

No. 638,136.

Patented Nov. 28, 1899.

A. PAULSON.

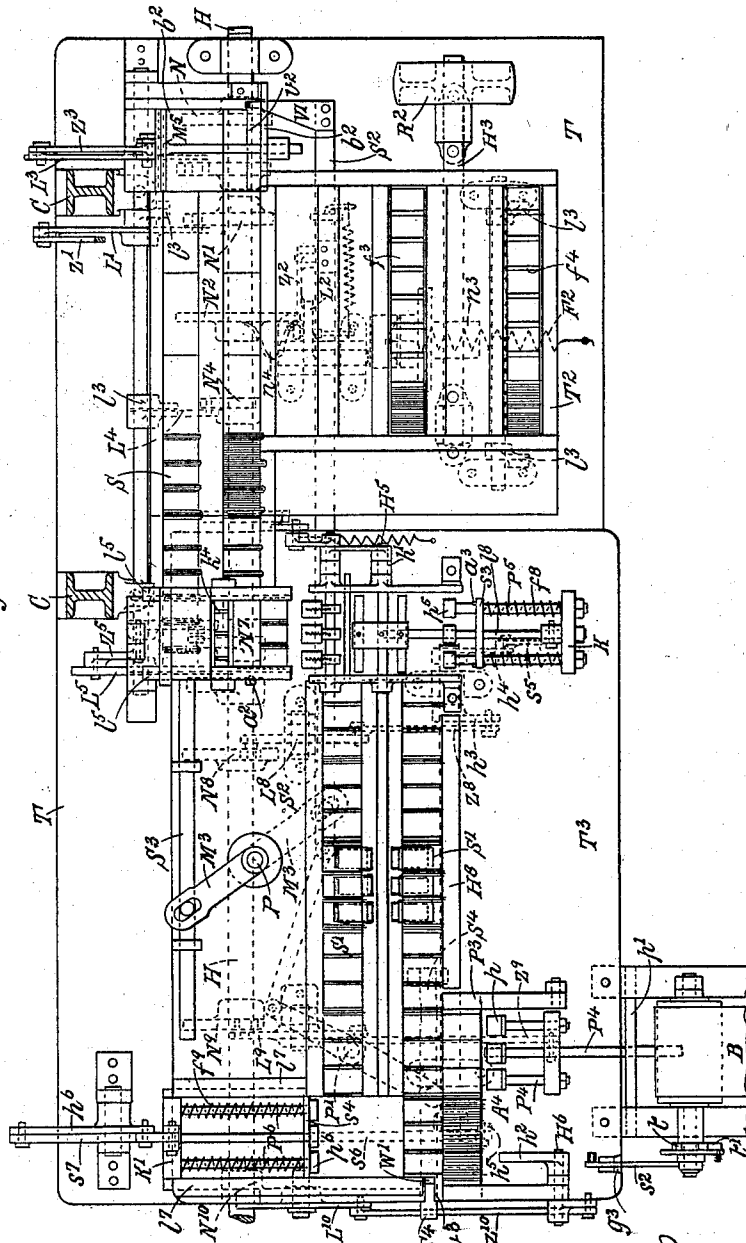
MACHINE FOR FILLING MATCH BOXES.

(Application filed Nov. 25, 1898.)

(No Model.)

5 Sheets—Sheet 1.

Fig. 1.



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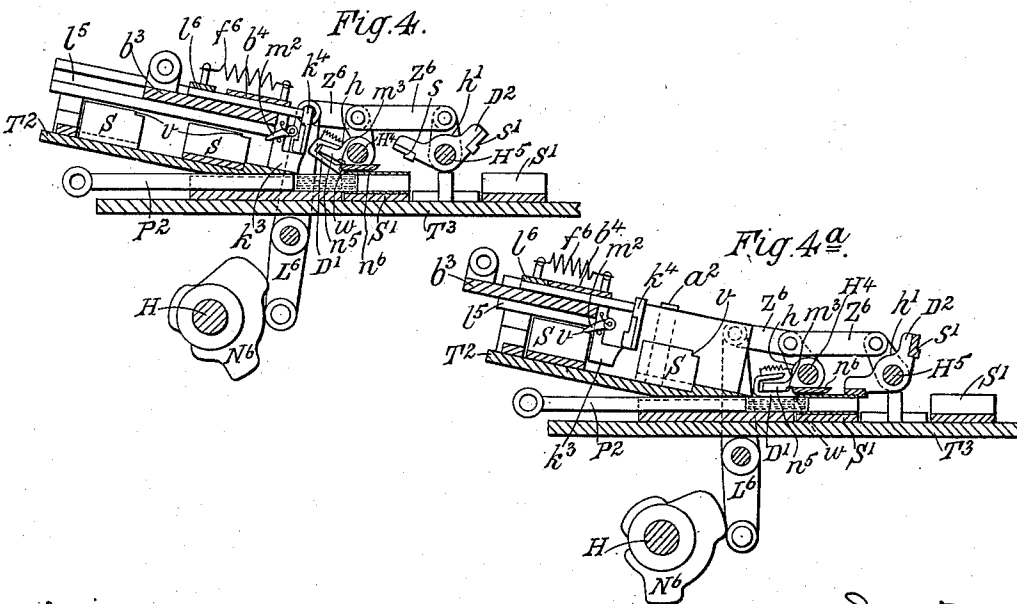
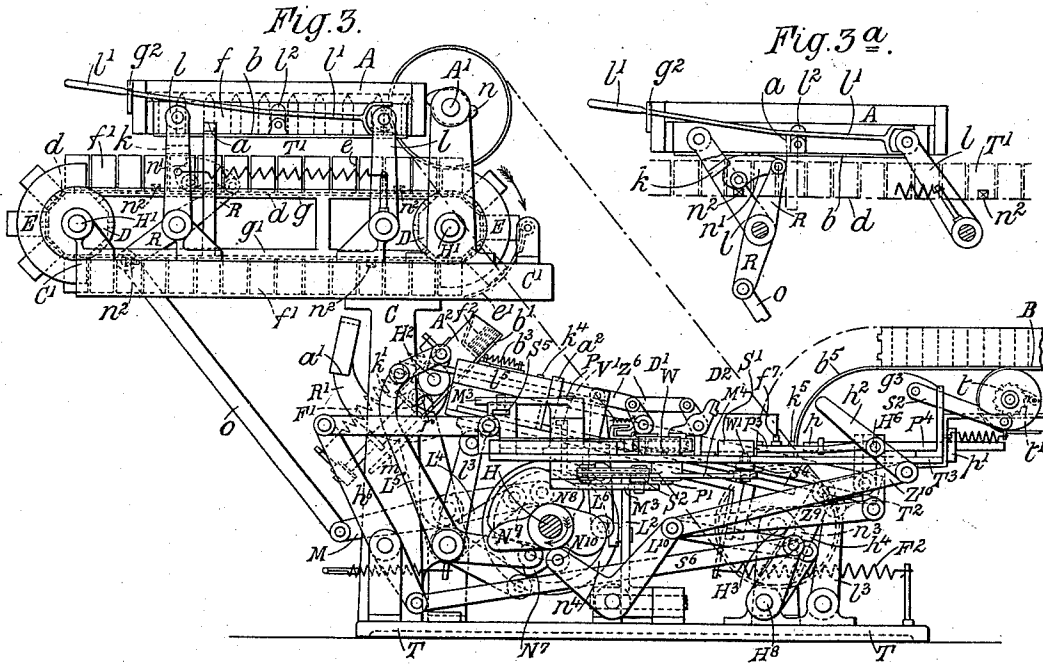
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5 Sheets—Sheet 3.



