

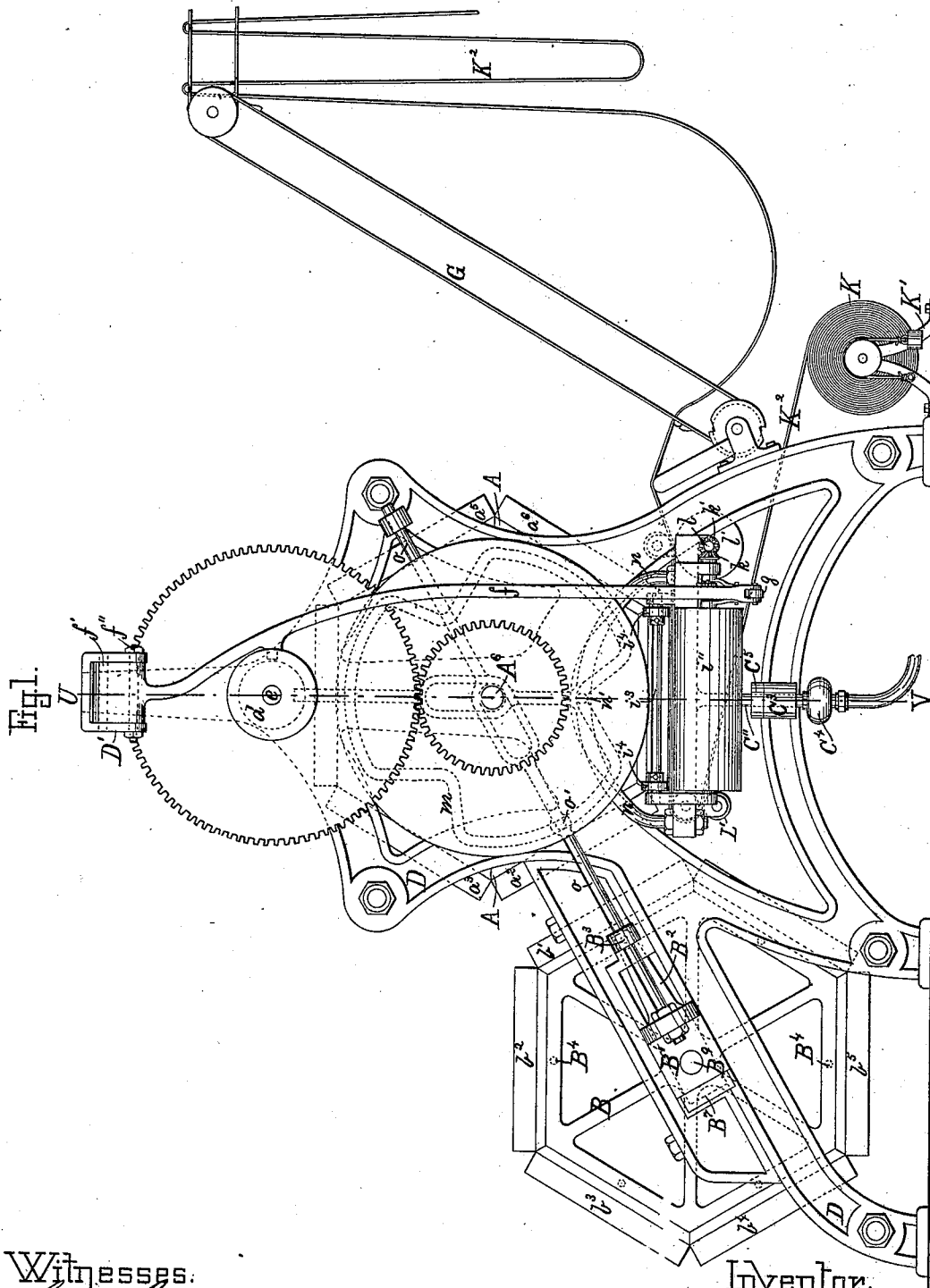
(No Model.)

4 Sheets—Sheet 1.

D. E. KEMPSTER.
COLOR PRINTING MACHINE.

No. 361,703.

Patented Apr. 26, 1887.



Witnesses.
Henry Chadbourne.
F. Allen.

