July 21, 1931. A. GÖRNER 1,815,504

DEVICE FOR PRINTING COLORED PATTERNS ON PLUSH AND LIKE FABRICS

Filed April 8, 1930 4 Sheets-Sheet. 1

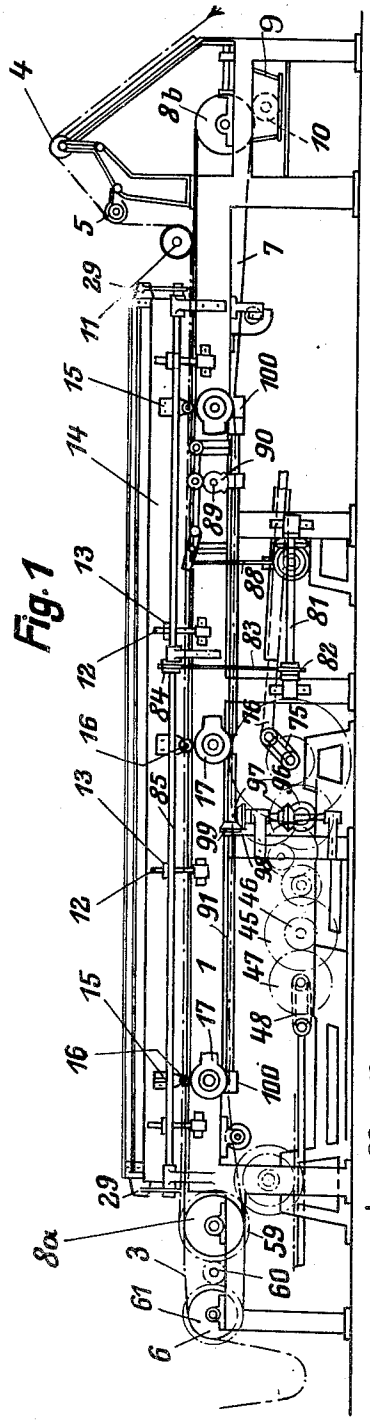

Fig. 1

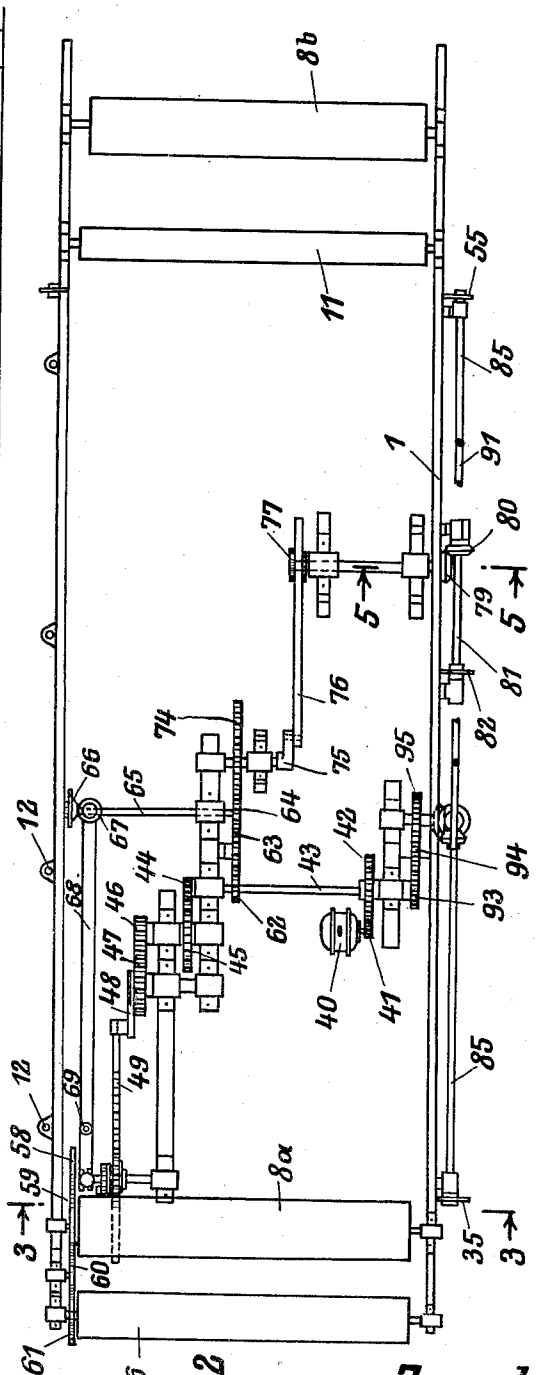

Fig. 2

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Filed April 8, 1930 4 Sheets-Sheet. 2

