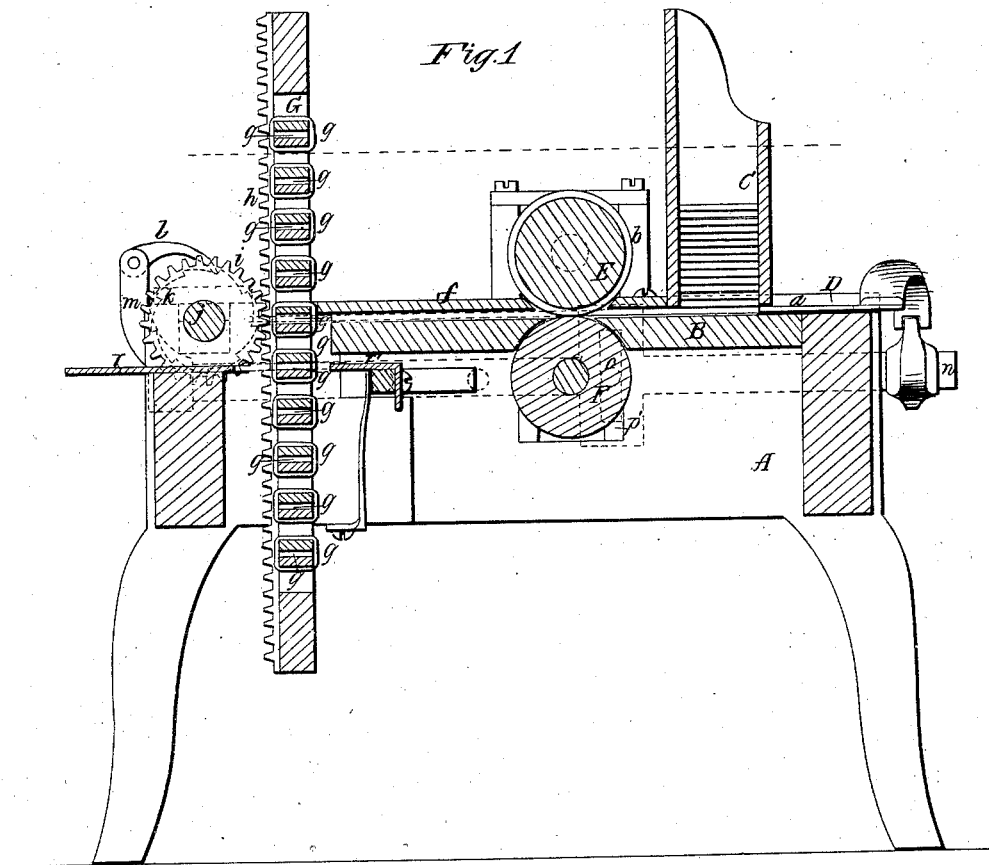


Andrews & Tucker,
Making Matches.

N^o 45,465.

Patented Dec. 20, 1864.



Witnesses:
C. D. Smith
R. N. Eagle

Inventors:
E. Andrews
Wm. Tucker
per Munn & Co.
Attorneys

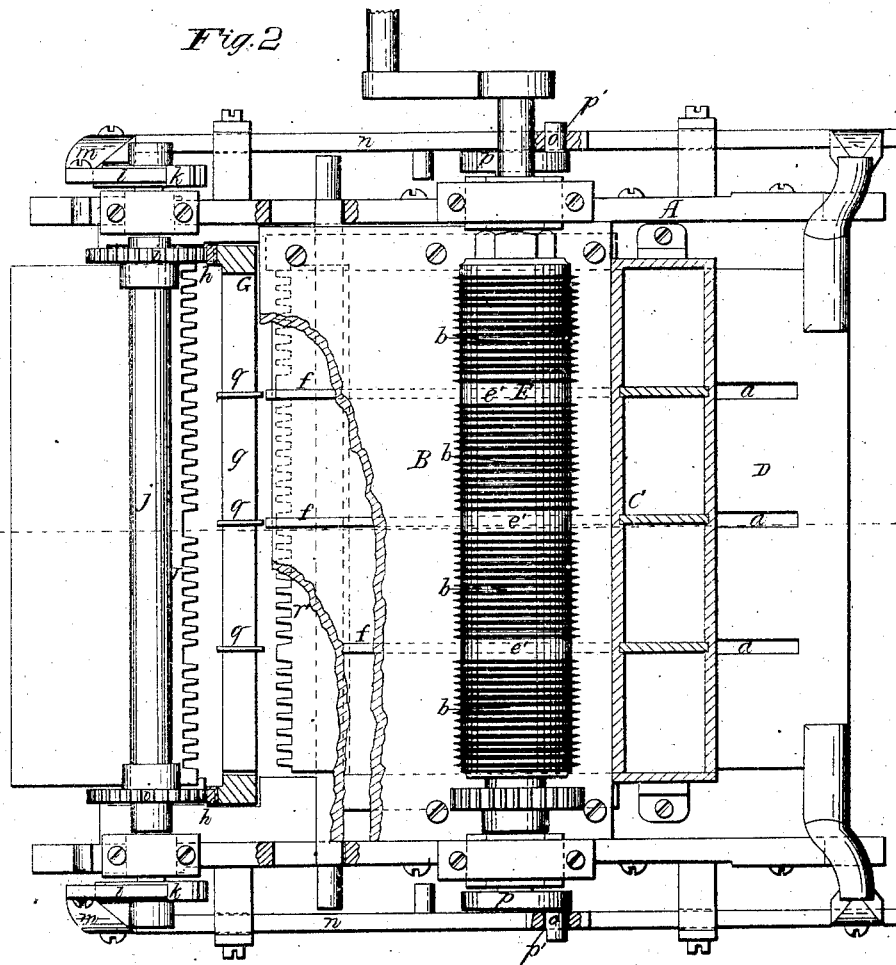
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Fig. 2



