

(No Model.)

3 Sheets—Sheet 1.

C. H. PALMER.

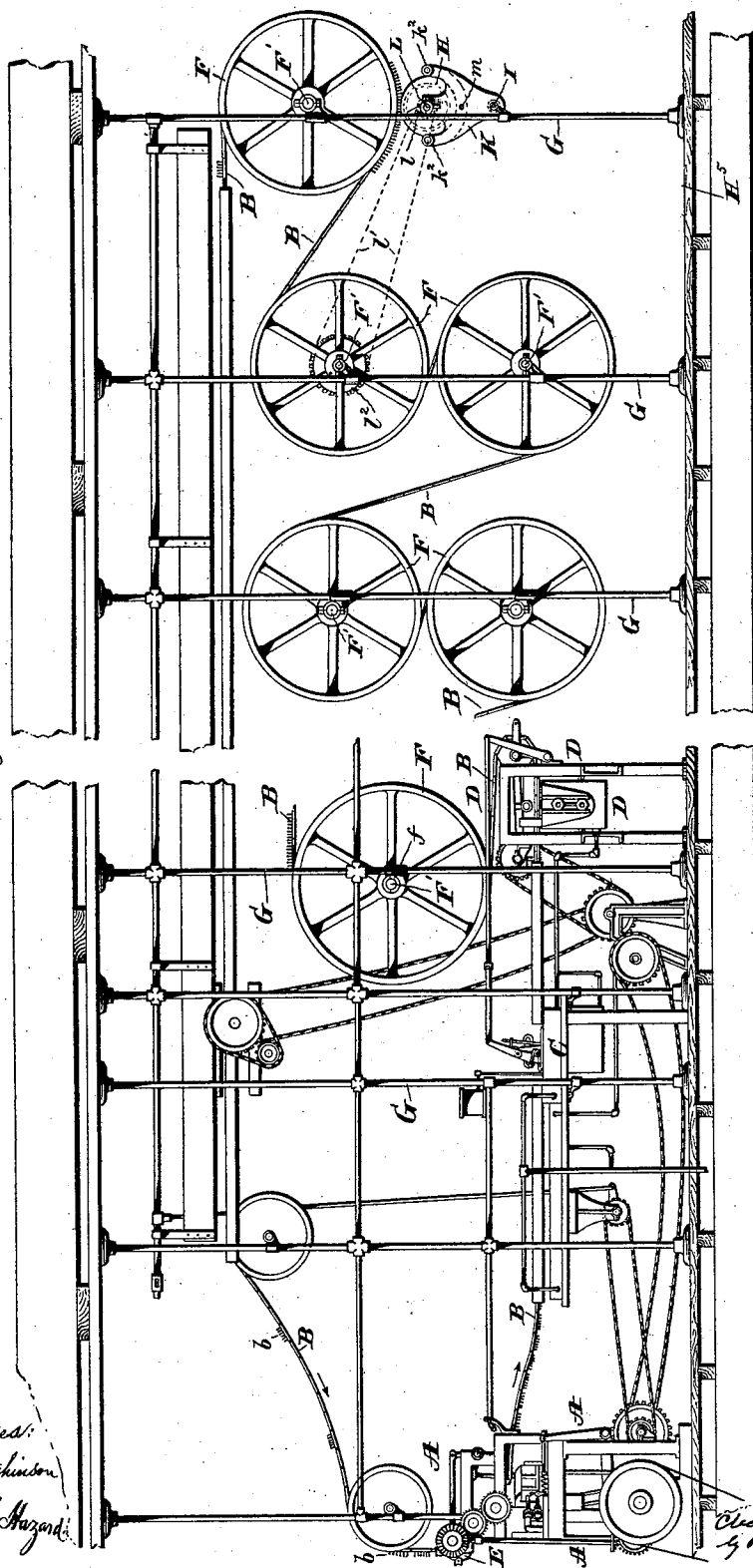
APPARATUS FOR AND PROCESS OF MAKING COLORED MATCHES.

No. 542,896.

Patented July 16, 1895.

Fig. 1.

Witnesses:
James Hutchinson
Henry C. Hazard



Inventor.
Charles H. Palmer
by Russell & Purcell
his attorney

(No Model.)