Witnesses
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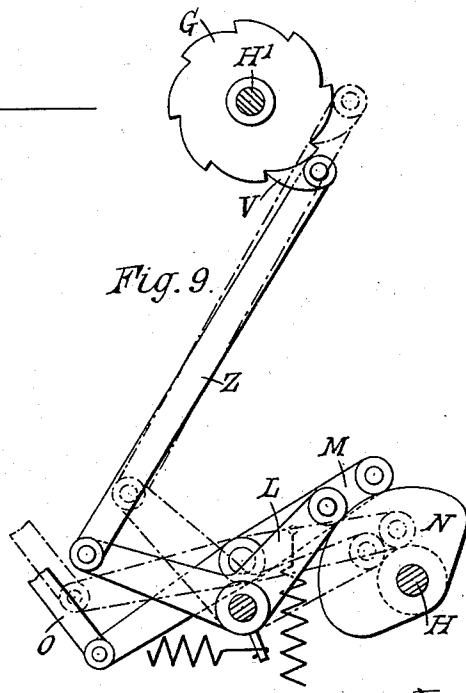
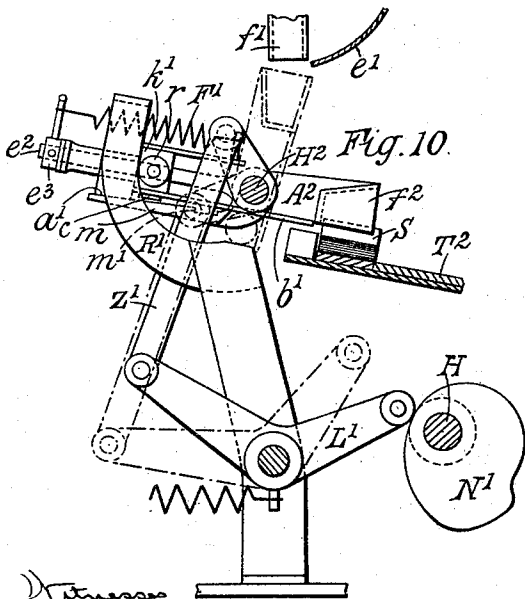
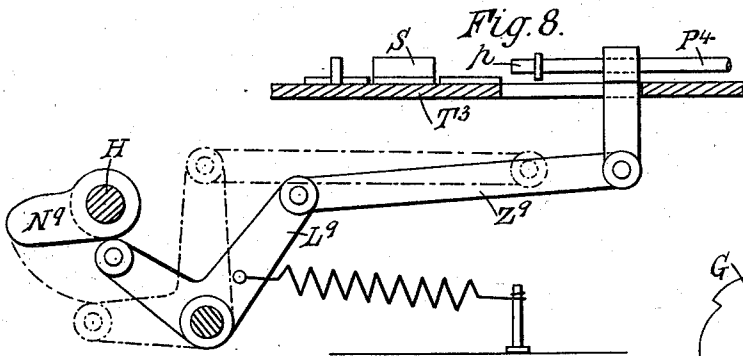
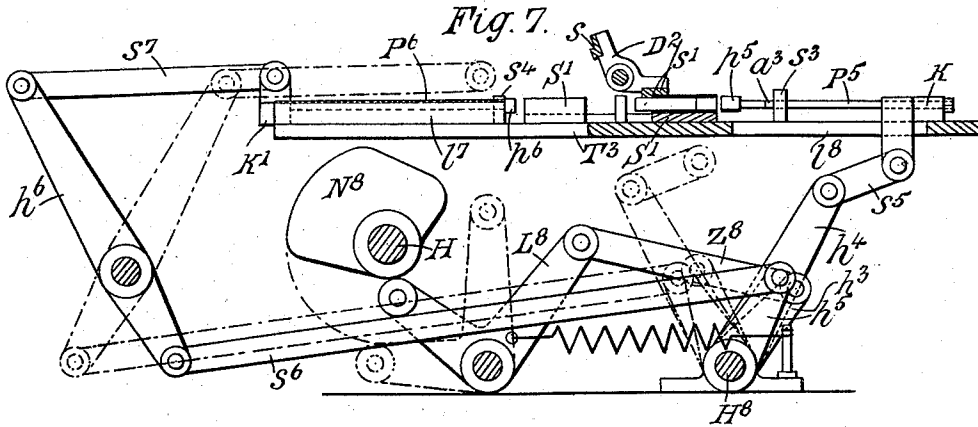
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MACHINE FOR FILLING MATCH BOXES.

