

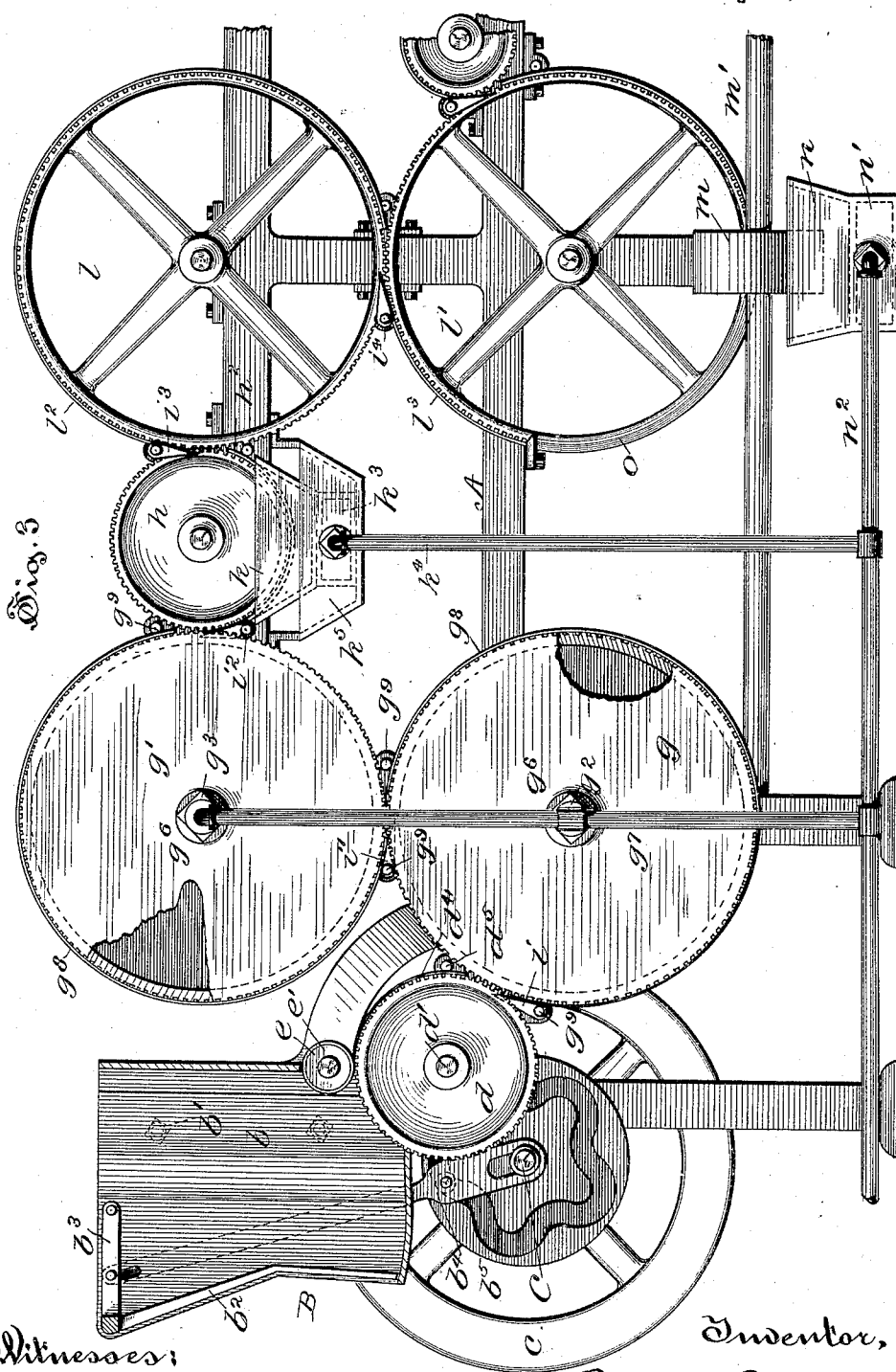
(No Model.)

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F. F. GUMAER.
MATCH MACHINE.

No. 473,922.

Patented May 3, 1892.



