

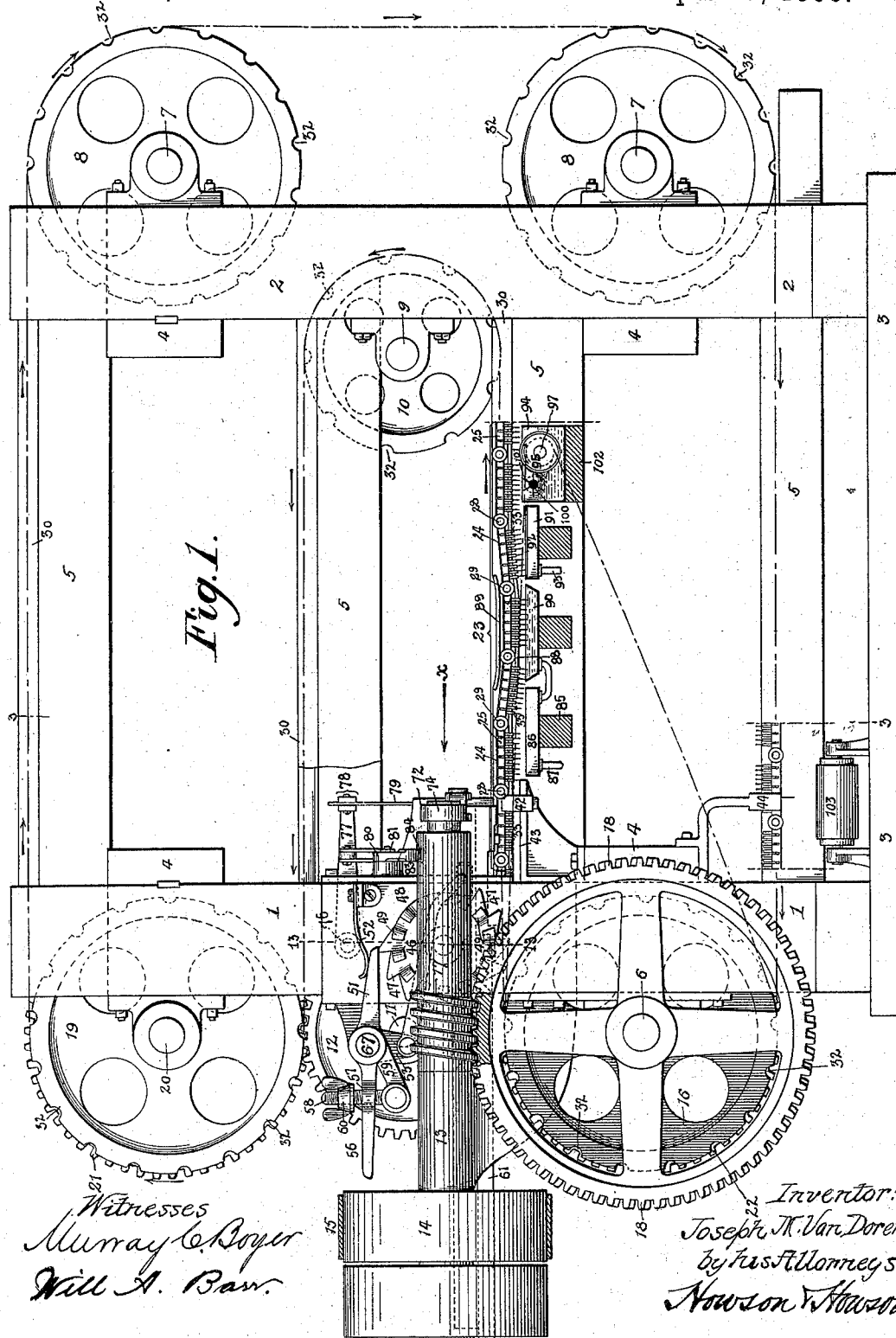
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6 Sheets—Sheet 1.

J. M. VAN DOREN.
MATCH MAKING MACHINE.

No. 567,927.

Patented Sept. 15, 1896.



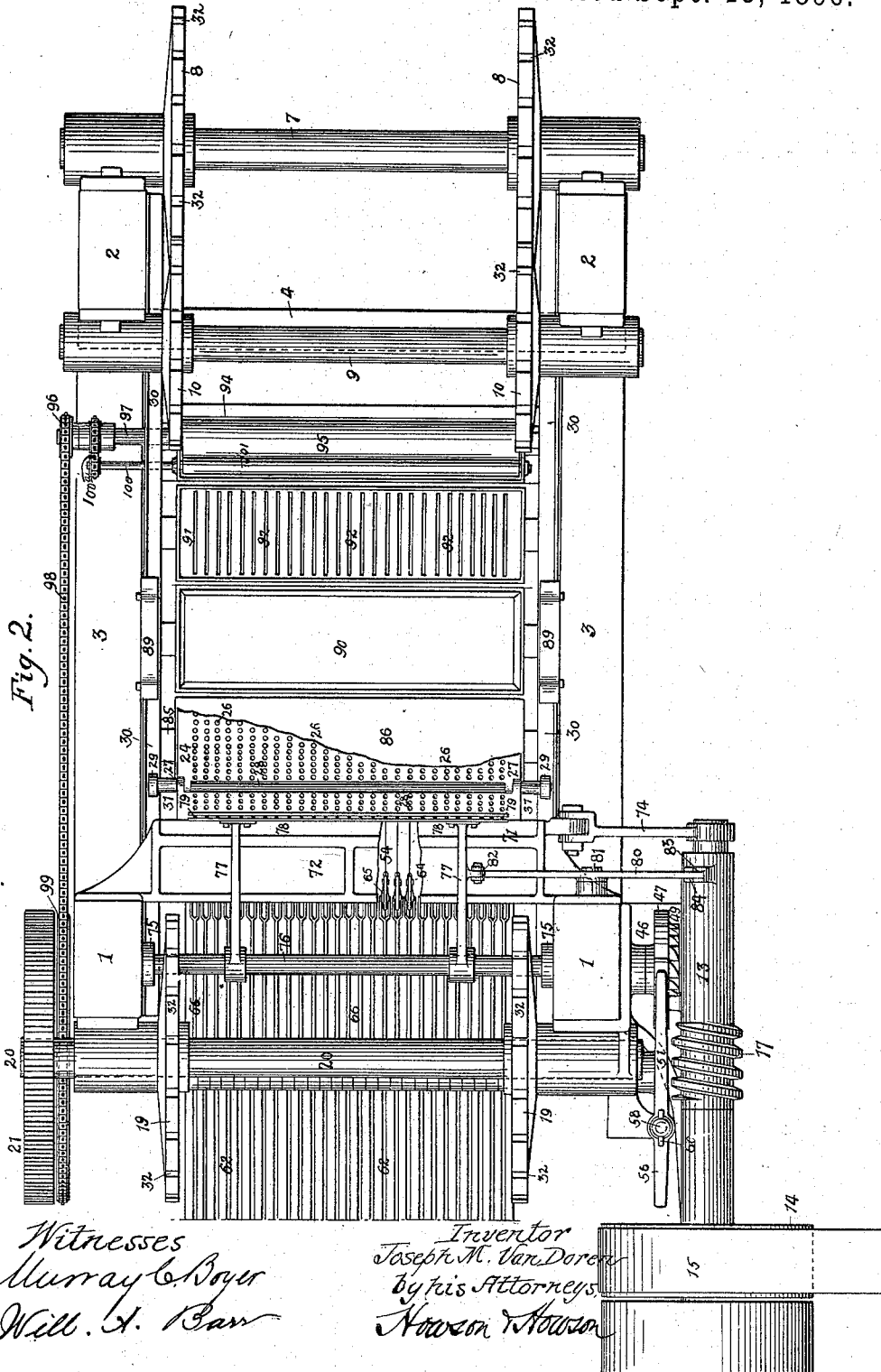
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6 Sheets—Sheet 2.

