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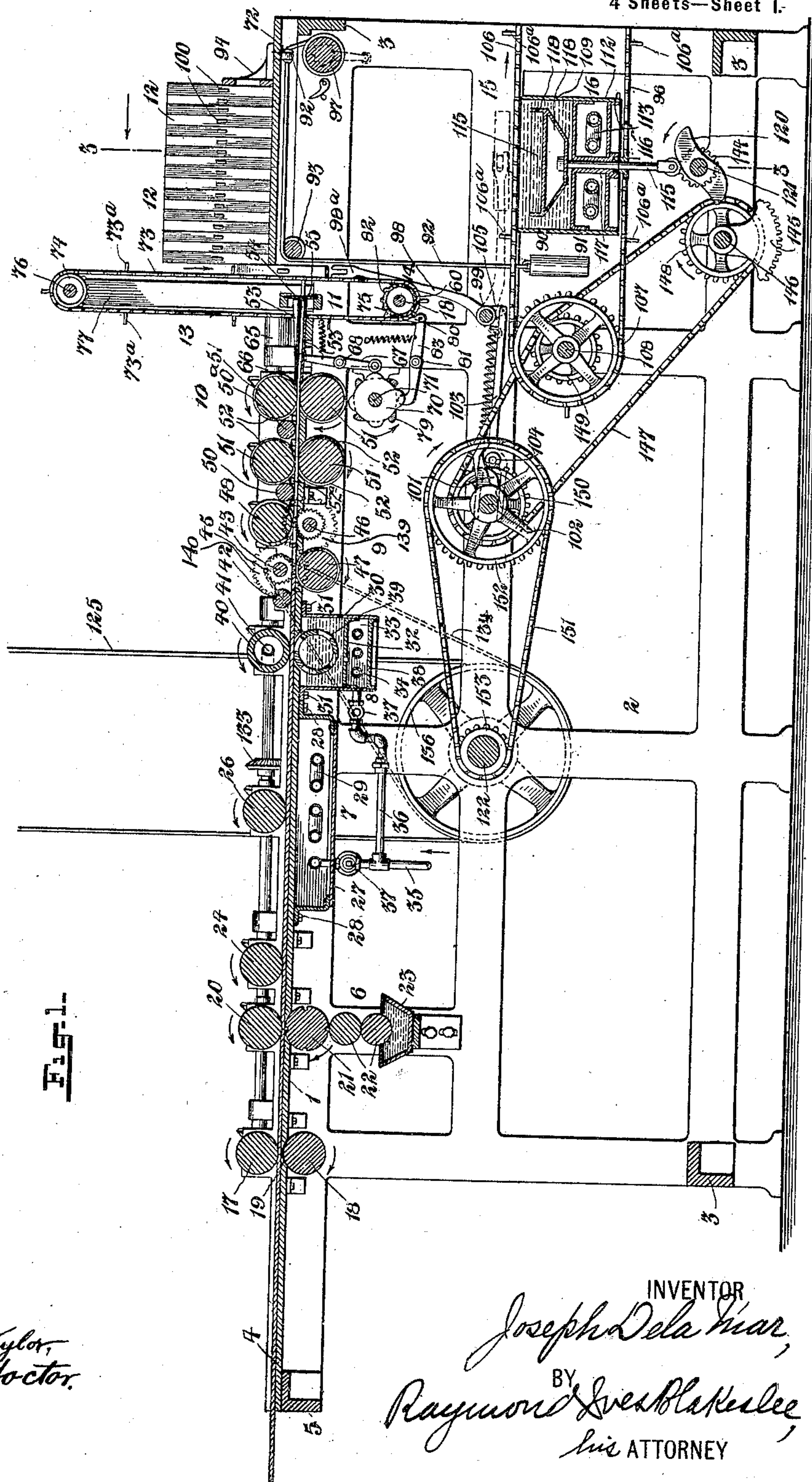
Patented Jan. 7, 1902.

J. DELA MAR.
MATCH MAKING MACHINE.

(Application filed Mar. 8, 1901.)

(No Model.)