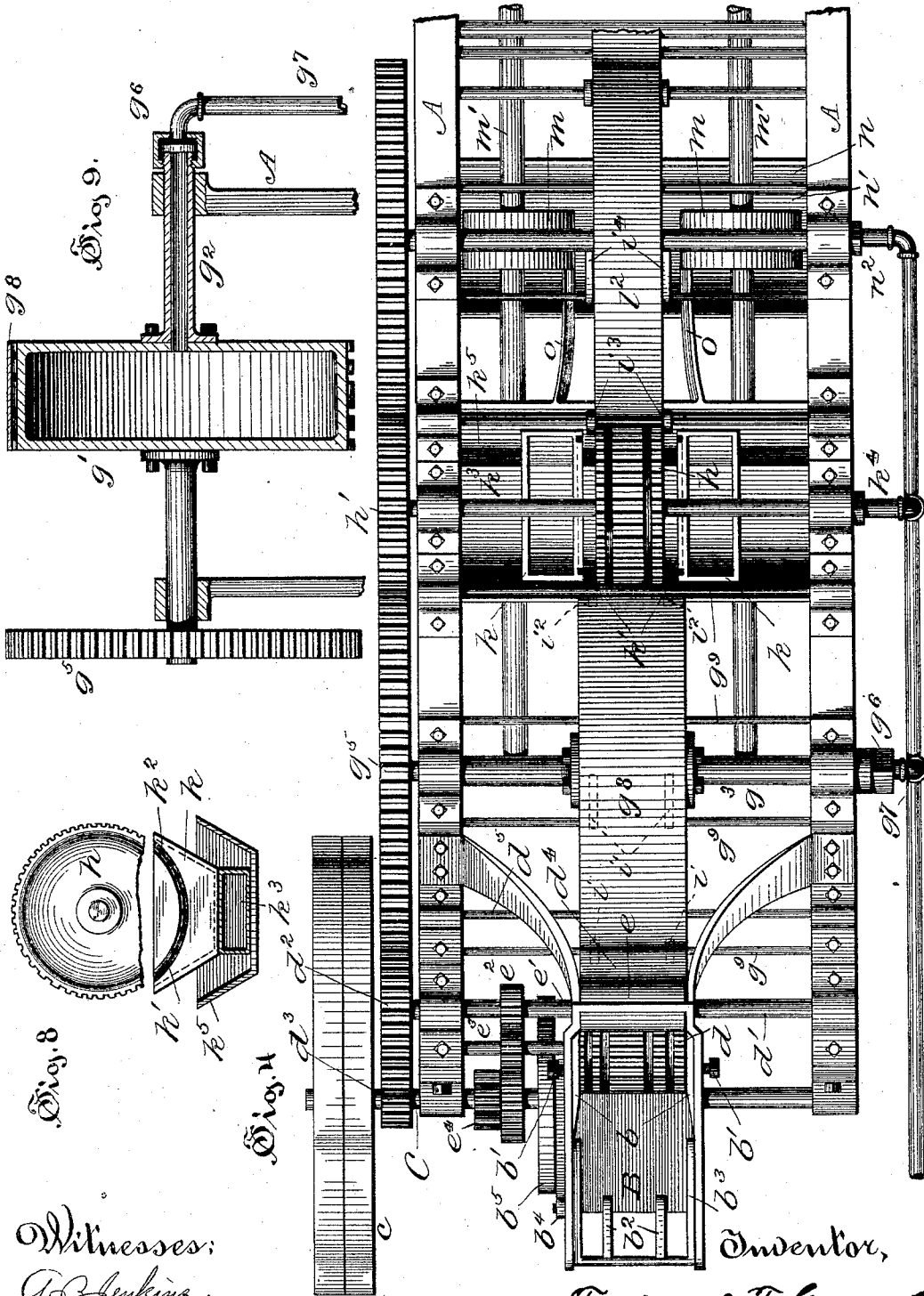
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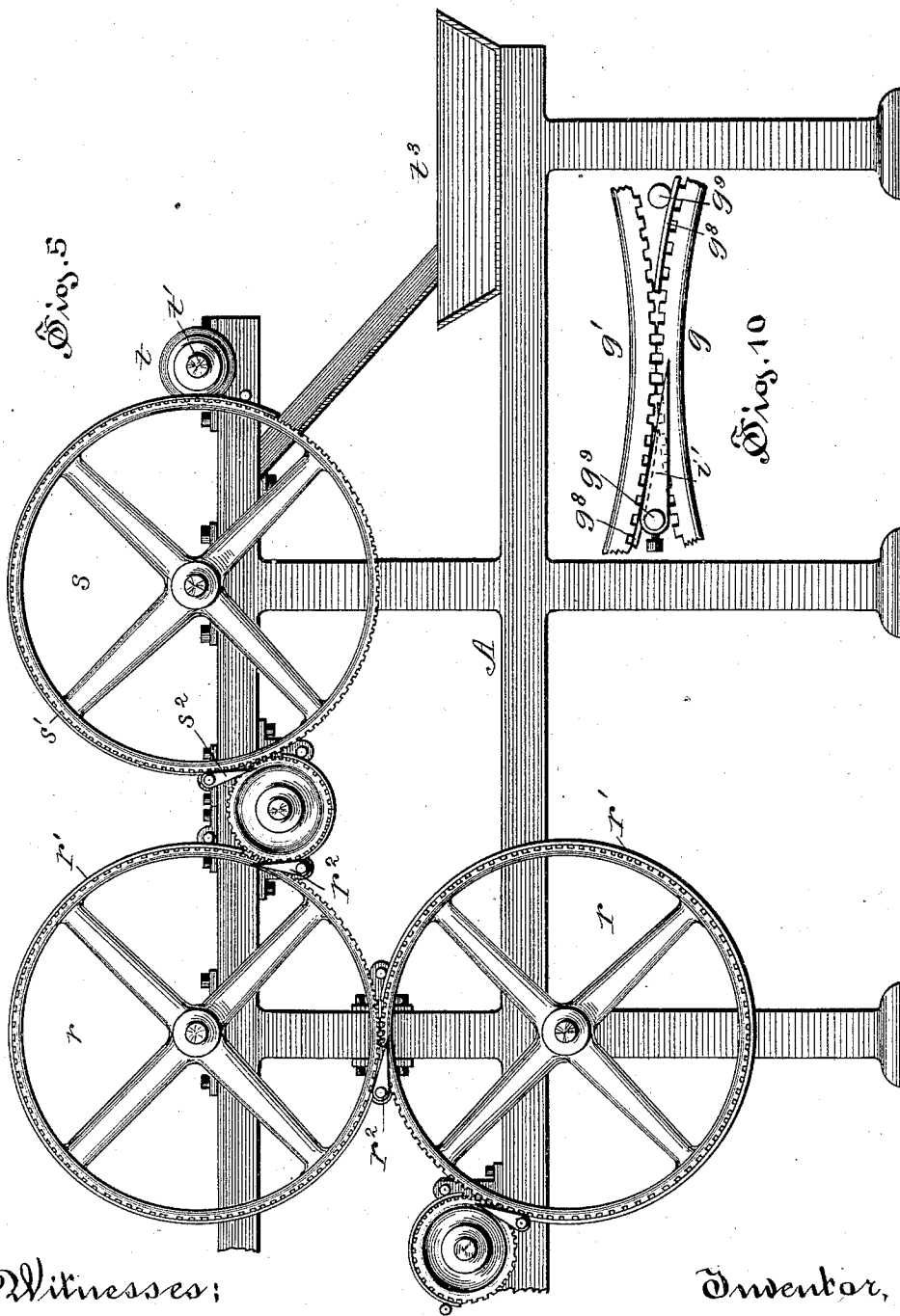
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