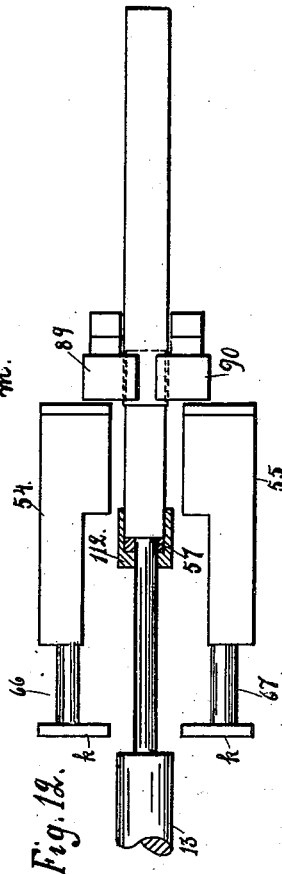


Fig. 12.

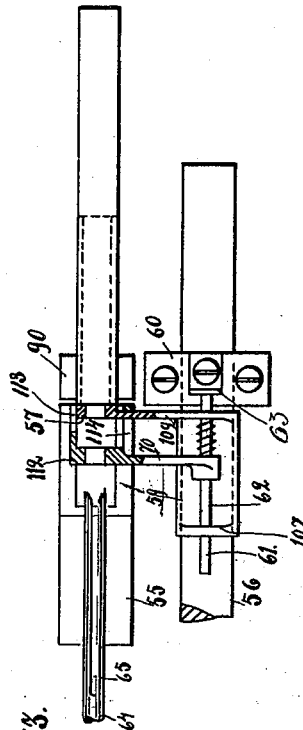


Fig. 13.

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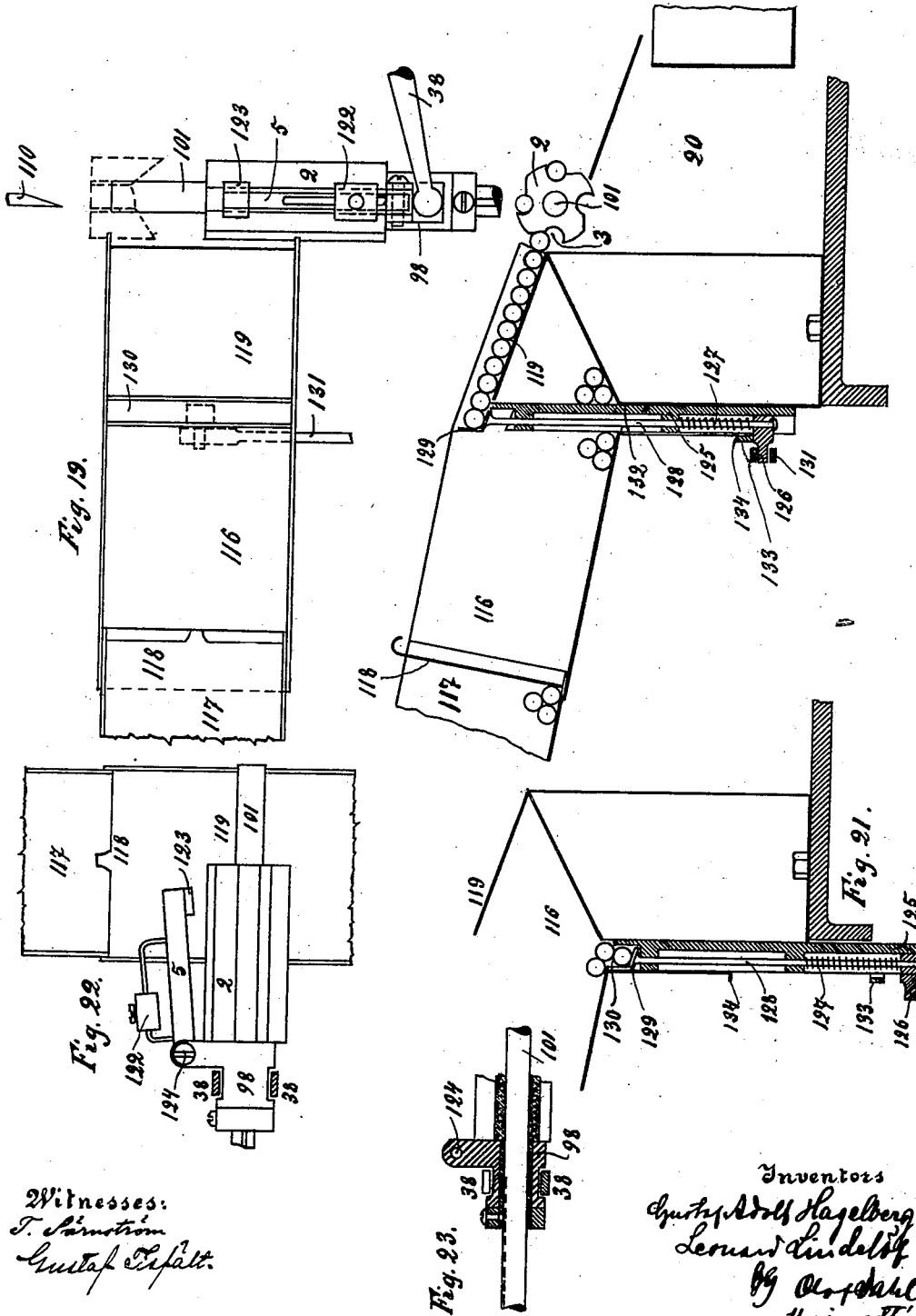
G. A. HAGELBERG & L. LINDELÖF.