J. M. VAN DOREN.
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No. 567,927.

Patented Sept. 15, 1896.



Witnesses
Murray C. Boyer
Will. H. Pan

Inventor
Joseph M. Van Doren
By his Attorneys
Norris & Peterson

(No Model.)

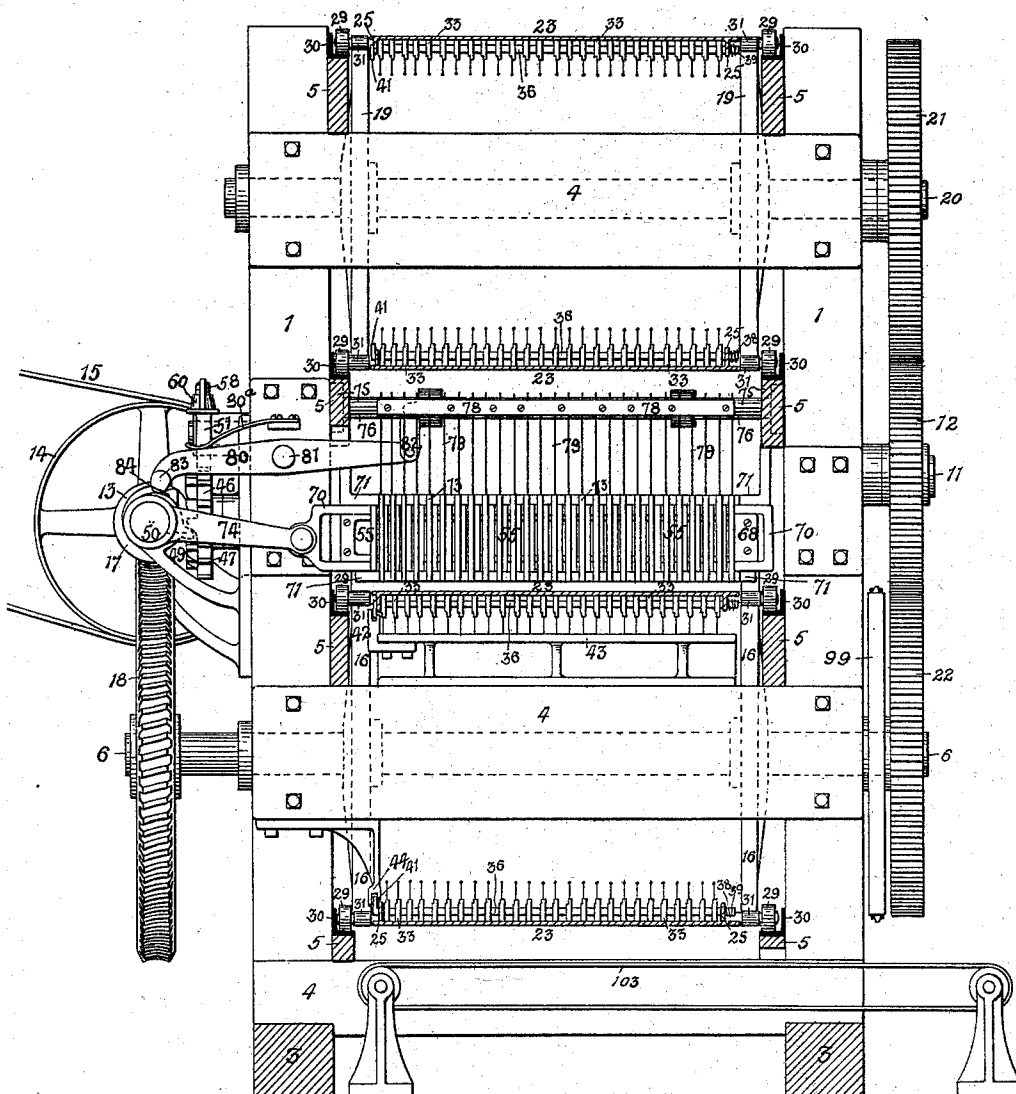
6 Sheets—Sheet 3.

J. M. VAN DOREN.
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Fig. 3.



Witnesses:
Murray C. Boyer
Will. N. Barr

Inventor,
Joseph M. Van Doren
by his Attorneys
Howson & Howson

(No Model.)