4 Sheets—Sheet 1.



WITNESSES:

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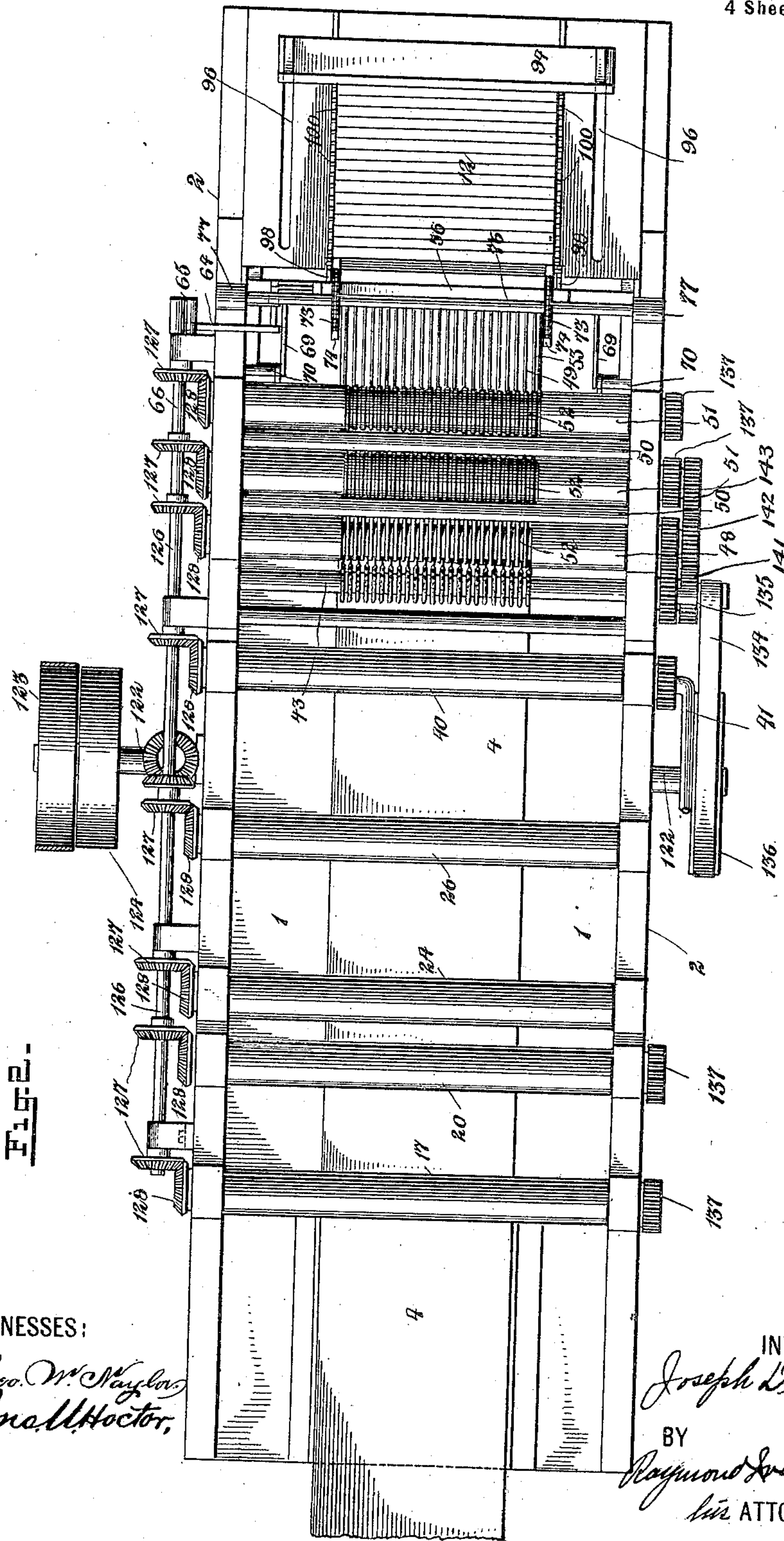
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4 Sheets—Sheet 2.



