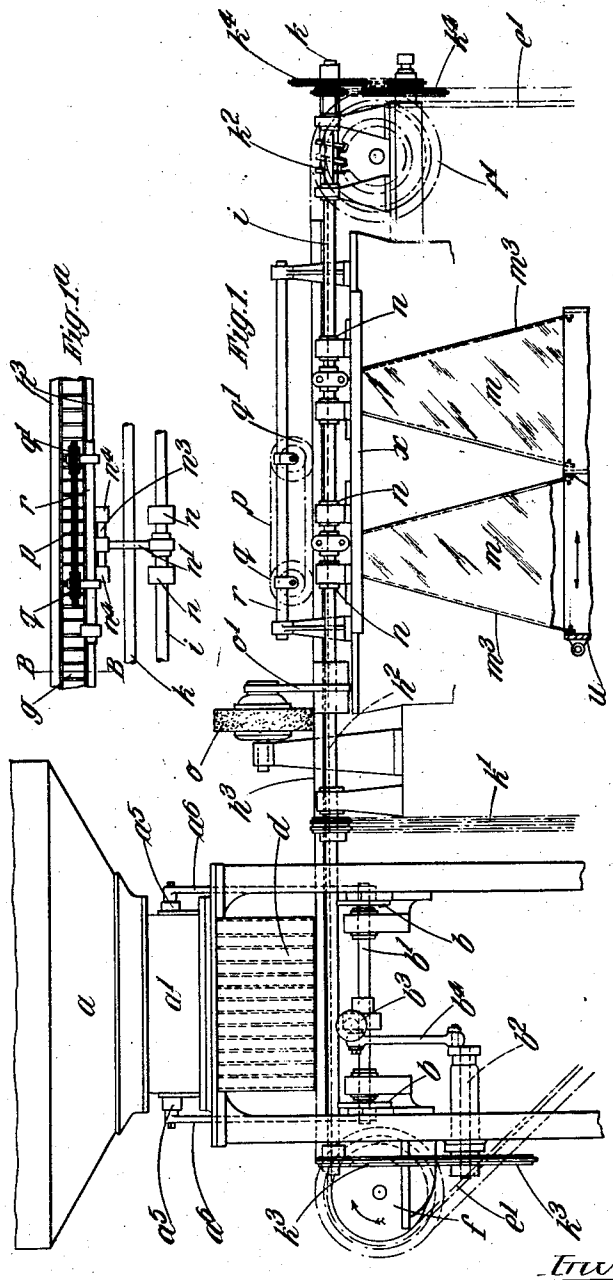
Dec. 7, 1926. 1,609,736

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MATCH MAKING MACHINE OR MACHINE FOR PACKING MATCH SPLINTS

Filed Oct. 23, 1923 5 Sheets-Sheet 1



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MATCH MAKING MACHINE OR MACHINE FOR PACKING MATCH SPLINTS

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Fig. 2.