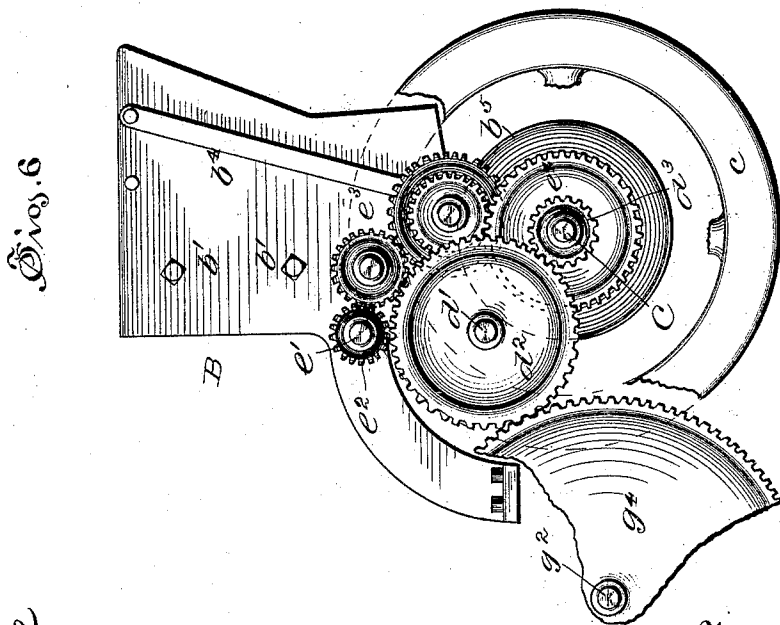
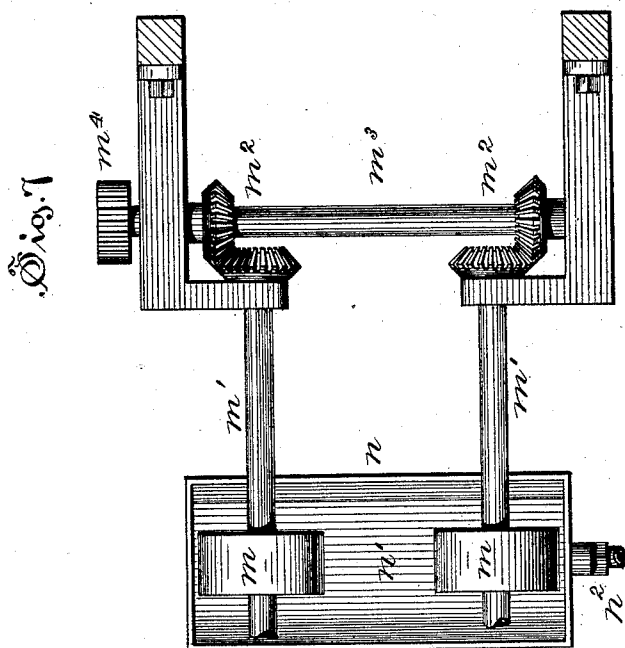
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UNITED STATES PATENT OFFICE.