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(No Model.)

5 Sheets—Sheet 4.



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No. 638,136.

Patented Nov. 28, 1899.

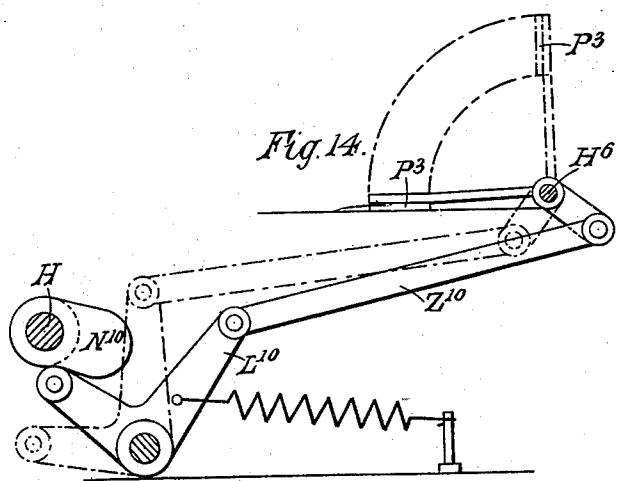
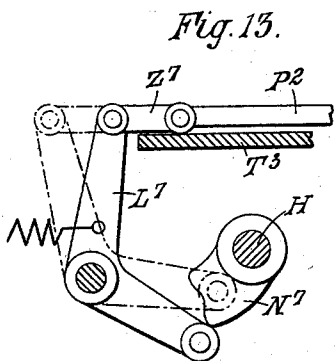
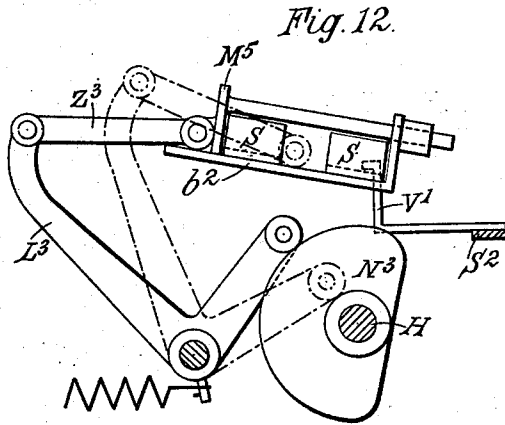
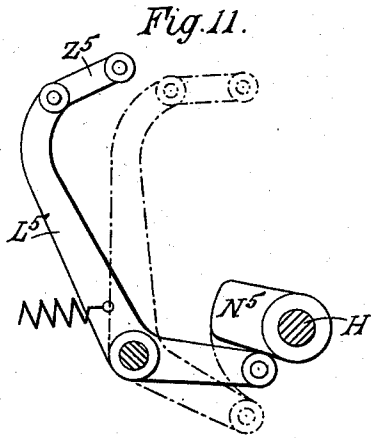
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(No Model.)

5 Sheets—Sheet 5.



Witnesses
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UNITED STATES PATENT OFFICE.

ANDERS PAULSON, OF BREDA, NETHERLANDS.

MACHINE FOR FILLING MATCH-BOXES.

SPECIFICATION forming part of Letters Patent No. 638,136, dated November 28, 1899.

Application filed November 25, 1898. Serial No. 697,402. (No model.)

To all whom it may concern:

Be it known that I, ANDERS PAULSON, engineer, a subject of the Queen of the Netherlands, residing at Breda, in the Kingdom of the Netherlands, have invented certain new and useful Improvements in Machines for Filling Match-Boxes, of which the following is a specification, reference being had to the accompanying drawings, in which—

10 Figure 1 is a plan omitting the filling-box and the distributor; Fig. 2, a front elevation; Fig. 3, a side elevation, with parts removed, looking from the left of the machine, while the remaining figures show details of the machine. 15 Fig. 3^a is a view of box A when its compartments lie over those of the conveyer. Figs. 4 and 4^a are detail sectional elevations illustrating certain parts hereinafter explained. Fig. 5 is a plan view of the filling-box. Fig. 20 6 is a vertical longitudinal sectional view of the same. Figs. 7 to 14, inclusive, are detail sectional elevations of various details of construction hereinafter described.

In the various figures like parts of the machine are indicated by like reference characters connected thereto by lines. The concealed parts, which are shown in dotted lines, are, however, for the sake of clearness connected by dotted lines with the corresponding reference characters.

30 My invention relates to an improved machine for filling match-boxes, the prepared or finished matches being transferred from frames filled therewith into the boxes, which are fed to the other side of the machine in a closed condition—*i. e.*, with their inner sliding parts pushed completely into their sheaths. The said frames empty themselves into a filling-box, from which a conveyer or transporter and a so-called “distributor” transfer a sufficient number of matches for each box into open carriers, consisting of different compartments. These carriers then move to the proper filling apparatus, which receives from 45 the other side the empty boxes, and these are pushed open in the machine. This apparatus then fills the inner sliding parts of the boxes with the matches from the carrier and pushes the said sliding parts of the boxes partly into their sheaths again. The filled 50 boxes are then removed from the machine

after being again completely closed at the end of their travel.