Inventor.
Daniel E. Kempster.
by *Wm. Audien* his atts.

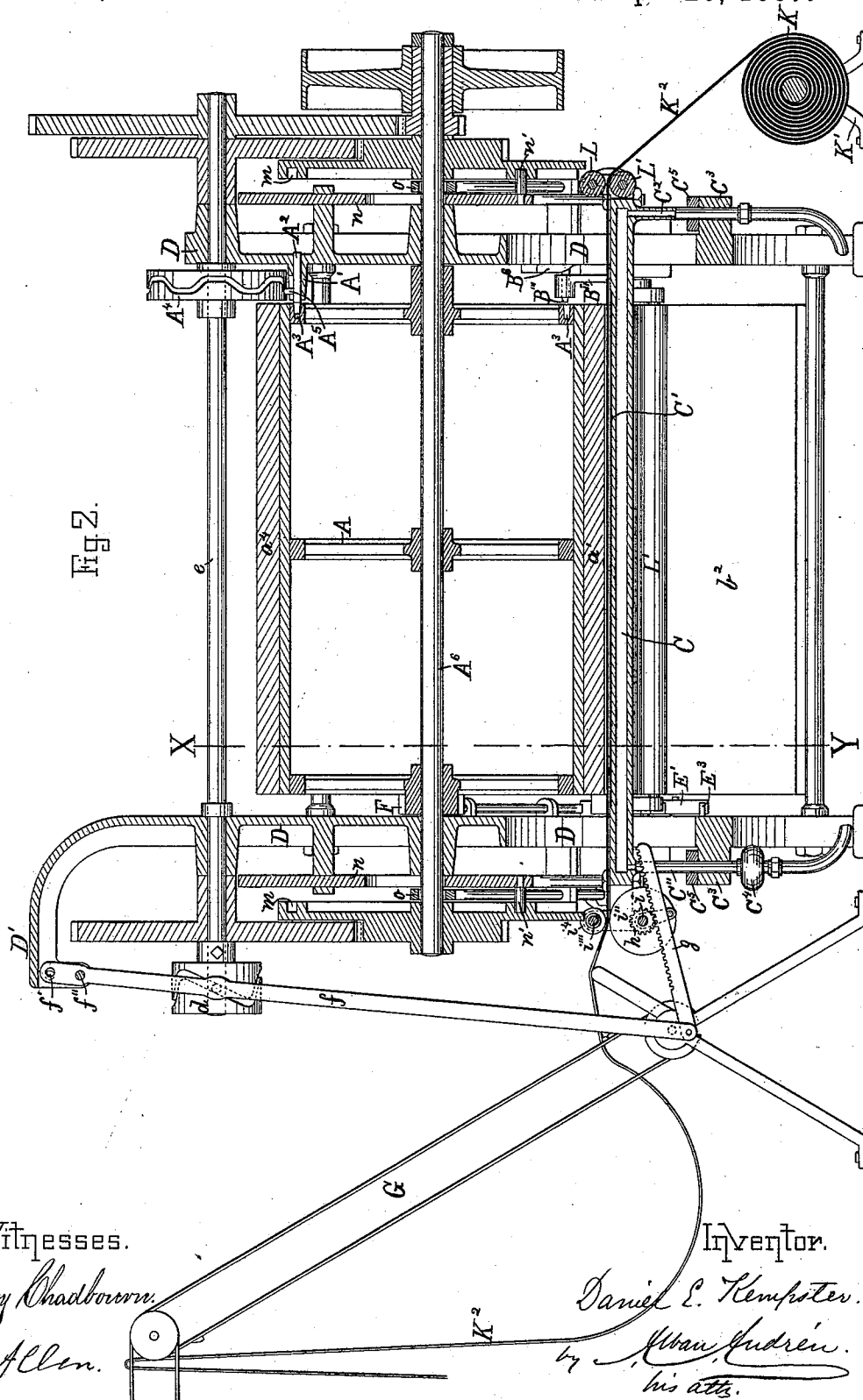
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