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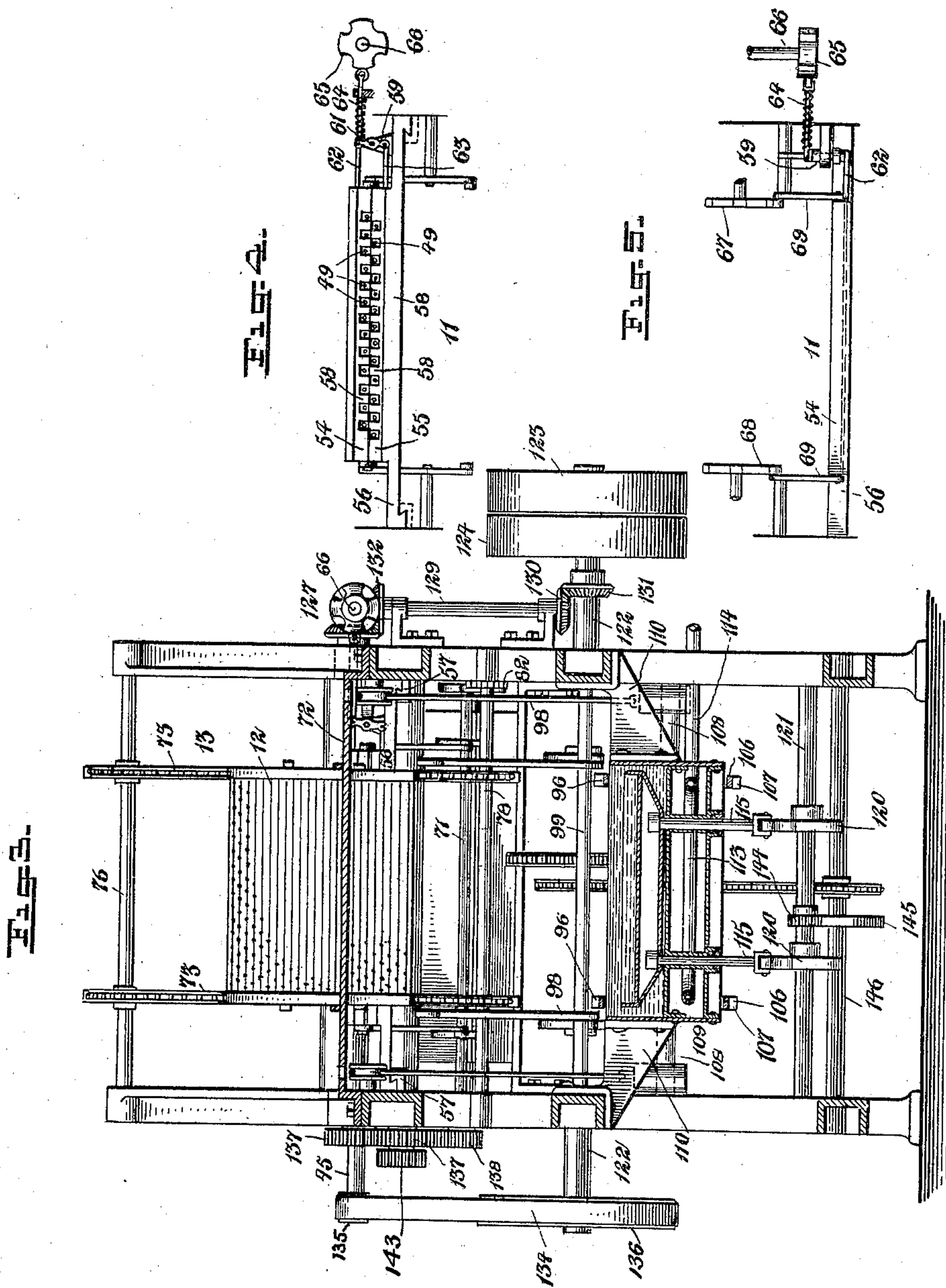
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4 Sheets—Sheet 3.



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UNITED STATES PATENT OFFICE.

JOSEPH DELA MAR, OF NEW YORK, N. Y., ASSIGNOR OF NINE-TENTHS TO SAMUEL KAUFMAN, OF NEW YORK, N. Y., AND GEORGE A. KOHLER, GEORGE S. MAYER, WILLIAM H. MAYER, JACOB A. MAYER, FRANK W. MAYER, GERTRUDE C. McDADE, ISAAC KOHLER, AND JOHN C. HECKERT, OF YORK, PENNSYLVANIA.

MATCH-MAKING MACHINE.

SPECIFICATION forming part of Letters Patent No. 690,905, dated January 7, 1902.

Application filed March 8, 1901. Serial No. 50,287. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH DELA MAR, a citizen of the United States, residing at New York, in the county and State of New York, have invented certain new and useful Improvements in Match-Making Machines, of which the following is a specification.

This invention relates to match-making machines; and it has for its object to provide an improved machine of this class which, while relatively simple in construction, shall be superior in point of speed and positiveness of operation, quantity and quality of output, and general efficiency.

In practicing my invention the stock in the form of a broad strip of veneer of any convenient length and of suitable width to form, say, from fifty to one hundred matches is fed to the longitudinally-operating cutting means, which divide the same into long strips of match width. Previous to this longitudinal severance the stock may be printed in a transverse series of impressions, one impression for each match width, and may be coated at predetermined points with paraffin for the customary purpose. After the longitudinal severances the match widths are finished or rounded, and the stock is then severed successively in a transverse plane, which operation cuts the several match widths into the separate match-bodies of the required length. The matches are then automatically stacked in frames, which latter when full are placed upon an endless carrier, and after the mechanical application of the match-head compound are conveyed to a suitable point of deposit. The members of the machine are driven by suitable mechanisms, which are connected in predetermined operative relation or step, so that the proper succession of movements of the parts is effected to form the complete match with the greatest expedition.