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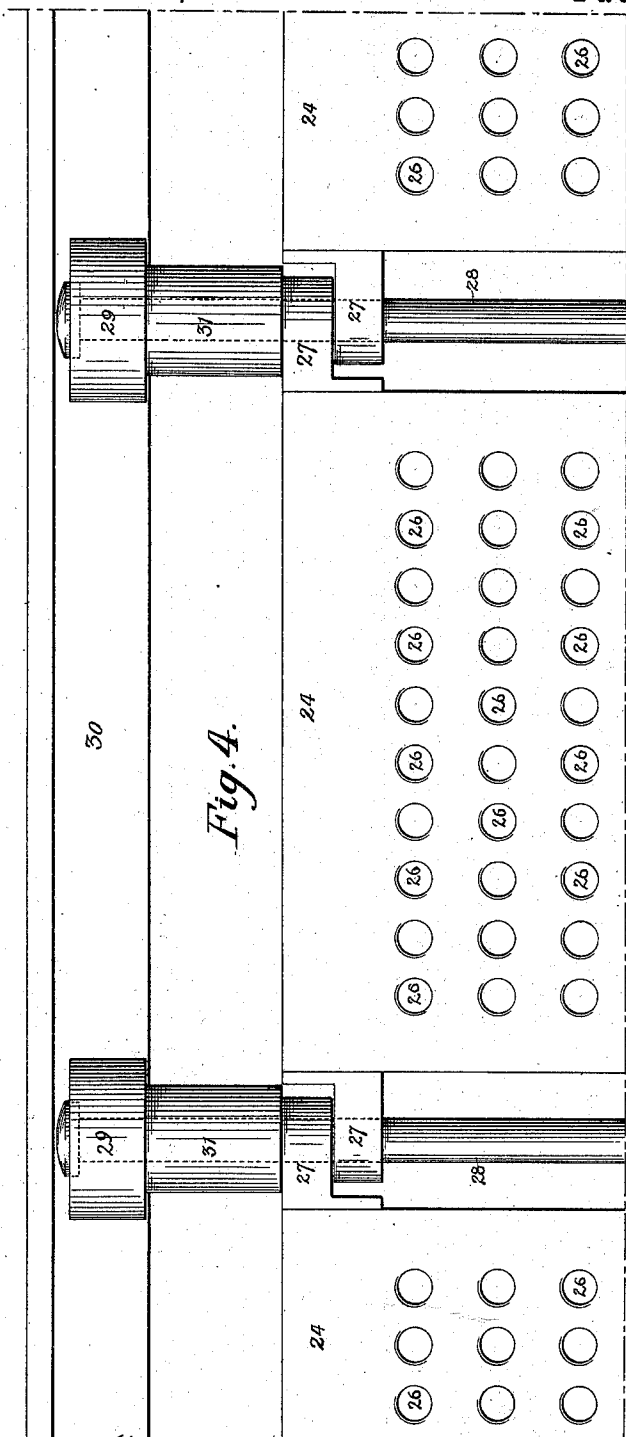


Fig. 4.

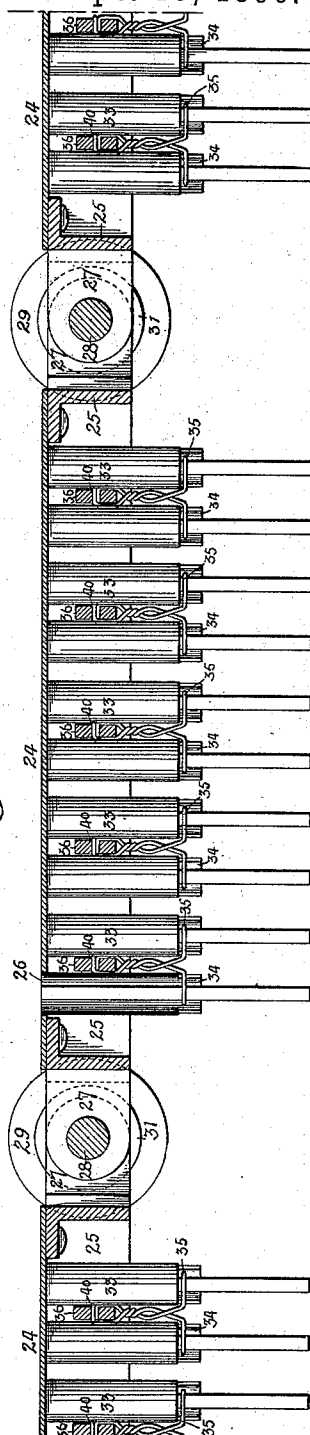


Fig. 5.

Witnesses:
Murray C. Boyer
Will. A. Row

Inventor
Joseph M. Van Doren
by his Attorneys
Harrison & Harrison

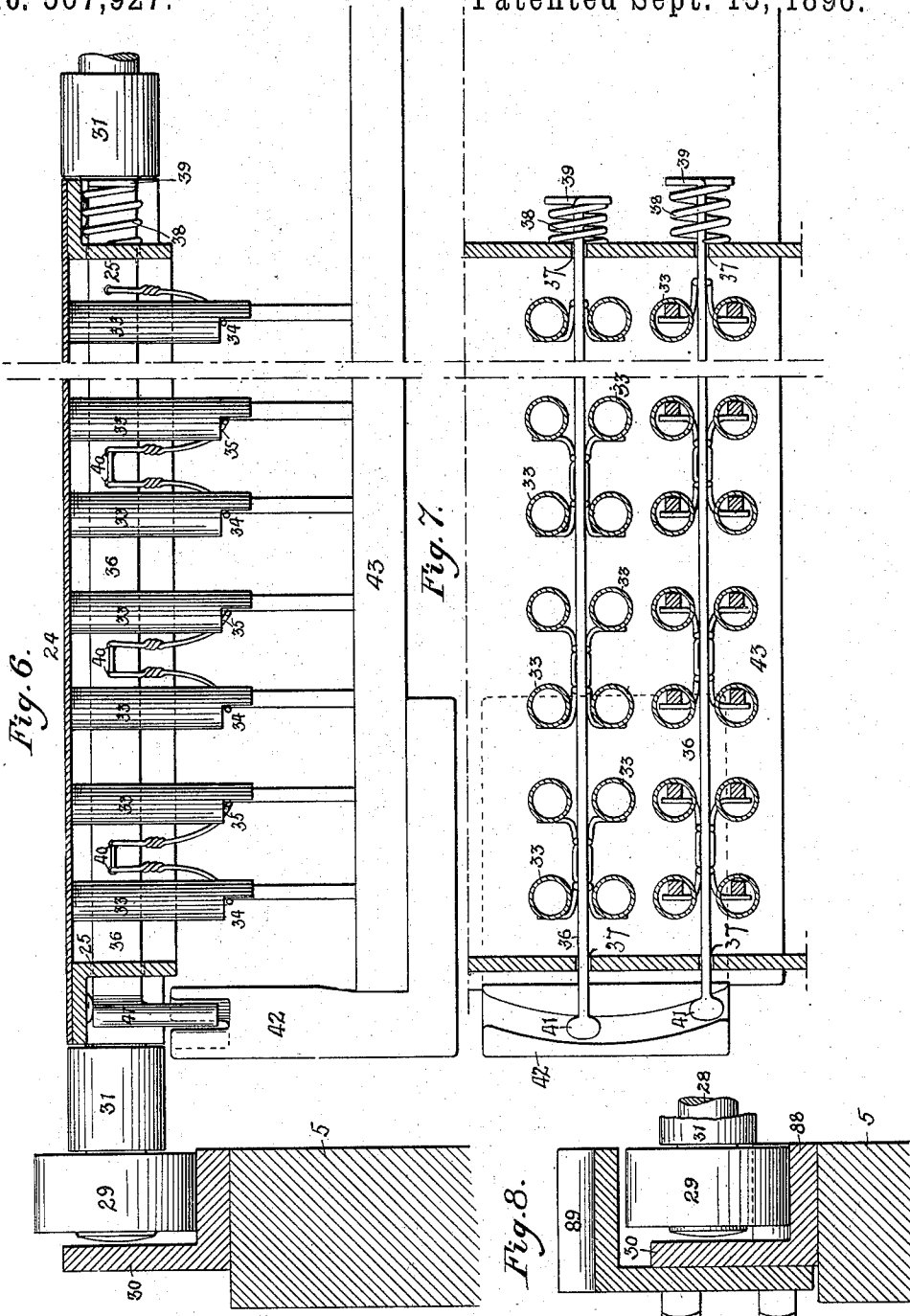
(No Model.)