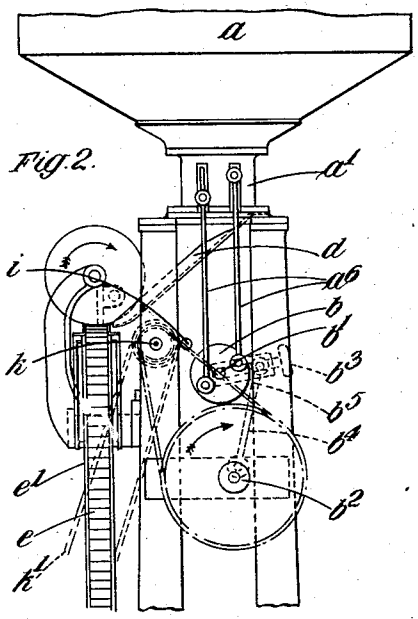
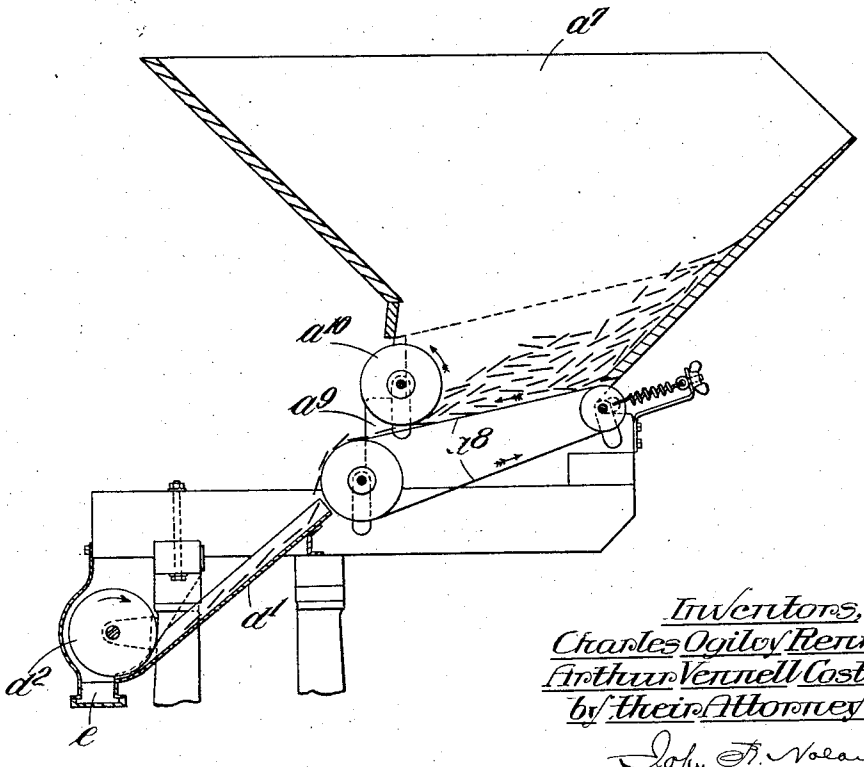


Fig. 6.



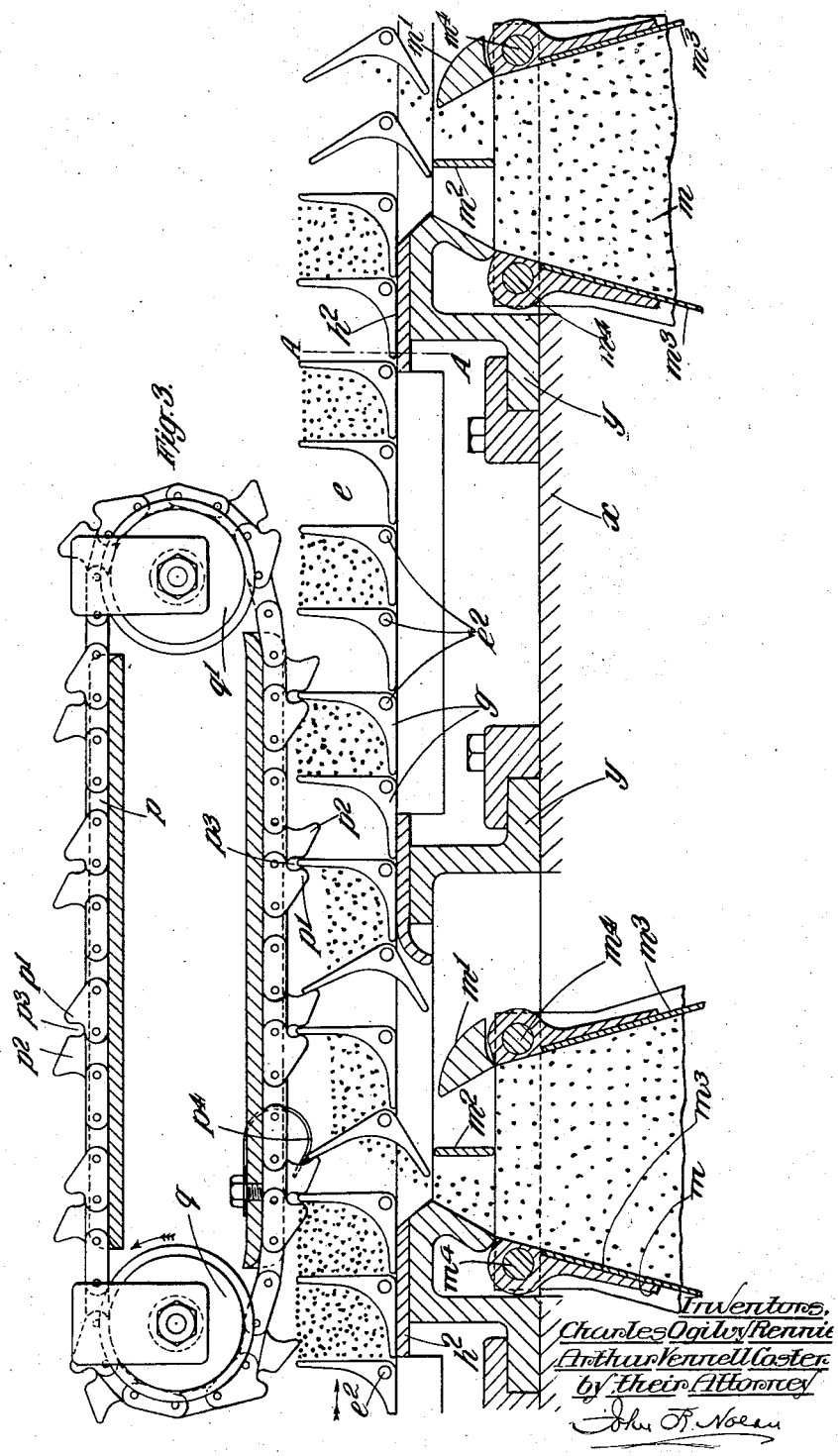
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Fig. 4.

