

J. P. WRIGHT.  
MATCH MACHINE.

APPLICATION FILED JUNE 27, 1906.

1,000,223.

Patented Aug. 8, 1911.

4 SHEETS—SHEET 1.

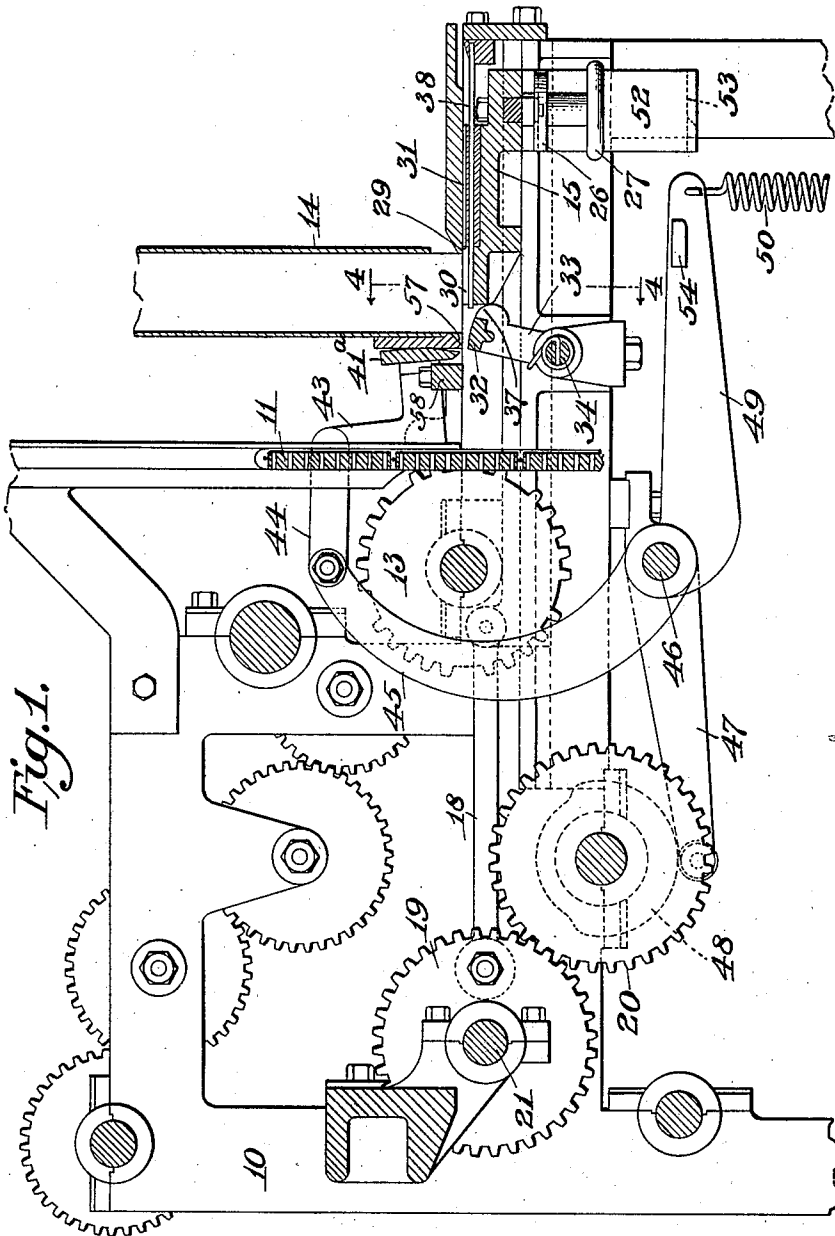


Fig. 1.

WITNESSES:

*James Lord*  
*McHayes*

INVENTOR

*Jacob P. Wright*  
BY *John F. Nolan*  
ATTORNEY

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Fig. 2.