MACHINE FOR MAKING PAPER MOUTHPIECES AND INSERTING THEM IN
TUBES OF CIGARETTES.

(No Model.)

(Application filed Nov. 8, 1898.)

7 Sheets—Sheet 6.



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MACHINE FOR MAKING PAPER MOUTHPIECES AND INSERTING THEM IN
TUBES OF CIGARETTES.

(Application filed Nov. 8, 1898.)

(No Model.)

7 Sheets—Sheet 7.

Fig. 24.

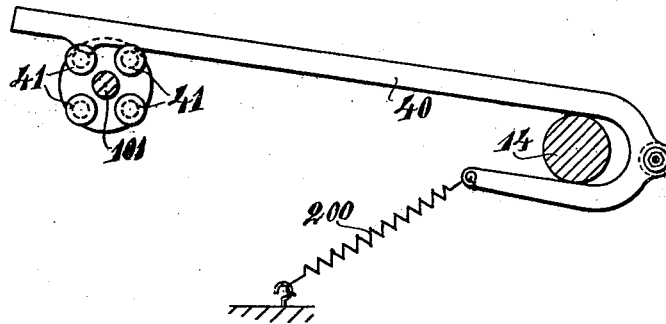


Fig. 25.

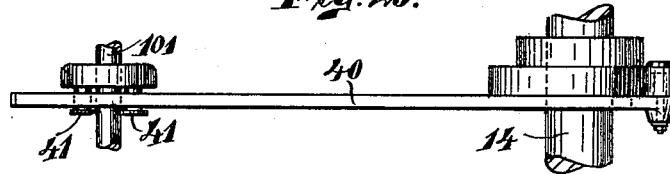


Fig. 26.

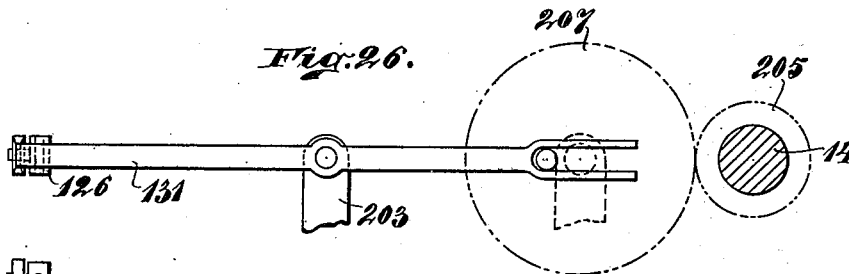
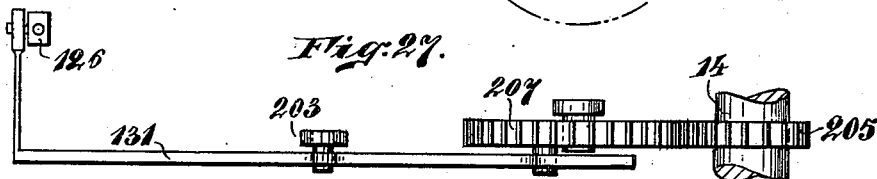