The machine automatically regulates the number of matches for each box and permits an efficient supervision as to whether the boxes are sufficiently filled or are overfilled. The only work of the attendants, therefore, consists in the introduction and removal of the frames filled with matches and in the feeding of the machine with empty boxes.

I will now describe the machine and its operation in the sequence of the phases of operation above mentioned.

The machine comprises a flat table T, on which the driving-shaft H is mounted longitudinally. This shaft receives the motion and communicates it by means of cams to the various operating devices. At the left-hand side a second table or plate T³ is arranged above the first, and onto this table T³, which I will hereinafter call the “match-box” table, are fed the empty boxes, which are filled, and the full boxes then removed. On the right-hand side there is an inclined table T² with the carriers S, from which the matches are fed into the filling apparatus, and above this, but more toward the rear, is the filling-box A and the transporter or conveyer T', arranged on two brackets C C, resting on the lower table T, while between the transporter or conveyer and the said inclined table T² is arranged the distributor A². The frames in which the matches are phosphorized or “tipped” contain, as is known, a number of laths or strips, between which the pieces of wood or match-sticks are clamped. Each of these frames is now laid with the heads of the matches downward on the filling-box A of the machine, Figs. 2, 3, and 5, and the clamps of the frame then slackened or released. The filling-box A is quadrangular and of the size of the frame, and is mounted in four hinged arms *l* on transverse bars C' of the brackets C. The box A contains eighty-one or other suitable number of compartments *f*, which are closed at the bottom by a movable perforated bottom plate *b*, Figs. 2 and 6. It has a shaking or jolting motion imparted to it by the cam *n*, mounted on the shaft A', which cam, by means of two projections, strikes each time against the front

edge of the filling-box, Fig. 3, so that all the matches fall out of the frame into the filling-box and distribute themselves approximately uniformly over the eighty-one compartments f of the filling-box. The cam n is driven by belting from the main shaft. Beneath the filling-box is arranged a transporter or conveyer T' on two octagonal drums D , the shafts H' of which are mounted on the transverse bars C' . The transporter or conveyer consists of thirty-six links, each link consisting of a long sheet-metal plate d , Figs. 2 and 3, on which are constructed compartments f' between two shorter sheet-metal plates $e g'$, secured along the same perpendicularly thereto. The transporter or conveyer moves like an endless chain around the two drums D . The several links are arranged loosely near each other on the small angle-iron g , which thus serves as a guide for the upper part of the chain, while in a similar manner an angle-iron g' forms the lower path or guide, and the links are guided at the sides of the drum by the round plates E . On each of the eight faces of the drums on both sides is arranged a pin and in each of the bottom plates d of the loose links of the chain is formed a corresponding hole, Fig. 3. By turning the drums the links are carried along by these pins, and each link pushes the next one forward both in the upper and in the lower parts of the path or track. The rotation of the drums is effected as follows: On the front shaft H' is mounted a ratchet-wheel G , Fig. 9, and on the driving-shaft a cam N , and by means of a bell-crank lever L , connecting-rod Z , and pawl V the chain is moved forward one link at each revolution of the main shaft H . The matches must now be first fed out of the compartments f of the filling-box into the compartments f' of the transporter or conveyer. In addition to this the sheet-metal bottom b of the said box must open and the box itself be depressed onto the transporter or conveyer in such a manner that the compartments f lie exactly over the compartments f' . The sheet-metal bottom has as many rectangular holes o as the filling-box has compartments f , which holes in the normal position of the sheet-metal bottom lie beneath the dividing-walls of the compartments. However, in moving the bottom toward the left hand the compartments open from beneath. The depression of the box and the opening of the sheet-metal bottom b take place as follows: Each ninth or other suitable link of the transporter-chain is provided on the right-hand side with a pin or projection n^2 . This pin lifts an oscillating cam or pawl n' , which is actuated by the main shaft and which during its forward motion brings the box toward the left, this being effected by the following means: At the upper end of a bell-crank lever R , Fig. 3, is pivotally mounted the cam or pawl n' , which rests on the bottom plate d of the chain-links. The bell-crank lever R is operated by means of a connecting-rod O

and bell-crank lever M from the cam N on the main shaft, Fig. 9, and moves to and fro on the bottom plate d during eight revolutions of the shaft without effect. In the ninth revolution, however, the cam n' is somewhat raised by the projection n^2 and in its motion engages the projection k on the lever l and in its further motion moves the box A back until the compartments of the said box lie exactly over those of the transporter or conveyer, as shown in Fig. 3^a. The lever l' always presses the sheet-metal bottom b toward the right against the action of the spring F , Figs. 5 and 6, since the said lever engages with the projection l^2 on the sheet-metal bottom b . In this position, in which the lever l' is held in a notch or recess in the plate g^2 , the bottom is closed. In moving back the box A the lever l' comes into contact with a stop a , Fig. 3, and is thus raised from the notch or recess in the plate g^2 . This enables the spring F to come into action and the sheet-metal bottom b moves toward the left, the apertures o come beneath the compartments f , and the matches fall out of the box into the transporter or conveyer. It will be seen that in nine revolutions of the main shaft the filling-box is emptied once, and in this period a full frame must accordingly be again introduced into the machine each time and be emptied into the filling-box. From the transporter or conveyer T' the matches must now be transferred into the carriers S , which are mounted on the inclined table T^2 and feed the filling apparatus. For this purpose the distributor A^2 is provided. The several links of the chain empty themselves in their lowermost position one after the other into this distributor, one link in each revolution of the main shaft. A curved plate e' , Fig. 3, is, moreover, provided in order that the matches shall not fall out of the compartments f' during the time that the links describe the arc of a circle around the front drum D .

