2 Sheets—Sheet 1.

McC. YOUNG.

MACHINES FOR MAKING MATCH-STICKS.

No. 187,576. Patented Feb. 20, 1877.

Fig. 1.

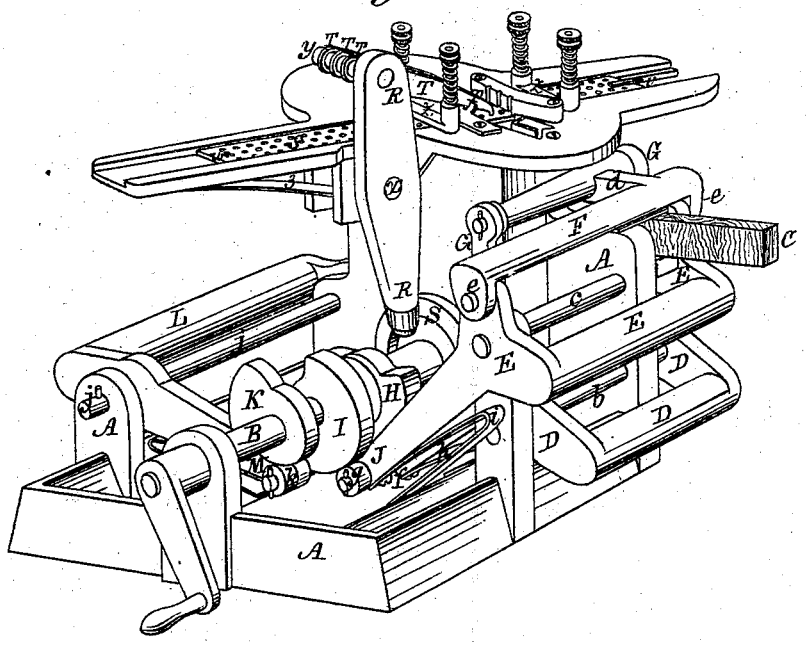
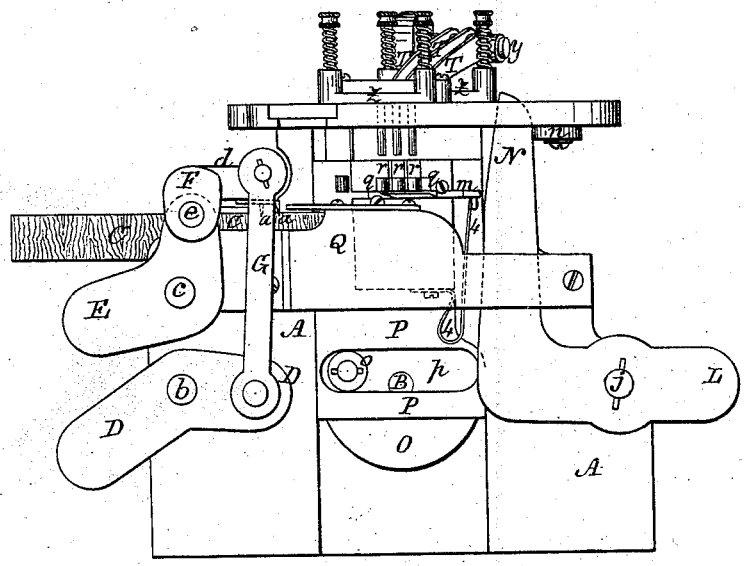


Fig. 2.



Witnesses.
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2 Sheets—Sheet 2.

McC. YOUNG.

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Fig. 3.

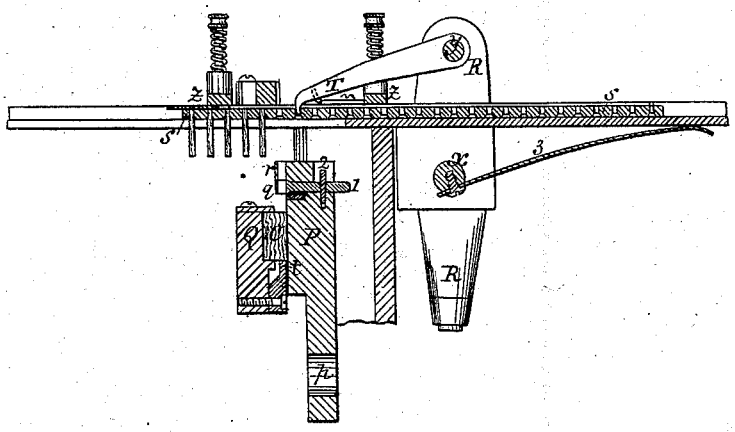


Fig. 4.