FREDERICK F. GUMAER, OF TRENTON, NEW JERSEY.

MATCH-MACHINE.

SPECIFICATION forming part of Letters Patent No. 473,922, dated May 3, 1892.

Application filed September 28, 1891. Serial No. 407,012. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK F. GUMAER, a citizen of the United States, residing at Trenton, in the county of Mercer and State of New Jersey, have invented certain new and useful Improvements in Match-Machines, of which the following is a full, clear, and exact specification.

The invention relates to the class of machines which provide splints with igniting material; and the object of the invention is to produce a machine which will automatically give to one or both ends of a match stick or splint a thorough coating of inflammable material, as wax or paraffine, and also apply a quantity of igniting composition and permit the same to dry before the match reaches the end of the mechanism.

Referring to the accompanying drawings, Figure 1 is a side elevation of the machine. Fig. 2 is a plan of the same. Fig. 3 is an enlarged side elevation, with the frame cut away and partly in section, of the hopper end of the machine. Fig. 4 is a top view of the same. Fig. 5 is a similar side elevation of the opposite end of the machine. Fig. 6 is a detail elevation of the opposite side of the hopper, showing the hopper-rolls-operating mechanism. Fig. 7 is a detail plan of a portion of the composition-applying mechanism. Fig. 8 is a detail side elevation of the waxing device, with part in section. Fig. 9 is a vertical section of one of the drum-heating rolls. Fig. 10 is a greatly-enlarged view of a portion of the periphery of two of the pocketed rolls and the splint-transferring device.

In the views, the letter A indicates a frame, preferably formed in sections, of cast-iron, and supporting near one end a hopper B for receiving the splints, which are previously cut in any ordinary machine. The hopper is preferably of cast-iron, bolted to the frame, and is of a width equal to the length of the longest of the splints which it would be desirable to pass through the machine. The sides may be provided with plates *b* that can be adjusted by means of screws *b'* to close to a width of short splints, if desired. The back of the hopper is preferably occupied by arms *b*², that project from a lever *b*³, oscillated by a rod *b*⁴, reciprocated by a cam *b*⁵ upon the main driving-shaft C, that is supported by the