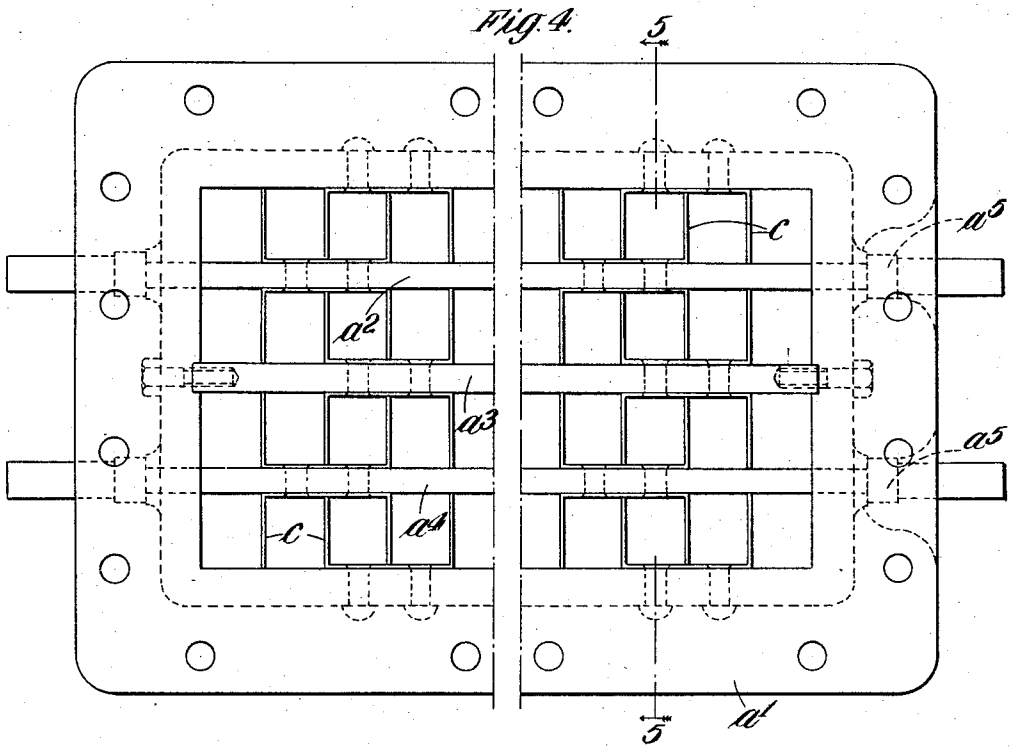
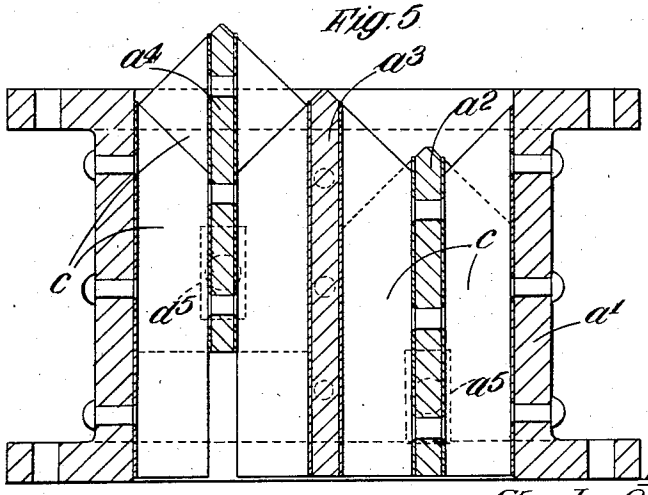