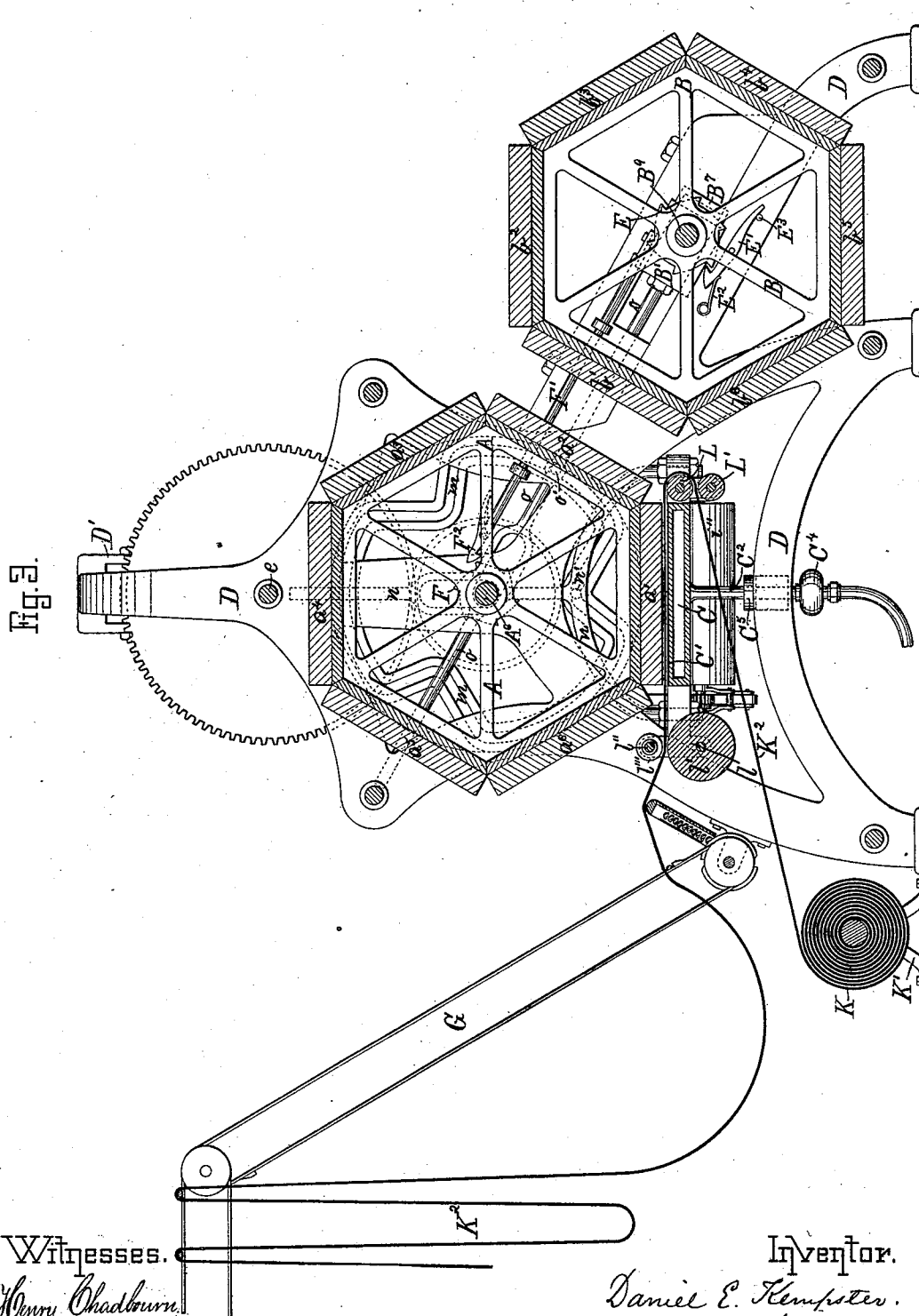
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4 Sheets—Sheet 4.