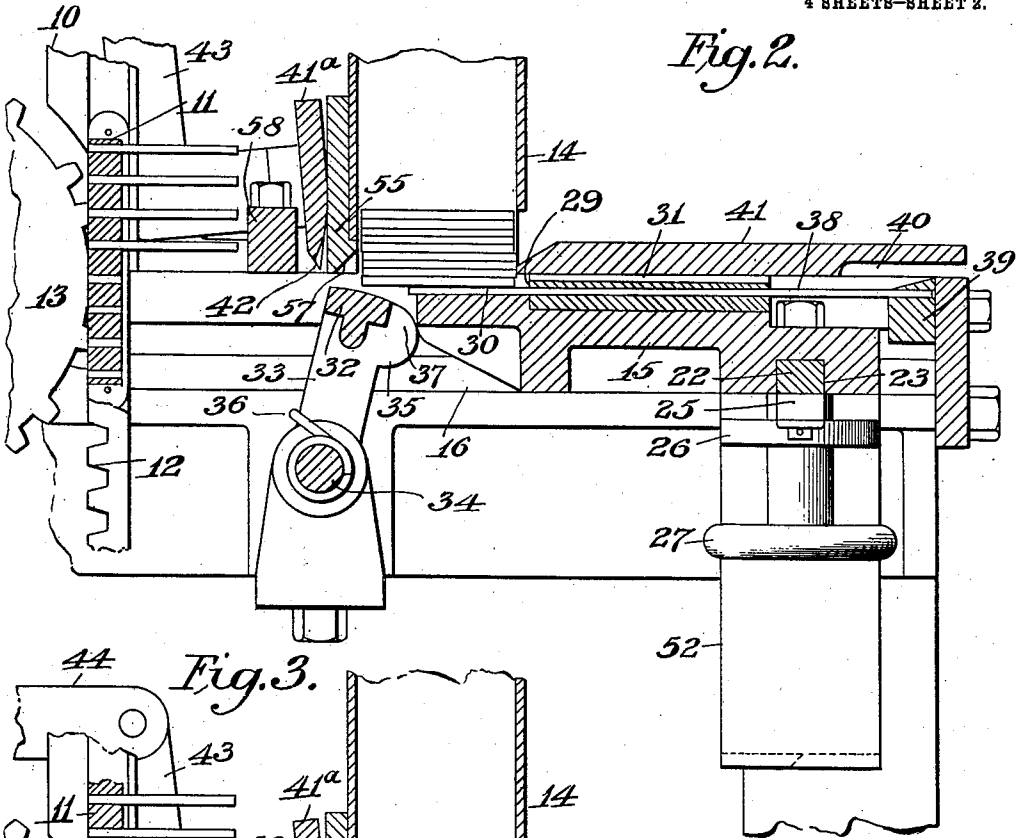
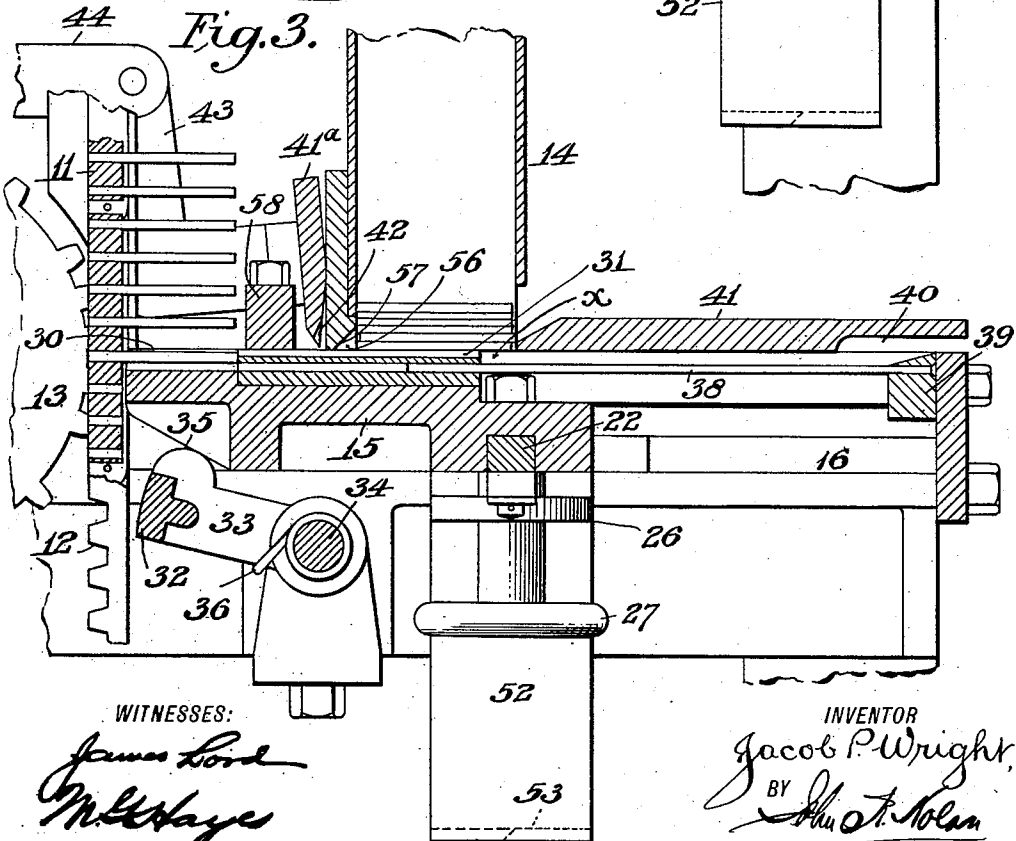


Fig. 3.