Fig. 5.



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Fig. 7.

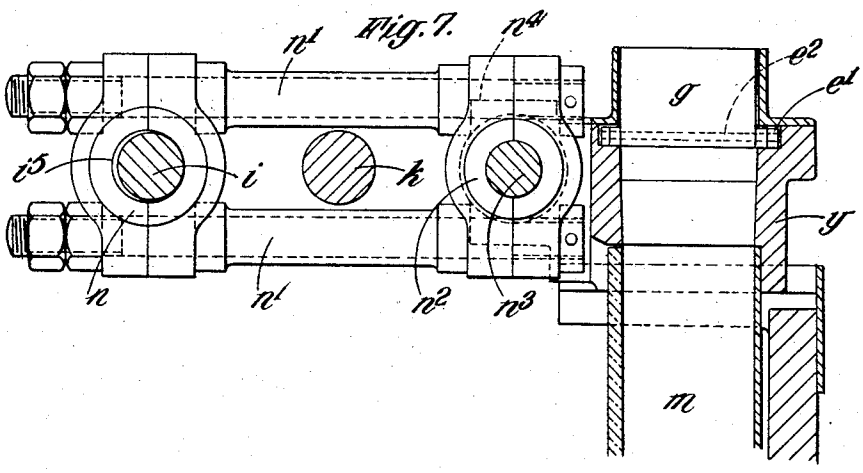


Fig. 8.

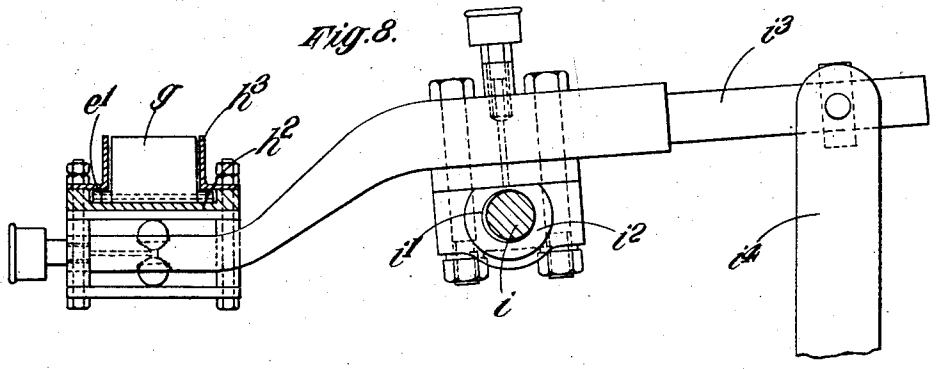
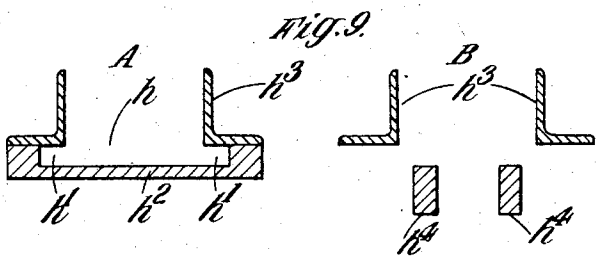


Fig. 9.



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UNITED STATES PATENT OFFICE.