Fig. 27.



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UNITED STATES PATENT OFFICE.

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RUSSIA.

MACHINE FOR MAKING PAPER MOUTHPIECES AND INSERTING THEM IN TUBES OF CIGARETTES.

SPECIFICATION forming part of Letters Patent No. 676,538, dated June 18, 1901.

Application filed November 8, 1898. Serial No. 695,838. (No model.)

To all whom it may concern:

Be it known that we, GUSTAF ADOLF HAGELBERG and LEONARD LINDELÖF, subjects of the Emperor of Russia, and residents of Helsingfors, Finland, Russia, have invented a new and useful Improvement in Machines for Rolling Paper Mouthpieces and Inserting Them in the Tubes of Cigarettes, of which the following is a specification, reference being had to the drawings accompanying and forming a part hereof.

The present invention relates to an entirely automatic machine for rolling paper mouthpieces and inserting them in the tubes of cigarettes, the machine being especially adapted for use when the tobacco has been previously introduced in the tubes, though it may be used to advantage also for empty tubes. In the construction of this machine our object has been to produce an apparatus which, besides having a considerable productive capacity, delivers a product of superior quality.

The construction and manner of operation of the machine are, briefly, as follows:

The beveled end of a strip of paper of a width equal to the length of the mouthpiece to be formed is caused to pass freely in between two pieces having a semicylindrical cavity and being at the time removed from each other, these pieces subsequently closing together each side of the end of the paper strip and holding it in a certain fixed position. A split spindle thereupon advancing grips in its slit the piece of paper for the mouthpiece and on being set rotating winds said strip of paper around itself. The roll of paper thus formed is afterward inserted in its tightly-rolled condition to the extent of about three-eighths of an inch of its length into the empty end of a cigarette-tube filled with tobacco, and as the spindle subsequently recedes and the pieces above mentioned move away from each other it is allowed to expand in the tube, where there is no intervening obstruction, so that the said roll of paper fills up the tube closely. A ring of an internal diameter equal to the diameter of the cigarette surrounds the other end of the mouthpiece and prevents undue expansion of the end of the latter that projects

beyond the paper tube. The cigarette is subsequently clasped at the point where the partly-inserted mouthpiece is situated by the jaws of a pair of grippers, which jaws are covered with rubber and serve to hold the cigarette stationary while the mouthpiece is being fully inserted into it. Owing to the above-mentioned fact that the end of the mouthpiece has been previously caused to fit closely in the tube, all particles of tobacco in the latter will be pushed in front of the mouthpiece when being inserted, and thus prevented from entering between the latter and the tube. The path of the strip of paper forms a slightly-oblique angle to the direction of the spindle, and the latter while rotating is caused to recede at a velocity conforming to the deviation of the angle from a right angle. Consequently the inner coils of the mouthpiece-roll will be made to protrude slightly beyond the outer coil, and an absolutely smooth end of the cigarette in process of forming is the result, since the inner coils, owing to the smaller resistance opposing their insertion, will after said insertion occupy the same level as the outer one. For transporting the cigarette-tubes from a holder to the point of the machine where the above operation is carried out and after its completion to another receptacle the machine is provided with an arrangement consisting of a box having a bottom of V-shaped section, into which the tubes are at first passed from the former holder and from which they are carried up to an inclined plane situated above the box by means of a prismatic part movable up and down through the bottom of the box at the lowest point of the latter, said part having the same width as the box and a thickness corresponding to one or a few of the cigarettes and being provided at its upper end with a suitable arrangement for receiving a few cigarettes when the said part is in the lowest position and again discharging them in its highest position. On being carried up on the inclined plane mentioned the cigarettes roll down said plane toward a cylinder located at the bottom edge of the plane and having an intermittent rotation and a reciprocating motion in the direction of its axis, the cigarettes being successively