WITNESSES:

*James Lord*  
*W. H. Hayes*

INVENTOR

*Jacob P. Wright*  
BY *John T. Nolan*  
ATTORNEY

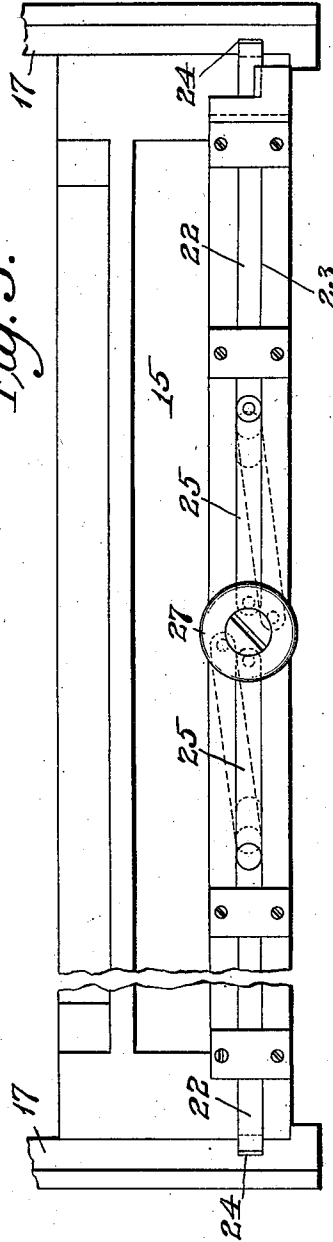
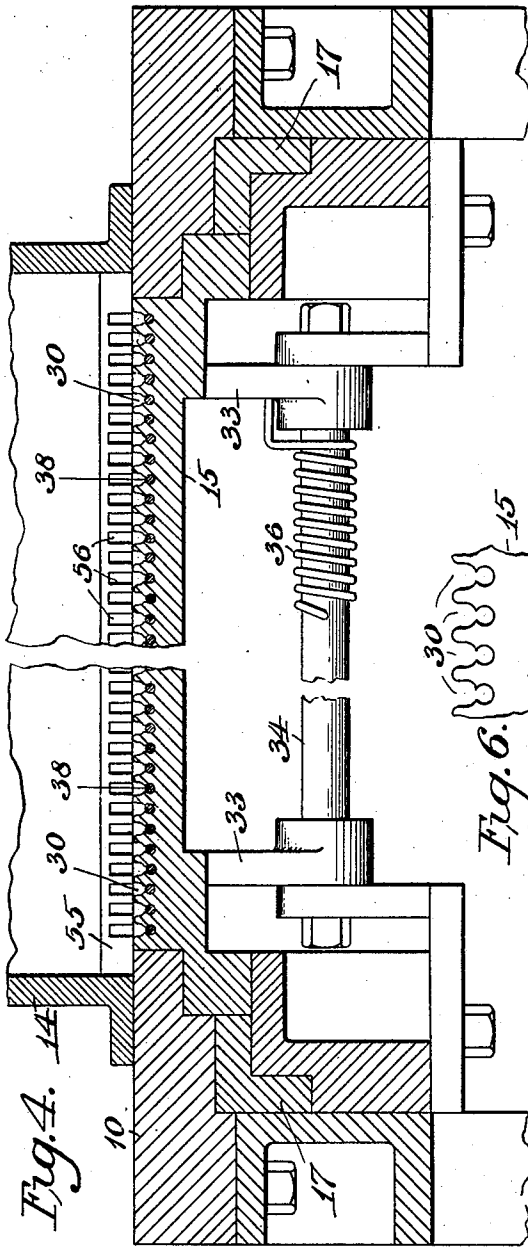
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4 SHEETS—SHEET 3.