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MATCH-MAKING MACHINE OR MACHINE FOR PACKING MATCH SPLINTS.

Application filed October 23, 1923, Serial No. 670,247, and in Great Britain January 22, 1923.

In dealing with match splints there is required mechanism for first "straightening" the match splints, that is to say, for bringing them all parallel to each other, in order that they may properly be fed into the match making machine in which the splints are tipped with ignition paste, or may be properly packed in cases for transport. Such straightening mechanism is well-known, but there have been certain difficulties in the way of eliminating manual labour in transferring the straightened splints to the hopper or magazine of the match making machine or to the packing case. The chief difficulty is that which exists in maintaining the straightened condition of the splints during the transfer when the latter is purely mechanical.

By this invention this difficulty is overcome by carrying the straightened splints by means of a conveyor to the mouth of a magazine and discharging them into the latter under such conditions that they fall through a distance not appreciably greater than the length of a splint. In this manner they are deposited in the magazine with minimum disarrangement.

The magazine may be that of a match making machine. To ensure their proper feed from this magazine to the match making machine, it has been usual to load them with a weight. By this invention this loading is not necessary owing to the fact that the magazine is constructed in such a manner that its sides are inclined towards each other and are kept in constant vibration. Provision is also made for keeping the magazine fully charged so that the head of match splints does not appreciably vary. To this end the mouth of the magazine may have a suitable overflow; the splints being fed in excess of the requirement, the surplus passes into the overflow to be returned in any suitable manner to the feeding hopper. The proper packing of the magazine may be facilitated by a mid-feather, preferably adjustable, in its mouth.

To facilitate control the front of the magazine may be transparent or have suitable windows, and doors for affording access to the mass of splints may be provided.

A suitable conveyer receives the splints from a preliminary straightening device; this may take the form of a reciprocating or rotary mechanism placed to receive the splints descending by gravity in promiscuous order from the feeding hopper.

The conveyor may consist of an endless chain of compartments or boxes which successively receive splints from the straightening device. To complete the straightening the chain is preferably kept in vibration by suitable mechanism both in horizontal and vertical direction. As each box or compartment arrives above the mouth of the magazine it is automatically opened in such a manner that the straightened splints slide easily on to those already on the magazine.

The accompanying drawings illustrate a machine comprising improved straightening mechanism and a conveyer for carrying the splints and delivering them to magazines of an improved construction belonging to a match making machine.

Fig. 1 is an elevation showing so much of the machine as is essential for explaining the invention. Fig. 1^a is a part plan of Fig. 1.

Fig. 2 is an end elevation of Fig. 1.

Fig. 3 is a vertical longitudinal section through the magazines, showing a part of the conveyor in elevation; it is drawn to an enlarged scale.

Fig. 4 is a plan drawn to an enlarged scale of the device for straightening the splints as they are discharged from a hopper.

Fig. 5 is a section on line 5—5 of Fig. 4.

Fig. 6 is a vertical section through a modified form of straightening device.

Figs. 7, 8 and 9 are detail views.

The splints are fed anyhow into the hopper a. In its broadest terms the straightening device shown in Figs. 1, 4 and 5 comprises a chute containing one or more vertically reciprocating pushers which in their upward movement raise the mass of splints in the hopper and cause the splints to descend one or more vertical cells in the chute, which cells allow only an end-on passage of the splints through them. In the particular form illustrated the rectangular chute a' has three longitudinal plates constituting partitions a^2, a^3, a^4 (Figs. 4 and 5).

The middle partition a^3 is bolted to the ends of the chute and is somewhat taller than the other partitions which are carried

at their ends by pins extending through slots in the ends of the chute and through sliding blocks a^5. The latter are connected by links a^6 (Figs. 1 and 2) with eccentric pins on discs b fixed to a shaft b' which is rocked by a crank shaft b^2 through an angle adjustable by shifting, by means of screw b^3, the position of the pin of the connecting rod b^4 in the slot of lever b^5.