received in longitudinal grooves at the surface of said cylinder, which by virtue of its reciprocating motion transports the tubes to the working place and back and when subsequently rotated delivers the ready tubes or completed cigarettes to an inclined plane below, along which they roll into the second receptacle mentioned.

The accompanying drawings illustrate one constructive form of the machine.

Figure 1 represents a top view of the machine. Fig. 2 represents a front elevation of the same. Fig. 3 represents a section of the machine on line *a b* looking to the left; Fig. 4, one on line *c d* looking to the right; Fig. 5, the fly-wheel 15, and Figs. 6 to 27 represent some important details of the machine.

The parts of the machine are mounted on a supporting base-plate 1. The shaft 14, which is the main or driving shaft, runs in the bearings 71 and 72 and is revolved either by means of a belt-pulley attached to its prolongation or by hand by means of a handle 29, fixed to a fly-wheel 15. The paper for forming the mouthpieces is present in a continuous roll carried by a cylinder (not shown in the drawings) and is conducted between the rollers 6 and 7. Both of these rollers are journaled in the support 88. On the shaft 14 is provided an eccentric or cam 26. A toothed rack 27, similar to the rack 40 (shown in Figs. 24 and 25) and which on the one end is bent like a hook, clasps the said cam 26. In the bend the said rack is provided with a stud 87, and a spring 201 holds the said stud in engagement with the said cam 26, so that the latter will cause the rack to move to and fro once in each revolution of the shaft 14. Said rack is provided with teeth of the same shape as those of the said bar 40 and engages with a pinion 28 on the shaft of the roller 6 and rotates the latter each time the rack recedes, but on account of the shape of the teeth will in its advancing not grip the said roller 6. The support 88 also carries the cutting arrangement 8, which consists of two pairs of cutters or shears 9 10 and 11 12. The pair 11 12 cuts off the paper strip at right angles to its path, while 9 and 10 cut it at an angle of about forty-five degrees or at a more acute angle. The triangular waste piece thus produced drops through a passage (not shown in the drawings) underneath the machine. The cutters 10 and 12 are secured to the support 88; 9 and 11, on the other hand, to the part 8, which is movable about the shaft 104 and on the other side of said shaft forms the arm 108. The cutting operation is performed by oscillating the piece 8 about shaft 104. The piece 8 obtains the required motion from the main shaft 14 by the action of the arm 108, the cam 24 and the lever 25, which is carried by the support 106 and can turn about the shaft 105.

The pieces 54 and 55, which are hollowed out semicylindrically, (and, together with the plunger 13, spindle 64, and other parts, are

illustrated in Fig. 7, viewed from above, the upper piece 54 being removed, in Fig. 8 in sections, in Figs. 6, 9, 10, and 12 in front elevations, and in details in Figs. 14 to 18,) are secured to the rods 48 and 49, which are of triangular section and can move up and down in bearings 135 and 136, attached to the support 52, and move intermittently toward and close to each other and again away from each other. This motion is produced by rotating the main shaft 14 and the cam 42 upon it, the lever 44, one end of which bears on the cam by means of the roller 43, and the connecting-piece 46, which oscillates about the shaft 45 and the forked ends of which embrace pins 50 51, attached to the rods 48 and 49. The pin 51, attached to rod 49, is prolonged beyond the connecting-piece 46 and is embraced also by the forked end of the lever 44, so that an oscillation communicated from the cam 42 to lever 44 is transmitted to rod 49, causing it to slide upward, and by means of the connecting-piece 46 to the rod 48, which will consequently slide downward. The pieces 54 and 55 are thus caused to move away from each other. The rods, and consequently the pieces 54 and 55, are returned to their original positions by the spiral spring 53.