WITNESSES:  
*James Lord*  
*McWaye*

INVENTOR  
*Jacob P. Wright*  
BY *She P. Nolan*  
ATTORNEY

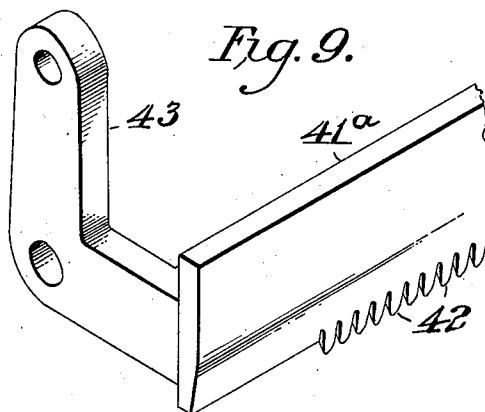
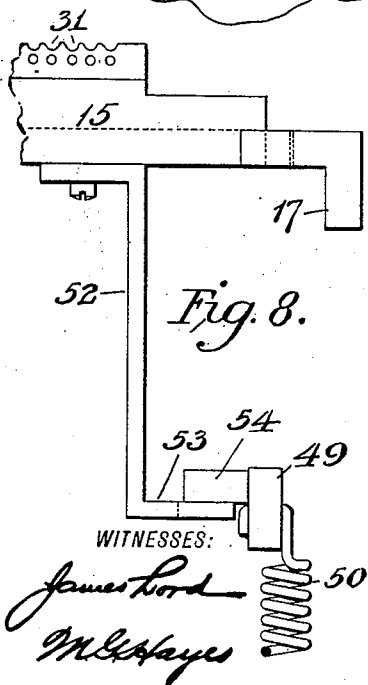
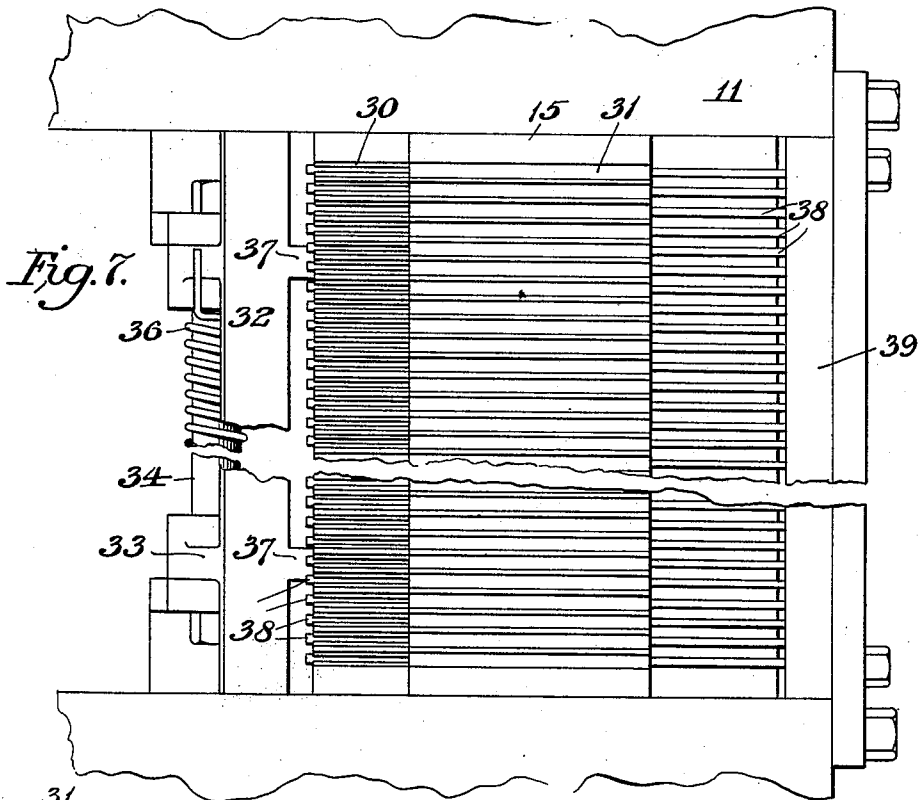
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4 SHEETS—SHEET 4.



*Fig. 9.*  
INVENTOR  
*Jacob P. Wright,*  
BY *John T. Nolan*  
ATTORNEY

# UNITED STATES PATENT OFFICE.

JACOB P. WRIGHT, OF BARBERTON, OHIO, ASSIGNOR TO THE DIAMOND MATCH COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

## MATCH-MACHINE.

1,000,223.

Specification of Letters Patent.

Patented Aug. 8, 1911.

Application filed June 27, 1906. Serial No. 323,565.

To all whom it may concern:

Be it known that I, JACOB P. WRIGHT, a citizen of the United States, and resident of Barberton, in the county of Summit and State of Ohio, have invented certain new and useful Improvements in Match-Machines, of which the following is a specification.

This invention relates to match machines, having reference, more particularly, to that class of machines in which superposed splints are ejected row by row from a magazine or hopper and delivered to an endless traveling carrier by means of which they are transported through appropriate dipping and drying paths for conversion into matches.

The invention has special relation to mechanism for removing the splints from the hopper and setting them in the carrier; my object, primarily, being to provide a simple and efficient construction and organization of devices of the character hereinafter pointed out, whereby broken and short splints, and splints that have become disarranged in the hopper, shall be freely discharged from the machine in a manner to permit and insure the proper disposition of perfect splints in the setting head, and whereby also, such properly arranged splints shall be effectually transferred to the match carrier; thus attaining a more complete and uniform filling of the carrier than formerly.