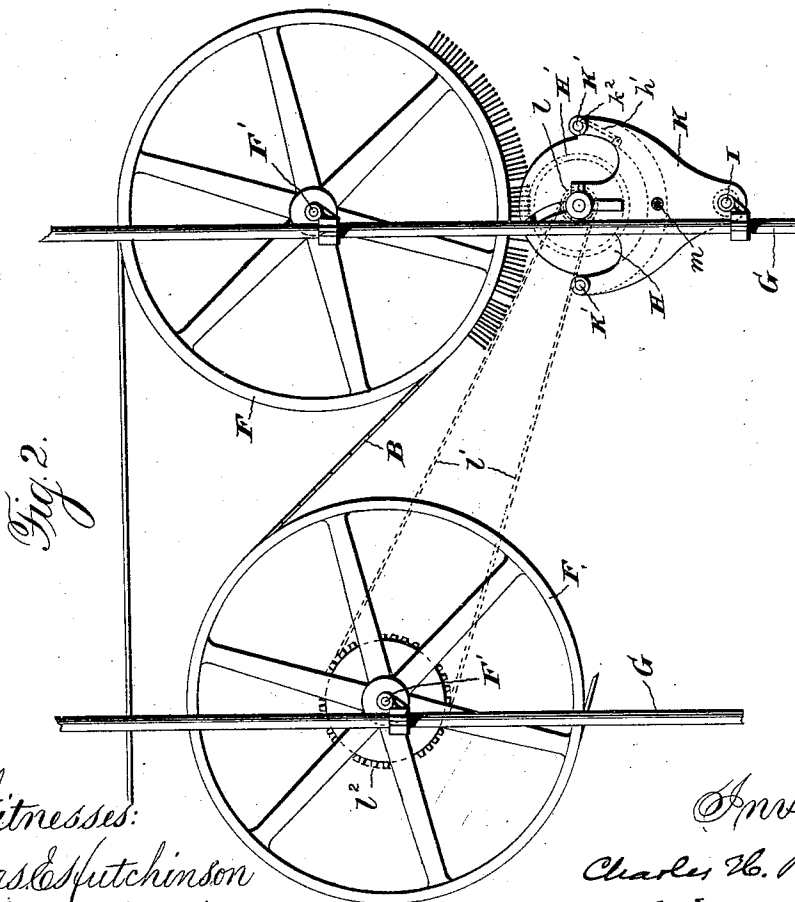
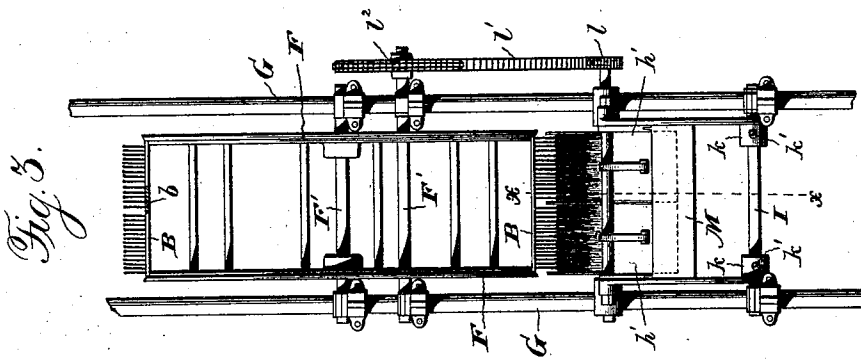
3 Sheets—Sheet 2.

C. H. PALMER.

APPARATUS FOR AND PROCESS OF MAKING COLORED MATCHES.

No. 542,896

Patented July 16, 1895.



Witnesses:
Jas. C. Hutchinson
Henry C. Hazard

Inventor:
Charles H. Palmer
by P. M. & P. M.
his attorney

(No Model.)

3 Sheets—Sheet 3.

C. H. PALMER.

APPARATUS FOR AND PROCESS OF MAKING COLORED MATCHES.

No. 542,896.

Patented July 16, 1895.

Fig. 4.

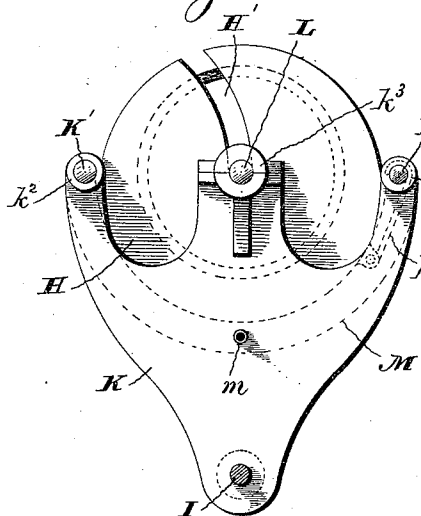


Fig. 5.