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Fig. 7.

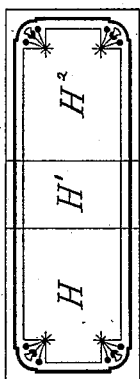


Fig. 8.

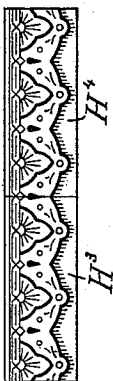


Fig. 9.



Fig. 6.

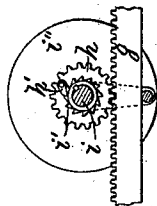


Fig. 5.

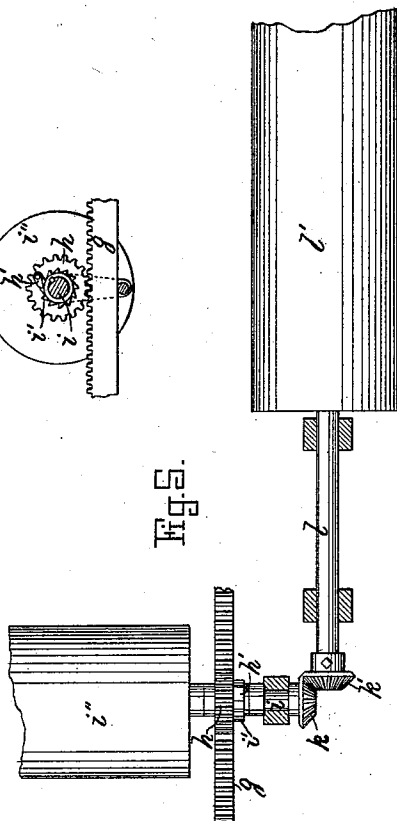
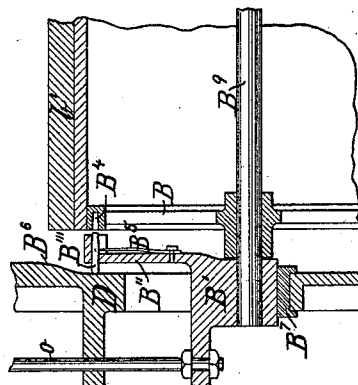


Fig. 4.



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UNITED STATES PATENT OFFICE.

DANIEL E. KEMPSTER, OF BOSTON, MASSACHUSETTS.

COLOR-PRINTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 361,703, dated April 26, 1887.

Application filed December 23, 1880. Serial No. 22,779. (No model.)

To all whom it may concern:

Be it known that I, DANIEL E. KEMPSTER, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Color-Printing Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

My invention relates particularly to a machine and blocks for printing ornamental bands, dadoes, &c., on window-shades, but may, without material change, be adapted to other kinds of color-printing, such as car-linings, stair-coverings, table-covers, oil-cloth, wall-papers, &c.

The invention is carried out as follows, reference being had to the accompanying drawings, on which—

Figure 1 represents an end elevation, showing the feeding mechanism, details of which are further shown on Figs. 4, 5, and 6. Fig. 2 represents a central longitudinal section on the line U V, shown in Fig. 1; and Fig. 3 represents a cross-section on the line X Y, shown on Fig. 2. Figs. 7 and 8 represent the printing blocks; and Fig. 9 represents specimens of printed shades and dadoes, as will be further described.

A is the intermittent rotary carrier, with its printing-blocks a^1, a^2, a^3, a^4, a^5 , and B is the intermittent rotary and reciprocating color-carrier, with its color-cushions b^1, b^2, b^3, b^4, b^5 , and b^6 attached.

C is the pressure-pad, located below the carrier A; and in Figs. 1 and 3 is shown the feeding device as I use it for printing dadoes, although such may also be printed with the aid of the feeding mechanism, as represented in Fig. 2; but I prefer, however, to arrange it as shown in Figs. 1 and 3, as by so doing I am able to print dadoes on material double the ordinary width of window-shades, or I am able to print dadoes on two strips of material side by side of the ordinary width.

The grooved cam d shown on the end of the

upper shaft, e , gives motion to the feeding mechanism by means of the lever f , a stud in the same having a roll on it which travels in the said grooved cam. The upper end of the lever f and forked casting D' , on which the lever is suspended, are provided with several holes, $f' f'$, the proper distance apart for the pin f'' , on which the lever is hung, by which means a variable throw is given to said lever and the material fed along for any desired length of shade, and through the reciprocating rack g and its loose pinion-gear h , with pawl h' pivoted to the same, which acts on the ratchet i' , that is fast on the shaft i , on which is also fast one of the feed-rolls, i'' . Above the feed-roll i'' is located the loosely-revolving shaft i''' , on which are arranged the laterally-adjustable friction-wheels $i^4 i^5$. Said wheels may also be adjustable to and from the feed-roll i'' , if so desired. The shaft i is also connected by bevel-gears $k k'$ to another shaft, l , on the side of the pad C, which also has a feed-roll, l' , above which is located the loosely-revolving shaft l'' , with its adjustable friction-wheels l^4 , in a similar manner as heretofore described, in relation to feed-roll i'' . Thus it will be seen the material can be fed either lengthwise or crosswise of the machine, as desired, for printing either bands or dadoes.