6 Sheets—Sheet 5.

J. M. VAN DOREN.
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Patented Sept. 15, 1896.



Witnesses:
Murray C. Boyer
Will. A. Barr

Inventor,
Joseph M. Van Doren
by his Attorneys
Houson & Houson

(No Model.)

6 Sheets—Sheet 6.

J. M. VAN DOREN.
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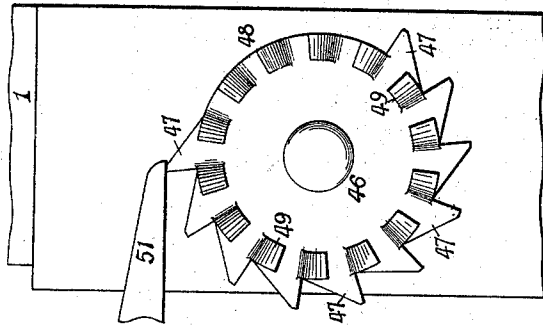


Fig. 14.

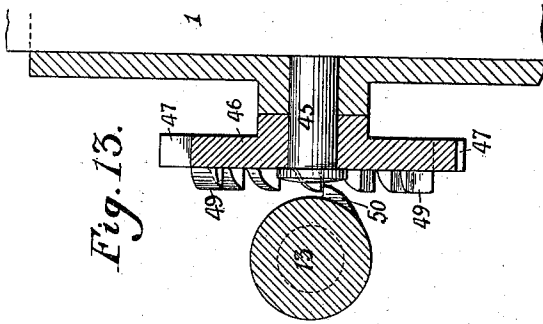


Fig. 13.

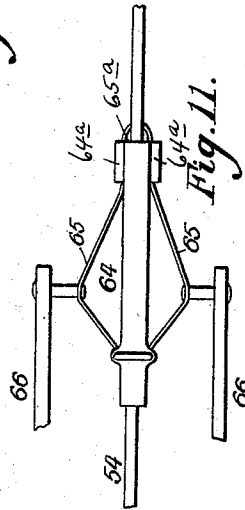


Fig. 11.

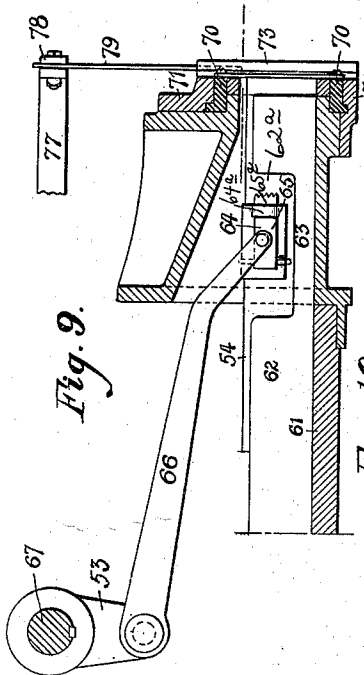


Fig. 9.

Fig. 10.

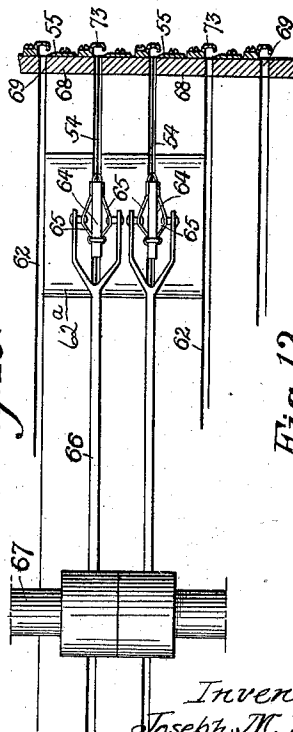
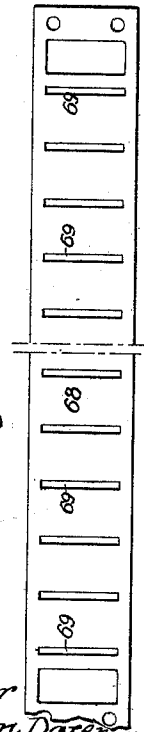


Fig. 12.



Witnesses:
Murray C. Boyer
Will. A. Bam

Inventor
Joseph M. Van Doren
by his Attorneys
Hawson & Hawson

UNITED STATES PATENT OFFICE.

JOSEPH M. VAN DOREN, OF YORK, PENNSYLVANIA.

MATCH-MAKING MACHINE.

SPECIFICATION forming part of Letters Patent No. 567,927, dated September 15, 1896.

Application filed January 9, 1895. Serial No. 534,378. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH M. VAN DOREN, a citizen of the United States, and a resident of York, York county, Pennsylvania, have invented certain Improvements in Match-Making Machines, of which the following is a specification.

My invention consists of improvements in match-making machinery, and relates particularly to that class of machines in which the match-splints are cut from veneer strips and are deposited in an endless belt, by which means they are carried through the different stages necessary to convert them into perfected matches.

My invention embraces the improved belt and the attachments thereto for holding and conveying the match-splints through the machine, means for automatically feeding the match-wood to reciprocating knives for cutting it into splints, means for automatically depositing these splints in said belt for conveying them through the machine, means for intermittently operating said feeding mechanism and continuously driving said belt, and means for automatically discharging the finished matches from the belt, all of which is more fully described and pointed out hereinafter, reference being had to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a side elevation of the machine, partly in section. Fig. 2 is a plan view of the machine. Fig. 3 is a sectional elevation of the machine, taken on the line 3 3 and looking in the direction of the arrow *z*, Fig. 1. Fig. 4 is an enlarged plan view of a portion of my improved match-carrying belt. Fig. 5 is an enlarged longitudinal sectional view of a portion of said belt. Fig. 6 is an enlarged transverse section of a portion of said belt. Fig. 7 is a sectional plan view, on an enlarged scale, of a portion of said belt. Fig. 8 is an enlarged view in cross-section of a cam-path in the machine used for depressing the match-carrying belt. Fig. 9 is a vertical sectional view, partly in elevation, of the match-wood table and the devices for feeding the wood to the reciprocating knives. Fig. 10 is a sectional plan view of the guide-plate for the match-wood. Fig. 11 is an enlarged view of the guide-plate for the match-

wood. Fig. 12 is a plan view, on an enlarged scale, of one of the clamps for feeding the match-wood to the reciprocating knives. Fig. 13 is a vertical sectional view on the line 13 13, Fig. 1; and Fig. 14 is an enlarged view in elevation of the ratchet-wheel used for imparting motion to the mechanism for feeding the match-wood and also for operating the presser-fingers which insert the match-splints in the endless belt.