Fig. 4

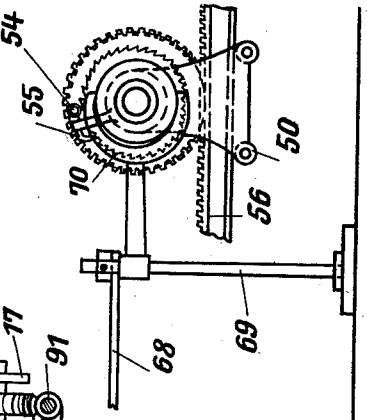
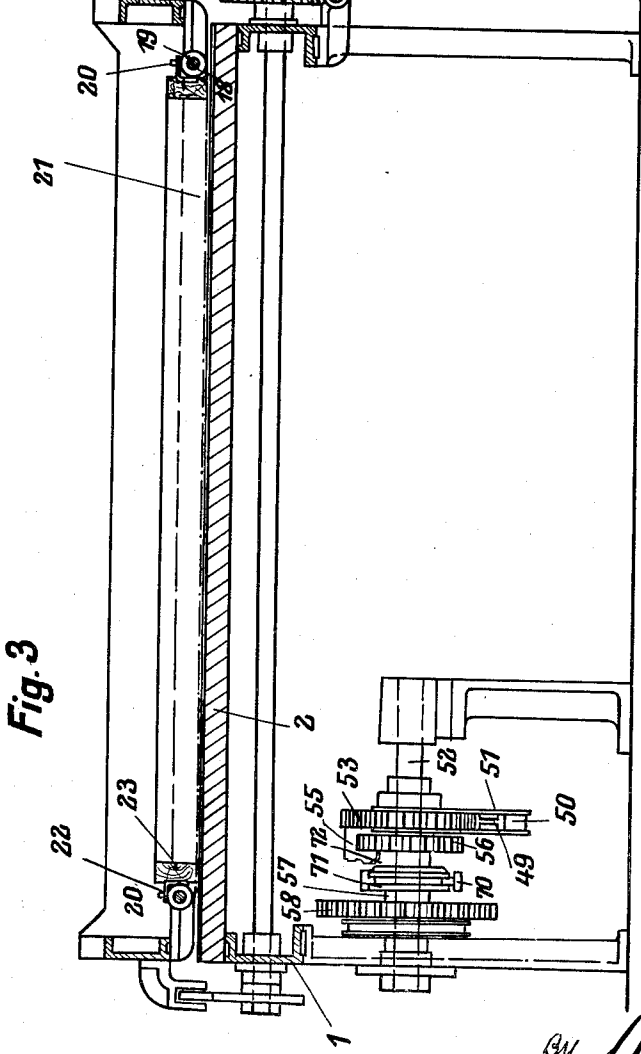