To each side of each partition a^2, a^3, a^4 and also to the sides of the chute a' are riveted sheet metal troughs c the sides of which form transverse partitions in the compartments formed by the longitudinal partitions a^2, a^3, a^4. The relative positions of the troughs are such that alternate transverse partitions in a longitudinal compartment are fixed to one side of the compartment and the remainder to the other side. Thus it happens that when partitions a^2 and a^4 are vertically reciprocated by the mechanism b—b^4 just described, alternate transverse partitions in each longitudinal compartment travel up and down while the others remain at rest. As shown in Fig. 5 the upper ends of those transverse partitions which are movable are inclined downwardly from the longitudinal partition a^2 or a^4 which carries them, while the upper ends of the stationary transverse partitions are inclined in the opposite direction.

It will be seen that at every upward stroke of partition a^2 or a^4 the upper part of this partition and the transverse partitions which it carries tend to push the splints towards the other side of the chute; thus the mass of splints has a perpetual rocking movement which promotes their entry into the cells formed in the chute by the several partitions, this action being aided by the inclined ends of the movable transverse partitions and also, during the return stroke by the inclined ends of the stationary transverse partitions. The dimension of each of the cells in the chute is such that a splint can only travel down the cell with one end considerably lower than the other.

Beneath the chute, a' is an inclined tray d composed of a number of narrow parallel troughs which receive the splints as they issue end-on from the cells in the chute. The splints slide down the troughs and pass into the boxes of the endless chain conveyor e presently to be described. Here they lie substantially parallel to each other owing to the manner in which they have been straightened.

In the modification shown in Fig. 6 the bottom of the hopper a^7 is an endless band a^8 travelling in the direction indicated by the arrows so that it tends to carry the splints out of the discharge opening a^9 of the hopper. This opening is substantially closed by an adjustable roller a^{10} driven in the direction of the arrow and having its periphery so close to the surface of the band a^8 that only a few splints can at any one moment continue their travel with the band. As the splints leave the band they are received by an inclined tray d', similar to the tray d already described, which delivers them to the conveyor e. The delivery may be controlled by a light brush d^2 revolving in the direction of the arrow above the lower end of the trough.

The conveyor comprises parallel endless sprocket chains e' (Fig. 2) connected by pins e^2 (Figs. 3 and 7). The chains pass over sprocket wheels of which two, f, f' are shown in Fig. 1, f' being driven. The pins e^2 are threaded through the angular portion of L-shaped plates g so that they constitute pivots on which these plates can turn. The boxes for carrying the splints are formed when the chain enters a horizontal guide-way h extending between the straightening device and the magazines. The guide-way is shown in enlarged cross section in Fig. 9 where A is a section on line A—A of Fig. 3 and B on line B—B of Fig. 1a. When the chains leave the sprocket wheel f they enter the recesses h' formed between the trough shaped base plate h^2 and the angle iron guide cheeks h^3. The plates g are of width comparable with the distance between the cheeks h^3 (as shown in Fig. 7) and the chamber formed between two adjacent plates g and the cheeks h^3 constitutes the box into which the splints are fed from tray d as the boxes pass this tray, in the manner already described.

The section B is through a part of the guide where there is a gap in the base plate bridged by two bars h^4 for supporting the plates g. The purpose of this is to permit to drop away dust and fragments which are contained in the boxes charged with splints and can escape through the spaces between the plates g and between the latter and the cheeks h^3.

This escape and also the final straightening of the splints in the boxes is aided by vibrating the conveyor both vertically and horizontally. In the present instance these movements are both derived from the same eccentric shaft i, shown in Figs. 7 and 8 (but not to the same scale). The shaft k (Fig. 1) driven through belt k' from a driving shaft (not shown), drives the drum of sprocket wheel f through worm gear k^2 and also, through gear k^3, the crank shaft b^2, already referred to, at the left hand end of Figure 1. At the right hand end, the shaft k drives through reduction gear k^4 the eccentric shaft i.

Referring to Fig. 8 at a suitable place on this shaft i an eccentric portion i' revolves in a bush i^2 carried by a lever i^3 which is pivoted at one end to an oscillating link i^4, mounted on the frame of the machine, and

engages at the other end beneath the base plate h^2. In this manner the guide-way receives a constant vertical vibration of short amplitude.