The number of points on the feeding-cam d regulates the number of times the material is fed along to every complete revolution of carriers A and B. Thus it will be seen that I am able to print dadoes on two strips of different-colored materials side by side and, if giving to each window-shade a dado of two colors, (which colors may also be different,) I produce at one complete revolution of the carriers A and B six window-shades, each with a different design and different-colored dado, and on two colors of material, and by changing the feed-cam I am able to print any number of colors before feeding, consistent with the number of sides on the carriers, which may be two or more, according to the quality of printing required.

Fig. 9 shows a strip of material as fed through the machine arranged as shown in Fig. 2, with a feed-cam for two colors, and, as will be seen, three different designs and colors may be obtained on one strip of material.

In Fig. 1 is shown one of the grooved cams, *m*, which gives reciprocating motions to the carrier B and pad C. Fig. 1 also shows one pair of the connecting-rods, *n o*, which have studs and rolls *n o* adapted to work in the grooved cams *m*, said connecting-rods being made to straddle the shaft A⁶, and having one end sliding through guide-pieces on the frames D D and the other ends attached to pad C and carrier B, respectively.

Rubber springs B' B' are placed under the sliding boxes B' B' on carrier B, and similar ones, C⁵, under pad C, above its bearings C³ C³, so as to relieve the shock when the motion is reversed.

B'' is a projection on the sliding bearing-box B' of carrier B. Said projection is provided with a sliding pin, B''', its inner end being tapered, as shown in Fig. 4, and adapted to enter holes B⁴ in the sides of carrier B, one hole for each flat side, which pin is held out of engagement by means of a spring, B⁵, and forced in by an incline, B⁶, on the inside of the frame, as shown in said Fig. 4, and by this device the carrier B is locked and released by its own travel back and forth as it is intermittently caused to revolve, it being necessary that the carrier B should be locked at the moment of delivering the color to the printing-blocks on carrier A.

The sectional elevation in Fig. 2 shows the feeding mechanism and material as arranged for printing bands or Japanese designs, covering nearly or quite the entire window-shade, as shown in the central part of Fig. 9.

In Fig. 2, A' is a hollow projection on the inside of the frame, in which is located the sliding pin A², having tapering end adapted to enter corresponding holes, A³, in the head of carrier A, for the purpose of securely locking it while the printing-blocks are receiving the colors and when giving their impressions. The pin A² is caused to slide in and out by the action of the grooved cam A⁴ on the shaft *e*, which operates a projection, A⁵, on the sliding pin A², as shown in said Fig. 2, as the carriers are intermittently caused to revolve.

The pad C is a metal case covered with any soft elastic material, C'—such as felt or flannel—and said case is made hollow to admit hot air, steam, or water; but in the present instance it is represented as using steam. The vertical stems C'' C'' are hollow, and made so as to slide up and down in the stationary bearings C³ C³. As the pad reciprocates, the steam enters one of them, and, as it condenses, the steam-trap C⁴ (shown on one of the bearings) takes care of the water. The connecting-pipes to both stems C'' C'' are flexible tubing or hose.

The mechanism for intermittently revolving the carriers A and B is shown in Fig. 3, in which the carrier B is shown fast on its shaft B³, as is also its ratchet-wheel E, the pawl E' of which is pivoted to the frame and held by a spring, E², in contact with the said ratchet-wheel E.

E³ is a stationary stop on the frame, to reg-

ulate and define the throw of the pawl E'. By these means an intermittent rotary motion is imparted to the carrier B as it reciprocates to and from the carrier A.

The carrier A is free to revolve on its shaft A⁶, but has attached to its head a ratchet, F, as shown.