In the drawings—Figure 1 is a longitudinal vertical section, partly in elevation, of a portion of a match machine embodying my invention, the splint-setting head being shown in its outer or rearward position. Fig. 2 is a similar section through said head and adjuncts, enlarged. Fig. 3 is a like section, showing the parts in the positions they occupy when the head is in its forward or setting position. Fig. 4 is a transverse vertical section, enlarged, as on the line 4—4 of Fig. 1. Fig. 5 is a bottom view of the splint-setting head and its slide bars, showing the device for detachably connecting said head with the bars. Fig. 6 is a detail of the setting head showing the splint-carrying grooves and their waste channels. Fig. 7 is a plan of the splint-setting head, and adjuncts, with the hopper and cap-plate removed. Fig. 8 is a detail of the rearward end of the setting head, showing its depending angle-bar in engagement with the comb-

controlling lever. Fig. 9 is a perspective view of a portion of the clearing comb.

The numeral 10 designates a part of the frame-work of a match machine, and 11 a part of the match carrier thereof. This carrier, in the particular type of machine which I have selected for illustration, comprises an endless chain of plates provided with parallel rows of perforations for the reception and retention of the splints to be treated. These plates are provided along their outer edges with rack-teeth 12 with which mesh gear wheels 13 that are appropriately driven from a suitable source of power, so as to advance the plates intermittently and present their rows of holes successively to the splints to be entered therein.

Suitably supported on the main frame, adjacent the path of the carrier, is the splint-hopper, or magazine 14 within which the splints are arranged in as orderly a condition as possible. Mounted to reciprocate horizontally under and in close proximity to the hopper is a "splint-setting head" 15 by means of which the lowermost splints in the hopper are transferred therefrom row by row to the match carrier. The head is slidingly-fitted to horizontal guideways 16 in the main frame, and is reciprocated therein with timely relation to the movement of the match carrier. Any suitable means for reciprocating the head may be employed. In the present instance, the head is detachably coupled to slide-bars 17 which are mounted to reciprocate in suitable guides on the main frame. These slides are each eccentrically connected by means of a rod 18 with a gear wheel 19 which meshes with a similar wheel 20 on the main shaft. The wheel 19 is carried by a shaft 21 which is mounted adjacent to and in parallelism with the main shaft. (Fig. 1.) The connection between the head and the slide bars comprises a pair of bolts 22 which are slidingly fitted to guide ways 23 in the underside of the bed so as to be movable into and out of engagement with opposing recessed portions 24 of the respective slide-bars 17. The inner ends of the bolts are connected by means of oppositely-disposed links 25 with a crank-disk 26 on a depending hand piece 27 carried by the head. (See Figs. 2 and 5). By turning this hand piece in one direction the bolts are shot into engagement with the

slide-bars; and by turning the hand piece in the opposite direction a reverse action is had so as to disengage them from the slide bars, thereby permitting the latter to reciprocate idly.

The upper surface of the splint-setting head is provided with a series of grooves (preferably with semi-circular bottoms) that run in a direction parallel with that in which the splints lie in the hopper. These grooves extend from end to end of the head, and correspond in number and relation with a transverse row of holes in the match carrier. In the fore part of the head, for a distance somewhat less than the length of a splint, the grooves are cut deeper than in the remaining portion, so as to afford for the inner ends of the splints which are seated in the deeper grooves, a shoulder or abutment 29, whereby, in the forward stroke of the head, such splints are advanced to and forced into the row of holes opposed thereto in the match carrier. The deeper grooves are indicated at 30, and the shallow grooves at 31. During the reciprocation of the head beneath the hopper, the shallow grooves 31 receive the lowermost splints in the hopper and effect their alinement, thus enabling such splints to fall more readily and uniformly into the deeper grooves 30 when the latter are brought below the same, that is to say, the deeper grooves are given a double opportunity to be filled, first, by the introduction thereto of the splints which have been initially seated in the shallow grooves, and next by the superposed splints dropping directly from the hopper into any deeper grooves which have not been previously supplied with splints from the shallow grooves. Arranged to swing in a horizontal arc extending from a point under the forward or splint-exit portion of the hopper to a point near the match carrier, is an oscillating frame, comprising a transverse bar 32 supported at its ends by arms 33 loosely mounted on a transverse shaft 34. The sides of the arms adjacent the head are provided with projecting bearing surfaces, 35, which are maintained yieldingly in contact with the head by means of a suitably-disposed torsional spring 36 on the shaft, and the abutting end of the head is appropriately formed for engagement with such surfaces, whereby, during the forward or setting stroke of the head, the frame is caused to move about a quarter-turn on its axis. The upper surface of the bar 32 is slightly rounded, as shown, and it is so disposed as to receive and support the free ends of the splints projecting from the head, and thereby prevent the tilting and displacement of such ends as the splints are being transferred from the hopper to the match carrier. It is to be noticed that the projecting parts 35 of the arms afford between the bar and the

setting head, an unobstructed space or way, as at 37, which permits the ready escape from the hopper of broken, short and disarranged splints when the head is in its extreme rearward position, as illustrated in Figs. 1 and 2.

