No. 709,645. Patented Sept. 23, 1902.

S. E. PASFIELD.

APPARATUS FOR APPLYING THE PREPARATION TO STRIKING SURFACES OF MATCH BOXES, &c.

(Application filed Oct. 18, 1901.)

(No Model.) 2 Sheets—Sheet 1.

FIG. 1.

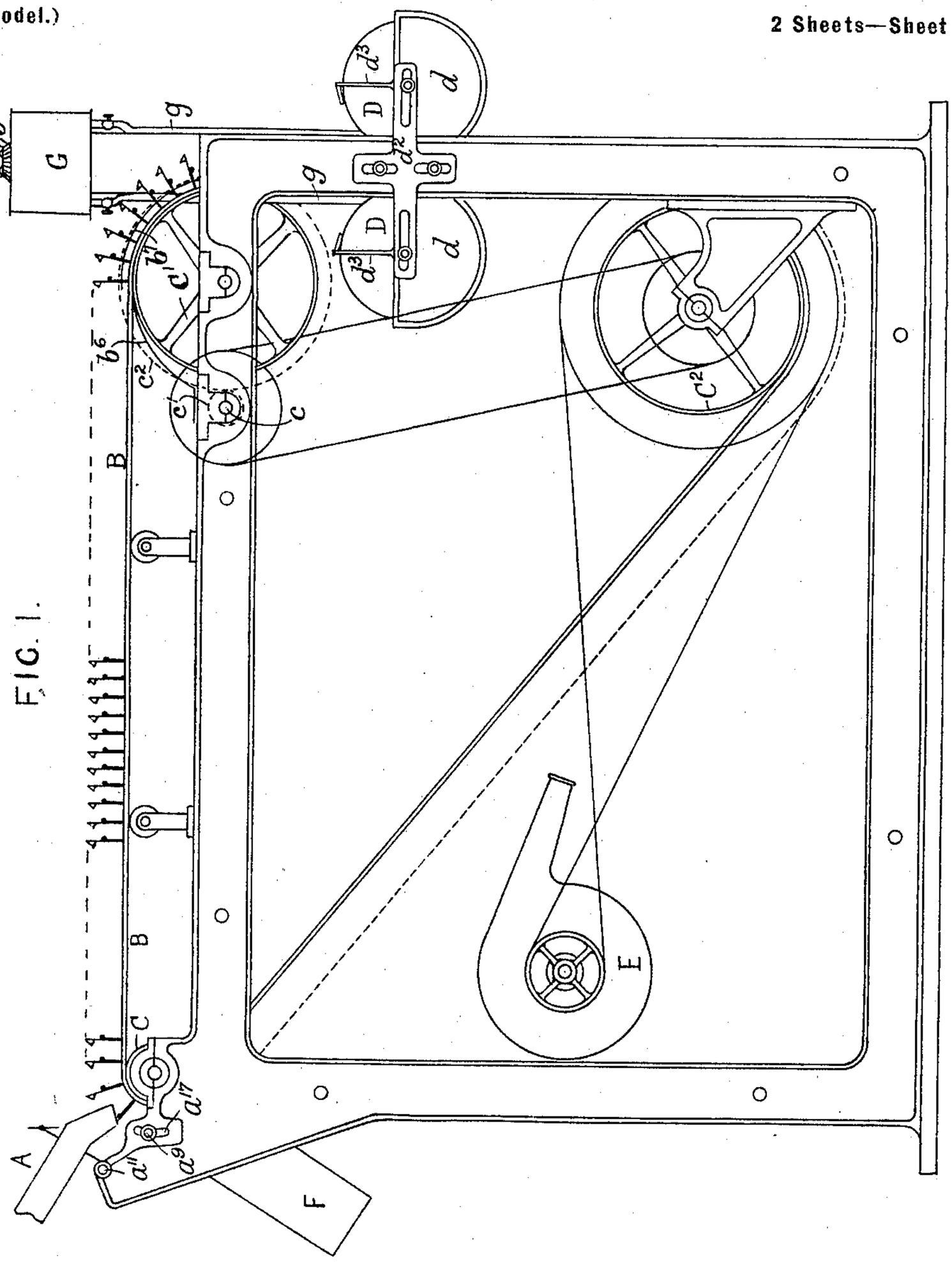
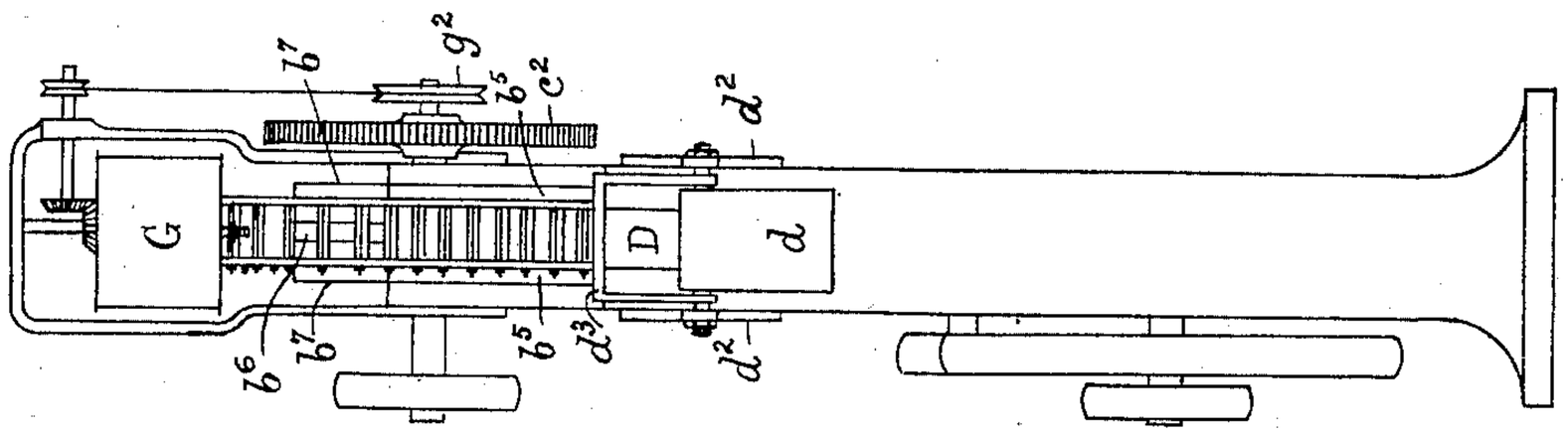