Referring to Fig. 7, the mechanism which produces the horizontal vibration of the conveyor serves also to vibrate the magazines m (Figs. 1 and 7). A second eccentric portion i^5 of shaft i revolves in a bush n carried by rods n' which connect it with a second bush n^2 adapted to turn on a short shaft n^3 carried in brackets n^4 (Fig. 7) which spring from the casting y. This casting slides on the plate x and constitutes the mouth of the magazine. The upper part of this casting is in the same plane as the plate h^2 and fills a gap in that plate. The sides m^3 of the magazine are suspended on bolts m^4 carried by casting y. Thus the vibration of the shaft n^3 is communicated to both the conveyor and the magazine.

The vibration of the sides m^3 of the magazine which allows the elimination of the weight on the splints as hereinbefore stated, is due to their engagement with the known vibrating frame n which is a part of the usual match making machine.

From the foregoing it will be understood that the conveyor boxes are successively filled with more or less straightened splints as they pass the inclined plate d and are further straightened in the boxes by the constant vibration of the guide-way and therefore of the conveyor chain. Since the boxes are liable to be fuller than is desirable there is provided a revolving brush o (Fig. 1) driven from shaft k by belt o' which brushes the excess splints from each box into a chute (not shown) whence they are collected by a conveyor and returned to hopper a.

Having passed the brush the boxes are ready to be discharged into the magazines m of which two are shown in this example. The important point about this discharge is that the straightened splints should fall through a distance not appreciably exceeding the length of a splint before they come to rest in the magazine and to achieve this end the rate at which the boxes are discharged is adjusted in comparison with the rate of withdrawal of the splints from the magazine so that either the level of the splints remains substantially constant at the desired distance or there is a constant overflow of splints from the magazine the mouth of which is at the desired distance.

Referring to Fig. 3, as each plate g passes over the mouth of the magazine m it turns on its pin e^2 and the splints are discharged. To make this action more positive any suitable tripping device may be used. In the case shown, in order that the conveyor may serve two magazines there is provided a device which permits only each alternate box to be discharged into the first magazine, the remainder being retained full for discharge into the second magazine.

In the case shown (Fig. 3) this device consists in a suitably guided endless chain p free to travel over pulleys q q' mounted on brackets carried by a bar r. Certain pairs of adjacent links of the chain are shaped to form fingers p', p^2, having a gripping opening p^3 between them; the distance between these pairs is identical with the distance between alternate plates g. Since there is always a number of the plates g engaged with a number of these openings p^3 (as shown in Fig. 3) the chain p travels at the same rate as the conveyor. When a pair of fingers travels over the pulley q the fingers move apart somewhat and come together again at the moment when plate g arrives beneath the axis of the pulley; thus the plate g engages in the opening p^3 and is thereby prevented from tipping when it arrives at the gap in the base plate h^2, but is carried forward to be tipped when it arrives at the second magazine. The alternate plates g do not become engaged with the chain but each is tripped by a light spring p^4 so that it falls against the finger p^2 belonging to the pair that engages the next following plate g. The splints are thus discharged and the plate g carried past the spring p^4 by the finger p^2 until it is again righted by the base plate h^2 of the guide-way.

The forward edge of the mouth of the magazine m is rounded as at m' (Fig. 3) to facilitate overflow of splints into a chute (not shown) for conveyance back to hopper a. The mid-feather m^2 in the mouth of the magazine ensures better packing by preventing accumulation of discharged splints at one side of the magazine.

Having thus described the nature of the said invention and the best means we know of carrying the same into practical effect, we claim:—

1. The combination with a splint supply hopper, of splint straightening means into which splints are delivered by the hopper, said means comprising a chute having partitioning members therein affording vertical cells, each of which in cross-section is of less length and of less width than the length of a splint, the alternate members being vertically reciprocative to effect the raising of the splints in the hopper, and means for actuating said reciprocative member.

2. The combination with a splint supply hopper, of splint straightening means into which splints are delivered by the hopper, said means comprising a chute, vertical partitions therein having trough-like members subdividing the interior of the chute in cells, each of which in cross-section is of less length and of less width than the length of

a splint, and means for vertically reciprocating alternate partitions.

3. The combination with a splint supply hopper, of splint straightening means into which splints are delivered by the hopper, said means comprising a chute, vertical partitions therein, trough-like members fast on adjacent partitions and relatively arranged one within the other to provide rectangular cells, each of which in cross-section is of less length and of less width than the length of a splint, and means for vertically reciprocating alternate partitions and their trough-like members.