The bottoms of the grooves 30 in the forward part of the setting head communicate throughout their length with a corresponding series of parallel holes which are drilled from end to end of the head. Extending freely into and through these holes are rods 38 which are rigidly fastened to a cross-bar 39 bolted to the main frame. In the advance stroke of the setting head it runs partly off the rods, and hence slivers or small pieces of splints, which would otherwise lie in the grooves 30 and tend to displace the splints therein, are permitted to drop into the holes or channels in front of the rods, which slivers, etc., on the return stroke of the head, are forcibly expelled therefrom by the opposing ends of the rods. The holes for the passage of the rods are preferably drilled in a plane tangential, or nearly so, with the bottoms of the grooves 30, and a slot or opening equal in width to about two-thirds the diameter of a splint is cut between each groove and the hole thereunder. (See Fig. 6.) The splint being thus partly supported on the underlying rod, it follows that as the groove recedes from the latter during the advancement of the head to the carrier, such splint is caused to roll slightly and settle into the slot or opening, thereby insuring a more reliable action of the abutment upon the inner end of the splint for its insertion into the match carrier. It will be seen that by the disposition of the slots or openings directly at or beneath the shouldered portions of the grooves, small slivers, etc., which would otherwise lodge and accumulate at the lower corners of the abutments and interfere with the accurate seating of the splint-ends thereagainst, escape by way of said slots or openings. When the head has advanced to its extreme forward or setting position, the rearward end thereof, at the extremities of the shallow grooves 31, extends slightly beneath the hopper, an unobstructed space (as at  $x$  Fig. 3) thus being afforded at the rear side of the hopper to permit the discharge therefrom of broken and disarranged splints. Such splints fall upon the rearwardly-extending portions of the rods 38, and, hence when the head moves rearwardly, the discharged matter is carried back therewith and ejected through an opening 40 conveniently located at the outer end of a cap-plate 41 which covers and protects the setting-head and adjacent parts. The forward end of this plate adjacent the hopper serves to prevent matches from being drawn out at the rear of the hopper during the rearward stroke of the head.

As a simple and efficient means to insure the clearing of short or broken splints from the grooves in the forward portion of the head, during the return stroke of the latter from the carrier to the hopper,—the breaking of weak or cross-grain splints sometimes resulting from the setting impact—I provide a comb-like device which is periodically caused to enter the grooves. This device, in its preferred form, includes a bar 41<sup>a</sup> arranged horizontally adjacent the forward side of the hopper. The lower edge of this bar is provided with a series of depending teeth 42, preferably pointed at their lower ends, which correspond in number, size and relation with the splint-supporting grooves 30 in the setting head, and are adapted, by actuation of the arm, to be moved into and out of the grooves at intervals. The comb-bar is supported by one arm of a bell-crank lever 43 that is pivoted to a bracket on the main frame, the other arm of the lever being connected by means of a link 44 with the upwardly-projecting arm 45 of a tri-armed lever rising from a rock shaft 46, having its bearings in brackets on the main frame. Another arm 47 of this lever extends forwardly, and engages a cam 48 on the main shaft of the machine, while the remaining arm 49 extends, rearwardly below the setting head and is held normally depressed, in opposition to the action of the cam by means of a suitable spring 50. (See Fig. 1.) The contour of the cam 48 is such that when the setting head is making its back stroke, the comb is permitted to descend by the tension of the spring at or about the time the inner shouldered portion of the grooves 30 is directly under the comb. The teeth of the comb thereupon enter the grooves 30 and remain therein until the head has completed its back stroke, thus effectually expelling all splints or pieces of splints from the grooves. The cam then raises the comb and maintains it in position for a succeeding descent at the proper time.

From the foregoing it will be seen that during each rearward stroke of the setting head, the grooves 30 thereof, through the actions of the comb and rods, are thoroughly cleaned for the reception of the succeeding load of splints.