FIG. 2.



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(No Model.) 2 Sheets—Sheet 2.

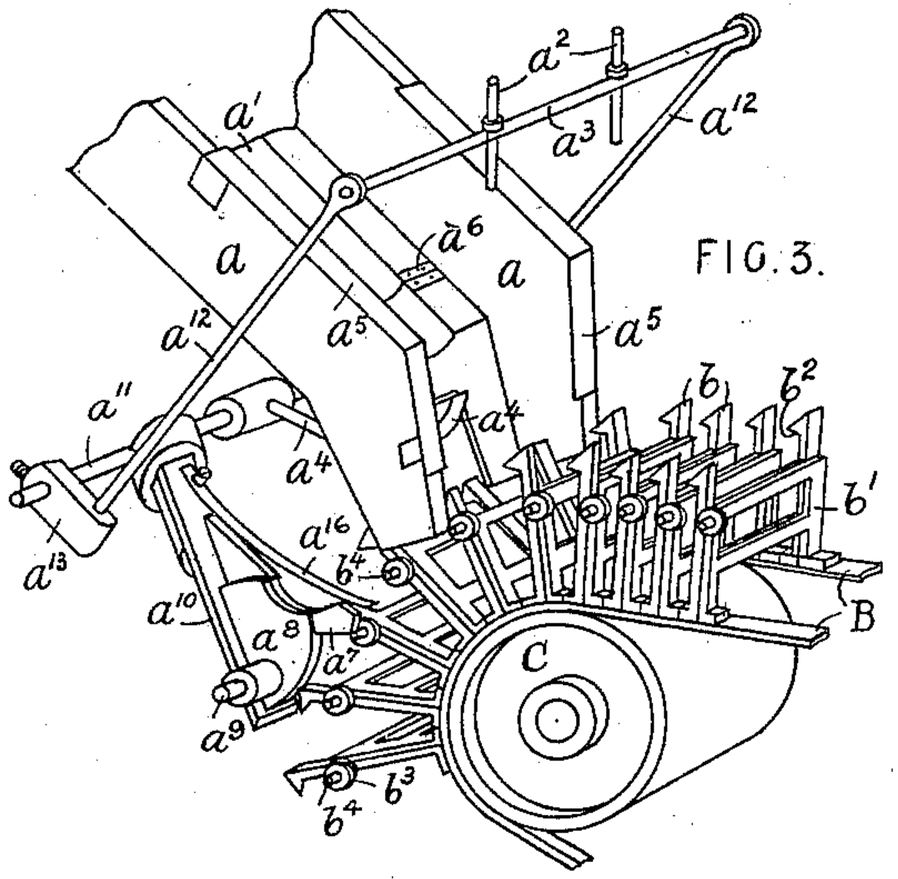

FIG. 3.

FIG. 4.

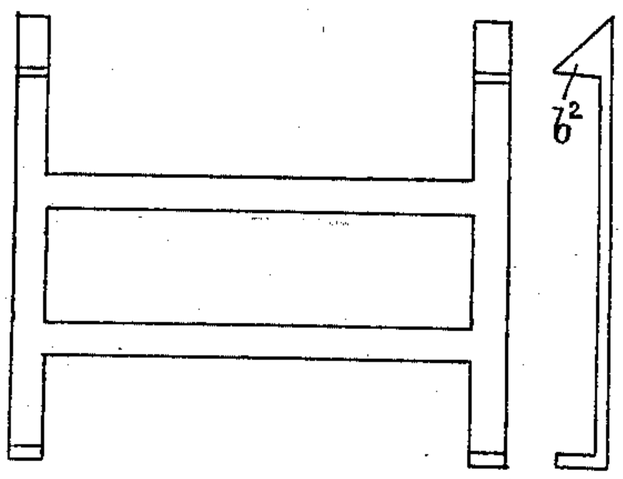

FIG. 5.

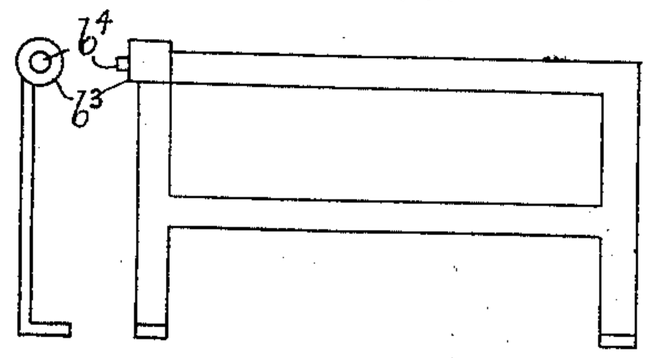

FIG. 6.

FIG. 7.

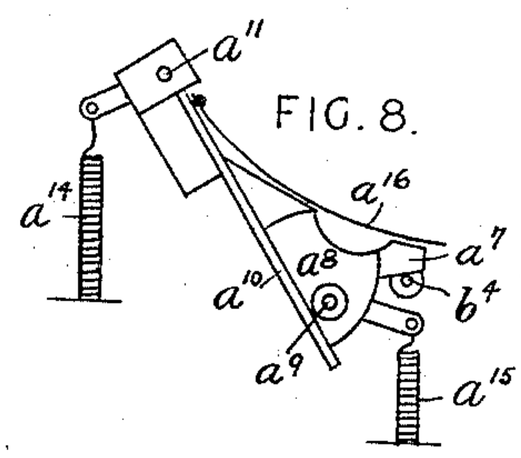

FIG. 8.