The distributor A^2 , Figs. 2, 3, and 10, comprises a front or bottom plate b' , moving before a row of nine compartments f^2 . The apparatus turns about the shaft H^2 and is shown in its outermost position in Fig. 10. The motion of the distributor is obtained from the cam N' on the main shaft by means of a bell-crank lever L' and connecting-rod Z' , Fig. 10. In the lowermost position of the distributor the compartments f^2 are exactly above the carriers S and can empty themselves into the said carriers as soon as the bottom plate b' is drawn away. The distributor is extended at the bottom by a rod e^2 , on which a block or piece k' , secured to the bottom plate b' , can slide to and fro, Figs. 3 and 10. On the said block or piece is a tooth c , Fig. 10, and on the shaft H^2 an arm m , which is pressed against the said block or piece by a spring, and a recess m' in the arm m holds fast the tooth c on the said block or piece and therefore also the bottom plate b' in the position shown in Fig. 3, wherein the said bottom plate consequently

closes the compartments f^2 in the distributor at the side. As soon, however, as the distributor has turned and has reached its lowest position the arm m is pressed down by the stop a' , the block or piece k' is free, and the bottom plate b' under the action of the spiral spring F' moves backward, as shown by full lines in Fig. 10. The matches then fall out of the nine compartments f^2 into the carriers S . When the parts move upward again, a roller r , mounted on the block or piece k' , runs along the guide-arc R' , whereby the block or piece k' , together with the bottom plate b' , is forced back until the tooth c again engages with the recess m' in the arm m and the original condition of the parts again exists. The rod e^2 has a buffer-disk e^3 , provided with a leather ring at its rear end, which limits the motion of the block or piece k' . It will be seen that the distributor, which receives at each revolution of the shaft the contents of one link of the transporter or conveyer chain, likewise empties itself once in each revolution into the carriers.

The carriers, into which the distributor empties itself, are arranged in depressions in the inclined table T^2 in two rows, of which the upper moves from left to right exactly beneath the distributor and receives the matches from the distributor, while the lower row, which receives the filled carriers from the upper row at the right-hand side, is to be moved more toward the front on the table from right to left to the filling apparatus. The carriers, emptied into the filling apparatus, are again transferred into the upper row at the end of their travel. It will be seen that the carriers move in an endless path, the motion in each revolution of the main shaft corresponding to the length of one carrier. Each carrier S , of which there are twelve in all, has three compartments. In each revolution of the main shaft H the nine compartments f^2 of the distributor empty their contents into nine of the carrier-compartments, consequently into three carriers S . Each carrier, therefore, during three revolutions of the shaft H is beneath the distributor A^2 , and each carrier-compartment consequently receives three times the contents of one distributor-compartment f^2 . The inclined table T^2 (which, for the sake of clearness, is not shown in Fig. 2) moves about four levers l^3 , Figs. 1 and 3, and abuts against a cam n^3 , provided with two projections, which impart a shaking motion to the table. The shaft H^3 , on which this cam is mounted, is driven by means of the belt-pulley R^2 . This shaking motion is required for removing the superfluous matches from the somewhat-overfilled carriers S . For this purpose the depression for the upper row of carriers at the left-hand side is not so deep as that on the right-hand side, and inversely that for the lower row is not so deep at the right-hand as on the left-hand side. From left to right in the upper row and from right to left in the lower row there are always a few

matches from the superfluous ones sliding out from the carriers. The carriers from the upper row pass those of the lower row and gradually reach the inclined table, first sliding down into one row of compartments f^3 and as soon as this row is filled into the next f^4 . The compartments f^3 and f^4 can be afterward emptied into the filling-box.

The method whereby the longitudinal and transverse motions of the two rows of carriers S are obtained will be hereinafter described. If the left hand of the machine, Fig. 1, be looked at, there will be seen the match-box table T^3 , in depressions on which there likewise move twelve carriers S' , arranged in two rows. Each carrier S' has here also three compartments. In the lower row the empty match-boxes are fed to the filling apparatus A^3 , while the filled match-boxes coming out of this apparatus are fed in the upper row toward the left to an apparatus A^4 , which removes them out of the machine and which is arranged at the extreme left-hand side of the table T . This apparatus likewise serves to bring the empty match-boxes from a transporter or conveyer band B into the carriers S' , Figs. 1 and 3. I will now more fully describe the motion mechanism of these two double rows of carriers. The said mechanism comprises a cam N^2 , with transverse projections n^4 , Fig. 2. This cam, by means of a bell-crank lever L^2 and connecting-rod Z^2 , imparts a reciprocating motion to a flat rod or bar S^2 , which is mounted beneath the inclined table T^2 and the match-box table T^3 . When the flat rod or bar S^2 is moved toward the left, this motion is transmitted in the two middle rows of carriers through the arm W to the carriers S' with the filled match-boxes and through the arm V' to the lower carriers S , Figs. 1, 2, and 12, while in the two outer rows the motion takes place in the opposite direction by means of the double-armed levers M^3 and M^4 , turning about the fixed points P and P' . The lever M^3 transmits the motion directly to the upper row of carriers S by means of the rod or bar S^3 , moving on the table T^3 , and the lever M^4 to the front carriers S' with the empty match-boxes by means of the bar S^4 , guided against the table T^3 underneath. The arms W V' and a pin W' on the bar S^4 extend through slots v^1 , v^2 , and v^3 in the table T^3 and lie against the carriers in the motion of the bar. The completely-filled carriers S on the inclined table in the upper row coming from the left are brought into the lower row by the bar M^5 , and the motion of this bar is obtained from a cam N^3 , mounted on the shaft by means of the double lever L^3 and connecting-rod Z^3 , Fig. 12. The carriers S are thus moved over the plate b^2 , which forms an extension of the inclined table T^2 .