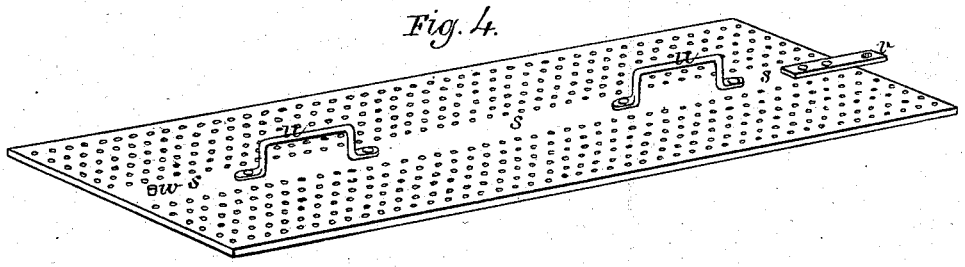
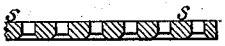


Fig. 5.



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UNITED STATES PATENT OFFICE

McCLINTOCK YOUNG, OF FREDERICK, MARYLAND.

IMPROVEMENT IN MACHINES FOR MAKING MATCH-STICKS.

Specification forming part of Letters Patent No. **187,576**, dated February 20, 1877; application filed August 12, 1874.

To all whom it may concern:

Be it known that I, McCLINTOCK YOUNG, of Frederick, in the county of Frederick and State of Maryland, have invented certain new and useful Improvements in Machines for Making Match-Sticks, and sticking them in holes made in a plate or plates that are fed through the machine, and which I call a "Filling-Machine;" and that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 represents a perspective view of the machine. Fig. 2 represents a view from one of the sides thereof. Fig. 3 represents a section through the cutting, filling, and feeding mechanism that advances the plates. Fig. 4 represents, in perspective, and upon an enlarged scale, one of the perforated plates with its appliances; and Fig. 5 represents a cross-section through one of the plates.

My invention relates to a machine wherein match-sticks are cut from a block or bolt of wood; and are then carried up and stuck in a perforated plate automatically fed along through the machine, and moved out of the machine with said plates; and my invention consists in the several mechanisms by which the block or bolt of wood is fed up to, and firmly held against, the cutters that cut off, carry up, and insert the cut sticks in a moving plate. It further consists in the construction of the points that hold and arrange the sticks in the cutters or carriers, so that they can be held while being forced into the holes of the plates; and, finally, it consists in furnishing the plates with handles, by which they and the match-sticks in them may be lifted and carried away, and with couplings, by which said plates may be fed into and through the machine in a continued series, and be taken out singly or in sections as they become filled.

To enable those skilled in the art to make and use my invention, I will proceed to describe the same with reference to the drawings.

The frame of the machine is shown at A. In or upon this frame is supported a shaft, B, upon which are arranged the several cams or eccentrics by which all the moving and holding parts of the machine are actuated. As the machine is run at a very high speed, it is only necessary to say that it is very strongly and rigidly put together, so that the jar incident to the high speed shall not disarrange or untime any of the parts. The block or bolt of wood C is fed into and through a trough-shaped passage, where it is guided, moved, and held as follows: The feed is what may be termed a "knife-edge feed." These knife-edges are shown at *a a*, Fig. 2, and are sunk into the block or bolt C, to feed it along, and raised out of it again before taking a new hold, by the rocking or vibrating of the frame D upon its pivots, journals, or through the shaft *b*, and have their forward and backward motion given to them by the frame E, which is also hung to the main frame and vibrated upon its pivots, journals, or through the shaft *c*. The arm *d*, that carries the knife-edges *a a*, projects from a bar, F, which, in turn, is pivoted to the frame E, at *e;* and, finally, the arm *d* is connected to the frame D by connecting-bars G, so that by this arrangement four motions are given to the knife-edge feed *a*, viz., down, up, forward, and back, and each of the movements positive, and not depending upon the action or reaction of a spring, when a working movement is to be made.

Upon the shaft B, so as to turn with said shaft, is arranged a cam, H, which acts against a friction-roller on an arm, *f*, projecting from the frame D, so as to rock said frame on its pivotal connection, and, by means of the connecting-bars G G, to draw down and hold the knife-edges *a* in the block or bolt of wood. When this is done, then the cam I upon the same shaft B rocks the frame E upon its pivotal bearing, through the intervention of the arm J projecting from said frame E and the friction-roll *g* thereon, against which the cam I acts, and this rocking of the frame E moves the block or bolt of wood C to the cutters. The raising of the knife-edges out of the block, and the rocking back of the frame E preparatory to the next feeding movement, I have represented as being done by the springs *h i*, but by using cam-grooves or walled cams for the rollers to run it, all the movements of the feeding mechanism may be made positive; and the feeding of the block may be regulated or

adjusted by a set-screw, to define the movement of the knife-edges, in the usual well-known way.

The cam K on the shaft B rocks the frame L on its pivotal bearings *j*, through the intervention of the arm M, and the friction-roll *k* thereon, against which latter said cam works. Upon this frame L there is an arm, N, Fig. 2, which at the proper time moves the cut-off or slide *m*, and then drops back against the cushion or pad *n*.

On a crank-wheel, O, on the extreme end of the shaft B, there is a crank-roll, *o*, which works in a horizontal slot or opening, *p*, in a gate or slide, P, causing said gate to move up and down in ways formed in the main frame; and this gate P carries the cutters *q*, which cut off the match-sticks from the block, as also the carriers or supporters *r* that receive the match-sticks, and carry them up and insert them in the holes made in the plate *s*, said holes being countersunk, as shown in Fig. 5, for the more easy insertion of the ends of the match-sticks.

