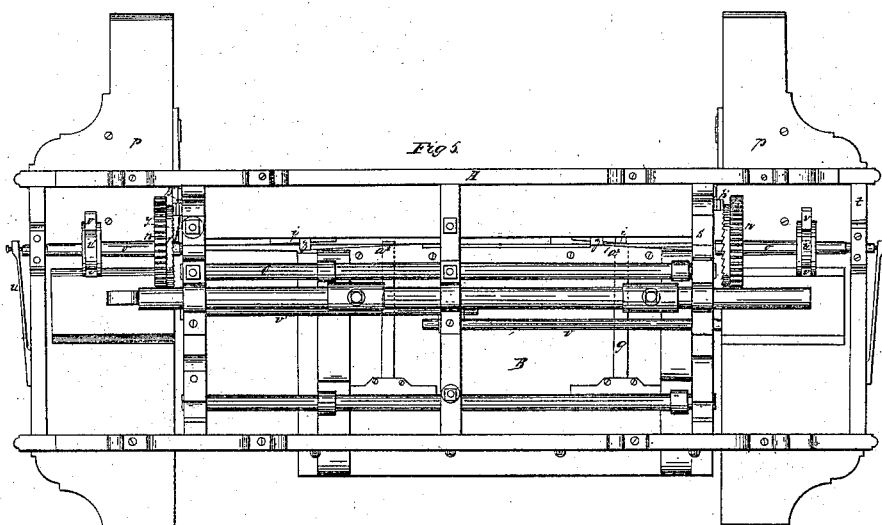


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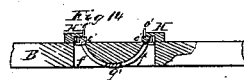
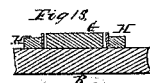
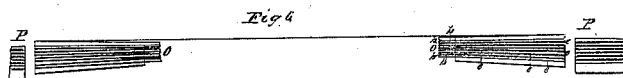
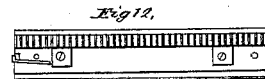
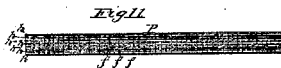
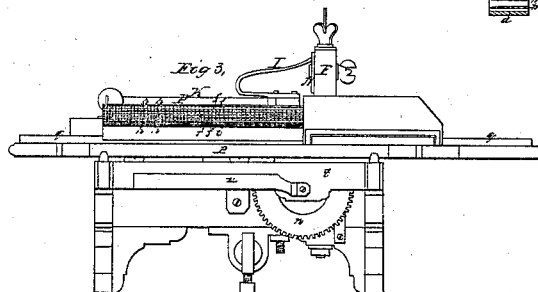
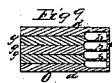
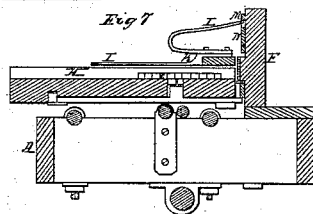
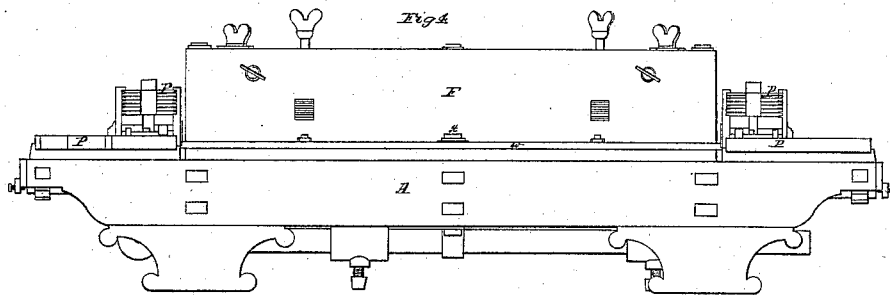


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Making Matches,

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No. 4,013,

Patented Apr. 26, 1845.



UNITED STATES PATENT OFFICE.

ASA FESSENDEN, OF TEMPLETON, AND LUKE L. KNIGHT, OF BARRE, MASSACHUSETTS.