Fig. 3



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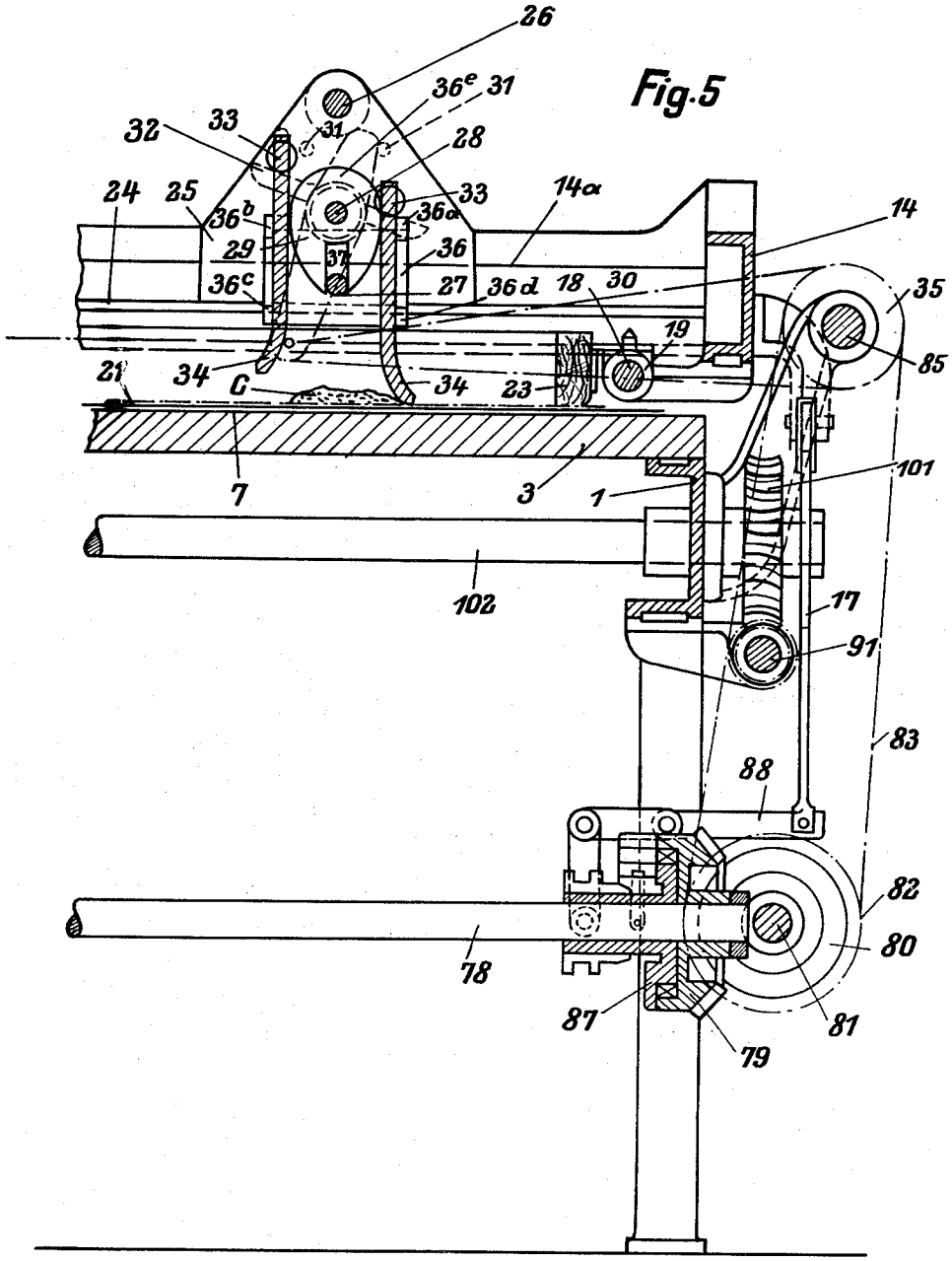
DEVICE FOR PRINTING COLORED PATTERNS ON PLUSH AND LIKE FABRICS