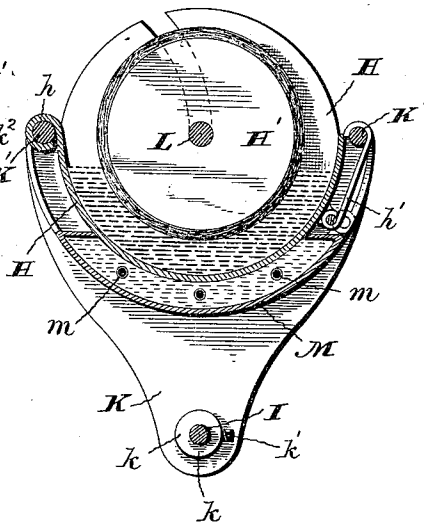
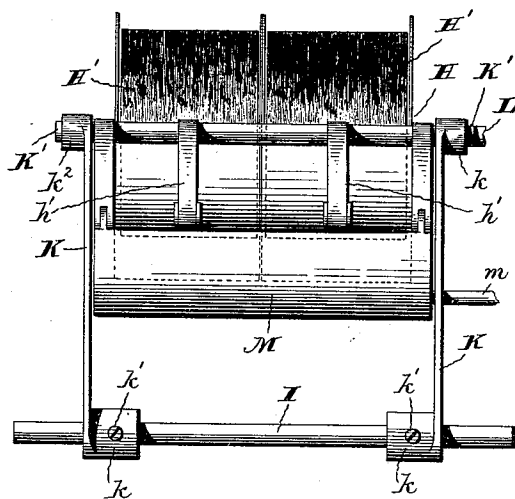


Fig. 6.



Witnesses:

Jas. E. Hutchinson.

Henry C. Hazard

Inventor.

Charles H. Palmer

*by Powell & Powell
his attorneys*

UNITED STATES PATENT OFFICE.

CHARLES H. PALMER, OF AKRON, OHIO, ASSIGNOR TO THE DIAMOND MATCH COMPANY, OF CHICAGO, ILLINOIS.

APPARATUS FOR AND PROCESS OF MAKING COLORED MATCHES.

SPECIFICATION forming part of Letters Patent No. 542,896, dated July 16, 1895.

Application filed November 22, 1894. Serial No. 529,600. (No model.)

To all whom it may concern:

Be it known that I, CHARLES H. PALMER, a citizen of the United States, and a resident of Akron, in the county of Summit, and in the State of Ohio, have invented certain new and useful Improvements in Apparatus for and Processes of Making Colored Matches; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, in which—

Figure 1 shows in side elevation a match-making machine with my invention applied thereto; Fig. 2, a similar view on a larger scale of the part of the machine where my coloring mechanism is located; Fig. 3, a view of such part of the machine in end elevation; Fig. 4, a detail enlarged view showing the head-coloring device in side elevation; Fig. 5, a view on the same scale of a vertical section of the head-coloring device, the plane of section being on line xx of Fig. 3; and Fig. 6, a detail enlarged view showing the coloring device in end elevation.

Letters of like name and kind refer to like parts in each of the figures.

The object of my invention is to provide an improved apparatus for and process of manufacturing matches with colored heads; and to this end my invention consists in the apparatus, in the combination of the parts thereof with each other, and in the process, as hereinafter specified.

In the manufacture of matches with colored heads as heretofore carried on it has been customary to color the ignitable composition before it was applied to the ends of the splints to form the match-heads thereon. There had then to be a vat of composition for each color of match-head produced, and when a different color was desired a new quantity of composition, properly colored, had to be produced.

The special purpose that I have had in view in making my present invention has been to make the coloring of the match-heads independent of that of the compositions to be applied to the splints and to make it possible to produce matches with heads of any color or colors without reference to the original color of the composition, and so to do away with

any necessity for mixing coloring-matter with said composition before application to the splints or changing the composition and applying devices when any change or variation in the color of the heads of the matches to be produced is desired.