The function of the plunger 13, which is journaled at 75 and 86, is to roll up the paper strip into the cylinder which is to form the mouthpiece. For this purpose it is provided with the spindle 64, at the end of which is provided a slit 65. The plunger has an intermittent rotating and reciprocating motion. It is rotated by means of the gear-wheels 18 and 19, the shaft 17, and the cylinder 16 at the end of the latter, said cylinder, which is coated with rubber, being rotated by friction of the edge of the fly-wheel 15 when the raised places *e f* and *g h* pass it, but remaining stationary while the sections *f g* and *h e* pass. The gear-wheel 19 is secured to the sleeve 47, in which the shaft 13 can be shifted longitudinally, while not being free to rotate in it. The sleeve 47 is journaled in the box 75. The plunger 13 is reciprocated by means of the involute cam 23 and the lever 82, the latter being provided at one end with a stud 80, engaging with a groove in cam 23, while the other end is made in the shape of a fork embracing the sleeve 22, which can revolve on shaft 13, but not be shifted along said shaft. On the end of shaft 17, outside of the friction-pinion 16, is secured a wing 17', which when passed by the piece 76 on the fly-wheel 15 is given by this piece a position parallel to the periphery of the fly-wheel, so that the shaft 17, plunger 13, and spindle 64 always occupy a certain position when the piece 76 has just passed the wing 17', said position being characterized by a horizontal position of the slit 65 of spindle 64. This is necessary in order that the slit 65 when the spindle is subsequently advanced shall receive in it the paper held between the pieces 54 and 55.

In each of the pieces 54 and 55 there is a

longitudinally-movable piece 66 and 67, consisting of a pin, at one end of which is fixed a washer *k*, while at the other there is secured one half *l* of a tube 110, which is cut off obliquely and divided in two halves by a plane passing through the point thus formed and its axis. (See Figs. 6 to 11 and 15 to 18.) The spiral springs 68 69 strive to shift the pieces 66 and 67 toward the left-hand side and to thus retain them in the position shown in Figs. 6 and 9. When the plunger 13 is advanced subsequent to the closing together of the pieces 54 and 55, Fig. 9, its end, striking the plates *k*, moves the pieces 66 67 forward, causing the halves *l* of the tube to be pushed out of the pieces 54 55, so as to form in the continuation of the latter the tube 110, which is obliquely cut off at the end, Figs. 10 and 11. In the return motion of the plunger the pieces 66 and 67 are restored to their original positions, and as a result the tube 110 is withdrawn within the pieces 54 and 55. As will be explained below, the tube 110 serves to facilitate the introduction of the end of the rolled-up paper mouthpiece in the paper tube. The upper half *l* of the tube is provided at the edge 111 with a recess, so as not to form any obstruction in winding the paper for the mouthpiece onto the spindle 64. For the same reason one side of the piece 54 is made longer than the other. (See Figs. 8 and 9.)

For pushing the roll of mouthpiece-paper into the paper tube the machine is provided with a rod 56 of triangular section, which can be shifted in the bearings 74 and 60 and carries the piece 59, to which is secured a circular disk 57 of the same external diameter as the mouthpiece to be formed, and which disk is perforated at the middle, so as to admit of the spindle 64 passing through. Moreover, the two upwardly-extending arms 107 and 109 of the piece 59 serve as bearings for the pin 61, which can slide longitudinally in said piece 59 and to which is attached an arm 70, terminating in a hub 112, surrounding the disk 57. This hub has two slots—viz., 114, providing room for the arm 109, supporting the disk 57, and 113, preventing the hub from obstructing the path of the paper strip in winding onto spindle 64. The spiral spring 62 strives to retain the hub 112 in and return it to the position shown in Figs. 6 to 10. The object of hub 112 is to prevent undue expansion of the mouthpiece-roll after the parting of pieces 54 and 55. The rod 56 derives its motion from the main shaft by means of the involute cam 23, with the groove 78' of which the stud 77 of the lever 21 engages. The lever 21 is pivoted on the stud 22', and its other forked end embraces the pin 84, attached to the rod 56.