Filed April 8, 1930 4 Sheets-Sheet. 3

Fig.5



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DEVICE FOR PRINTING COLORED PATTERNS ON PLUSH AND LIKE FABRICS

Filed April 8, 1930 4 Sheets-Sheet, 4

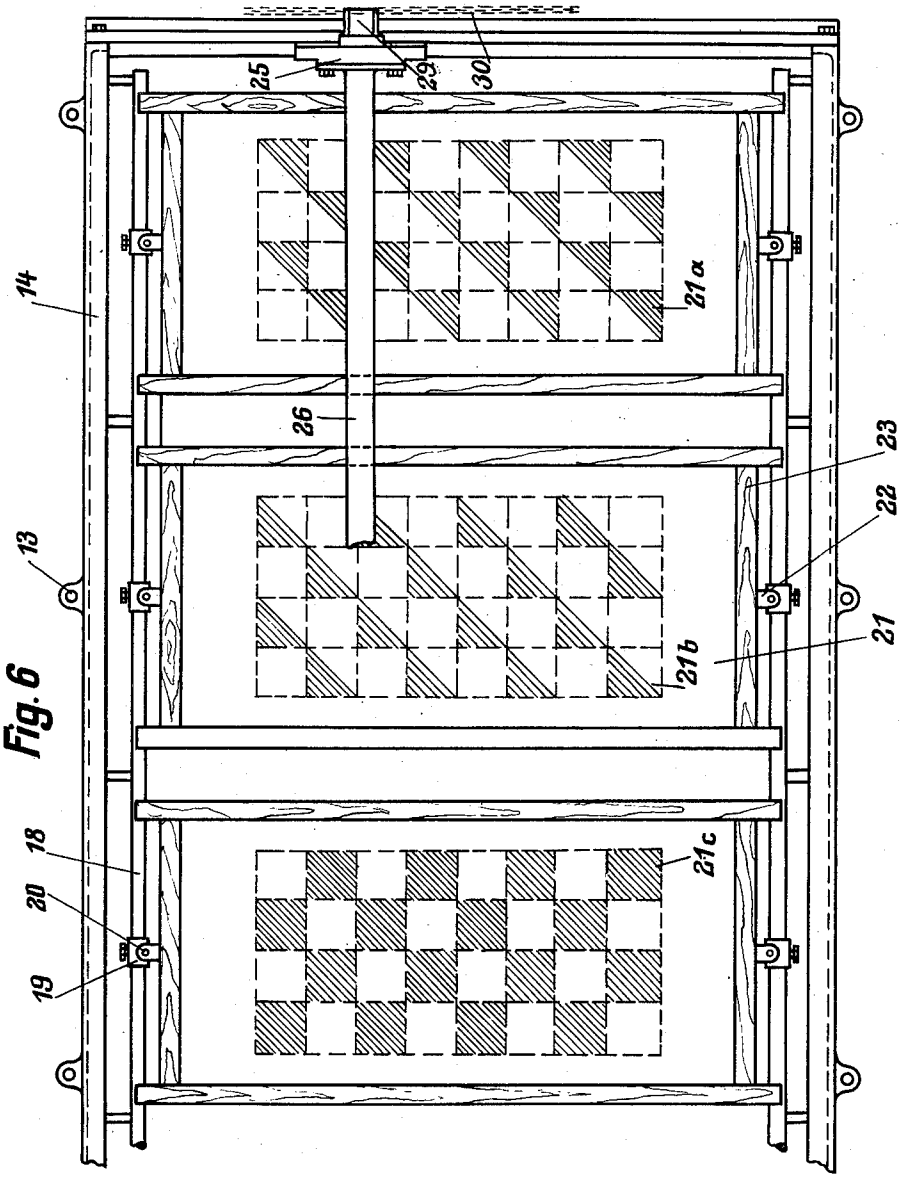

Fig. 6

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Patented July 21, 1931 1,815,504

UNITED STATES PATENT OFFICE

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DEVICE FOR PRINTING COLORED PATTERNS ON PLUSH AND LIKE FABRICS

Application filed April 8, 1930. Serial No. 442,577.

My present invention relates to a machine for printing color patterns on plush fabric or like webs, of that type in which there is or are arranged above the fabric web fed intermittently over a support one or more vertically movable stencils associated with pushers reciprocating over the stencils and serving to spread the color.