frame transversely below the hopper and bears a driving-pulley *c*. Below the hopper and projecting partly into the interior is a roll *d*, with a serrated, notched, or pocketed periphery. This roll is mounted on a journal *d'*, supported by the frame, bearing a gear *d*², that meshes with a pinion *d*³ on the driving-shaft. Adjacent to this roll *d* is a roll *e*, of smaller diameter, supported upon a shaft *e'*, bearing a pinion *e*², driven through the train *e*³ by a gear *e*⁴ on the driving-shaft. (See Figs. 3, 4, and 6.) A shield or band *d*⁴, held in place by a rod *d*⁵, supported at its ends by the frame, encircles a portion of the roll *d*, so as to hold the splints in the peripheral pockets during a part of the revolution of the roll. Supported by journals *g*³ *g*³, bearing gears *g*⁴ *g*⁵, driven by the gear *d*², adjacent to the roll *d*, is a pair of hollow drums *g* *g'*. The peripheries of these drums are provided with pockets and rotate in contact with each other, while one *g* is also in contact with the smaller roll *d*. The journals of these drums are preferably hollow and provided with any common connection *g*⁶ to allow steam to enter from pipes *g*⁷ and heat the drum during rotation. Bands *g*⁸, held by rods *g*⁹, encircle a portion of the circumference of the drums to hold the splints in the pockets. Near the terminus of the band *d*⁴, held by a rod *g*⁹, is placed a wedge-shaped guide or switch *i*, so located as to insure the transfer of the splints from the pockets of the roll *d* to the pockets of the drum *g* beneath the band *g*⁸, while a switch *i'* is provided to insure the transference of the splints from the drum *g* to the drum *g'*. (See Figs. 3 and 10.) Supported by the frame, with its pocketed surface in contact with the drum *g'* and driven by a gear *h'*, meshing with the gear *g*⁵ of that drum, is a small roll *h*, which may or not be hollow and have a steam connection for heating. A band *h*² encircles a portion of its lower periphery, adjacent to which are one or more vats or pans *k*, containing an inflammable material, as wax or paraffine, with which the ends of the splints are to be coated to insure their ready ignition when the match is lighted. In the form shown a vat is placed upon each side of the roll, provided inside next the roll with a groove *k'*, through which the ends of the splints pass when conveyed by the roll. Small perfora-

tions k^2 are made from the interior of the vats to these grooves to allow the escape of a small quantity of paraffine into the groove in the path of the ends of the splints. A steam-box k^3 , with suitable connections k^4 , may be placed below the vats to keep the paraffine warm and liquid and a tray k^5 provided to catch the drip. (See Figs. 3, 4, and 8.) Switches i^2 i^3 are provided to transfer the splints from the pockets of the drum g' to the roll h , and from this roll to a roll l , with which it rotates in contact. Below the roll l , in contact with it and driven by its gear, is a similar roll l' . These rolls are partly encircled by bands l^2 l^3 , and at the ends of the bands for transferring the splints from one to the other are placed the usual switches i^4 . Adjacent to the roll l' on each side, with their peripheries nearly on a line with the projecting ends of the splints as they are carried by this roll, are placed rollers m , mounted upon shafts m' , driven by bevel-gears m^2 from shaft m^3 , provided with a pinion m^4 , that meshes with one gear of the main roll-driving train. A part of these rollers, which may or may not be heated, revolve in a pan or tray n , containing a quantity of igniting composition, as phosphorus, sulphur, glue, &c., so that the surfaces of the rollers are constantly besmeared with the composition. This tray may be provided with a box n' , having a suitable steam connection n^2 to keep the composition warmed. As the splints are conveyed by the roll l' , these rollers with an upward motion deposit a small quantity of the igniting composition on each end of the splints. Guides o are secured to the frame in such manner adjacent to the rollers as to center the splints, so that each end will be in proper position to receive the correct quantity of composition as they pass the rollers. (See Figs. 3, 4, and 7.)

The frame may be extended to any length and support any desired number of pocketed rolls p q r s , of various sizes, partly encircled by bands p' q' r' s' to keep the splints in place, and provided with suitable transfer-switches p^2 q^2 r^2 s^2 to deliver the splints from one roll to the next, according to the amount of time it is desired that shall elapse before the matches shall reach the end of the train, so the composition shall become set and dry before the matches run out into the trays. It is desirable that the gears be about the same size as the rolls and that the pitch of the teeth shall coincide with the pockets. At the delivery end of the machine a cutter t is mounted upon a shaft t' , bearing a pinion t^2 in mesh with the gear s^3 of the last roll. This cutter divides the splints at the middle, and the matches thus formed drop from the pockets of the last roll into the trays t^3 , in which they may remain until bunched for packing into boxes. (See Figs. 1, 2, and 5.)