MACHINE FOR MAKING MATCH-SPLINTS AND ARRANGING THEM IN DIPPING-FRAMES.

Specification of Letters Patent No. 4,013, dated April 26, 1845.

To all whom it may concern:

Be it known that we, ASA FESSENDEN, of Templeton, and LUKE L. KNIGHT, of Barre, in the county of Worcester and State of Massachusetts, have invented a new and useful machine for making these splints or sticks of phosphorus or sulfur matches, and for inserting them in frames ready to be dipped in the sulfur or compositions or mastic to be applied to their extremities, of the construction and operation of which machine the following description and accompanying drawings taken together constitute a full and exact specification.

Figure 1, of the above mentioned drawings, represents a top view of our machine. Fig. 2, is an elevation of the front side. Fig. 3 is an end elevation. Fig. 4 is an elevation of the rear side. Fig. 5 is a view of the machine as it appears when turned bottom upward. Fig. 6, is a vertical and longitudinal section taken through the cutters and the passages leading therefrom, as will be hereinafter described. Fig. 7, is a transverse vertical section taken through the center of the path of one of the blocks or pieces of wood, from which the match splints are to be cut. Such other figures as are necessary to a full description of the mechanism are hereinafter referred to and described.

The operative parts of the machine are, generally, sustained by a suitable frame, A. The said machine as exhibited by the drawings, is intended to separate matches from the blocks of wood, and insert them in two dipping molds or frames. A carriage or table (B, Figs. 1, 2 &c.) is supported upon guide rails, C, C, in such manner as to be capable of being moved from right to left, and left to right, alternately, which operation is to be performed, either by means of manual power applied to a lever, connected to the carriage by a connecting rod, or by any other power and mechanism applied to the carriage, so as to impart to it the reciprocating rectilinear movement requisite to its operation.

Directly in the rear of the carriage, a board F is set up vertically the said board serving to sustain the cutters and other parts to be described. Each block of wood (G) from which the match splints are to be severed, is supported on the upper surface of the carriage (B,) and between two ver-

tical and parallel guides (H, H). It is pressed down upon the carriage, by a spring (I), which projects from a frame K, which is hinged or jointed to the carriage as its ends, *a, a*, in such manner as to be capable of being turned on its hinges, from a horizontal into a vertical position. Directly over each of the springs (II) before mentioned, is another bent spring L, one end of which is secured to the frame K, while the other enters into a curved groove or passage M, formed in a plate of metal N, as seen in Fig. 1, the said plate of metal being secured to the front side of the board F before mentioned, and having adjusting screws adapted to it, by which its position upon the board may be changed, as circumstances may require.

Underneath the plate N, and inserted in and projecting from, the board F, are the series of cutters O O, there being one series to each block, and each being placed on a level with its block, and projecting from the front of the board F, a distance equal, or about equal, to the thickness of each match splint. A front view of each series of cutters, is given on an enlarged scale in Fig. 8, and a vertical and longitudinal section of them, in Fig. 9, and another vertical, but transverse section in Fig. 10, each of the said series being composed of thin horizontal plates, *b, b, b*, arranged parallel to each other, at equal distances apart, and united at their front ends to a thin vertical plate C. The edges of the said plates, which are first brought in contact with the block of wood, are to be rendered sharp, so as to readily cut into it.

The several knives are placed between horizontal plates *d d*, which are placed at a distance apart from each other, equal to the thickness of the block from which the match splints are to be severed. From each of the spaces, between either two consecutive horizontal knives, or between the upper and lower knives and the plate just above and below them, respectively, one of a series of divergent passages *e, e, e*, &c., extends laterally as seen in Fig. 6, each of the said passages being square in its cross section, and of a size in said section, just sufficient to receive a match splint. The said passages are intended to communicate, or come directly opposite and in line with others, (viz. *f, f*, &c.) formed through one of two blocks