Witnesses:

Hon. F. M. Hamara
 J. P. Hall,

Inventors:

E. Andrews

Hm Tackern

per Munnell
Attorneys

UNITED STATES PATENT OFFICE.

EMORY ANDREWS AND WILLIAM TUCKER, OF SPRINGFIELD, MASS.

IMPROVEMENT IN MACHINE FOR MAKING MATCH-SPLINTS.

Specification forming part of Letters Patent No. 45,465, dated December 20, 1864.

To all whom it may concern:

Be it known that we, EMORY ANDREWS and WILLIAM TUCKER, of Springfield, in the county of Hampden and State of Massachusetts, have invented a new and Improved Match-Machine; and we do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 represents a longitudinal vertical section of this invention, the plane of section being indicated by the line *x x*, Fig. 2. Fig. 2 is a plan or top view of the same, partly in section.

Similar letters of reference indicate like parts.

This invention consists in the employment or use of one or more hoppers filled with cards, in combination with a suitable feed apparatus and set of knives, in such a manner that one card after the other is taken from the hopper automatically and exposed to the action of the knives, to be cut up in single sticks of the requisite thickness; also, in taking the cards from the bottom of the hopper or hoppers, so that the same by their inherent gravity are brought in the requisite position to be fed to the knives, until the hoppers are exhausted; further, in arranging the knives in sections, separated from each other by suitable intervals, so that each card is cut up separate, and the match-stick so cut can be easily kept in separate tiers and the feeding to the rack is facilitated; also, in the use of guides in front of the knives and placed opposite the intervals between the several sections to keep the match-sticks in separate distinct tiers; further, in the employment or use of a rack, to which an intermittent motion is imparted, in combination with the guides, the knives, and the feed apparatus, in such a manner that one tier of matches after the other is automatically pushed between the slats of the rack, as the same arrives successively in a position opposite the table; also, in the application to the slats of two or more elastic bands or springs placed round said slats at suitable intervals in such a manner that they hold the same together with a yielding pressure, and the frames are enabled to hold the match-

sticks and to accommodate themselves to sticks of different size and thickness; finally, in subjecting the match-sticks, after they have been passed between the slats of the rack, to the action of the combs or other suitable devices, in such a manner that the same are automatically "slipped," or, in other words, that the alternate sticks are pushed out in opposite directions to keep their ends separate while dipping.

A represents a frame, made of iron or any other suitable material, and provided with a platform or table, B, to support the working mechanism of our machine. The wood from which the matches are to be made is first cut up into cards of suitable size and these cards are placed into the hoppers C, which are secured on the table B. One or more such hoppers may be arranged side by side and the cards are pushed out from the hoppers by the action of the feed-plate D, to which a reciprocating motion is imparted by the action of eccentric wrist-pins on the ends of the axle of the feed-roller, or in any other convenient manner. The feed-plate D is divided by slots *a* into a number of sections to correspond to the number of hoppers, and it acts upon the lowest card in each hopper, the sides of the hopper being cut off at such a distance above the table that the feed-plate is enabled to push out one card after the other. Upon being pushed out of the hoppers the cards are caught between the knife-cylinder E and feed-roller F, and by the action of the revolving knives *b* each card is cut up in match-sticks of the requisite thickness. The knives are arranged on the cylinder E in sections, which are separated one from the other by intervals *c*, each section to correspond to one of the hoppers, as clearly shown in Fig. 2 of the drawings.