In the drawings, Figure 1 is a vertical longitudinal sectional view of an improved match-making machine. Fig. 2 is a plan view of the same. Fig. 3 is a vertical transverse sectional view taken upon the line 3 3,

Fig. 1, and looking in the direction of the arrow. Fig. 4 is a detail rear elevation of the means for transversely severing the match widths. Fig. 5 is a plan view of the same. Fig. 6 is a detail front elevation of one of the stacking-frames, broken away in part to show the construction. Fig. 7 is a detail end elevation of the same, broken away in part to show the construction.

Corresponding parts in all the figures are denoted by the same reference characters.

Referring with particularity to the drawings, 1 designates the bed-plate of my improved match-making machine, which is supported upon vertical side frame members 2 and transverse end frame members 3. The stock 4 is fed in an extended strip over the front end extension 5 of the bed-plate and is successively operated upon by printing means 6, heating means 7, paraffin-coating means 8, longitudinal severance means 9, finishing means 10, and transverse severance means 11. From the transverse severance means the match-bodies are forced into or stacked in frames 12 in horizontal superposed series or rows, the frames being successively lowered to permit filling by an endless carrier 13. A suitable conveyer 14 successively conveys the stacked frames to an endless carrier 15, which supports the frames, while the matches in the same are headed by the match-head-compound-application means 16. The endless carrier 15 then conveys away the complete matches to be boxed or otherwise disposed of.

The veneer strip 4 is initially moved upon the forward end of the feed-plate 1 by a pair of transversely-arranged feed-rollers 17 and 18, respectively, which are respectively arranged above and beneath the bed-plate and are suitably actuated in opposite directions. The bed-plate is cut away transversely to permit the periphery of the roller 18 to engage the strip 4. The strip 4 next passes between two similarly-arranged printing-rollers 20 and 21, respectively, a presser-roller and an impression-roller, and constituting the