In known machines for printing color patterns on plush fabric and like webs by aid of stencils there are used devices by aid of which the color is forced through the pattern of the stencil into the fabric web to be printed. Usually there are employed for this purpose suction devices whereby a vacuum is set up beneath the fabric web, so that the color applied to the stencil is sucked through the stencil on to the fabric web. It has been found that the sucking of the color into the fabric web can be effected without the employment of special suction devices. According to my invention as disclosed in the copending application, Ser. No. 288,897, the color is uniformly distributed by means of a reciprocating pusher over the stencil surface so as to close tightly the interstices in the stencil and thereafter the stencil is suddenly stripped from the fabric web. There is preferably used a stencil of permeable fabric blocked out by impermeable material, for example, lacquer. The color uniformly distributed over the stencil surface by means of reciprocatory pusher clings in the form of small pellicles in the meshes of the fabric of the stencil pattern. On stripping the stencil from the fabric web there is set up beneath the stencil a vacuum which in consequence of the small dimensions of the color pellicles filling the meshes of the fabric attains a substantial value. At the moment in which in consequence of the vacuum the color pellicles are stripped off the stencil the outer air flows at high speed through the meshes of the stencil fabric and drives the color into the fabric web.

To obtain this effect it is essential that the color should be distributed as uniformly as possible over the stencil surface and the stencil stripped at high speed from the fabric web.

The invention has for its object to provide an improved machine in which for this purpose there are effected mechanically by simple means all the movements incident to the printing operation. Means are also provided to render possible the production of patterns of different size.

A construction of machine according to my present invention is illustrated in the accompanying drawings, by way of example.

Fig. 1 is a side elevation of the machine.

Fig. 2 is a plan of the machine, the table serving as a support for the fabric web and parts above same being omitted.

Fig. 3 is a section on the line 3—3 of Fig. 2.

Fig. 4 shows in plan a detail of Fig. 3.

Fig. 5 is a part section on the line 5—5 of Fig. 2 to a larger scale.

Fig. 6 is a plan of the stencil-containing frame with three stencils.

As shown, the machine frame 1 carries a table 2 over which the fabric web 3 to be printed is fed intermittently, said web being led to the table from a roll, not shown, over rollers 4 and 5. The feeding of the fabric web is effected by a preferably spiked roller 6 located in front of the table 2 considered in the direction of travel. Between the fabric web 3 and the table 2 is an endless band 7 of rubber or the like of about the breadth of the fabric web. This endless band runs over rollers 8*a* and 8*b* beyond the ends of the table 2.

Beneath the roller 8*b* is a bath 9 of adhesive into which dips a roller 10 contacting with the endless band 7, so that the endless band is coated with adhesive on the side adjacent to the fabric web. A roller 11 arranged above the table 2 presses firmly together the fabric web 3 and the endless band 7 coated with adhesive. At the side portions of the machine frame 1 are secured several vertical pins 12 on which a rectangular frame 14 having lateral eyes 13 is guided for up-and-down-movement. The side members of this frame are fitted with brackets 15 carrying rollers 16 which ride on a corresponding number of cams 17 which are driven in a manner hereinafter described. Adjacent to the side members of the frame 14 there extend par-