F' is a rod, one end of which is secured to the sliding bearing B' of the carrier B, and passes through guide-pieces on the frame. On the upper end of the rod F' is pivoted a pawl, F², held properly by a spring and stop attached to the rod in a similar manner as heretofore described in relation to carrier B. The motion back and forth of the latter causes the pawl F² to engage with the ratchet F on carrier A, and thus causes said carrier A to intermittently revolve in the proper time. The looping-up or hanging mechanism G (shown in Figs. 1, 2, and 3) is the same as commonly used by wall-paper manufacturers.

In Figs. 7 and 8 are represented the machine-printing blocks as arranged in sections H H' H² and H³ H⁴, by which means window-shades of different lengths and widths can be printed from one set of blocks, and without changing the design, simply by taking from or adding sections of the block, which is a great advantage in blocks for machine-printing, as it gives them a much greater range of usefulness without adding much to their cost.

D D represent the frames of the machine, provided with suitable bearings for the reception of the various shafts heretofore described.

The operation of the machine is substantially as follows: A roll, K, of the material to be printed on is suspended in bearings K' K' on one side of the machine. The material K² passes in between friction-rolls L L' on the side of the pressure-pad C, thence across said pad and between one of the feed-rolls and its friction-wheels, as heretofore described, which are revolved together and are caused to intermittently revolve and feed the material along by the mechanism heretofore described. Commencing with the pad C at the bottom of its stroke, the carrier B would be at the top of its stroke, and the elastic cushion B' on the latter would be pressed against the opposite printing-block, a', on the carrier A, and thus transfer the color to the latter. Through the action of the grooved cams *m m*, the carrier B quickly recedes and remains at rest at the end of its stroke, when the color is applied and evenly distributed on the uppermost cushion, b², of the same. As the carrier B recedes, the carrier A quickly revolves far enough to bring its printing-block a', on which the color has just been transferred, to the bottom, or directly over the material to be printed on the pressure-pad C, which advances toward carrier A as the carrier B recedes. When the pad C is advanced to the end of its stroke, it has pressed the material to be printed on against the printing-block a', and receives a corresponding impression of the same. As pad C recedes, carrier B advances and revolves far

enough to bring cushion b^2 in position to transfer the color to the printing-block a^2 , and so on until the number of impressions required are given, when, as the pad C recedes, the material automatically feeds along the length or more or less of a shade, as the case may require, for printing either bands or dados or other designs.

It will be seen that when the color is applied the elastic cushion on the carrier B is in a perfectly level position, and remains so until it is being advanced, when it revolves far enough to bring the cushion in the proper position to transfer the color to the printing-block opposite; also, that the printing-block, as soon as it has received its color, is revolved far enough to bring it level in a position to give the impression to the material. The object of arranging the cushions and blocks to be operated in the aforesaid manner is so as to keep the color in a level position, so it will not run to one side, and at the proper working-speed of the machine this is fully accomplished.

The feed device may be caused, by a suitable number of points on the cam d , to revolve and feed the material to be printed on between any number of impressions consistent with the number of sides on the carriers A and B, according to the number of colors desired to be applied to the material. By this arrangement several styles of shades may be printed on the same roll of material from one set of printing-blocks simply by causing the material to feed along after different numbers of impressions. This is obviously a great advantage in a machine for printing in colors. I also cause pressure-pad C to be hot, by steam or otherwise, which makes the colors dry quickly and allows of running the machine at a faster speed. As fast as the material is printed on it is, by suitable mechanism, looped up on an overhead railway or looping-machine, under which are lines of steam-pipes, and passes away from the machine a sufficient distance or length of travel to insure its being perfectly dry before it reaches the feed-rolls or an automatic shearing-machine, which cuts it off into the proper lengths of shades.

In printing shades which are to have more or less of their pattern in gold or silver bronze, the drying of the other colors must be effected before the bronzing. The size which is to carry the bronze is made especially for this purpose, and when the colors which have been printed are entirely dry the size, printed also at the same operation, is just in the proper condition to take and firmly hold the bronze. This is put on in a separate machine with many brushes, (and will form subject-matter for another application for patent,) into which the material passes continuously from the printing-machine after it has gone through its journey over the steam-pipes on the overhead railroad. From the bronzing-machine, as from the printing-machine, the material proceeds in the same manner as before to the feed-rolls

on the shearing-machine, which cuts it off into shades ready to be rolled up into pairs.