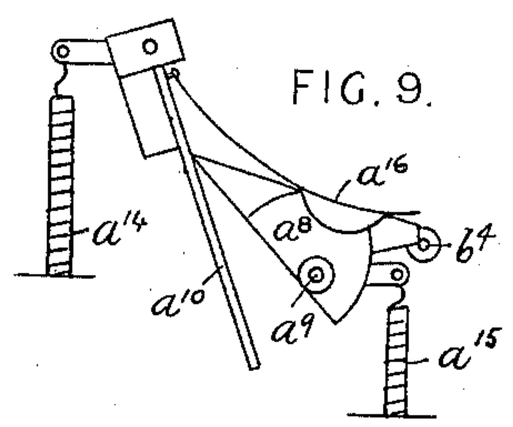

FIG. 9.

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UNITED STATES PATENT OFFICE.

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APPARATUS FOR APPLYING THE PREPARATION TO STRIKING-SURFACES OF MATCH-BOXES, &c.

SPECIFICATION forming part of Letters Patent No. 709,645, dated September 23, 1902.

Application filed October 18, 1901. Serial No. 79,141. (No model.)

To all whom it may concern:

Be it known that I, STEPHEN EDWARD PASFIELD, a subject of the King of Great Britain, residing at 249 High street, Plumstead, county of Kent, England, have invented certain new and useful Improvements in Apparatus for Applying the Preparation to the Striking-Surfaces of Match-Boxes or for Similarly Treating other Articles, of which the following is a specification.

In the manufacture of match-boxes and the like as at present practiced the operation of applying the preparation to the striking surface or surfaces of each box—an operation technically termed "painting"—is effected by lightly rubbing a series of boxes with a brush dipped in the preparation or by placing them by hand in batches upon traveling tapes, which carry them forward to painting-rollers, between which the boxes pass. Neither method, however, provides means for insuring that the boxes shall take and retain a correct position while undergoing the operation. Consequently it often results that they become unevenly painted, and printed matter—such as "Rub lightly," "Strike here," or the like—upon the boxes adjacent to the striking-surfaces becomes obliterated. Further, as no provision is ordinarily made for drying the boxes they are liable to become smeared and dirty by contact one with another. There are also other disadvantages consequent upon the insecure positions of the boxes while being painted.

The object of this invention is to provide improved apparatus for effecting this operation of painting independently of human agency, except as regards the initial supply of the boxes, and is not subject to the above-mentioned disadvantages and comprises, first, an automatic feed mechanism by which the boxes are fed in regular sequence and in correct positions for treatment to the traveling tapes while the tapes are following a curved path; secondly, means for holding the boxes securely in position upon the traveling tapes when received from the feed mechanism and during the painting and subsequent treatment; thirdly, arrangements for adjusting upon the traveling tapes any boxes accidentally disarranged before being painted; fourthly, the painting devices, and, fifthly, means for drying them, after which the boxes become automatically released from the traveling tapes and fall out of the apparatus in a finished condition so far as the painting is concerned.

It will of course be understood that although my invention is specially adapted for painting match-boxes it is generally applicable wherever it is desired to feed small boxes or similar articles in regular sequence and in correct positions to a traveling band upon which they are to be securely held and, if need be, adjusted in position during transference and during subsequent treatment analogous to the painting and drying operations. The feed mechanism is also applicable when it is desired to feed the boxes or articles directly to apparatus for treating them for various purposes without the intervention of a traveling band or the like.