The object of my invention has been to construct a machine for making matches in a simple and substantial manner and with as few parts as possible, thus reducing the wear and tear of such a machine during its operation and the consequent heavy expenses for repairs, and at the same time to increase the efficiency and output of the machine.

The most novel feature of my machine is the splint-holding devices for the endless belt. These splint-holding devices consist of small tubes secured within apertures or perforations in the endless belt and provided with spring-fingers to hold the splints within said tubes, said spring-fingers being operated by rods carried by the links of the endless belt and held normally in action by means of suitable springs. These tubes may project above or below the surface of the belt, or may be fixed so as to project equidistantly on both sides, as may be desired. The preferable arrangement, however, is as shown in the accompanying drawings.

The rods carrying the spring-fingers which engage the tubes of the endless belt are provided at one end with depending heads adapted to engage with cam projections or paths in the machine for the purpose of releasing said fingers from their engagement with the tubes. This arrangement is for two purposes—first, to free the tubes from any projection, so that the splints may be deposited in the same, and, second, to release the fingers from their engagement with the matches when it is desired to empty the belt of the same.

Another novel feature of my invention consists of the mechanism for feeding the match-splints to the endless belt. This mechanism is operated intermittently in order that the splints will not be fed to the belt while the hinge-joints of the same are passing under

the feeding mechanism, as the movement of the belt is continuous.

For convenience and clearness the description will be given under different heads, as follows: first, the framework of the machine and the shafts and pulleys for carrying the endless belt; second, the mechanism for driving the pulleys supporting the endless belt; third, the endless belt for holding and carrying the match-splints; fourth, the auxiliary supports for the endless belt; fifth, the devices for holding the matches in the endless belt; sixth, the means for giving the feeding mechanism an intermittent motion; seventh, mechanism for feeding the match-wood forward; eighth, mechanism for cutting the match-wood into splints; ninth, mechanism for operating the knives which cut the match-wood into splints; tenth, mechanism for depositing the match-splints in the tubes of the endless belt; eleventh, means for heating the match-splints; twelfth, mechanism for dipping the match-splints into the paraffin-bath; thirteenth, means for chilling the paraffin coating on the match-splints; fourteenth, means for coating the ends of the match-splints with the ignition material; fifteenth, means for discharging the finished matches from the endless belt.

The framework of the machine and the shafts and pulleys for carrying the endless belt.—The main framework of the machine consists of the corner posts 11 and 22. These are mounted on the base 3, and are connected together by the cross-braces 4 and the longitudinal stringers 5. 6 is the main driving-shaft, mounted in suitable bearings on posts 11. 7 7 are shafts for the idler-pulleys 8, which are mounted in bearings secured to the outer face of the post 22. 9 is a shaft for a smaller idler-pulley 10, mounted in bearings on the inner face of the posts 22. 11 is a short shaft or spindle mounted in a bearing secured to one of the posts 1 and carrying an intermediate gear-wheel 12, and 13 is a worm-shaft mounted in bracket-bearings at the side of one of the posts 1.

The mechanism for driving the pulleys supporting the endless belt.—The worm-shaft 13 is driven by means of a pulley 14 on the outer end of the same, said pulley being driven by a belt 15 from any suitable source of power, and motion is imparted to the belt-pulleys 16 on the main driving-shaft 6 to move the endless belt through the medium of the worm 17 and worm-wheel 18. The pulleys 19 on the shaft 20 are driven by means of a gear-wheel 21 on the end of said shaft, said gear-wheel meshing with the intermediate gear-wheel 12, which is driven by the gear-wheel 22 on the main driving-shaft 6. By this means the endless belt is positively driven from two points and in opposite directions, which is a necessary arrangement on account of the length of the chain. The pulleys 8 are idler-pulleys and serve only to support and guide the endless belt.

The endless belt for holding and carrying the match-splints.—23 is the endless belt for carrying the match-splints. It is shown in side elevation in Fig. 1, in plan view in Fig. 2, in cross-section in Fig. 3, and in detail, on an enlarged scale, in Figs. 5 to 8, inclusive. It consists of a series of sheet-metal plates 24, riveted or secured in any other suitable manner to a frame 25, made of angle-iron for the purpose of stiffening said plates and also for another purpose described hereinafter. These plates 24 are provided with perforations 26 to receive the tubes for holding the match-splints, and form the links of the endless belt 23. Secured to the frame of these links are perforated ears 27, through which are passed rods 28 to connect the links together to form the endless belt. The ends of the rods 28 are provided with rollers 29 and are adapted to a track 30, formed of angle-iron, which is secured to the longitudinal stringers 5 of the frame of the machine. Interposed between the ends of the frame 25 and the rollers 29 are collars 31, which form antifriction-rollers and are engaged by the notches 32 on the driving-pulleys and idlers on which the belt travels, the notches in the said pulleys being spaced the same distance apart as the joints of the endless belt. The metal frame 25 of the links 24 stiffens the plate and prevents the same from becoming bent. This frame serves the further purpose of affording a support for the various attachments for holding the match-splints in the tubes of the belt.

The auxiliary supports for the endless belt.—As an auxiliary support for the endless belt I provide the tracks 30, formed of angle-iron, as described, and arranged at different heights in the machine to correspond with the height of the chain as it passes over the different pulleys for carrying the same. These tracks are secured to the stringers 5 in any suitable manner, and while serving as a support for the belt also strengthen the frame of the machine.

The devices for holding the matches in the endless belt.—Secured in the holes 26 in the plate 24 of the endless belt are a series of tubes 33, open throughout their length and partly cut away at their lower ends, as shown at 34, to enable the spring-fingers 35 to hold the match-splints within said tubes, as shown in Figs. 5, 6, and 7. The match-splints are deposited in the tubes of the endless belt by special mechanism and held by the spring-fingers 35, described above, which are carried by the bars 36. The bars 36 are carried by the frame 25 of the endless belt and are free to move in slots 37 in the same. They are normally held to the extreme right of said frame by means of springs 38, interposed between the ends 39 of the bars 36 and the frame 25, so as to keep the spring-fingers 35 always in engagement with the match-splints. The spring-fingers 35, which hold the splints within the tubes 33, are made by bending

two pieces of wire into U-shaped form, putting each wire so bent from opposite sides through the same holes 40 in the bar 36, twisting the ends of one wire with the ends of the other wire over the lower edge of said bar, and then bending the free ends of the wires into such shape that they will rest against the cut-out portions of the tubes 33 in a position to hold the match-splints when they are deposited within said tubes. By the above arrangement two pieces of wire may form four spring-fingers. The rods or bars 36 are provided with elongated heads or lugs 41, and these are acted upon by a cam or projection 42 to free the tubes from the spring-fingers, so that the splints may be deposited within the same, as shown in Figs. 5, 6, and 7. This cam or projection is situated at the side of the machine directly under the mechanism which deposits the match-splints in the tubes and is carried by a shelf 43, secured to the frame of the machine between the posts 11. This shelf also supports the splints in the belt before the spring-fingers can act. As soon as the heads 41 of the bars 36 leave the projection 42 and before they pass the shelf 43 they are retracted by the springs 38 and the spring-fingers assume their normal duty of holding the splints in the tubes. They are released from said tubes as finished matches by a similar cam or projection 44 at a suitable point in the machine after they have completed the circuit of the same.