While my invention is applicable to other forms of match-making machines or apparatus in which the headed splints, after passing the dipping and composition-applying mechanisms, are conveyed away in one or more rows, or are held in plates, clamps, or bundles carried along by suitable carriers or conveying mechanism, and is also applicable where the headed-splint-holding plates, clamps, or bundles are not carried by such conveying mechanism, but by hand, I shall show and describe the invention in detail as applied to what is known as a "continuous machine," in which the headed splints are held in rows in perforated-plates, which, being hinged together, form a continuous carrier into which the splints are stuck and by which they are carried to the dipping and composition-applying devices and from which they are discharged after the heads have been applied and dried. I desire it to be understood, however, that, while this is the form of mechanism in which I prefer to use my invention, I do not limit myself thereto, but contemplate employing it in connection with any form of holder and conveyer for the match-splints whatever the form of dipping and composition-applying devices may be.

The machine shown in the drawings is, so far as the endless chain of perforated splint-carrying plates, the means for filling such plates and moving the chain along, the dipping and composition-applying devices, and the mechanism for discharging the completed matches from the plates of the chain are concerned, substantially the same as that shown and described in the United States Patent to Beecher, No. 389,435, dated September 11, 1888, and need not therefore be described in detail in the present case. For a description and setting forth of such devices I hereby refer to the specification and drawings of said patent.

In the machine as shown in the drawings of this application the conveying-wheels for

100

supporting and guiding the chain of perforated plates after it leaves the composition-applying mechanism are differently arranged, and there are more of them than are shown in the patent referred to, the object of the difference in number being to give the match-heads more time to dry and harden as the chain is moved along on the way toward the discharging mechanism.

10 In the drawings, A designates the splint cutting and sticking mechanism; B, the chain of perforated links, each of which contains a series of transverse rows of perforations *b b*, into which the splints are stuck as such rows are brought successively opposite the sticking devices of mechanism A; C, the dipping mechanism for applying the paraffin or wax to the splints as the endless chain of plates is moved along; D, the mechanism for applying the ignitable composition to form the heads of the matches, and E the discharging mechanism for discharging the rows of matches from the perforations in the plates of the chain before such plates reach the splint-sticking mechanism A again.

25 After leaving the composition-applying devices the chain of plates passes up over one of the pairs of carrier-wheels F F, which, like those shown in Fig. 3, are adapted to support the plates at or near their opposite edges and are secured to a shaft F', which is journaled in suitable bearings *ff* on the frame-standards G G. The first pair of wheels up over which the chain passes after leaving the composition-applying mechanism causes the chain to turn over, so as to bring the matches, with the fresh heads thereon, upright. The chain then travels horizontally for a short distance to give the heads a chance to properly shape themselves, as specified in the Beecher patent hereinbefore referred to. It then passes alternately under and over the succeeding pairs of supporting and guiding wheels, so as to give an opportunity for a drying and hardening of the heads. Below the last of these carrier-wheels F F, around which the chain of perforated plates passes on its way outward before its return toward the place where the matches are to be discharged from the plates, I place my head-coloring device, which, as shown, consists, broadly, of several separate vats H H containing the coloring liquid, in each of which revolves a roller H', arranged so as to dip down into the liquid in the respective vat and having its periphery formed of felt, cloth, bristles, or other material adapted to take up some of the coloring liquid in which the roller revolves and apply it over the head of a match brought into contact with it on the upper side of the roller. These rollers, being so situated with reference to the carrier-wheel F above and the chain of perforated plates passing under such wheel that the heads of the matches held in the plates will come in contact with and be pressed slightly into the yielding surfaces of the rollers carrying the coloring-matter, are placed

close together, so that no match-heads can get by between them, so as not to come in contact with the color-applying periphery of one of them.

For convenience sake I prefer to make the separate color-containing vats, as shown in the drawings, so that they can be easily removed for filling or any other purpose and changed in number or relative position, as desired. Each one being wide enough to allow its respective roller H' to extend down into and revolve within it, with its sides close to the vat sides, has its side walls extended upward, so as to stand between and separate adjacent rollers from each other. These side walls being made very thin are high enough to project above the tops of the rollers H' H' and between the matches, so as to effectually prevent any mixing of colors from the edges of two adjacent rollers.