To hold the tube of the cigarette in place during the insertion of the mouthpiece, the machine is provided with a clamping arrangement in the shape of a pair of grippers, the jaws 89 and 90 of which are coated with rubber and during the said insertion clasp the

cigarette and hold it fast, owing to the friction of the thin paper of the tube against the jaws of the grippers being greater than that at the surface of contact of the mouthpiece and the tube. The grippers derive their motion from the main shaft by means of the cam 30, lever 33, and rod 32, to which the wedge-shaped piece 35 is secured. The lever 33, which is provided with a roller 31, sliding on the cam 30, is thus given a rocking motion and the rod 32 a sliding motion, which causes the piece 35 to be forced in between the ends of the grippers, so as to separate them and cause the opposite ends to approach to each other. By means of the spiral springs 115 and 95 the grippers are kept open while the lower section of the periphery of cam 30 passes the sliding roller 31.

The principal parts of the arrangement for transporting the tubes to and fro, which arrangement is shown in Figs. 19 to 23, are the box or holder 116, the bottom of which slopes on each side toward the aperture 132, and the vertically-movable part 125. The holder 117, which contains the tubes to be provided with mouthpieces, closely adjoins the box 116, and the separating-wall 118 between the boxes can be removed, so as to successively admit the tubes from the former holder to the latter. One or more tubes, when the piece 125 occupies its lowest position, drop into the space 130, Fig. 21, formed by the said piece 125 and the knee-shaped piece 129. When the piece 125 is subsequently elevated by the lever 131, which with its forked end embraces the pin 126, the tubes resting in the space 130 accompany it in its upward motion. As soon as the lip 133 strikes the projection 134 the upward motion of piece 125 ceases, whereas the rod 128 and piece 129 continue to be moved upward, while the spiral spring 127 is compressed until they have assumed the position shown in Fig. 20. The tubes contained in the space 130 thereupon roll down the inclined plane 119 toward the cylinder 2, Fig. 20. If a greater number of tubes than can find room on the plane 119 are brought up, the excess is returned to the holder 116, when the piece 125 descends.

In each revolution of the shaft 14 the cylinder 2 is rotated a quarter of a turn, and afterward it slides to and fro along the shaft 101.

When the cylinder 2 is rotated, the lowest-situated tube on plane 119 drops into its groove 3, which is subsequently made to face upward, and the cigarette now accompanies the cylinder in its longitudinal motion and is slid over the tube 110 as the cylinder is shifted toward the latter. For holding the tubes in the groove in the said cylinder 2 while being slid over the tube 110 the arm 5 is provided. Said arm is journaled in the tap 124 of the sleeve 98 and is on its bottom surface provided with a rubber coating 123. Said arm is so journaled that its free end is held just so high that when the cylinder 2 is turning upward the paper tubes will be pressed under

and against the said rubber coating of the said arm 5. As soon as the end of the paper tube which adjoins the tube 110 strikes the pieces 54 and 55 the arm 5, the pressure of which can be regulated by shifting the weight 122, begins to slide over the paper tube and continues to do so as long as the movement of the cylinder in the direction of the tube 110 is going on. This arrangement is necessary and cannot be replaced by a terminating plane limiting the length of the grooves, owing to the fact that when the machine is at work the tubes are filled with tobacco, which may be projecting more or less beyond the end of the paper tube that points away from the tube 110. The end of the paper tube would therefore be liable to crush against the pieces 54 and 55 when being slid over the tube 110. On the shaft 14 is provided another eccentric or cam 39, which actuates the toothed bar 40. (Shown in Figs. 24 and 25.) Said bar 40 is similar to the rack 27, hereinbefore described, and is similarly held in engagement with the said cam 39 by the spring 200. The shaft 101 of the cylinder 2 is provided with a pin-wheel 41, with which the teeth of the rack 40 engage, so as to rotate the shaft 101 and cylinder 2 when the rack by the cam 39 is pulled backward, but which the teeth slide over without engaging with when the rack is pulled forward by the said spring 200. To the said cylinder 2 reciprocating motion is imparted by the lever 38, which is pivoted on the fixed tap 96 and by its forked end 38 embraces a sleeve 98, attached to said cylinder 2 so as not to turn, but only slide with the same on the shaft 101, and its other end is provided with a stud 102, engaging with the groove of an involute cam 37 on the shaft 14. The feeding-piece 125 is moved up and down for every two revolutions of the main shaft 14 by the said lever 131, which is pivoted to the fixed post 203. (Shown in Figs. 26 and 27.) Said lever engages by its one forked end with the said pin 126 of the feeding-piece 125 and by its other forked end with the crank-pin of a gear-wheel 204, journaled to the frame of the machine and engaging with the gear-wheel 205 on the shaft 14. The said wheel 204 is of double the size of the said wheel 205.