allel thereto within the frame 2 rods 18 upon which are slidably mounted several sleeves 19. Each sleeve 19 carries a pin 20. A plurality of stencils 21 are supported by means of lateral lugs 22 of the stencil frame 23 on the pins 20 of the sleeve 19 so that by sliding the sleeves 19 on the rods 18 the spacing of the stencils 21 may be varied in accordance with the pattern to be produced on the fabric web. 21*a*, 21*b* and 21*c* represent the patterns of the adjacent stencils. The transverse members 14*a* of the frame 14 are provided with slide rails 24 on each of which is mounted a slide or carriage 25. The two slides are connected together by means of rods 26, 27 so that they can be reciprocated together transversely to the direction of feed of the fabric web. A shaft 28 disposed parallel to the rods 26 carries on each of its ends rotatably mounted in the slides 25 a two-armed lever 29, the depending arm of which is connected with a driving chain, while the rocking movement of its upper arm is limited by stops 31. On the shaft 28 there are also mounted several two-armed levers 32 which are slidable in longitudinal direction on the shaft 28 but non-rotatable relatively thereto. On each pair of levers 32 there ride lateral rollers or projections 33 fitted to substantially vertical plates 34 of soft rubber or the like which plates serve as pushers or spreaders for effecting uniform distribution of the color C over the surface of the stencils. The levers 32 are given rocking movements by means of levers 39 on the shaft 28 whereby the pushers 34 confining the mass of color C are alternately raised and lowered. The operating chain 30 for each pusher 34 is guided at both sides of the machine frame 1 over sprockets 35, both ends of the chain coming from opposite directions being connected to the lower arm of the relative lever 29. The sprockets are actuated in a manner to be described below in such wise that the lever 29 is first rocked until it engages with one of the stops 31 and then the slide 25 is moved transversely of the direction of movement of the fabric web for a distance equal to about the breadth of the web to be printed. At one end of the excursion of the slide 25 the direction of rotation of the sprockets 35 is reversed so that the chain 30 pulls the lever 29 in the opposite direction and rocks the lever into engagement with the other stop 31. At the same time also the two-armed levers 32 are rocked so that the previously operative pusher 34 is lifted from the stencil 21 and the other pusher is lowered. In this way the result is obtained that at all times only the pusher 34 which is located behind the mass of color C considered in the direction of movement of the slide 25 is operative. To guide the pushers 34 in their up-and-down movement there are employed several plates 36 slidably mounted on the shaft 28. These plates are provided with projections 36*a*, 36*b*, 36*c*, 36*d* and 36*e* which engage between the ends of the pushers. These projections are so formed that in spite of their curved form the pushers can be readily moved between the same upwardly and downwardly. The rod 27 is led through notches 27 in these plates so that the plates do not participate in the rotary movement of the shaft 28.

The actuation of all the movable parts of the machine is derived from a common electric motor 40. To effect intermittent movement of the fabric web 3 there is driven by the electric motor 40 by way of gearing 41, 42, a shaft 43 and lay mechanism 44, 45, 46, 47, a crank 48 which engages a slidable rack 49. The rack is guided on the roller 50 which is rotatably mounted in a frame 51. This frame is carried by a shaft 52 on which is freely rotatable a pinion 53 meshing with the rack 49. The pinion 53 carries on a pin 54 adjacent to its periphery a pivoted pawl which co-operates with a ratchet wheel 56 (see Fig. 3). This ratchet wheel is rigidly connected by means of a boss 57 with a pinion 58 which meshes with a pinion 59 mounted on the axis of the roller 8*a* for the endless band 7. This pinion 59 drives by way of a pinion 60 a pinion 61 which is mounted on the shaft of the feed roller 6 for the fabric web 3.

A shaft 65 driven from the shaft 43 by means of gearing 62, 63, 64, carries at its end a cam 66 which co-operates with a roller 67 on one arm of a two-armed lever 68 in such wise that the lever 68 may be rocked about its stationary fulcrum pin 69. The other arm of this lever 68 carries a fork 70 which engages with a sleeve 71 slidable on the boss 57 connecting the ratchet wheel 56 with the pinion 58 (Figs. 3 to 5). The sleeve 71 with its projection 72 acts on its movement towards the right (Fig. 3) on the pawl 55 in such wise that the pawl is disengaged from the teeth of the ratchet wheel 53. By this means the result is obtained that the movement of the rack 49 is converted into rotary movement of the roller 8*a* for the endless band 7 and of the feeding roller 6 for the fabric web 2 in one direction only.

The shaft 43 drives by way of the gearing 62, 63, 64 an additional pinion 74 which is mounted on a shaft provided with the crank 75. This crank 75 engages a movable rack 76 which meshes with a pinion 77. The pinion 77 is mounted on a shaft 78 which by means of a pair of bevel gears 79, 80 drives a shaft 81 disposed parallel to the sides of the machine frame 1. On this shaft 81 is mounted a sprocket 82 over which is led an endless chain 83. The chain 83 drives by means of a sprocket 84 a shaft 85 also disposed parallel to the sides of the machine frame so that said shaft 85 receives an oscillatory movement. On the ends of the shaft