As above mentioned, the inclined table T^2 has a shaking motion imparted to it from the shaft H^3 by means of the cam n^3 in order to remove the superfluous matches from the somewhat overfilled carriers S , Figs. 1, 2, and

3, for the sake of safety. In this arrangement the table moves about the levers l^2 . This shaking motion must, however, cease at the moment when the carriers S are moved longitudinally by the rod or bar S^2 , whereby at the right-hand side a filled carrier comes onto the plate b^2 or from this plate into the lower row of the table and on the left-hand side a filled one comes into the filling apparatus A^3 or an empty one out of this apparatus into the upper row of the table. For this purpose the lever-arm l^3 is turned back at this moment by means of the cam N^4 and connecting-rod L^4 , Fig. 2, and thus the contact of the table with the cam n^3 , maintained by the spiral spring F^2 , is stopped. The other cams N^5 N^6 N^7 on the main shaft belong to the mechanism of the filling apparatus A^3 , which I will now more fully explain.

In Fig. 4 the four carriers are specially shown in transverse section. The right-hand carrier S is just emptied. The left-hand carrier S' carries the now filled match-boxes with the inner parts thereof still pushed out of the sheaths in the position in which the filling of the boxes took place. On the inclined table the plate b^3 reciprocates above the carriers between the guide-bars l^3 . On the plate b^3 are secured three slides k^3 , which move in the three compartments of the carrier S. In Fig. 4^a these slides k^3 are shown in their highest position, in which they lie between the two carriers, and in Fig. 4 the said slides are shown in their lowermost position. In their downward motion these slides k^3 take the matches from the carrier S and push them into the boxes. This motion is effected from the main shaft by means of the cam N^5 , bell-crank lever L^5 , and connecting-rod Z^5 , which is hinged to the plate b^3 , Figs. 3 and 11. On the guide-strips l^3 slides a bar l^6 , Figs. 3 and 4, which is drawn, by means of a spiral spring f^6 , against the guide-plate b^4 , connected to the plate b^3 . To the bar l^6 are connected three blocks or pieces k^4 , the lower edges of which lie exactly over the slides k^3 , Fig. 4. The function of these blocks or pieces is to prevent working upward of the matches as they are being pushed into the boxes. The slides k^3 and the blocks or pieces k^4 thus move into the opposite position, (shown in Fig. 4^a), wherein the bar l^6 fits close up against the guide-plate b^4 at the bottom. Before the slides k^3 have reached their lowermost position the bar l^6 strikes against a stop a^2 , Fig. 3, so that the blocks or pieces stop or come to rest. The slides k^3 , however, move farther beneath the blocks or pieces up to the presser D' , Fig. 4, which serves to press the matches into the boxes. The arresting of the motion of the blocks or pieces is necessary for the free motion of this presser. In the backward motion of the plate b^3 a pawl m^3 , hinged to the said plate, engages in a recess v in the upper edge of the carrier S, Fig. 4, so as to guide the empty carrier over into the upper row, Fig. 4^a, wherein the said carrier is then again con-

veyed to the distributor by means of the bar S^3 , which lies directly against the carrier on the inclined table, Figs. 1 and 2.

The three pressers D' , Figs. 1, 3, and 4, are loosely placed on arms or projections n^5 , which are mounted on the rock-shaft H^4 and are connected by a spiral spring with the said arms or projections. These pressers each have a sharp extension w at the bottom, which engages under the top of the sheath of the match-box and maintains the same in its correct position during the introduction of the matches. When the matches are placed in the boxes, the pressers are turned over by the action of the cam N^6 , double lever L^6 , connecting-rod Z^6 , and lever h on the shaft H^4 . The projection m^3 on the presser D' then lies against the rigid transverse strip n^6 , arranged above the match-box, whereby the sharp extension w is pushed back out of the sheath and the box is completely released, and consequently comes into the position shown in Fig. 3. After this the inner sliding parts of the match-boxes are partly pushed into the sheaths by the three fingers P^2 , Fig. 4. In order to hold the match-boxes during this pushing in of the inner parts into the sheaths, a tumbler D^2 is mounted on the shaft H^5 . This tumbler is provided with a transverse strip or bar s , having a sharp projection or ledge. In the depression of the tumbler this ledge lies behind the sheaths of the three match-boxes and holds them fast until the inner sliding parts thereof are pushed in far enough. The connecting-rod Z^6 is extended up to the tumbler and is connected with the shaft H^5 thereof by a lever h' . The presser D' and tumbler D^2 thus move simultaneously.

The fingers P^2 receive their motion from the cam N^7 , Fig. 13, by means of a bell-crank lever L^7 and connecting-rod Z^7 . As soon as the inner sliding part of the box is sufficiently pushed in the presser D' and tumbler D^2 rise, and thus release the match-boxes. In the further motion of the finger P^2 the filled match-boxes are pushed forward in a slightly-opened condition partly by means of the carriers, and the carrier S' is now seized by the arm W and moved out of the filling apparatus again onto the match-box table T^3 . In this position of the match-boxes in the carriers, Fig. 1, the sheaths consequently stand partly open, so that it can be seen at any time whether they are properly filled. At the other end of the tumbler D^2 is arranged a second bar s' , likewise provided with a sharp projection or ledge. This bar serves to hold the empty match-boxes out of the front row of carriers S' in the pushing out of the inner sliding parts of the boxes from the sheaths before they are filled with matches in the above-described filling apparatus. Its operation will be hereinafter more fully explained.