Each vat has on its forward side a hollow lug forming an eye *h* and on its outer or rear side a pivoted hook *h'*.

Supported on brackets attached to the upright frame-bars G G is the rod I, carrying the two vertical side plates K K, each provided with a hollow hub or boss *k*, through which the rod passes, and a set-screw *k'* on such hub to engage the rod and fix the plate in position thereon. Connecting the upper portions of these two side plates are the rods K' K', having their ends removably supported in suitable openings *k² k²* in the plates. Each plate is also provided with a journal-bearing *k³*, in which is journaled the rotary shaft L, which carries the rollers H' H' and the sprocket-wheel *l*, fixed upon and rotating with it.

The color-containing vats H H are supported from the rods K' K', one of which passes through the eyes or tubular bosses *h* on the vats, while the other is engaged by the vat-hooks *h'* *h'*.

Obviously, if desired, instead of having the eyes *h h* the vats might be provided with hooked lugs to rest upon and partially encircle the rod K' to be engaged thereby.

In order that the coloring-liquid in the vats may be kept properly heated, I provide a water tank or chamber M, in which the lower portions of the vats are immersed, as shown in Figs. 4 and 6. This tank or chamber, which is shown as supported from the rods K' K' in the same manner as are the vats H H, but can be supported in any other desired way from the plates K K, is provided with pipes *m m* for the circulation of steam or other heating medium from any suitable source of supply.

The sprocket-wheel *l* on the roller-carrying shaft L is to be driven from any suitable source of power, so that the peripheries of the rollers on the upper sides of the latter will be moved in the same direction and at the same speed as the matches carried by the carrier-chain of plates. As shown in the drawings, it is driven by a sprocket-chain *l'*,

which in turn is driven by the sprocket-wheel $\mathcal{L}$ on the shaft of the carrier-wheel F next to the last one above the rollers H H, the two sprocket-wheels being so proportioned as to
 5 secure the proper peripheral speed of the rollers indicated just above.

The shaft-carrying sprocket-wheel $\mathcal{L}$ can be rotated by power applied in any desired way, or, without departure from my invention, the
 10 sprocket-wheel could be made rotatable independently of the shaft of wheel F and could be driven by a belt-pulley or other sprocket-wheel attached to it. With this arrangement and the rollers H H set at such distance from
 15 the carrier-wheel F above, that the heads of the matches carried by the carrier-chain not only come in contact with the felt or other color-charged yielding material on the rollers, but are pressed slightly into such material,
 20 all the heads will receive a complete thin coating of color without any danger of breaking the matches or loosening same from the perforations in the carrying-plates.

With the different vats removably supported from the rods K' K', as shown and described, they can obviously be readily removed from and put back into the supporting-frame. The removal involves only the taking out of one of the rods K' and the disengaging of the vat-hooks h' h'. With the vats thus made easily removable any desired change in their number or relative positions can be readily and quickly made.

Any of the vats can without removal be
 35 tipped down for emptying and filling upon the disengaging of the respective hook or hooks from the rear rod K'.

If it be desired to apply a greater number of colors simultaneously the rollers and vats
 40 can be increased in number, as required, no other change in the machine being necessary.

The coloring matter or material in each vat preferably consists of a mixture of shellac or other quick-drying substance or varnish, colored as desired by any suitable coloring
 45 mixed with it, and is of such consistency that the felt or other yielding layer on the respective roller H' will readily take it up and apply a thin layer of it over each match-head brought
 50 in contact with it, as described above.

With the different vats supplied with coloring material of different colors the manufacture of matches with heads of the various colors will go on continuously as the headed
 55 splints are carried along by the motion of the carrier-chain.

Different portions of the quantity of matches carried by each plate will have their heads differently colored, so that as such plate
 60 is unfilled the matches produced at any one time will be of several different colors in position to be readily mingled together, so as to produce a variegated and most pleasing appearance when put up in a box or case. After
 65 leaving the color-applying devices the chain of perforated plates travels slowly onward

over suitable guiding devices, so as to give the thin layer of quick-drying coloring-matter on the heads an opportunity to dry before the discharging mechanism E is reached. 70

By my apparatus and process, as shown and described, I am enabled to produce matches of any desired color or variety of colors without the necessity of coloring the composition for the match-heads before it is applied, of
 75 using a series of composition-applying devices with composition of different colors therefor, or of changing the composition when change or variety in color of the match-head is desired. 80