printing means 6 in their preferred form. The impression-roller 21 is arranged beneath the feed-plate and is fed by a series of feed-rollers 22, which convey the ink from a vertically-adjustable ink-reservoir 23. The operative periphery of the impression-roller 21 is so formed and divided as to suitably print with a single complete impression each transverse and longitudinal portion of the strip 4, which eventually becomes a segregated match-body. From the printing means 6 the strip 4 passes beneath a transversely-arranged feed-roller 25 and a transversely-arranged feed-roller 26, the latter of which is disposed above the heating means 7, which in the preferred form of construction consists of a steam-box 27, which is secured, as at 28, beneath the bed-plate and in which is arranged a steam-coil 29. The steam-box 27 is closed at the top of the bed-plate, which is thus maintained at a high temperature, and the strip 4 in passing over the same becomes thoroughly heated to assist the operation of the paraffin-coating means 8. In the preferred form of construction the paraffin-coating means 8 consist of a paraffin-reservoir 30, which is open at its top and is secured beneath the bed-plate, as at 31. The paraffin-reservoir 30 is transversely divided by a partition 32, forming a steam-box 33 in the lower part of the paraffin-reservoir, and the steam-box is provided with a steam-coil 34, which may communicate with a main steam-pipe 35, which also communicates with the steam-coil 29 in the steam-box 27 by a branch steam-pipe 36. The pipes 35 and 36 may be provided with cocks 37 to permit control of the coils 29 and 34. A feed-roller 38 is arranged in the paraffin-reservoir 30, and its periphery is so cut away, as at 39, as to apply the paraffin in the reservoir to such predetermined portion of the strip 4 as shall finally constitute the head ends of the complete match-bodies. The feed-roller 38 applies the paraffin to the lower surface of the strip 4, and the upper surface of the same is operated upon by a transverse hollow roller 40, which is heated by an axially-arranged steam-pipe 41. The roller 40 is arranged in vertical alignment with the roller 38, and by its application of heat to the strip 4 serves to "draw" the paraffin through the fiber of the strip. The strip 4 next passes beneath a transverse guide-roller 42, which positively feeds the same to the longitudinal severance means 9. The latter means consist in the preferred form of construction of two transverse gangs of circular saws, an upper and a lower, 43 and 44, respectively, and the same are carried upon transverse rollers 45 and 46, respectively. The rollers 45 and 46 are arranged, respectively, in vertical alignment with a serially and annularly grooved lower roller 47, and a serially and annularly grooved upper roller 48, which rollers receive in their grooved peripheries the toothed peripheries of the respective gangs of circular saws 43 and 44. The saws of both gangs operate upon the strip 4 in the same series of longitudinal lines and effectually divide the strip 4 into a plurality of match widths 49, which pass in close flat serial arrangement beneath a transverse guide-roller 50 and thence to the finishing means 10. The finishing means 10 in the preferred form of construction consist of two series of longitudinally corrugated or fluted transverse rollers 51, each of which series consists of an upper and a lower roller, and the corrugated or fluted peripheries of the rollers 51 are arranged in each series to pass between the several match widths 49 from above and beneath and to symmetrically mold, round, or finish the sides and edges of the match widths. A guide-roller 50^a is arranged between the two series of rollers 51. Between the guide-rollers 50 and 50^a and the fluted finishing-rollers 51 and above the feed-plate are arranged a plurality of aligned vertical guide-plates 52^a, between which the match widths pass after leaving the longitudinal severance means 9 and by which the match widths are guided in their movement forward to the transverse severance means 11. After finishing, each of the match widths 49 enters a separate guide-trough 53, through which it is forced by the on-moving strip 4 to the transverse severance means 11. The guide-troughs 53, as shown in Figs. 1 and 7, alternately diverge, whereby the match widths are presented to the transverse severance means 11 in two horizontal planes, and the match-bodies are correspondingly subsequently presented to the frames 12 for stacking. The transverse severance means 11 in the preferred form of construction consist of two knives or cutter members, an upper and lower, 54 and 55, respectively, which have a relative endwise operative movement transversely of the machine and a combined reciprocating movement longitudinally of the machine, being slidably mounted upon a carriage 56, which, as illustrated in Figs. 1, 3, and 4, is sustained at its ends upon members 57 of the frame sides 2. The upper knife 54 is provided in its lower edge portion and the lower knife 55 is provided in its upper edge portion with a plurality of spaced angular cutting-teeth 58, between which the match widths 49 pass and whereby they are cut into finished match-bodies 60. The cutter members 54 and 55 may be oppositely reciprocated by a suitably-oscillated beam-lever 59, which is pivotally mounted, as at 61, upon the carriage 56 and is operatively connected with the knives 54 and 55 by link arms 62 and 63, respectively. The beam-lever 59 may be oscillated by a spring-retracted plunger 64 and a cam 65, which engages with the end of the same and is mounted upon a longitudinal shaft 66 at one side of the machine. To reciprocate the carriage 56 longitudinally of the machine and alternately in step with the longitudinally-moving match widths, I may employ two beam-levers 67, pivotally mounted at either side of the machine-frame,

as at 68, and each operatively connected at one end with the carriage 56 by a link arm 69. The other ends of the beam-levers 67 may be oscillated by cams 70, fixed to a transverse shaft 71.

The frames 12 are normally stacked in upright position upon a horizontal table 72 at the rear end of the machine and rearwardly of the endless vertically-arranged carrier 13, which successively moves the frames during the filling operation downwardly to the conveyer 14. The endless carrier 13 in the preferred form of construction consists of two parallel link belts 73, which work over upper sprocket-wheels 74 and lower sprocket-wheels 75. The sprocket-wheels 74 are loosely mounted upon an upper transverse shaft 76, which is mounted in upright standards 77. The lower sprocket-wheels 75 are fixed to a lower transverse shaft 78, which is journaled in the side frame members 2. The transverse severance means 11 are arranged between the parallel link belts 73, and the match-bodies 60 are fed directly from the knives 54 and 55 into the frames, which are successively lowered by the rearward downwardly-moving portions of the link belts 73. In the preferred form of construction the endless carrier 13 is intermittently actuated by a cam 79, fixed to the transverse shaft 71, which carries the cams 70. A beam-lever 80, pivoted to the frame 2, as at 81, is oscillated at one end by the cam 79 and by its other end intermittently rotates the shaft 78 by means of a pawl 83, which engages a ratchet 82 upon said shaft 78.