On leaving the knife-cylinder the matches pass out on the table B, each tier being pushed along by the succeeding tiers, and the several tiers of matches which pass along the table simultaneously are kept separate by guides *f*, which extend from the knife-cylinder to the extreme edge of the table, and serve to conduct the cut matches to the rack G. By referring to Fig. 2 it will be noticed that the guides *f* are in line with the intervals between the knives on the cylinder, and with the partitions between the several hoppers, so that

each card on its course from the hopper to the end of the table follows a straight line. The rack G, which receives the matches as the same leave the table B, is provided with a series of slats, *g*, to hold the matches in position for dipping, and it is so constructed by suitable driving mechanism with the driving-shaft that an intermittent rectilinear motion is imparted to it, and that for each stroke of the feed-plate a new slat is brought opposite the table. It is obvious that this motion can be effected by various different mechanisms, and we do not wish to confine ourselves to the peculiar mechanism represented in the drawings, though we may by preference use this or substantially the same mechanism. It consists of two toothed racks, *h*, attached to the edges of the rack G, and made to gear in two cog-wheels, *i*, which are mounted on a shaft, *j*, which has its bearings in the extreme ends of the table, as clearly shown in the drawings. The ends of this shaft extend beyond the edges of the table, and they bear ratchet-wheels *k*. The teeth of these ratchet-wheels are so adjusted that each tooth corresponds to the distance between the slats *g* in the rack, and for each stroke of the feed-plate they (the ratchet-wheels) are turned one tooth by the action of the pawls *l*, which are secured to arms *m*, rising from the rods *n*. These rods slide in suitable boxes on the sides of the frame A, and a reciprocating motion is imparted to them by the action of eccentric wrist-pins *o*, which project from disks *p*, mounted on the ends of the axle of the feed-roller, and extend into slots *p'* in said rods. These rods also connect with the feed-plate, so that when the motion of the rack takes place the feed-plate recedes.

The slats which receive the matches as the same are pushed off from the table B are composed of two distinct parts, the lower one of which is firmly secured to the side rails of the rack, whereas the upper one is loose and connected to the lower by elastic bands or springs.

The two slats are kept sufficiently far apart to admit the points of the match-sticks by suitable ribs, which are in line with the guides *f* on the table, and the springs *q* are arranged at such intervals, one from the other, that they do not interfere with the match-sticks pushed out from the table B.

In order to keep the points of the match-sticks well separated in the slats for dipping, it is desirable to "slip" them—that is, to push out the alternate sticks so that their ends project beyond the ends of the remainder. This operation is generally performed by hand at a great loss of time, but we have arranged our machine so that the slipping is effected automatically. For this purpose we use two combs, *r r'*, one of which is stationary and secured under the shaft *j* on the end of the frame A and the other is movable and fastened under the table B. The teeth of one of the combs are opposite the spaces between

the teeth of the opposite comb, and said combs are divided in sections corresponding to those of the knives, and the number of teeth in each section of the movable comb is equal to one-half the number of knives in each section on the cylinder E, whereas the number of teeth in each section of the stationary comb exceeds by one that in each section of the movable comb. The position of these combs is such that they are opposite that slat which has just been filled and lowered for one tooth of the ratchet-wheels *k*, and the movable comb *r'* is connected to the reciprocating rods *n*, so that the same is brought forward simultaneously with the feed-plate. The teeth of the comb *r'*, on being brought forward, strike the ends of the match-sticks in the slat opposite the combs, and the sticks are slipped in the most simple manner and without fail. By this arrangement the match-sticks are cut, fed to the racks, and slipped automatically, and, as the racks, pass out of the machine, the sticks are in the proper position for dipping.

We claim as new, and desire to secure by Letters Patent—

1. The combination of the series of hoppers, the sectional knife cylinder E, and the guides *f* on the table B, arranged, constructed, and operating substantially as described.

2. The rack G, to which an intermittent rectilinear motion is imparted by suitable mechanism, in combination with the guides *f*, knives *e*, feed-plate D, and hoppers C, constructed and operating substantially as and for the purpose set forth.

3. The combination of the elastic bands with the stationary lower slat and the upper movable slat in the vertically-moving rack, by which the match-sticks are received and held, at the intervals between the sections or tiers, as they pass from the table under the pressure of the succeeding set.

4. The arrangement, substantially as described, consisting of the stationary and movable combs, and their operating mechanism, by which the alternate match-splints within the embrace of the clamp *g* are slipped out so as to detach their points for dipping.

5. Arranging the match-splints in the clamps, in the manner described, as effected by the combs *r r'*, so that they may project alternately at each side of the clamp for dipping, and so that the tiers of matches being removed from the frame may be laid upon each other, checker-board fashion, with the blank ends separating the charged ends, preventing the friction of the composition on adjoining matches.

EMORY ANDREWS.
WILLIAM TUCKER.

Witnesses:

A. G. SNELL,
GEO. ANDREWS,
GEO. W. HOBBS,
THOS. R. PHETTEPLAS.