The invention consists, essentially, of simultaneously automatically-operated devices, one of which effects the separation of a box or article fed along a feed-chute from the following boxes or articles, while the other controls the separated box or article, so that the boxes or articles are fed singly and in regular sequence, the chute and other parts insuring that they shall be fed in correct position; of a series of partitions forming "carriers" for the boxes or articles, which partitions are so arranged upon the traveling tapes that while the tapes are pursuing a curved path, as when passing over guide-rollers, the partitions spread sufficiently to allow a box or article fed by the feed mechanism to enter easily between them, but when a straight path is resumed the partitions grip the boxes or articles tightly to hold them in place; in the construction of the partitions for the purpose of preventing any upward and outward movement of the boxes or articles from the tapes while pursuing a curved path, except as required, and for operating the feed mechanism; in guide-surfaces whereby any boxes or articles accidentally disarranged upon the traveling tapes are adjusted in position and whereby lateral displacement is prevented; in the construction and arrangement of the painting apparatus; in the provision of a fan

for supplying an air-blast (heated or not) for drying the "painted" boxes, and in means for preventing injury to the apparatus should a box or article fail to be released from the traveling tapes. The invention also comprises means for maintaining the "paint" in a homogeneous condition.

The invention will now be described more particularly with reference to the painting of match-boxes, a preferred form of apparatus for carrying it into practice being shown in the accompanying drawings.

Figure 1 shows in side elevation a complete machine in so far as this invention is concerned, the front of the machine being supposed removed. Fig. 2 is an end elevation thereof. Fig. 3 is a perspective view to a larger scale, showing the supply mechanism and the construction of the traveling tapes; and Figs. 4 to 9 show views of details.

On the drawings, A indicates generally the feed mechanism, B B the traveling tapes, and C, C', and C^2 the guide-rollers therefor; D D the painting-rollers, E the drying-fan, and F the delivery-chute.

The feed mechanism (shown in Fig. 3) comprises a chute a, receiving the boxes and of just appropriate size to guide the boxes in their correct positions, the chute a having a metallic sliding surface a', hollowed out to reduce friction; catch-fingers a^2 a^2, mounted upon a rod a^3, which is arranged to move toward or away from the chute a, as will be hereinafter described, and a catch a^4, operated coincidently with the fingers a^2 a^2, passing through the base of the chute a. Projecting strips a^5 a^5 are also fitted upon the sides of the chute a in order to prevent the match-boxes from rising as they pass along. The chute a is also hinged at a^6 a^6 for a purpose yet to be mentioned.

In operation, it being supposed that the rod a^3 is in a position near to the chute a and the fingers a^2 a^2 projecting into the path of the boxes passing down the chute, the supply from which is therefore checked, an outward movement is imparted to the rod a^3 and fingers a^2 a^2 until the boxes are released and fall forward on the catch a^4, which has meanwhile moved so as to project into their path, the forward movement being equal to the thickness of one box. The rod a^3 then again approaches the chute a and the fingers miss the first box, but hold the following boxes. The catch a^4 is at the same time released and the first box falls toward the traveling tapes B B. Thus the fingers a^2 a^2 and the catch a^4 alternately hold back and release the boxes in turn, the former controlling the whole series of boxes and the latter each single box as it is released, the chute a itself and the projecting strips a^5 a^5 further insuring that the single boxes shall retain their correct positions for supply.

The traveling tapes B B have attached to them at intervals the partitions b b b' b', there being in each case a partition b in contact with, but not attached to, the contiguous preceding and succeeding partition b', the partitions b b and b' b' alternating and constituting the carriers for the match-boxes. The partitions b b, Figs. 4 and 5, are higher than the partitions b' b' and are provided at their upper portions with projections b^2 b^2, so constructed and dimensioned that a box can be conveniently received between them and the feet of the partitions. The partitions b' b' have at one side bosses b^3 b^3, projecting from each of which is a pin b^4, the bosses b^3 b^3 and the pins b^4 b^4 providing the means for operating the feed mechanism.