The layer of coloring-matter applied to the match-heads being very thin will dry very quickly, and, while producing an ornamental colored and glossy or glazed appearance, does not interfere with the ignition and combustion of the head. 85

As the coloring-matter can be made quite liquid, the color-applying rolls can be placed very close together, so as to effectually color with different colors all the matches, however close together, held in a plate, clamp,
 90 or bundle, without danger of one color running upon or overlapping another, as would be the case if it were attempted to produce matches of different colors by means of composition-applying devices placed close together and supplied with composition of different colors. 95

Having thus described my invention, what I claim is— 100

1. In a match making machine in combination with a suitable carrying holder for the splints and means for moving the holder to bring the splints successively past a given point, composition applying mechanism, and
 105 a color applying device in the paths of the portions of composition on the splints, as the latter are moved along by the carrier, adapted to come in contact with the sides as well as the ends of such portions of composition, as they are moved past the color applying device, substantially as and for the purpose specified. 110

2. In a match making machine, in combination with a moving splint holding carrier, and means for moving the same, the composition applying mechanism to and past which the splints are carried by the movement of the carrier, a roller in the path of the heads, after they are applied to the splints, having a yielding surface adapted to take up and carry coloring matter, and arranged so that the portions of composition on the splint ends will be pressed into it, as the splints are moved along by the carrier, and means for supplying
 115 such matter to the roller, substantially as and for the purpose set forth. 120

3. In a match making machine, in combination with a moving splint holding carrier, and means for moving the same, the composition
 125 applying mechanism, a vat holding coloring matter and a roller revolving therein, having 130

its periphery yielding, and adapted to take and convey the coloring material from the vat, situated so that such periphery is in the path of the heads placed upon the splints by the composition applying devices, and the heads on the splints will be pressed down into it as the splints are moved along by the carrier, substantially as and for the purpose specified.

4. In a machine for making matches, in combination with a moving splint holding carrier, the composition applying mechanism, to and past which the splints are carried by the carrier, and the head coloring mechanism placed beyond the composition applying devices, and consisting of a roller having its periphery in the path of the heads on the splints, made of soft absorbent material, as felt, situated so that the heads on the splints will be pressed down into it as the splints are moved along by the carrier and supplied with coloring material from a source of supply, substantially as and for the purpose shown.

5. In a match making machine in combination with a moving splint holding carrier carrying a body of splints traveling in different lines, as the holder is moved along, the composition applying mechanism and a series of color applying devices in the paths of different splints in the holder, and sources of supply of coloring matter of different colors for the different color applying devices, substantially as and for the purpose described.

6. In a match making machine, in combination with a moving splint holding carrier carrying a body of splints traveling in different lines, as the holder is moved along, the composition applying mechanism, and the transverse series of rollers, revolving in separate vats containing coloring matter, having their peripheries adapted to take up and carry the coloring matter, situated so that the heads applied to the splints by the composition applying mechanism, come in contact with, and take up coloring matter from the roller pe-

ripheries, substantially as and for the purpose specified.

7. In a match making machine, in combination with a moving splint holding carrier carrying a body of splints traveling in different lines as the holder is moved, the composition-applying mechanism, the transverse series of rollers beyond such mechanism having their peripheries in position to be engaged by the heads on the splints, and vats of different colored coloring materials into which the different rollers dip, substantially as and for the purpose described.

8. In combination with a splint carrying holder carrying a body of splints traveling in different lines as the holder is moved, a suitable support, the shaft carrying a series of color applying rollers to apply colors to heads on the splints and the separate color containing vats, in which the rollers revolve, having guard plates extending up between and above the rollers and between the lower ends of rows of matches in the holder to keep the colors on adjoining rollers from mingling and prevent the heads of any matches from receiving two colors, substantially as and for the purpose shown.

9. As an improvement in the art of making matches with colored heads, the process which consists in placing the splints in a moving holder adapted to hold a quantity of splints, so that the latter will travel in different lines, as the holder is moved, and applying to the heads of different parts of the body of splints as they are moved along, different colored coloring materials, substantially as and for the purpose described.

In testimony that I claim the foregoing I have hereunto set my hand this 19th day of November, 1894.

CHARLES H. PALMER.

Witnesses:

E. C. MANWARING,
F. S. NEWTON.