The operation of the machine is as follows: The strip of paper being advanced by the roller passes beneath the piece 8 and cutters 10 and 12 and in between the parted pieces 54 and 55 until its end projects slightly beyond the latter, as shown in Fig. 7. The movement of the strip of paper now ceases. The pieces 54 and 55 subsequently close together and in so doing clasp the strip of paper between them, Fig. 9. The plunger 13, which at this moment does not rotate and by the piece 17' has been given the position in which the slit 65 is horizontal, is now advanced so that the paper enters the slit 65, and the tube 110, as described above, passes out of the pieces 54 and 55, Figs. 10 and 11. The plunger 13 is

now rotated and winds on the paper for the mouthpiece. When the proper length has been wound on, the rotation of the plunger is arrested for a moment and the shears are brought into action to cut off the strip of paper. When this operation has been performed, the rotating movement of the plunger is continued an instant until the whole band of paper cut off is wound on. The mouthpiece-roll now occupies a position in relation to the spindle 64, hub 112, disk 57, pieces 54 and 55, and tube 110 as shown in Fig. 10, or such a position that one of its ends is surrounded by the hub 112 and the other by the tube 110. Meanwhile a paper tube has been fed forward by the cylinder 2 (between the grippers 89 and 90) and pushed over the tube 110 so far as permitted by the pieces 54 and 55, Figs. 10 and 12. The rod 56 is now set in motion and by means of the disk 57 pushes the mouthpiece-roll forward through the tube 110. The said movement of rod 56 ceases when the farther end of the paper-roll has reached or passed slightly beyond the plane of the extreme end of the grippers 89 and 90. The plunger 13 now recedes, together with the spindle 64 and the pieces 66 and 67, and the points 7 simultaneously withdraw inside the pieces 54 and 55. The said pieces 54 and 55 subsequently part from each other, and the mouthpiece consequently unrolls as much as permitted by the paper tube and hub 112, which now surround its ends, the mouthpiece being thus made to close up tight to the paper tube. The grippers 89 and 90 now approach to each other until they embrace and slightly press on the paper tube. Fig. 12 shows the relative positions of the various parts at this moment. The rod 56 now again commences to move, pushing the entire mouthpiece into the paper tube. In order, however, that the hub 112 shall not form an obstruction in this operation and the paper tube be crushed by its edge, its motion in the direction of the paper tube must be discontinued before it touches the latter. This is accomplished by the pin 61 striking the spring 63 at a suitable moment, the spiral spring 62 being consequently compressed and the motion of the hub 112 ceasing until the disk 57 has arrived on a plane with the end of the hub 112. From this moment on the latter, owing to the arm 109 striking against the end of the slot 114, again accompanies the disk 57 and rod 56 while the spring 63 yields to the pressure, Fig. 13. The motion of the rod 56 and disk 57 is adjusted so as to continue until the mouthpiece has become fully inserted in the tube. This adjustment is effected by the regulating-screw 58.