I will now give a description of the mechanism of the apparatus A^4 which feeds the empty match-boxes into the lower row of carriers S' , partially pushes out the inner slid-

ing parts of the boxes, and lifts off the filled boxes from the table T^3 and brings them into a discharge chute or channel, and also of the mechanism which pushes the empty inner parts of the boxes into the filling apparatus A^3 , pushes the inner parts of the boxes almost entirely out of the sheaths in order to be filled, and moves the carriers S' from the front into the rear row, and, finally, of the mechanism at the extreme left-hand side of the table T^3 , which brings the carriers S' , with the filled match-boxes, from the rear into the front row of carriers S' and afterward completely pushes in the inner parts of the boxes and discharges the match-boxes from the machine.

On the left-hand side the cam N^{10} , Figs. 1, 2, 3, and 14, is arranged on the main shaft. This cam actuates the match-box-feeding apparatus A^4 by means of a bell-crank lever L^{10} , coupled by a connecting-rod Z^{10} to a lever Z^{20} on the shaft H^6 . The feeding apparatus A^4 comprises a plate P^3 , which is supported by a divided shaft H^6 and in turning about the axis of the said shaft moves along the bent plate b^5 , Fig. 3. In Fig. 14 the two end positions of this plate are shown, while in Figs. 1 and 3 the said plate is shown in its lowermost position. On the right-hand side or half of the plate P^3 , Fig. 1, are arranged vertical partition-walls k^5 with small flat springs f^7 . When the plate P^3 is in the position shown in dotted lines in Fig. 14, three empty match-boxes situated side by side on the conveyer-band B are fed into position by the said conveyer-band and are held on the plate P^3 between the partition-walls k^5 by the flat spring f^7 , and are then while thus held turned down until they come onto the table T^3 , the said plate coming into the position shown in Fig. 3. The transporter-band B , on which the empty match-boxes are placed closely behind each other in rows of three, must move forward through a distance equivalent to the thickness of one match-box in each oscillatory motion of the plate P^3 . For this purpose a rotary one-armed lever h^2 is mounted on the shaft H^6 of the plate P^3 , Figs. 1 and 3. This lever each time strikes against a rod s^2 , guided in the fork g^3 , and the band-drum is thereby turned, by means of a ratchet-wheel t and pawl t' , through such an angle that the band moves through a distance equivalent to the thickness of one match-box. In each revolution of the shaft three match-boxes are thus removed from the band B and transferred into the carriers S' . In the position of the said feeding apparatus shown in Figs. 1 and 3 three fingers P^4 , which are actuated by the cam N^9 through the bell-crank lever L^9 and connecting-rod Z^9 , Fig. 8, and of which the extended center one is guided in the transverse bar p' , push these three empty match-boxes onto the carrier S' and simultaneously push the inner parts of the boxes somewhat out of their sheaths, Fig. 1. The front parts p of these fingers fit exactly into the sheaths of the match-boxes, and after the match-

boxes have been brought into the carriers and abut against the projecting edge of the depression in the table T^3 in their further motion push the inner parts of the boxes to a short distance out of the sheaths into the position shown in the first row in Fig. 1. In this position of the apparatus three filled boxes are pushed out of the rear row of carriers S' onto the left-hand side of the plate P^3 by means of the fingers P^6 , hereinafter described. These filled boxes are then in the upward motion of the plate P^3 fed along the plate b^5 and conducted away near the transporter or conveyer band B into a guide groove or channel. The said plate b^5 is for this purpose made of sufficient width to permit of the filled boxes sliding along the same to one side of the conveyer-band B .

In Fig. 7 is shown the mechanism which transfers the carriers S' at the right-hand side of the table T^3 from the front into the rear row and pushes the inner parts of the boxes out of the sheaths and those at the left-hand side from the rear into the front row and pushes the inner parts of the boxes entirely in, and feeds the finished filled boxes onto the plate P^3 . The left-hand side of this figure shows the table T^3 in side elevation (looking from the left,) and the right-hand side shows the same in section through the filling apparatus. The required motions are effected by three fingers P^5 , with a transverse bar s^3 , for the carriers with the empty match-boxes, and also by three fingers P^6 , with a transverse bar s^4 , for the carriers with the filled match-boxes. The movement of the fingers P^5 and P^6 is effected by the cam N^8 , together with the bell-crank lever L^8 , connecting-rod Z^8 , lever h^3 , and auxiliary shaft H^8 , which at the right-hand side, Figs. 1 and 7, by means of the lever h^4 and connecting-rod s^5 , communicates reciprocating motion to the fingers P^5 , and at the left-hand side, Figs. 1 and 7, by means of the lever h^5 , connecting-rod s^6 , double lever h^6 , and connecting-rod s^7 , imparts reciprocating motion to the fingers P^6 . The fingers $P^5 P^6$ are connected to blocks or pieces $K K'$, respectively, to which the connecting-rods $s^5 s^7$ are respectively connected. Between the block K and transverse bar s^3 of the fingers P^5 and between the block K' and transverse bar s^4 of the fingers P^6 are arranged spiral springs $f^8 f^9$, respectively. These springs press the transverse bar s^3 against a projection a^3 at a short distance from the widened front parts p^5 of the fingers P^5 and the transverse bar s^4 directly against the widened front parts p^6 of the fingers P^6 . The widened front parts p^5 and p^6 fit into the sheaths of the match-boxes. The block K' is guided in guide-bars l' on the table T^3 and the block K in a slot l^8 in the table. Before the fingers P^5 are moved the tumbler D^2 is turned by means of the aforesaid cam N^6 and the intermediate mechanism belonging thereto, Fig. 4. During this operation the bar s' lies with its sharp projecting edge on the