The traveling tapes B B are of course flexible, and when passing over the curved surfaces of the pulleys C C' C^2 the partitions b b b' b' tend to take up radial positions. In consequence the partitions all separate slightly at their upper ends and this separation is sufficient to allow boxes fed as already described to clear the projections b^2 b^2 and to enter one between every two adjacent sets of partitions, and the feed mechanism A is so disposed in relation to the traveling tapes B B that the boxes as fed shall be thus received. When, however, the traveling tapes B B resume a straight path, the partitions close nearer together again and the boxes are securely gripped.

While the tapes are passing over the rollers C' C^2 the partitions b b b' b' of course tend to separate, as in the case of the roller C; but the projections b^2 b^2 prevent the boxes from falling out of place while the grip upon them is released.

Before describing the apparatus further I will now deal with the devices for operating the feed mechanism A.

The fingers a^2 a^2 and the catch a^4 are operated from the pins b^4 b^4, which successively engage a cam a^7, carried by a tipping-piece a^8, keyed to a shaft a^9 and lying flat upon, but not connected to, an arm or lever a^{10}, fixed to the shaft a^{11}, as shown in Fig. 8. As the pins b^4 b^4 are carried around the cam a^7 is raised and the piece a^8 deflected, its upper end depressing the arm a^{10} and partially rotating the shaft a^{11}, as will be clearly seen on reference to Fig. 9. The catch a^4 is attached directly to a collar secured to the shaft a^{11}, and the links a^{12} a^{12}, carrying the rod a^3 and the fingers a^2 a^2, are attached to short arms a^{13} a^{13}, fixed to the shaft a^{11}. Thus the fingers a^2 a^2 and the catch a^4 are lowered simultaneously as the shaft a^{11} oscillates, causing the boxes to be delivered one by one, as described above. As soon as the cam a^7 is released from one of the pins b^4 b^4 the parts are brought back to their normal positions by springs a^{14}, a^{15}, and a^{16}, Figs. 8 and 9. The shaft a^9 is adjustable in the curved slot a^{17}, Fig. 1, to permit of the accurate adjustment of the cam a^7. This automatic supply mechanism is obviously applicable to any machines where

boxes or other articles are to be operated upon singly and consecutively.

The tapes B B are driven from the power-shaft *c* by means of a pinion *c'*, gearing with the spur-wheel c^2 on the shaft of the guide-roller C'.

To restore a box which may by any means have become disarranged on the tapes and fallen from between the carriers or partitions *b b b' b'*, a central guide b^6 is provided upon the framing, with which the disarranged box will come in contact as it travels along and be raised to its correct position, and to prevent the boxes from lateral displacement two side guides b^7 b^7 are provided extending from the upper part of the pulley C' to the painting-rollers D D. The boxes thus received upon the tapes B B and adjusted in position thereon if need be are carried on over the roller C' and between the painting-rollers D D, which revolve in paint-boxes *d d*. The paint is applied simultaneously to the two opposite surfaces of each box, and as each box is rigidly held in a central position during the operation any obliteration of printing upon the box is effectually prevented and an even symmetrical coating of paint is insured. Guides b^5 b^5, Fig. 2, are provided for the tapes B B from the guide-roller C' to the painting-rollers D D.

The painting-rollers D D may be driven by frictional contact with the boxes or may be positively driven by belt or other gearing, their peripheries moving either with or contrary to the boxes.

In cases where it is desired to paint only one surface of each match-box one only of the rollers D D will be supplied with paint, the other roller, or any suitable equivalent therefor, simply providing the necessary resistance or guide for the opposite surfaces of the boxes.

The painting-rollers D D are adapted for adjustment in the slotted bearer d^2 to suit various sizes of boxes and rollers, and scrapers d^3 are also fitted.

The preparation is supplied to the paint-boxes *d d* from a mixer G by pipes *g g*, fitted with regulating-taps, and is maintained in a homogeneous state in the vessel G by means of stirrers rotated by bevel-gearing *g'*, driven by a belt from the pulley g^2 on the shaft of the roller C'.