The frames 12 each consist, preferably, as illustrated, of vertically-grooved vertical side pieces 84, between which extend a fixed bottom piece 85, a detachable top piece 86, and a plurality of detachable flat frame members 87, between which in horizontal rows the match-bodies are projected. The frame members may be clamped together by suitable clamping means 12^a, which consist of a tie-rod 12^b, which passes through the top piece 86, and side arms 12^c, which are pivotally connected with the tie-rod, as at 12^d, and are operatively connected with pivoted eccentric locking-heads 12^e, carried by the side pieces 84. The frame members 87 may consist of flat bars or strips of wood or metal, and the same, as well as the top and bottom pieces, are grooved in their engaging faces to form cylindrical bores 88, extending in longitudinal series in the respective lines of connection of the parts, as most clearly illustrated in Figs. 6 and 7. The bores 88 extend entirely through the frame and are flared or of conical form at their forward ends, as at 89, to more accurately receive the match-bodies 60 from the guide-troughs 53. As above stated, the guide-troughs 53 are oppositely projected alternately at their rearward ends, as most clearly illustrated in detail in Fig. 7, and the match-bodies thus enter two series or rows of the bores 88 simultaneously. The series of bores 88 are consequently arranged alternately in

any two adjacent series, as illustrated. As each two adjacent series of bores 88 become filled the endless carrier 13 lowers the respective frame sufficiently to permit a continuation of the filling operation.

The frames 12 are automatically fed forwardly to the endless carrier 13 by tensional means 90, which may consist of weights 91, which are suspended by cords 92, passing over a transverse shaft 93 and connected with a follower or push-frame 94, movably mounted upon the table 72. The follower 94 is preferably connected with the cords 92 by downwardly-projecting extensions 95, which traverse elongated slots 96 in the table 72. The cords 92 may be connected with a winding-drum 97, journaled transversely of the machine. The link belts 73 are provided with spaced fingers or projections 73^a, upon which the frames 12 are carried in the movement of the endless carrier 13, and when a given frame is completely lowered in the filling operation it is received by the conveyer 14 and transferred to the endless horizontally-moving carrier 15. In the preferred form of construction the conveyer 14 consists of two lever-arms 98, which are mounted upon a transverse shaft 99 and are capable of vertical oscillation, whereby their upper ends, which are notched or bifurcated, as at 98^a, may be brought into position to receive lugs 100, formed upon the sides of each frame 12. When a given filled frame is thus imposed upon the conveyer lever-arms 98, the latter are tilted or oscillated rearwardly until the respective frame 12 is deposited rear face downward upon the endless carrier 15. The lever-arms 98 are oscillated at the proper periods in the preferred form of construction by a cam 101, fixed to a transverse shaft 102 and operating in connection with a horizontal connecting-rod 103 which is slidably sustained by the frame 2, as at 104, and is operatively connected at its rearward end with the transverse shaft 99 by a crank 105.

The endless carrier 15 may consist of two spaced parallel horizontal endless link belts 106, which are supported at one end of their path of motion by sprocket-wheels 107, which are fixed to a transverse shaft 108. The link belts 106 are provided with projections or fingers 106^a, which serve to impel the frames 12 rearwardly to the point of deposit of the finished matches.

The match-head-compound-application means 16 are preferably arranged between the vertical planes of the link belts 106 and comprise a reservoir 109, which is supported by lateral trusses or frame members 110. The reservoir 109 is divided transversely by a horizontal partition 111 to form a lower steam-box 112, in which are arranged steam-coils 113, which are fed by a main steam-pipe 114. The steam-box 112 serves to maintain the match-head compound 115 at the proper temperature and consistency. Two vertical plungers 115 operate through stuffing-boxes 116

and guide-tubes 117 in the steam-box and carry at their upper ends a compound-spreader 118, which is dish-shaped in form and whereby the compound 115 is raised at the proper period of operation and applied to the downwardly-projecting ends of the match-bodies in a given frame 12 at the moment of its deposit upon the endless carrier 15. The spreader 118 is provided with side flanges 119, which fit closely about the frame 112, bringing the compound directly upon the ends of the match-bodies, which ends project slightly beneath the respective frame 12, as shown in Fig. 7, being forced into this position by the feed movement of the stock. The plungers 115 are operated by cams 120, fixed to a transverse shaft 121.