The mechanism for giving the feeding mechanism an intermittent motion.—This mechanism is shown in side elevation in Fig. 1, in plan in Fig. 2, and in detail, on an enlarged scale, in Figs. 13 and 14. In the machine shown in the accompanying drawings each link 24 of the endless belt contains ten rows of perforations adapted to receive the match-splints, and the forward motion of the belt is so timed as to bring a row of these perforations directly under that portion of the machine where the match-splints are cut off simultaneously with the cutting off of said splints. The hinge connections of the endless belt are equal in width to the space taken up by four rows of tubes of the same, and in order to move the belt from the last row of tubes in one link to the first row in the next link or past the hinge-joint a special ratchet-and-pawl mechanism is employed, operating as follows: Mounted on one end of a spindle 45, secured to one of the posts 1, is a ratchet-wheel 46, having ratchet-teeth 47, ten in number, spaced equidistant from each other, and a space 48, which takes the place of four ratchet-teeth which are purposely left out. On the outer face of the ratchet-wheel 45 are fourteen teeth or projections 49, arranged in a circle inside the line of the ratchet-notches and offset from the line of the same. Carried by the worm-shaft 13 is a lug 50, which engages with the projections 49 on the ratchet-wheel 46. The endless belt is moved the distance from one row of tubes to the next at

every revolution of the worm-shaft 13, and the ratchet-wheel is turned the distance of one ratchet by the engagement of the lug 50 with the teeth 49 of the face of the same. This forward movement of the ratchet-wheel 45 raises the lever 51 each time the moving ratchets come under the said lever. This lever 51 is normally held on top of the ratchet-wheel 46 by the spring 52, and this upward movement operates the lever 53, to which is connected the levers 66 to move the match-wood 54 into position to be cut off into splints by the knives 55. The arm 56 forms a continuation of the lever 51 and serves as a stop to limit the drop of said lever as the ratchet-teeth 47 are disengaged from the same to regulate the feed of the match-wood to the reciprocating knives. In order to regulate the drop of this lever 51 and the consequent feed of the match-wood, I provide a screw-bolt 58, which is pivotally connected to a bracket 59, secured to one of the posts 1 of the machine. This bolt passes through a hole 57 in the arm 56, which forms a continuation of the lever 51, and is provided with a thumb-nut 60, against which the arm 56 seats when the lever 51 drops as the ratchet-teeth 47 are disengaged from the same.

If it be desired to stop the feeding mechanism entirely, the arm 56 is pressed down to the limit of its movement and the thumb-nut 60 is screwed down to hold it in this lowered position. This raises the lever 51 clear of the ratchet-wheel 45, and the movement of the mechanism for feeding the match-wood ceases. The endless belt, however, is kept in motion until it has been emptied of the matches contained therein.

It will be seen from the foregoing description that the worm-shaft 13 makes one revolution for each row of match-splints, while the endless belt carrying these match-splints moves the distance from one row of perforations to the next by means of the proportionate number of teeth in the worm-wheel. The ratchet-wheel 46 makes only one revolution while the worm-shaft makes fourteen revolutions; but as it has only ten ratchet-teeth it produces but ten feed movements equal to the ten rows of match-splints which each link of the belt can contain, while the endless belt moves the distance of fourteen match-spaces for each revolution of the ratchet-wheel 46, four ratchets being left out of the ratchet-wheel 46 to equal the four rows of perforations which are taken up by hinge-joints of the endless belt.

Mechanism for feeding the match-wood forward.—This mechanism is clearly shown in Figs. 9, 10, and 11. The match-wood 54 for use in this machine is mounted on the table 61 and is preferably in coils, so as to economize space. The strips of wood, there being one for each of the longitudinal rows of tubes of the endless belt, are adapted to guides 62, along which they are fed to a point where they are cut off into splints. These guides

62 are cut away at 63 to give space for the clamps 64 of the feeding mechanism to grip the match-wood in order to feed it to the reciprocating knives. The clamps 64 consist of the spring-arms 65, provided with the serrated forward edges 65^a, that are held on each side of the match-wood veneer, and are loosely confined against undue spreading at the forward end by means of the clamp 64^a. These spring-arms are always in contact with the match-wood, but are free to be disengaged when retracted by the action of the levers 66 in order to get a fresh grip on the same, so as to feed it forward for the cutting off of another series of splints. The guide-ways for the match-wood are cut away at 62^a, as shown at Fig. 9, for the free working of the clamps 64. Every time one of the ratchets 47 raises the lever 51 it causes a movement of the rock-shaft 67 sufficient to move the match-wood forward for the cutting off of a match-splint from each strip of the same, the clamps 64 being retracted for another grip upon the match-wood each time ratchets 47 pass the lever 51. While the blank space 47 on the ratchet-wheel 45 is passing under the lever 51, there will be no forward movement of the match-wood. This arrangement permits the hinge-joints of the endless belt to pass the point where the splints are fed to the belt without wasting any of the splints and without stopping the movement of said belt.

The mechanism for cutting the match-wood into splints.—This mechanism is as follows: Secured to the inner side of the posts 1 of the frame of the machine is a plate 68, provided with slots 69, through which the match-wood is fed to the reciprocating knives 55. These knives 55 are carried by a sliding frame 70, which moves in guides 71, secured to a frame or box 72, which is placed between the posts 1 and forms the forward part or continuation of the table 61. The mechanism which moves these knives is so timed as to cut off a series of splints just before a row of tubes in the endless belt comes underneath the same, so that as soon as the tubes in the endless belt register with the splints they will be inserted into the said tubes. Directly in front of each slot 69 in the plate 68 is an L-shaped guard 73, which acts, first, as a stop for the match-wood during its forward movement, so that splints of the same size will be cut off, though the feed of the match-wood may be in excess of the quantity desired; second, as a stop for the reciprocating knives 55 in their transverse cutting movement, and, lastly, as a guide to enable the match-splints to register accurately with the tubes in the endless belt, a necessary feature of the perfect working of the machine, as the downward movement of the splints at this point is somewhat rapid.