When it is desired, as is sometimes the case, to run the match carrier without the splint-setting operation, the splint-setting head is disengaged from the slide bars, as above described, and then moved to its extreme forward position under the hopper. This necessitates the throwing out of operation of the clearing comb, as otherwise it would come in contact with the shallow grooved portion of the head. I, therefore, affix to the rear end of the head, a depending angle-bar 52, which is provided at its lower extremity with a laterally-projecting lip 53

into the horizontal path of which extends a lug 54 suitably located on one side of the lever arm 49. In the forward movement of the head, when it is released from the slides, the lip 53 passes and comes to rest under this lug, thus preventing the depression of the lever arm by the spring 50 and, perforce, maintaining the comb in its raised position, while the head is quiescent.

Adjacent the lower forward edge of the hopper is a stationary "cut-off" bar 55 which is designed to prevent the splints, excepting those in the grooves of the splint-setting head, from passing out of the hopper during the forward stroke of the head. The lower edge of this bar extends in proximity to the horizontal plane of the grooved upper surface of the head, and has cut in and along its inner corner a series of inclined kerfs 56 which correspond in number and relation with the row of splint-receiving grooves in the head. The bases of the kerfs are at an angle to the path of the splints, as clearly indicated at 57, Figs. 1, 2 and 3, and hence in the advancement of the head, the forward ends of any splints not properly seated therein, are forced downward into place, thus insuring an unobstructed passage from the hopper for the row of splints.

To hold down and steady the splints in their grooves, as they enter and are partly forced into the carrier, a bridge-bar 58 is preferably affixed to the main frame between the hopper and the carrier. This bar is so located in respect to the carrier that when the row of splints has been fully set in the latter, their outer ends are clear of the bar in order that they may freely move upward with the match carrier as it advances and assumes its position for the reception of a succeeding row of splints.

I claim—

1. In a match machine, the combination of a carrier, a splint hopper adjacent thereto, two members movable relatively to each other beneath and from the hopper, and adapted to support the respective ends of the splints, one of said members being movable under and from one side only of the hopper, and the other of said members being movable under and from both sides of the hopper, and having a relatively-fixed abutment for the rearward ends of the splints, and means for actuating said members.

2. In a match machine, the combination of a progressively-moving carrier, a splint-hopper adjacent thereto, a splint-setting member having a relatively-fixed shoulder or abutment on its upper surface and mounted to reciprocate directly beneath the hopper and toward and from the carrier, so as to receive the lowermost row of splints from the hopper and push the row into the

carrier, a splint-end supporting member movable relatively to the setting member and beneath and from the hopper, whereby the splints of proper length are maintained within the hopper by the said members underlying the same, and a space transversely of the hopper provided between said members to afford an open passage for the discharge of broken, short or disarranged splints from the hopper, and means for actuating said members.

3. In a match machine, the combination of a progressively-moving carrier, a splint hopper adjacent thereto, a splint-setting member mounted to reciprocate directly beneath the hopper and toward and from the carrier, the upper surface of which member is provided at its forward portion with a row of parallel grooves of less length than that of a match splint and with relatively fixed shoulders or abutments at the inner ends of said grooves, a splint-end-supporting member movable relatively to the setting member and beneath and from the hopper, whereby the splints of proper length are maintained within the hopper by the said members underlying the same, and a space transversely of the hopper provided between said members to afford an open passage for the discharge of broken, short or disarranged splints from the hopper, and means for actuating said members.

4. In a match machine, the combination of a progressively-moving carrier, a splint hopper adjacent thereto, a splint-setting member mounted to reciprocate directly beneath said hopper and toward and from the carrier, the upper surface of which member is provided with a row of parallel grooves whereof the forward portions are deeper than the rearward portions and are adapted to receive a row of splints from the hopper and transfer them to the carrier, a splint-end supporting member movable relatively to the setting member and beneath and from the hopper, whereby the splints of proper length are maintained within the hopper by the said members underlying the same, and a space transversely of the hopper provided between said members to afford an open space or passage for the discharge of broken, short or disarranged splints from the hopper, and means for actuating said members.

5. In a match-machine, the combination of a carrier, a splint-hopper adjacent thereto, a splint-setting head mounted to reciprocate directly beneath said hopper, said head having a surface to receive and support a row of splints with their forward ends projecting therefrom toward the carrier, and having a relatively-fixed abutment for the rear ends of the splints, means for actuating said head, a splint support movable relatively to the head and adapted to lie normally under

the splint-exit-end of the hopper and between the head and the carrier when the said head is in its rearward position, and means whereby said support is moved toward and from the carrier concurrently with the splint-setting head.