To drive the several parts of my machine, I preferably employ a main transverse power-shaft 122, which may be actuated by and disconnected from suitable power-transmission devices 125 by fast and loose-running pulleys 123 and 124, respectively. The several rollers 17, 20, 24, 26, 40, 48, and 51 are all positively rotated in the directions indicated by the arrows and are operatively connected by the longitudinal shaft 66, to which are fixed bevel-gears 127, which intermesh with bevel-gears 128, which are fixed to the several rollers. The shaft 66 is actuated by a short vertical transmission-shaft 129, provided at its lower end with a bevel-gear 130, which meshes with a bevel-gear 131, fixed to the main shaft 122, and provided at its upper end with a bevel-gear 132, which meshes with a bevel-gear 133, fixed to the shaft 66. The roller 43, which carries the gang of knives 45, is driven by a belt 134, which passes about a large pulley 136, fixed to one end of the main shaft 122, and a small pulley 135, fixed to one end of said roller 43. The rollers 17 and 18, 20 and 21, and the two vertical pairs of rollers 51 are geared together in pairs by intermeshing gears 137, whereby the respective rollers of each pair are oppositely rotated. The transverse shaft 71 is rotated in the required direction, as denoted by the arrow, by a gear 138, fixed to the same and intermeshing with the gear 137 upon the lower rearmost roller 51. The roller 46, which carries the gang of knives, is rotated in a direction opposite to that of the roller 43 by a gear 139, fixed to the roller 46 and intermeshing with a gear 140, fixed to the roller 43. The roller 47 is rotated in the direction denoted by the arrow by a gear 141, which is fixed to the same and which intermeshes with a gear 142, fixed to the roller 46. The shaft 121 is provided with a pinion 144, which intermittently meshes with a segment-gear 145, fixed to a transverse shaft 146, and the transverse shafts 146, 108, and 102 are operatively connected by a sprocket-chain 147, which passes about sprocket-wheels 148, 149, and 150, which are fixed, respectively, to the shafts 146, 108, and 102. The shaft 102 is driven by the main shaft 122, being operatively connected with the same by a sprocket-

chain 151, which passes about sprocket-wheels 152 and 153, which are fixed, respectively, to the shafts 102 and 122.

The operation and advantages of my improved match-making machine will be readily understood. The veneer strip 4 is fed continuously forwardly by the several rollers, being veritably actuated by the feed-rollers 17 and 18, and the continuous feed is maintained up to and including the formation of the match-bodies and the stacking of the same in the frames 12. This continuity of feed gives the machine a greater capacity per time unit than the machines in which the operation is intermittent. The stock is then operated upon by the printing means 6, which apply to each transverse portion of the stock which eventually becomes a match-body the predetermined impression, which may be advertising or otherwise. The impression-roller 21 is so formed as to apply the impressions upon the proper longitudinal spaces of the stock. The stock is next fed over the heating means 7, which maintain the bed-plate at a high degree of temperature, and upon which heated bed-plate the stock is firmly pressed by the roller 26, which may, if desired, be independently heated. After being thoroughly heated the stock receives in predetermined portions applications of paraffin by the paraffin application means 8. As the paraffin is affixed only to the head ends of matches, the roller 39, which spreads the same upon the stock, is, as described, so formed in its operative periphery as to apply the paraffin only at the required points. The heated roller 40 operates simultaneously above the stock to draw the paraffin through the fiber of the same and thoroughly prepare the stock for the subsequent application of the match-head compound. The longitudinal-severance means 9 in the succeeding step of the operation divide the stock longitudinally into the match widths, the gangs of saws 45 and 49 thoroughly severing the match widths by operating above and beneath the stock, respectively. The match widths then pass between the several vertical guide-plates 52^a and beneath the rollers 50, being thus firmly maintained in proper longitudinal arrangement while subjected to the operation of the finishing means 10, consisting of the pair of peripherally-grooved rollers 51, which round the match widths into proper symmetrical form by compression. The gangs of saws 43 and 44 operate in connection with the grooved peripheries of the rollers 47 and 48 to initially round and smooth the edges of the severed match widths from above and beneath. This operation is completed by the finishing means 10. By spacing the rollers 45 and 46 slightly farther from the grooved rollers 47 and 48 and by also raising the upper rollers of each of the series of fluted finishing-rollers 51 out of operative contact with the match widths the match widths may pass to the transverse-

severance means in square form and ultimately constitute square instead of round matches. My improved machine is therefore capable of producing square as well as round matches. The paraffined, printed, and finished match widths 149, which are moving toward the frames 12 at a constant speed, are now ready for transverse severance into the match-bodies and enter the troughs 53, by which they are led to the laterally-reciprocating knives 54 and 55, which with the carriage 56 are continuously jointly reciprocated longitudinally of the machine alternately in conjunction with and in opposition to the moving stock. In the former phase of their joint reciprocation the knives are oppositely reciprocated at the proper moment by the cam 65 to cut the match widths into match-bodies. The alternate upward and downward slant of the troughs 53 groups the match widths into two horizontal planes, which relatively separates the same and permits the perfect application of the match-head compound to the same while in the frames 12 without danger of the match-heads forming together or otherwise imperfectly. As soon as the match-bodies are formed they enter the frame 12, which is carried by the endless vertical carrier 13, two rows of the frame being filled at a time and the frame being intermittently lowered by the cam 79. When a given frame is completely filled, it is received by the conveyer-arms 89 of the conveyer 14 and is placed upon the endless horizontal carrier 15, by which it is moved rearwardly to the point of deposit. While upon the carrier 15 the frames, beneath which the ends of the match-bodies project, pass above the match-head-compound-application means 16, which by the rising of the compound-spreader 115 under the timed actuation of the cams 120 spreads the compound upon the head ends of the match-bodies *in transitu*. The raised flange 119 causes the spreader 115 to rise for each application with a full charge of the compound as the spreader is dipped by the cam 120 before each application of the compound. The weights 91 feed the frames 12 successively to the vertical carrier 13.