Means for operating the knives which cut the match-wood into splints.—This device is shown in plan view in Fig. 2 and in end elevation in Fig. 3. Mounted on the end of the

worm-shaft 13 is an eccentric rod or lever 74, which is connected at its other end to the sliding frame 70, which carries the knives 55. At every revolution of the shaft 13 the sliding frame 70 is moved back and forth, so as to permit the knives carried thereby to sever the match-wood into splints at regular intervals, and this cutting movement of the knives is timed to correspond with the feed of the endless belt, so as to bring a row of tubes directly under every row of match-splints cut off.

The device for depositing the match-splints in the tubes of the endless belt.—Carried by bearings 75, secured to the posts 1 of the frame of the machine, is a rock-shaft 76, provided with arms 77, which carry at their outer ends a frame 78, which is mounted directly above the L-shaped guards 73. This frame is provided with a series of wires or fingers 79, one for each splint, and these fingers are intended to force the splints into the tubes of the endless belt, being carried down by the frame 78 when the latter is depressed by the mechanism employed for that purpose. This mechanism consists of a lever 80, pivoted to the post 1 at 81 and connected at one end 82 to one of the arms 77 and provided at its other end with an enlarged head 83, engaging with a projection 84 on the worm-shaft 13, so that at every revolution of the said worm-shaft the wires or fingers will be carried downward. The downward movement of these pushing-fingers is so timed as to deposit a row of match-splints in the tubes of the endless belt each time the same are brought under the said fingers. The ends of the fingers 79 are held normally in the upper part of the guards 73, so that they are directly above the severed match-splints. The shelf 43, extending across the machine directly underneath the point where the match-splints are deposited in the tubes of the endless belt, serves as a stop to prevent the matches from dropping through the same, and also to keep the projecting portion of the splints of the same length.

Means for heating the match-splints.—Mounted on cross-bar 85, secured to the longitudinal stringers of the machine, is a steam or hot-air chamber 86, over which the match-splints pass. This drum is supplied with steam or hot air from the pipe 87, and the heated air radiating from the enlarged surface of this drum circulates among the match-splints as they are carried over the same, and they are thereby thoroughly dried in order that they may more readily absorb the paraffin.

Mechanism for dipping the match-splints into the paraffin-bath.—At a suitable point in the length of the track 30 I provide a depression 88 and secure to the upper edge of said track a plate or guide flange 89, which practically forms a cam-path at this point. As the belt moves forward the rollers which are on the track 30 are deflected downward by reason of the guide or flange plate 89, and

this depression of the endless belt allows the splints to dip into the paraffin contained in the receptacle 90 as they are carried forward.

Means for chilling the paraffin coating on the match-splints.—In the manufacture of matches by means of an automatically-working machine it is necessary that the paraffin on the splints may be cooled or hardened as rapidly as possible in order that the splints may receive the ignition material. For this purpose I provide a cold-air chamber 91, suitably secured to the frame of the machine, and this chamber is provided with a series of transverse slots 92 in the top of the same, the distance between the said slots corresponding to the distance between the longitudinal rows of match-splints in the endless belt. A pipe 93 for conveying cold air from any suitable source of supply is secured to the tank at any suitable point and the air so supplied circulates around the splints and hardens the paraffin.

While I have shown the means for cooling or hardening the paraffin on the match-splints, as described above, I nevertheless do not wish to limit myself to this precise method of cooling said paraffin, as the same purpose might be accomplished by means of jets or blasts of air adapted to impinge upon the splints from the sides of the machine.

Means for coating the ends of the match-splints with the ignition material.—Beyond the cold-air chamber 91 is a trough-like receptacle 94, containing the ignition material. Journaled in suitable bearings in the ends of this receptacle is a roller 95, which is revolved by any suitable mechanism. In this instance a sprocket-wheel 96 is mounted on the end of the shaft 97, which carries the roller 95, and this is driven by a chain 98 from a sprocket-wheel 99 on the main driving-shaft. The roller 96 is covered with felt, asbestos, cloth, or any other suitable fibrous material to more readily collect and hold the required quantity of the ignition material and present it to the match-splints as they pass over the same. In order to have this coating of a uniform thickness, I provide a roller 100, carrying a series of blades 101, which serve to keep the ignition material thoroughly mixed and also to scrape off the superfluous material from the roller 95. The roller 100, however, may be smaller and be used as a mixer only, employing a scraper-blade to scrape off the superfluous ignition material. Both the roller and the scraper-blade, if used, are intended to be made adjustable, so that the amount of ignition material to be deposited upon the match-splints may be positively regulated. The roller 100 is driven in an opposite direction to the coating-roller 95 by means of the chain 100^a. This receptacle is supported by means of the cross-brace 102. While I have shown the top of the roller 95 on a level with the lower ends of the match-splints, so that there will be no necessity of depressing the endless belt, I may, however, place this roller on a

lower level, so that it will be necessary to depress the belt to allow the splints to become coated with the ignition material, and for this purpose a plate or guide flange substantially the same as that shown at 89 in the track 30 may be used.

Means for discharging the finished matches from the endless belt.—After the splints have received the coating of ignition material they are carried by the endless belt over the various pulleys 8 and 10 in the direction of the small arrows shown in Fig. 1 until they finally arrive at the point where they are discharged from the same. The matches have become thoroughly dried during their passage through the machine, and there is no danger of their sticking together after they have been discharged onto the endless belt 103.

The operation of discharging the matches is as follows: The endless belt passes or rather arrives at the point of discharge with the heads of the matches uppermost, and the bars 36, carrying the spring-fingers 35, which hold the matches in the tubes of the belt, also have their elongated heads projecting upward as they pass this point. A cam or projection 44 is secured to the inside of one of the posts 1 and is so placed that the elongated heads of the rods 36 will engage with the flanges 25, carrying the spring-fingers 34, and thus release the matches and permit them to drop out of the tubes onto the endless belt 103, which conveys them away from the machine to any suitable point for packing. As the endless belt 23 passes the point of discharge the head of the rods 36 leave the cam or projection 44 and are returned to their normal position by means of the springs 38, before described.

The operation of the machine is as follows: The machine having been started, the endless belt is being traversed through the circuit of the same through the medium of the worm and worm-wheel. The feeding mechanism for moving the match-wood to the reciprocating knives is in operation through the medium of the ratchet-wheel, and the splints are being cut off by said knives. Immediately upon the severing of the splints the fingers which insert the same into the tubes in the endless belt and which have been resting normally in the guides directly above the splints descend through the action of the mechanism for operating the same, and the splints are deposited into the tubes of the endless belts, the fingers being retracted by the action of the spring 80^a, connected to said lever 80. The worm-shaft has now made one complete revolution and has brought the belt forward until the next row of tubes is under the series of splints that are being cut off, and they are inserted in the tubes by the fingers, as before described. Every revolution of the worm-shaft operates the knives to cut off one row of splints, and the mechanism for feeding the match-wood

is drawn back for a fresh grip on the same simultaneously with the severing and depositing of the splints in the tubes of the endless belt. After the splints have been deposited in the belt they are carried by the same successively to the hot-air drum, where they are dried, to the paraffin-bath, where they are dipped to make them inflammable, then past the cold-air-blast chamber to chill and harden the paraffin, and then to the roller in the phosphorus-tank, which coats their ends with said ignition material. Passing these points the matches are conveyed around the circuit of the machine until they become thoroughly dried, after which they are discharged from the said belt onto an endless cross-belt 103, which conveys them away from the machine and deposits them at any suitable point for packing in boxes.