6. In a match machine, the combination of a carrier, a splint-holder adjacent thereto, a splint-setting head mounted to reciprocate directly beneath said hopper, said head having a surface to receive and support a row of splints with their forward ends projecting therefrom toward the carrier, and having a relatively-fixed abutment for the rear ends of the splints, means for actuating said head, a splint support movable relatively to the head and adapted to lie normally under the splint-exit-end of the hopper and between the head and the carrier when the said head is in its extreme rearward position, and to provide a free space or passage between said support and head, and means whereby said support is moved toward and from the carrier concurrently with the splint-setting head.

7. In a match machine, the combination of a carrier, a splint hopper adjacent thereto, a splint-setting head mounted to reciprocate directly beneath said hopper, means for actuating said head, a splint-supporting member movable relatively to said head and adapted to lie under the splint-exit-end of the hopper and between the head and the carrier when the said head is in its rearward position, and to lie below the path of said head when the head is in its forward position, and means for actuating said head and member.

8. In a match machine, the combination of a carrier, a splint-hopper adjacent thereto, a splint-setting head mounted to reciprocate directly beneath said hopper, means for actuating said head, a splint-supporting frame oscillatory in a horizontal arc and adapted normally to lie under the splint-exit-end of the hopper and between the head and the carrier when the said head is in its rearward position, and means whereby said frame is oscillated toward and from the carrier concurrently with the splint-setting head.

9. In a match machine, the combination of a carrier, a splint-hopper adjacent thereto, a splint-setting head mounted to reciprocate directly beneath said hopper, means for actuating said head, a splint-supporting frame oscillatory in a horizontal arc and adapted normally to lie under the splint-exit-end of the hopper and between the head and the carrier when the said head is in its rearward position, said head and frame having contacting parts, and means for maintaining said parts in operative engagement.

10. In a match machine, the combination

of a carrier, a splint hopper adjacent thereto, a reciprocating splint-setting head below said hopper, the upper surface of which head is provided with a row of parallel  
5 grooves which extend from the front end of the head and are of less length than that of a match splint, and with permanent shoulders or abutments at the inner ends of said  
10 grooves, the bottoms of said grooves having narrow slots or openings throughout their length and in proximity to said shoulders or abutments.

11. In a match machine, the combination of a carrier, a splint hopper adjacent thereto, a reciprocating splint-setting head below  
15 said hopper, the upper surface of which head is provided with a row of parallel grooves whereof the forward portions extend from the front end of the head and  
20 are deeper than the rearward portions and are adapted to receive a row of splints from the hopper and transfer them to the carrier, the bottoms of the deeper portions of the grooves having narrow slots or open-  
25 ings throughout their length.

12. In a match machine, the combination of a carrier, a splint-hopper adjacent thereto, a splint-setting head provided with  
30 grooves to receive a row of splints from the hopper and transfer them to the carrier, said grooves communicating with parallel channels immediately below the same, means for actuating said head, and means extending  
35 into said channels for expelling the waste therefrom during the travel of the head.

13. In a match machine, the combination of a carrier, a splint-hopper adjacent thereto, a splint-setting head provided with  
40 grooves to receive a row of splints from the hopper and transfer them to the carrier, said grooves communicating with parallel channels below the same, a series of stationary rods extending freely into said  
45 channels, and means for actuating the head.

14. In a match machine, the combination of a carrier, a splint-hopper adjacent there-

to, a splint-setting head provided with grooves to receive a row of splints from the  
50 hopper and transfer them to the carrier, said grooves communicating by narrow longitudinal slots with parallel channels below the same, a series of stationary rods extending freely into said channels and slots, and  
55 affording a temporary support for the splints in the grooves, and means for actuating said head.

15. In a match machine, the combination of a carrier, means for impelling the same, a splint-hopper, a splint-setting head provided with grooves to receive a row of  
60 splints from the hopper and transfer them to the carrier, means for actuating said head, a clearing-comb, means, including a lever, for moving said comb into and from said  
65 grooves at predetermined intervals, means for disengaging said head from its actuating means, and a supporting member on said head arranged to co-act with a portion of  
70 said lever when the head is disengaged from its actuating means, and thereby lock the comb out of action.

16. In a match machine, the combination of a carrier, a splint-hopper adjacent thereto, a splint-setting head provided with  
75 grooves to receive a row of splints from the hopper and transfer them to the carrier, said grooves communicating with parallel channels below the same, means for reciprocating said head so that the rearward end thereof  
80 passes inwardly beyond the outer side of the hopper during the stroke of the head toward the carrier, a series of rearwardly extending stationary rods upon which said head slides, said rods corresponding with  
85 and entering the channels below the grooves, and a cap-plate covering said head and rods.

Signed at Barberton in the county of Summit and State of Ohio this 23rd day of June 1906.

JACOB P. WRIGHT.

Witnesses:

B. C. Ross,  
F. W. Root.