The back-plate Q, Fig. 3, on and against which the block of wood rests and is supported, is made very rigid, so that the block cannot be pressed away from the knives during the cutting. On this plate Q, underneath the block, are a series of points, *t*, corresponding to the series of cutters *q*, one for each cutter, and separately made, attached, and set to work in connection with its cutter. These points *t* support that part of the wood only which its special cutter is to take from the block, and as the cutter descends the stick which it cuts off passes through the hollow cutter *q*, and as the cutter passes over its point the latter holds the stick until it is fairly inserted in the carrier above the cutter, and as the gate P ascends with the stick the arm N is thrown forward and against the slide *m*, moving the latter in underneath the match-sticks, so that when the gate rises high enough to insert the sticks in the carrier into the holes in the plate *s*, the slide *m* will hold said sticks firmly while being pressed into said holes.

The plates *s*, as shown on an enlarged scale in Fig. 4, are made in sections, each section having suitable handles *u u* upon it, so that, as it is filled with match-sticks, it may be removed with the sticks and taken to the dipping-vat, where the sticks are to receive the composition by which they are ignited. But to feed in the plates continuously, so as not to stop the machine, and to take away the plates in sections of convenient length and weight for ready handling, I furnish said plates further with a coupling-bar, *v*, at one of their ends, and a stud or pin, *w*, at the other end, so that, as the empty plates are fed in in succession, they are coupled one to the other, so as to make a continuous feed, and as they are filled the filled one is uncoupled from the next one which is being filled, and so on, thus making the feeding of the plates into the machine continuous, or in endless series, while they are taken out separately as they become filled.

The feeding in of the plates so as to bring their holes in exact position for receiving the sticks, and at the exact time, is accomplished as follows: To the frame of the machine, as at *x*, Figs. 1, 3, there is pivoted, about centrally of its length, an arm, R, against a friction-roll, on the lower end of which runs a face-cam, S, so as to vibrate said arm on its pivot *x*. To a stud, *y*, on the upper end of this arm, are loosely hung, so as to be independent of each other, and as an improvement on my patent of 29th August, 1871, a series of fingers, T, the front ends of each of which take into a special line of holes in the plate *s*, and either one of which will feed along the plate, if even all the rest of the series should not act; but in the number of feeding-fingers there is little or no liability of a failure, while with a single one, or even two, there may be. This multiple feed is important, because a single failure of the plate to move, so as to bring a series of unfilled holes opposite the sticks coming up with the gate, must break the sticks and clog up the machine. *z z* are spring presser-bars for holding the plates in their ways and proper position when they have been fed up by the fingers; and the latter are rocked or moved back to prepare for the next succeeding feeding operation. Using the holes themselves in the plates for the feeding-fingers to work in, and a series of feeding-fingers, the certainty, timing, and exactness of the feed, is practically perfect.

I have described the cutters and carriers as though separate in action and construction, which is correct, although in one essential, viz., the holding, carrying up, and sticking of the match-sticks in the plates, they act as one. The cutters are made of steel, and united to the gate that carries them by a shank, 1, and a pin, 2, Fig. 3. The carriers are of similar shape, form, and size, as to their interiors, as the cutters, so as to aid the cutter, which is quite short, in sustaining and carrying up and sticking the splints in the plates. In this relation they act as one, though the carriers may be simply suitably shaped and sized holes; but the cutters have other work to do, are liable to break and wear out, and must be replaced by others, and to these ends are separate, separately constructed and attached, and of a different material. The cutters and carriers, as herein shown, are represented as circular in cross-section. They may be square, diamond, or other angular sided form, as it is desirable that the match-sticks should be.

The spring 3 is for holding the tail end of the arm R against the face-cam S. The slide *m* that is moved by the arm N to close the ends of cutters, and form a support for the sticks in the cutters and carriers, so that they may be stuck into the holes in the plates, is retracted by the spring 4. In the construction

of the full-sized machines, I substitute positive cam-movements for all reactionary spring-movements, where great certainty of action is required.

Having thus fully described my invention, what I claim therein as new, and desire to secure by Letters Patent, is—

1. The combination of the independent pawls or fingers T, in series, upon the same vibrating stud or arm, with the perforated plates *s*, so as to insure the feeding along of said plates, as and for the purpose described and represented.

2. The combination of the rocking frames D E, bar F, and projecting arm *d*, and coupling-bars G, for the purpose of imparting four motions to the block-feeding mechanism, substantially as described.

3. The combination, with the four-motion feed, as herein described, of the knife-edge feeding-points, as and for the purpose described.

4. The block-holding mechanism, provided with the separate points *t* for supporting the wood that is to constitute the match-stick when cut off, as described and represented.

5. The plates *s*, provided with the handles *u*, coupling-bar *v*, and stud or pin *w*, as and for the purpose described and represented.

McCLINTOCK YOUNG.

Witnesses:

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EDMUND MASSON.