or dipping frames, (P, P), as seen in Figs. 6 and 11, the latter being a longitudinal section of one of the dipping frames. Each of the several plates or knives, extends from
 5 one of a series of thicker plates g, g, g , which are laid upon one another and properly riveted or otherwise confined together, the block of knives so formed, being inserted in the board F. The dipping frames
 10 may be made, simply of wood or other suitable material, having vertical and parallel ranges of holes bored through them transversely, and at equal distances apart, the holes of each range being also at equal and
 15 such distances apart, in vertical directions, as when each range is successively brought in opposition with the range of passages, e, e , to form, as it were, continuations of said passages through the dipping frame;
 20 whereby, at the match splints are successively forced through and out of the passages e, e , &c., they may enter and pass into the receiving passages of the dipping frame.

For the sake of convenience of removal
 25 of the match splints, or of confining them in the frames, the said frames may be composed of a series of thin boards, or plates of wood, h, h, h , laid upon one another and upon a carriage i ; each of the said boards,
 30 (excepting the upper and lower ones), having the receiving passages cut transversely, and partly in its upper and under surfaces. The ends of the several boards are to have rectangular notches, k, k , cut in them, which
 35 receive upright studs, l, l , projecting from the carriage i , and are thereby kept in place upon the said carriage.

The carriage i , is to be regularly and progressively moved forward or toward the
 40 front of the machine, as the match splints are formed. For this purpose a rack (m) of teeth (see Fig. 12, which denotes a view of the lower side of the carriage i), is attached to its lower side, as seen in Fig. 12,
 45 the said rack engaging with a toothed pinion (n), of a horizontal shaft (o) arranged underneath the board or table (p), on which the carriage rests and moves upon rails
 50 (q, q).

A ratchet wheel (r), is arranged upon the shaft, by the side of the cogged pinion (n) as seen in Fig. 5, and the journals of the shaft (o) are sustained in bearings formed in the cross ties, s, t , of the frame A. A
 55 spring, u , acts against the outer end of the shaft (o), in order to press it in a direction toward the center of the machine, and to allow it to recede, whenever necessary. A grooved pulley or wheel u' is fixed upon the
 60 shaft, in the groove of which a projection v , from the underside of the board (p) rests.

Each of the boards p, p , has a rod v extending from it toward the center of the machine, and passing through bearings of
 65 the framework, in such manner as to allow

of the rod running or sliding in the direction of its axis, the object of the said rod, being, simply, to steady the board (p), when moved laterally from or toward the center of the machine.

A long lever (w), is arranged horizontally in rear of the board (E), and turns or vibrates on a fulcrum, (x) at its center. Each of its ends has a spring pall, click or arm (y), extending from it toward,
 75 and so as to come in contact with, the teeth of the ratchet wheel r , before mentioned; and it is by the reciprocating vibrating movement of the said lever, that the ratchet wheel is turned, and the dipping frame
 80 regularly and progressively moved in the manner as hereinbefore explained. The said vibrating movement of the said lever, is produced in the following manner. On each side of the center of the lever, and
 85 about midway between it and the end of the lever, one of two arms (z, z), is jointed, the said arm extending through the board (F), (that is,—through an opening or slot of the same), as seen in Fig. 5, and so
 90 as to abut against one of two inclined planes a^1, a^2 , fixed in the carriage B. Therefore, when the carriage (B) is moved toward the right or left, one of the inclined
 95 planes a^1, a^2 causes one end of the lever (w) to recede from the board, (F) and the other to advance toward it. The one that advances, will therefore turn the ratchet wheel which is in contact with its spring arm (y),
 100 around, so as to cause the dipping frame to advance, or move the necessary distance, to present an empty vertical range of its holes to be filled, at the next movement of the carriage (B,) toward it.