85 are mounted the already mentioned sprockets 35 for the chain 30 serving to actuate the pushers 34. The bevel gear 79 is mounted to be freely rotatable on the shaft 78 and receives its actuation from the shaft 78 through the intermediary of a clutch 87 which is alternately engaged and disengaged by a lever mechanism 88 (Fig. 5). The lever mechanism 88 is preferably controlled by means of a cam 89 rotatably mounted on the machine frame, which cam receives its actuation by means of worm-gearing 90 from a continuously rotating shaft 91 extending longitudinally of the machine frame (Figs. 1 and 5). This shaft is also driven from the motor 40 by way of the shaft 43 and gearing 93, 94, 95, 96, 97, 98, 99. The shaft 91 also serves to actuate the cams 17 for effecting the up-and-down movement of the frame 14. For this purpose there are mounted on the shaft 91 several worms 100 which mesh with gears 101 on the shaft 102 carrying the cams 17.

The operation of the machine is as follows:—

During the intermittent feeding movement of the fabric web 3 and of the endless band 7 gummed thereto, the frame 14 with the stencils 21 arranged therein and the pushers 34 is elevated by means of the cams 17. During this time the clutch 87 on the shaft 78 is disengaged so that the sprockets 35 are at rest. After completion of the feeding movement the frame 14 is arrested and at the same time the clutch 87 is engaged. By the following movement of the chain 30 the slides 25 with the pushers 34 are moved transversely of the fabric web, the pushers 34 being alternately raised and lowered at the end of their excursion so that at all times only the pusher located behind the mass of color is operative. After the mass of color C has been uniformly distributed over the entire surface of the stencil, the frame 14 is again elevated by means of the cams 17 so that the stencils 21 are stripped from the fabric web 3. The fabric web remains adhering to the impermeable endless band 7 until said web has left the last stencil.

What I claim as my invention and desire to secure by Letters Patent of the United States, is:—

1. In a device for printing colored patterns on plush and like fabrics, at least one vertically movable stencil of permeable fabric, a support for the fabric webs to be treated, means for intermittently feeding the fabric webs over said support, pushers for each stencil for distributing the color over the surface of said stencil, a carrier for said pushers and adapted to reciprocate over the surface of said stencil, a common vertically movable frame for said stencil and said pushers, and means whereby the relative position of said pushers to said stencil may be adjusted.

2. In a device for printing colored patterns on plush and like fabrics, at least one stencil of permeable fabric, said stencil being vertically movable, a support for the fabric webs over said support, pushers for each stencil and adapted to distribute the color over the surface of said stencil, a carrier for said pushers and adapted to reciprocate over the surface of said stencil, a common vertically movable frame for said stencil and said pushers, within said frame carriers for said stencil frame, and means in connection with said carriers, whereby the position of each respective stencil frame may be adjustably secured on said carriers.

3. In a device for printing colored patterns on plush and like fabrics, at least one vertically movable stencil of permeable fabric, a support for the fabric webs to be treated, means for intermittently feeding the fabric webs over said support, a pair of pushers for each stencil for distributing the color over the surface of said stencil, a carrier for said pair of pushers and adapted to reciprocate over the surface of said stencil, a common vertically movable frame for said stencil and said pushers, means provided in operative connection with said carrier for imparting an alternate rising and falling movement to said pushers at both ends of said stencil, whereby one operative pusher is always rendered operative behind the mass of color considered in the direction of movement, and means whereby the relative position of said pair of pushers to said stencil may be adjusted.

4. In a device for printing colored patterns on plush and like fabrics, at least one vertically movable stencil of permeable fabric, a support for the fabric webs to be treated, means for intermittently feeding the fabric webs over said support, pushers for each stencil and adapted to distribute the color over the surface of said stencil, a carrier for said pushers and adapted to reciprocate over the surface of said stencil, means for imparting to said pushers a rising and falling movement at both ends of their excursion, whereby the pusher is always located behind the mass of color before starting its forward stroke over said stencil, a common vertically movable frame for said stencil and said pushers and within said frame carriers for said stencil frames and means in connection with said carriers whereby the position of each respective stencil frame may be adjustably secured.