Splints cut to the desired length are placed in the hopper, the sides of which are adjusted to fit the length of the splints, so that when thrown by the oscillating arms the splints will

be straight upon the periphery of the hopper-roll d . The roll e revolves in the opposite direction from the roll d , to prevent more splints from passing from the hopper than can be carried by the pockets of the roll d to the pockets of the drum g , from which they are taken by the drum g' to the waxing-roll h . The drums, being heated by steam, warm the splints which they carry, so that the wax or paraffine is not chilled when applied, but more thoroughly permeates and is absorbed by the wood fibers of the splints. From the waxing-roll h the splints are carried by the rolls l l' past the rolls m , receiving on each end a quantity of igniting composition, and the splints in this condition are carried over and around the various rolls of the train in the pockets until the composition is dry and the splints can be cut and the matches allowed to fall into the receiving-trays, from which they are boxed.

Of course, if desired, the splints can be waxed before being placed in the hopper, in which case the trays containing the paraffine may be omitted and the drums need not be heated.

The machine is simple and cheap in construction, and splints of various lengths may be passed through the hopper, waxed, supplied with igniting composition, and dried without sticking together before leaving the machine, the matches passing in the pockets in the wheels under the bands and being transferred by the switches from one to the next roll automatically without handling. The heated splints thoroughly absorb the paraffine, and thus are rendered highly inflammable, and as they are carried around the rolls and occupy different positions the igniting composition during the carriage settles evenly around the ends, forming a round smooth head for the match.

I claim as my invention—

1. In combination, in a match-machine, a hopper, pocketed rolls for conveying splints from the hopper, a rotary drum having closed ends and a pocketed periphery, a heating system connected with the drum, a wax-vat adjacent to the drum in the path of the splints, and pocketed rolls for conveying splints from the waxing-vat, substantially as specified.

2. In combination, in a match-machine, a hopper, pocketed rolls for conveying splints from the hopper to a waxing-vat, a waxing-vat, pocketed rolls for conveying splints from the waxing-vat to a composition-vat, a composition-vat, and a train of pocketed rolls for conveying splints from the composition-vat, substantially as specified.

3. In combination, in a match-machine, a hopper, pocketed rolls for conveying splints from the hopper, a rotary drum having a pocketed periphery, steam-pipes connected with said drum, a waxing-vat on each side adjacent to the drum near the path of the splints, pocketed rolls for conveying splints from the waxing-vat to a composition-vat, a composition-

vat, and a train of pocketed rolls for conveying splints from the composition-vat, substantially as specified.

4. In combination, in a match-machine, a hopper, pocketed rolls for conveying splints from the hopper, a rotary drum having a pocketed periphery, a waxing-vat adjacent to the drum near the path of the splints, pocketed rolls for conveying splints from the waxing-vat to a composition-vat, a composition-vat, pocketed rolls for conveying splints from the composition-vat, and a system of steam-pipes connected with the drum, waxing and composition vats, substantially as specified.

5. In combination with a match-machine, a hopper, pocketed rolls for conveying splints from the hopper to a waxing-vat, a waxing-vat, pocketed rolls for conveying splints from the waxing-vat to a composition-vat, a composition-vat, pocketed rolls for conveying splints from the composition-vat to a cutter, and a cutter for dividing the splints, substantially as specified.

6. In the herein-described match-machine, in combination with the train of pocketed conveying-rolls, a waxing-vat provided with grooves and openings in the path of the ends of the splints on each side of and adjacent to one of the conveying-rolls, substantially as specified.

7. In the herein-described match-machine, in combination with the train of pocketed conveying-rolls, a rotary drum having a pocketed periphery, and steam-pipes leading into the drum, whereby the splints are heated by the drum, substantially as specified.

8. In combination with the pocketed conveying-rolls of a match-machine, a hopper having a portion of its side walls double, the inner of which are movable toward or from the outer, and means for moving the inner, substantially as specified.

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