The ratchet wheel is prevented from turning around, when not acted upon by the spring arm (y), by being pressed by the spring which acts at the outer end of its shaft, against a fixed stud (d'), which is placed so as to enter between any consecutive teeth of it, which may be brought
 110 around so as to receive it. Both of the said studs are represented in Fig. 5. The next portion of the machinery, is that by which the blank or blocks of wood, are regularly
 115 and progressively forced or moved forward against the front face of the board (F), as fast as the match splints are cut from them. Each of the blocks of wood moves within the path or space between parallel
 120 guides (H, H), and are grasped at their sides by notched or toothed bars, or pieces of metal ($c' c'$)—see Fig. 13, which is a horizontal section taken through the center
 125 of one of the blocks, and the parallel guides between which it moves. Each of the toothed pieces rests, at the central part of its rear or untoothed side, against the middle part of a curved or bent spring (d'), as seen in the drawing, while its ends are
 130

borne by the said bent spring, against the front plate (e') of the guide H.

The teeth on the piece (c') should project through the plate (e'), so as to bear 5 against the side of the piece or block of wood, and they should be shaped in the manner and pointing in the direction, as seen in the drawing. Each of the said toothed pieces is jointed at the center of its lowest 10 side, to one of two curved arms f', f'' , which projects from a horizontal bar g' , as seen in Fig. 14, which represents a vertical section of the arms, and a portion of the carriage, etc., over them. The said bar g' is 15 arranged on the underside of the carriage, and so as to move forward and backward in the direction of its length. It is forced toward the board (F,) by a spring (h'), (represented in Fig. 5, by dotted lines) and 20 in the opposite direction by one of two inclined planes (i', i''), applied to and extending from the board F as seen in Fig. 5. Consequently, when one of the said inclined planes pushes the bar g' in a direction away 25 from the board (F), the toothed pieces (c', c'') of each block will be slipped along the sides of said blocks, while the block is kept down upon its carriage, or from retreating, by the spring (I,) before mentioned, which is at such time, borne down 30 upon it, by the spring over it, and the curved groove before described. When the carriage (B,) moves in the opposite direction, the spring (h') throws the block up 35 against the board (F). Thus, each block of wood is alternately acted upon by its mechanism, and as it is moved sideways, is brought in contact with the cutting knives and has a series of match splints removed 40 from it, all of which, as fast as formed, are forced through the passages leading from the cutters to the dipping frames—the match splints, the one of each of the passages, pressing forward or out of the passage— 45 that—in advance of it, and into the dipping frames, as it may be requisite for them to be supplied. As fast as one of the dipping frames is filled, it may be removed, and another or empty one substituted or 50 put in its place to be filled in its turn, and they may be made to follow, the one after the other, as circumstances may require.

When filled with match splints, each frame is ready for the dipping operation as usually practiced. The mode heretofore 55 adopted to fill the frames with splints, has been by the hand alone, which has been both a tedious and costly operation.

In conclusion, from the above it will be seen, that our machine as it cuts the match 60 splints and arranges them in the dipping frames, is a great improvement on what has been before adopted to accomplish such ends.

We shall therefore claim—

1. The combination with the series of cutters (O), the passages $e e$ &c., leading from 65 the cutters—whether there be one or more series of said cutters and passages; the whole being for the purpose of making match splints from a block or blocks, as described. 70

2. Also, the combination with the aforesaid cutters and passages, of one or more dipping frames, arranged and operating with respect to them, substantially as hereinbefore described. 75

3. Also, our improved manner of making the dipping frames—viz,—in sections of separate pieces or plates (h, h, h) as described. 80

4. Also, the combination of mechanism, by which each of the blocks of wood is held down upon the carriage (B.), and progressively forced forward against the board (F); the said mechanism being applied to 85 the carriage (B.), and board (F), and constructed and operating together substantially as herein before set forth.

5. Also, the combination of machinery, by which the dipping frames are progressively moved forward, the said machinery 90 being connected with, and intervening between, the carriage (B) and the said dipping frames, and operating substantially in the manner as hereinbefore explained. 95

In testimony whereof, we have hereto set our signatures, this twenty fourth day of January, A. D. 1845.

ASA FESSENDEN.
LUKE L. KNIGHT.

Witnesses:

TRASK RAY,
JOSEPH DAVIS.