As far as I am aware, ornamental printed window-shades in oil-colors have only been successfully produced by hand labor. On account of the cheapness of said window-shades, handsome designs of many colors have been too expensive; but with my improved machine and method of manufacture I am able to produce cheap window-shades having a very fine and rich appearance of elaborate designs and artistic paintings in many colors.

I do not wish to confine myself to any particular mechanical devices for operating the several parts of the machine, or to any particular number of sides on the carriers, or to this particular manner of arranging and operating them, as all may be changed without departing from the essential features and spirit of my invention.

The colors may be applied to the elastic color-cushions by hand or by suitable machinery, and the colors may be blended, if so desired, on the material printed on by arranging the printing-blocks so as to overlap each other.

What I claim is—

1. In a color-printing machine, in combination, the vertically-reciprocating pad C, the intermittently-revolving printing-block carrier A above it, the intermittently-revolving color-carrier B, reciprocating at an angle thereto, and the intermittently-feeding mechanism operating to feed the material horizontally thereon, all substantially as and for the purpose set forth.

2. In a color-printing machine, in combination, the frame D, the shaft A^6 therein, the printing-block carrier A on said shaft, the vertically-reciprocating pad C, the shaft B^9 , the color-carrier B thereon and reciprocating at an angle, as described, the cams $m m$, the connecting-rods $n n o o$, and mechanism, substantially as described, whereby the carriers A and B are intermittently revolved, as set forth.

3. In a color-printing machine, the reciprocating pad C and intermittently-revolving printing-block carrier A, combined with the reciprocating and intermittently-revolving color-carrier B, and the mechanism, substantially as described, for alternately locking and unlocking said carriers, substantially as and for the purpose set forth.

4. In a color-printing machine, the combination of the frame D, the shaft A^6 therein, the cams $m m$ on said shaft, the connecting-rods $o o$, the shaft B^9 , the color-carrier B thereon, the ratchet E on said carrier, and the pawl E' , pivoted on the frame D, all substantially as shown and described, whereby the carrier B is intermittently reciprocated and revolved, as set forth.

5. In a color-printing machine, the two sets of feed-rolls and friction-wheels geared together at right angles to each other, combined with the mechanism, substantially as described, for intermittently revolving them, whereby the

material to be printed upon may be fed either lengthwise or crosswise of the machine, substantially as and for the purpose set forth.

6. In a color-printing machine, the intermittently-revolving printing-block carrier A, the vertically-reciprocating pad C beneath it, and the color-cushion carrier B, reciprocating at an angle thereto, in combination with the cams *m m* and mechanism, substantially as described, whereby said cams alternately reciprocate said carrier B and pad C, for the purpose set forth.

7. In a color-printing machine, the vertically-reciprocating pad C, with the intermittently-revolving printing-block carrier A above it, and the intermittently revolving and reciprocating color-cushion carrier B, reciprocating at an angle thereto, all arranged and operating substantially as described, whereby the color is applied to the color-cushion and also applied to the material on the pad C while both said cushion and the printing-block are in a perfectly-level position, as and for the purpose set forth.

8. The reciprocating color-carrier B, its at-

tached rod F', and pawl F² thereon, in combination with the ratchet F and carrier A, substantially as and for the purpose set forth.

9. The carrier A and the holes A³ therein, combined with the frame D, sliding pin A² therein, its operating-cam A⁴, and shaft *e*, all substantially as and for the purpose set forth.

10. The carrier B and the holes B⁴ therein, combined with the sliding box B' B'', sliding pin B''' therein, spring B⁵, and incline B⁶ on the frame D, all substantially as and for the purpose set forth.

11. In a color-printing machine, the frames D D, the shafts A⁶ B⁹, and the cams *m m*, in combination with the connecting-rods *n n o o*, adapted to be operated by said cams, as described, and the pad C and carrier B, as set forth.

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

DANIEL E. KEMPSTER.

Witnesses:

ALBAN ANDRÉN,

HENRY CHADBOURN.