match-boxes, resting against the sheaths thereof. The three match-boxes are thus held fast. In the motion of the fingers P^5 the front parts p^5 press into the match-boxes and almost entirely push out the inner parts thereof into the position shown in Fig. 4. The tumbler D^2 then turns up the transverse rod s^3 , strikes against the carrier S' and moves it in its further motion, together with the pushed-out inner parts of the boxes, into the upper row of carriers, where the said carrier is filled with matches, and the boxes are held by the tumbler D^2 and presser D' in the manner above described. At the left-hand side of the table T^3 in the motion of the fingers P^6 the front parts p^6 (since they lie against the drawn-out sheaths) push the match-boxes slightly toward the carriers. Then the carrier S' is itself seized by the transverse bar s^4 and moved into the front row, wherein the carrier strikes against a strip secured to the table T^3 . Further motion is made by the fingers P^6 alone, and thus they push the three match-boxes onto the plate P^3 of the apparatus A^4 until these strike against the guide-plate b^5 and in the last part of the motion of the fingers P^6 the inner parts of the match-boxes are pushed completely into the sheaths.

The whole of the machine being now explained, it will be seen that the machine in each revolution of the main shaft takes three empty match-boxes from the conveyer-band, pushes out the inner parts thereof, fills them with matches, again closes them, and finally moves them into the discharge channel or chute, while in nine revolutions of the shaft the filling-box will be supplied once with finished matches from the frame. The placing of the match-boxes on the conveyer-band in rows of three and the placing in position and removal of the frame on the filling-box are thus the only hand labor which is necessary in filling match-boxes with matches on this machine.

45 What I claim is—

1. A machine for filling match-boxes with dipped match-sticks, comprising a filling-box made with compartments and having a perforated movable bottom, an oscillating or rotary distributor, a transporter or conveyer for transferring the matches from said filling-box to said distributor, a series of match-carriers into which the matches are placed by said distributor, an inclined table having depressions or guideways in which said carriers move, a series of match-box carriers, reciprocating slides for pushing the matches from said match-carriers into the match-boxes, reciprocating fingers for pushing the inner parts of the match-boxes into and out of their sheaths, and a turning-over or reversing plate whereby the empty match-boxes are fed toward the match-box carriers and the filled match-boxes are discharged, substantially as, and for the purposes, hereinbefore described.

2. In a machine for filling match-boxes, the combination of a filling-box formed with a

number of compartments for the reception of the matches from a frame and with a perforated movable bottom, swinging supporting-levers carrying the said filling-box, a rotary cam for shaking the said filling-box, an oscillating cam or pawl, a projection on one of said supporting-levers adapted to be engaged by said cam or pawl, a spring acting on said movable bottom of the filling-box, and a locking-lever for holding said bottom against the action of said spring, substantially as, and for the purposes, hereinbefore described.

3. In a machine for filling match-boxes the combination of a filling-box, formed with a number of compartments for the reception of the matches from a frame and with a perforated movable bottom, swinging supporting-levers carrying said filling-box, a projection on one of said supporting-levers, a rotary cam for shaking said filling-box, a distributor and a transporter or conveyer comprising loose compartment-links, guides for said links, intermittently-rotated drums provided with pins for engaging said links, projections on some of said links, an oscillating cam or pawl adapted to be actuated by said projections and to engage said projection on the supporting-lever cam or pawl, a cam for actuating said bell-crank lever, and connecting mechanism between this cam and said bell-crank lever, substantially as, and for the purposes, hereinbefore described.

4. In a machine for filling match-boxes, the combination of a distributor having a row of compartments, a rock-shaft bearing said distributor, a movable wall for the said compartments, a spring for retracting said movable wall, a roller on said movable wall, a guide-arc or cam-surface for engaging with said roller during the rocking motion of said distributor, a catch for holding said movable wall in its extended position, and a fixed stop for disengaging said catch, substantially as, and for the purposes, hereinbefore described.

5. In a machine for filling match-boxes, the combination of an inclined yieldingly-supported table, match-carriers adapted to move in guideways or depressions in said table, reciprocating bars for moving said carriers along said guideways and from one guideway to another, a rotary cam for imparting a shaking or oscillating motion to said table, and means for interrupting said shaking motion, substantially as, and for the purposes hereinbefore described.

6. In a machine for filling match-boxes, the combination of a table, match-box carriers arranged in guideways or depressions in said table, a turning-over plate for feeding the empty match-boxes to said carriers, a conveyer for feeding said boxes to said turning-over plate, reciprocating bars for moving said carriers along said guideways and from one guideway to another, reciprocating fingers for pushing the match-boxes into said carriers and for pushing the inner parts of said boxes into and out of their sheaths, and

means for feeding matches into said boxes while held in said carriers, substantially as, and for the purposes, hereinbefore described.

5 7. In a machine for filling match-boxes, the combination of tables provided with guide-ways or depressions, match-carriers and match-box carriers arranged respectively in double rows, reciprocating bars whereby the carriers in the two rows of each series are
10 moved in opposite directions, and means, such as are hereinbefore described, for transferring said carriers from one row to the other, substantially as, and for the purposes, hereinbefore described.

15 8. In a machine for filling match-boxes, the combination of match-carriers, match-box

carriers arranged, respectively, in double rows, and a filling apparatus comprising reciprocating fingers, a tumbler for holding the match-boxes in said match-box carriers, rods
20 on said fingers for transferring said match-box carriers from one row to another, and pressers for guiding and pressing the matches into the match-boxes, substantially as, and
25 for the purposes, hereinbefore described.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

ANDERS PAULSON.

Witnesses:

CHARLES LOYENS,
ANTOON LOYENS.