I claim as my invention--

1. The combination in a match-making machine of a carrier having a series of sockets receiving the match-splints larger than the splints so that they will freely enter the sockets, retainers cooperating with the sockets to hold the splints therein with means for actuating the retainers to release the splints, substantially as described.

2. The combination in a match-making machine, of the carrier, a series of sockets receiving the splints, with spring-retainers adapted to press against the splints within and cooperating with the sockets to hold the splints and means for withdrawing the spring-retainers to release the splints and allow them to be discharged from the carrier, substantially as described.

3. The combination in a match-making machine, of the carrier, sockets therein larger than and receiving the splints, independent retainers for each socket cooperating therewith to hold the splints and means for withdrawing the retainers so that the splints may enter the sockets at one point and be discharged from the sockets at another point, substantially as described.

4. The combination in a match-making machine, of a series of plates linked together forming chains, sockets in each plate, independent spring-retainers adapted to each socket, means for retracting said retainers, veneer-feeders above the sockets in the chain, cutters adapted to cut the veneers into splints and feeders for forcing the cut splints into the sockets, a table directly under the chain at the feeding-point to limit the fall of the splints, said retainers being relieved from the control of the retracting means as the chain moves over the table, substantially as described.

5. The combination in a match-making machine, of the horizontal guides, chain adapted to travel thereon, each section of the chain having a number of sockets, guides for the veneers of match-wood, intermittent feeders for the veneers and for the chain, cutters arranged at the end of the veneer-guides, said

cutters being directly above the chain so that as the splints are cut they will drop into the sockets of the chain, a stop to limit the fall of the splints, retainers cooperating with the sockets and carried by the chain whereby each splint is held independently in its socket, with means for dipping the projecting ends of the splints as they travel forward, substantially as described.

6. The combination in a match-making machine, of the horizontal table having grooves therein forming guideways for the match-wood veneers arranged on edge, a rock-shaft, means for intermittently operating said shaft, levers on the shaft, feeders adapted to straddle the veneers and connected to said levers, cutters at the end of the table and stops beyond the cutters with a perforated belt adapted to travel under the end of the table and to receive the splints as they are cut from the veneers, substantially as described.

7. An endless belt for use in match-making machines, comprising a series of plates hinged together, a series of tubes on said plates for holding the match-splints, spring-fingers adapted to confine the splints within the tubes, and rods carried by the endless belt to which said spring-fingers are secured, substantially as described.

8. The combination in a machine for making matches, of the endless belt, mechanism for driving the same, including a worm-shaft, match-splint-feeding devices, and mechanism for intermittently driving the same consisting of a wheel having a blank space and a series of ratchets on its periphery, and a series of lugs on its face which are engaged with by a projection on the worm-shaft, substantially as described.

9. In a machine for making matches, the combination of the frame, a match-wood-carrying table, knives for cutting the match-wood into splints, feeders for the match-wood, a rock-shaft, arms on said shaft connected to the feeders, a driven ratchet-wheel, a lever on said rock-shaft engaging with the ratchet-wheel with an adjustable stop for said lever, substantially as described.

10. In a machine for making matches, the combination of the frame the match-wood-carrying table supported by said frame, knives for cutting the said match-wood into splints, mechanism for feeding the match-wood to the knives, a rock-shaft carried by said frame and operating said feeding mechanism, a ratchet-wheel also carried by the frame, a lever connected to said rock-shaft one end of which is in engagement with said ratchet-wheel, and a screw-nut for depressing and holding the opposite end of said lever out of engagement with said ratchet-wheel so as to stop the feeding of the match-wood, substantially as described.

11. The combination in a match-making machine, of the endless belt, tubes within the same, mechanism for depositing the match-splints in said tubes, a rock-shaft for operat-

ing the same, a worm-shaft, and a lever pivoted to the frame of the machine, one end of said lever being connected to the match-splint-depositing mechanism, while the other end is free to be acted upon by a lug carried by said worm-shaft to operate said depositing mechanism, substantially as described.

12. The combination in a machine for making matches, of the endless belt, a worm-wheel for driving the same, a worm-shaft, a worm on said shaft for operating said worm-wheel, a cutting-head provided with a series of knives, and an eccentric rod or lever carried by said worm-shaft for reciprocating said knives to sever the match-splints, substantially as described.

13. The combination in a machine for making matches, of the endless belt, tubes in said belt, a worm-wheel for operating the same, a worm-shaft, a worm on said shaft for operating the worm-wheel, fingers carried by a vertically-moving frame for depositing the match-splints into the tubes of the endless belt, and a lug or projection on the worm-shaft adapted to operate said frame, substantially as described.

14. The combination in a machine for making matches, of the endless belt, tubes on said belt for holding the splints, spring-fingers, as 35, for confining the splints within said tubes, spring-controlled rods carried by the endless belt to which said spring-fingers are secured, heads on said rods, and a cam guide or projection for engaging said heads, substantially as described.

15. The combination in a machine for making matches, of the endless belt, spring-tubes, as 33, within said belt having spring-fingers, as 35, adapted to confine the splints within

the same, spring-controlled rods carried by the endless belt controlling said spring-fingers, heads on said rods, and a cam-guide, as 99, extending into the path of these heads and with which they are adapted to engage, whereby the rods may be pushed into the links of the endless belt thus releasing the spring-fingers from their engagement with the tubes 33, so that the splints may be deposited in the same, the spring-fingers being retracted as soon as the heads of the spring-controlled rods pass the cam 99, substantially as described.

16. The combination in a machine for making matches, of the endless belt, sockets therein receiving the match-splints, independent spring-retainers coöperating with the sockets to hold the splints therein, a cam-guide acting to withdraw the springs in a line and thus release the matches contained in the sockets, substantially as described.

17. The combination in a machine for making matches, of the endless belt, sockets therein and retainers for the splints carried by the belt, splint-feeding mechanism and means for discharging the matches from the belt, a horizontal track over which the belt travels, a heater for drying the splints, a paraffin-tank, means for dipping the splints therein, an air-blast apparatus for cooling the coated splint and apparatus for coating the splints with ignition material, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOSEPH M. VAN DOREN.

Witnesses:

M. J. RIEGEL,
ALICE FENTLE.