The entire machine is positive, rapid, and efficient in construction and because of its continuity of operation is capable of a large output per time unit.

I do not desire to be understood as limiting myself to the specific construction and arrangement of parts as shown and described, but reserve the right to vary the same within the scope of my invention and the terms of the following claims.

Having thus described my invention, I claim and desire to secure by Letters Patent—

1. In an improved match-making machine, means for feeding the stock in strip form, means for heating the same, means for applying paraffin to the same at predetermined

points, longitudinal-severance means whereby the stock is divided into match widths, transverse-severance means whereby the match widths are divided into match-bodies, and means for applying the match-head compound to the match-bodies.

2. In an improved match-making machine, means for feeding the stock in strip form, means for applying paraffin to the same at predetermined points, longitudinal-severance means whereby the stock is divided into match widths, transverse-severance means whereby the match widths are divided into match-bodies, finishing means whereby the match-bodies are rounded or finished in form, and means for applying the match-head compound to the match-bodies.

3. In an improved match-making machine, means for feeding the stock in strip form, means for applying paraffin to the same at predetermined points, longitudinal-severance means whereby the stock is divided into match widths, transverse-severance means whereby the match widths are divided into match-bodies, and means for applying the match-head compound to the match-bodies.

4. In an improved match-making machine, means for feeding the stock in strip form, means for printing predetermined parts of the same, means for applying paraffin to predetermined parts of the same, longitudinal-severance means whereby the stock is divided into match widths, transverse-severance means whereby the match widths are divided into match-bodies, and means for applying the match-head compound to the match-bodies.

5. In an improved match-making machine, means for feeding the stock in strip form, means for applying paraffin to predetermined portions of the stock, means for reducing the stock to match-bodies, and means for applying the match-head compound to the match-bodies.

6. In an improved match-making machine, means for feeding the stock in strip form, means for printing the stock in predetermined portions, means for applying paraffin to predetermined portions of the stock, means for reducing the stock to match-bodies, and means for applying the match-head compound to the match-bodies.

7. In an improved match-making machine, means for feeding the stock in strip form, means for applying paraffin to predetermined portions of the stock, means for reducing the stock to match-bodies, finishing means whereby the match-bodies are rounded or finished in form, and means for applying the match-head compound to the match-bodies.

8. In an improved match-making machine, means for feeding the stock in strip form, means for reducing the stock to match-bodies, a plurality of frames in which the match-bodies are received, a vertical carrier by which the frames are moved successively across the path of movement of the stock in

position to receive the match-bodies, means for successively feeding the frames to the vertical carrier, a horizontal carrier by which the filled frames are successively moved to a point of deposit, and a conveyer by which the frames are successively transferred from the vertical carrier to the horizontal carrier.

9. An improved match-making machine, comprising means for feeding the stock in strip form, printing-rollers between which the stock is passed and whereby the stock is printed in predetermined portions, means for heating the stock, a paraffin-roller whereby paraffin is applied to predetermined portions of the heated stock, a gang of rotary saws whereby the stock is divided into match widths, fluted finishing-rollers between which the stock is passed and whereby the match widths are rounded in form, means for dividing the match widths into match-bodies, and means for applying the match-head compound to the match-bodies.

10. In an improved match-making machine,

means for feeding the stock in strip form, means for applying paraffin to predetermined portions of the stock, means for dividing the stock into match widths, finishing means whereby the match widths are rounded in form, and means for dividing the match widths into match-bodies.

11. In an improved match-making machine, means for feeding the stock in strip form, means for heating the stock, means for applying paraffin to predetermined portions of the stock, means for dividing the stock into match widths, finishing means whereby the match widths are rounded in form, and means for dividing the match widths into match-bodies.

In testimony whereof I have signed my name in the presence of the subscribing witnesses.

JOSEPH DELA MAR.

Witnesses:

JOHN H. DELA MAR,
RAYMOND J. BLAKESLEE.