From the painting-rollers the boxes pass around the roller C^2 and then travel up toward the roller C. While so doing they are subjected to an air-blast, heated or not, according to requirements, from the fan E, so that the paint is rapidly dried. As the boxes are carried around the bend of the lower part of the roller C the partitions *b b b' b'* open out, as in receiving the boxes, and the boxes, not being now supported, fall from the tapes B B and are delivered from the machine down the chute F. To insure the boxes falling freely from the partitions, the under edge of each of the projections b^2 b^2 is sloped slightly, as shown in Fig. 5. In the event of a box failing to be thus released the lower part of the chute *a*, owing to the hinges at a^6 a^6, lifts slightly to allow the box to pass, and the only consequence is that one fresh box from the feed mechanism A fails to be received properly upon the tapes B B and soon falls out of the way, while the apparatus can be stopped at convenience to remove the unreleased box.

Heating-coils may be fitted wherever desirable in the apparatus, the sides of which are of course boxed in.

The apparatus being exact and automatic in its action, the parts may be driven at a high speed, it being quite possible to paint the match-boxes at the rate of two hundred to three hundred per minute, a great saving in time compared with the present rate of fifty per minute. All that is necessary is to maintain the supply to the machine.

What I claim as new, and desire to secure by Letters Patent, is—

1. In combination, in apparatus for painting or similarly treating match-boxes or other articles, a chute *a* down which the match-boxes or articles are fed; catch-fingers a^2, a^2 and a catch a^4 arranged in the path of the chute *a* and connected together and simultaneously operated to allow a match-box or article to pass the catch-fingers a^2, a^2, then to be held back by the catch a^4, and finally released from the catch a^4; traveling tapes B, B, provided with double partitions *b b*, *b' b'*, adapted to receive the match-boxes or articles from the chute *a* and to hold them securely for treatment; devices in connection with the traveling tapes B, B and the partitions *b b*, *b' b'* in conjunction with devices for actuating the catch-fingers a^2, a^2, and the catch a^4, substantially as set forth and illustrated.

2. Feed mechanism for apparatus for painting or similarly treating match-boxes or other articles, comprising a chute *a*; catch-fingers a^2, a^2 and a catch a^4 disposed in the path of the chute *a*; and devices for effecting the automatic operation of the catch-fingers a^2, a^2 and the catch a^4, consisting of the cam a^7 operated from the apparatus to be fed and carried by a tipping-piece a^8, a shaft a^9 adjacent to the chute *a* and carrying the tipping-piece a^8, an arm or lever a^{10} upon which the tipping-piece a^8 normally lies, but to which the tipping-piece is not attached, a shaft a^{11} fitted adjacent to the chute *a* and carrying the arm or lever a^{10} and the catch a^4, links a^{12}, a^{12} carrying the rod a^3 and the fingers a^2, a^2 attached by arms a^{13}, a^{13} to the shaft a^{11}, and springs a^{14}, a^{15}, and a^{16} for insuring the return movements of the parts; all constructed, arranged, and adapted for operation substantially as set forth and illustrated.

3. In apparatus for painting or similarly treating match-boxes or other articles, traveling tapes B, B suitably operated and guided, the partitions *b b* on the traveling tapes B, B

and having on their upper portions projections b^2 b^2, and partitions b' b' fitted adjacent to the partitions b b and having bosses b^3 and projecting pins b^4, the pins b^4 successively engaging and actuating a cam a^7 carried by a tipping-piece a^8 operating a shaft a^{11} which is rigidly attached to the catch-fingers a^2, a^4; all arranged, constructed, and adapted for operation substantially as set forth and illustrated.

In testimony whereof I affix my signature in presence of two witnesses.

STEPHEN EDWARD PASFIELD.

Witnesses:

HENRY W. HEATH,

AMELIA M. HEATH.