4. The combination with a splint supply hopper, of splint straightening means into which splints are delivered by the hopper, said means comprising a chute, vertical partitions therein having trough-like members subdividing the interior of the chute in cells, each of which in cross-section is of less length and of less width than the length of a splint, the upper ends of the said members of alternate partitions being of A-form, and means for vertically reciprocating the said alternate partitions and their trough-like members.

5. The combination with a splint supply hopper, of splint straightening means into which splints are delivered by the hopper, said means comprising a chute, vertical partitions therein, trough-like members fast on adjacent partitions and relatively arranged one within the other to provide rectangular cells, each of which in cross-section is of less length and of less width than the length of a splint, the upper ends of the said members of alternate partitions being of A-form, and means for vertically reciprocating the said alternate partitions and their trough-like members.

6. The combination with means for supplying splints, of a conveyer comprising a chain of pivotally mounted supporting members, means for maintaining said members normally positioned to provide a succession of receptacles into which the splints are progressively delivered by the splint supply means, a conveyer guide having spaced-apart discharge openings over which the said members progress, and means to prevent the tilting of each alternate element as it passes over the first opening and progresses toward the second opening.

7. The combination with means for supplying splints, of a conveyer comprising a chain of pivotally mounted supporting members, means for maintaining said members normally positioned to provide a succession of receptacles into which the splints are progressively delivered by the splint supply means, a magazine below the path of the said receptacles after they leave the supply means, and an endless chain of spaced-apart grippers overlying the path of travel of the conveyer and adapted to engage the alternate members of the conveyer and prevent their tilting as they approach and pass over the magazine.

8. The combination with means for supplying splints, of a conveyer comprising a chain of pivotally mounted angular members, a guide-way upon which the upper run of the conveyer is supported so as to maintain said members positioned to provide a succession of receptacles into which the splints are progressively delivered by the splint supply means, said guideway having an opening therein beyond the supply means, a magazine located beneath said opening, means for tilting the alternate angular members as they approach and pass over the opening into the guide-way, and means to prevent the tilting of the remaining members during such passage.

9. The combination with a source of splint supply, of a conveyer comprising a succession of box-like members into which the splints are progressively delivered in parallelism from the source of supply, each of said members being operable to release its contents at a location beyond the source of supply, means for impelling the conveyer, a magazine located beneath the path of the conveyer, means for actuating the alternate members to discharge their contents into the underlying magazine, means to maintain the remaining members in closed position during their progress over the magazine and mechanism for simultaneously vibrating the travelling conveyer and the magazine.

10. The combination with means for supplying splints, of an elongated guide trough having a bottom opening spaced from the source of supply, an endless conveyer mounted to travel along said trough and comprising a chain of pivotally-mounted angular members normally positioned adjacent each other to provide a succession of receptacles into which the splints are delivered so as to lie transversely of the trough, said members being tiltable over the opening of the guide trough to permit the discharge of splints from the receptacles.

11. The combination with means for supplying splints, of an elongated guide trough having two bottom openings therein spaced from the source of supply and from each other, an endless conveyer mounted to travel along said trough and comprising a chain of pivotally-mounted angular members normally positioned adjacent each other to provide a succession of receptacles into which the splints are delivered so as to lie transversely of the trough, and means to prevent the tilting of each alternate member as it passes over the first opening and progresses toward the second opening of the trough.

12. The combination with means for supplying splints, of an elongated guide trough

having two bottom openings therein spaced from the source of supply and from each other, an endless conveyer mounted to travel along said trough and comprising a chain of pivotally-mounted angular members normally positioned adjacent each other to provide a succession of receptacles into which the splints are delivered so as to lie transversely of the trough, an endless chain of spaced-apart grippers overlying the path of travel of the conveyer and adapted to engage the alternate members of the conveyer and prevent their tilting as they approach and pass over the first opening of the trough and to release said alternate members before they reach the second opening of the trough.

In testimony whereof we have signed our names to this specification.

CHARLES OGILVY RENNIE.
ARTHUR VENNELL COSTER.