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

1. In a machine for rolling paper mouthpieces, the combination, with mechanism for delivering the paper, of a mechanism for rolling and inserting the mouthpieces, consist-

ing of two semicylindrically-recessed parts, power connections adapted to move said parts toward and from each other, a split spindle, gearings adapted to periodically rotate and move the said split spindle longitudinally, a shoulder on said spindle, a pin movable through each of said semicylindrically-recessed parts, a registering head on one end of each of said pins and one-half of an obliquely-cut-off tube on each of the other ends of said pins, springs adapted to push said pins toward the said shoulder, a rod movable parallel and close to said split spindle, mechanical connection adapted to move the said rod longitudinally, a disk slidably mounted on the said split spindle and secured to said rod, a pin slidable in bearings in said rod, a slotted hollow hub attached to said pin and slidably mounted on said split spindle, a spring on said pin adapted to push said pin and hub into the position where the hub incloses said disk, a clamping arrangement and mechanical connection adapted to periodically open and close the said clamping arrangement, for the purpose set forth.

2. In a machine for rolling paper mouthpieces and inserting them in the tubes of cigarettes, the combination with a mechanism for rolling the paper mouthpieces and inserting them in the tubes, of a mechanism for transporting the tubes to and fro, consisting of a receptacle having an inclined bottom, an angular rod movable up and down through and above the bottom of the said receptacle and having a recess at its upper end, mechanical connection adapted to move the said angular rod up and down, a plane inclining from the said angular rod when it stands in its highest position, an intermittently-rotating and axially-reciprocating cylinder located below the other end of said inclined plane and having longitudinal grooves, and mechanical connections between the main shaft and said cylinder adapted to periodically rotate and reciprocate the same, substantially as and for the purpose set forth.

3. In a machine for rolling paper mouthpieces, the combination, with a bed and a main shaft parallel thereto, of a pair of feed-rollers, a cam on said shaft and a rod one end of which is hooked and engages with said cam the other end of which carries a rack and engages with a pinion on one of said rollers so as to turn the latter periodically, two pairs of shears, a cam and lever for operating said shears, two semicylindrically-recessed parts, a cam and levers for moving said parts toward and from each other, a split spindle,

gearings between said main shaft and spindle adapted to periodically rotate and move the same longitudinally, a shoulder on said spindle, a pin movable through each of said semicylindrically-recessed parts, a registering head on one end of each of said pins and one-half of an obliquely-cut-off tube on each of the other ends of said pins, springs adapted to push said pins toward the said shoulder, a rod movable parallel and close to said split spindle, a cam and lever between the main shaft and said rod, a disk slidably mounted on the said split spindle and secured to said rod, a pin slidable in bearings in said rod, a slotted hub attached to said pin and slidably mounted on said split spindle, a spring on said pin adapted to push said pin and hub into the position where the hub incloses said disk, a pair of grippers, mechanical connection between the main shaft and said grippers adapted to periodically open and close the latter, and means for feeding the ready-made cigarette-tubes to said grippers, substantially as and for the purpose set forth.

4. In a machine for rolling paper mouthpieces and inserting them in the tubes of cigarettes, the combination with the bed, the main shaft parallel thereto, and a mechanism for rolling the paper mouthpieces and inserting them in the tubes, of a mechanism for transporting the tubes to and fro consisting of, a receptacle having an inclined bottom, another similar receptacle attached to its upper end, a movable separating-wall between said receptacles, an angular rod movable up and down through and above the bottom of the first-mentioned receptacle and having a recess at its upper end, mechanical connection between the main shaft and said angular rod adapted to move the same up and down by each revolution of the main shaft, a plane inclining from the said recess when it stands in its highest position, an intermittently-rotating and axially-reciprocating cylinder located below the other end of said inclined plane and having longitudinal grooves, a retaining-arm hinged to one end of the cylinder, and cam and levers, between the main shaft and said cylinder adapted to periodically rotate and reciprocate the same, substantially as and for the purpose set forth.

In witness whereof we have hereunto set our hands in presence of two witnesses.

GUSTAF ADOLF HAGELBERG.
LEONARD LINDELÖF.

Witnesses:

AUGUST TEODOR FÄRNSTRÖM,
GUSTAF TSFÄLT.