5. In a device for printing colored patterns on plush and like fabrics, at least one vertically movable stencil of permeable fabric, a support for the fabric webs to be treated, means for intermittently feeding the fabric webs over said support, a pair of pushers for

each stencil for distributing the color over the surface of said stencil, a carrier for said pair of pushers and adapted to reciprocate over the surface of said stencil, a common vertically movable frame for said stencil and said pushers, means provided in operative connection with said carrier for imparting an alternate rising and falling movement to said pushers at both ends of said stencil, whereby one operative pusher is always rendered operative behind the mass of color considered in the direction of movement, said means comprising a double-armed rock-lever, a projection on each pusher and in operative connection with the respective arm of said rock-lever, tension members adapted to impart a rocking movement to said rock-lever, and means whereby the relative position of said pair of pushers to said stencil may be adjusted.

6. In a device for printing colored patterns on plush and like fabrics, at least one vertically movable stencil of permeable fabric, a stationary support for the fabric webs to be treated, means for intermittently feeding the fabric webs over said stationary support, pushers for each stencil for distributing the color over the surface of said stencil, a carrier for said pushers and adapted to reciprocate over the surface of said stencil, a common vertically movable frame for said stencil and said pushers, within said frame carriers for said stencil frame, means in connection with said carrier, whereby the position of each respective stencil frame may be adjustably secured, an impermeable supporting band for the fabric to be treated and adapted to move with the fabric over said stationary support, means for applying an adhesive between said fabric and said supporting band, and a pressing device for causing said band to adhere to said fabric during the printing operation.

7. In a device for printing colored patterns on plush and like fabrics, at least one vertically movable stencil of permeable fabric, a support for the fabric webs to be treated, means for intermittently feeding the fabric webs over said support, a pair of pushers for each stencil for distributing the color over the surface of said stencil, a carrier for said pair of pushers and adapted to reciprocate over the surface of said stencil, a common vertically movable frame for said stencil and said pushers, means provided in operative connection with said carrier for imparting an alternate rising and falling movement to said pushers at both ends of said stencil, whereby one operative pusher is always rendered operative behind the mass of color considered in the direction of movement, means whereby the relative position of said pair of pushers to said stencil may be adjusted, an impermeable supporting band for the fabric to be treated and adapted to move with the fabric over said stationary support, means for applying an adhesive between said fabric and said supporting band, and a pressing device for causing said band to adhere to said fabric during the printing operation.

8. In a device for printing colored patterns on plush and like fabrics, at least one vertically movable stencil of permeable fabric, a support for the fabric webs to be treated, means for intermittently feeding the fabric webs over said support, a pair of pushers for each stencil for distributing the color over the surface of said stencil, a carrier for said pair of pushers and adapted to reciprocate over the surface of said stencil, a common vertically movable frame for said stencil and said pushers, means provided in operative connection with said carrier for imparting an alternate rising and falling movement to said pushers at both ends of said stencil, whereby one operative pusher is always rendered operative behind the mass of color considered in the direction of movement, said means comprising a double-armed rock-lever, a projection on each pusher and in operative connection with the respective arm of said rock-lever, tension members adapted to impart a rocking movement to said rock-lever, means whereby the relative position of said pair of pushers to said stencil may be adjusted, an impermeable supporting band for the fabric to be treated and adapted to move with the fabric over said stationary support, means for applying an adhesive between said fabric and said supporting band, and a pressing device for causing said band to adhere to said fabric during the printing operation.

9. In a device for printing colored patterns on plush and like fabrics, at least one vertically movable stencil of permeable fabric, a support for the fabric webs to be treated, means for intermittently feeding the fabric webs over said support, a pair of pushers for each stencil for distributing the color over the surface of said stencil, a carrier for said pair of pushers and adapted to reciprocate over the surface of said stencil, a common vertically movable frame for said stencil and said pushers, means provided in operative connection with said carrier for imparting an alternate rising and falling movement to said pushers at both ends of said stencil, whereby one operative pusher is always rendered operative behind the mass of color considered in the direction of movement, means whereby the relative position of said pair of pushers to said stencil may be adjusted, and power transmission means adapted to impart timed movements to the machine parts and the fabric from a single source of power.

10. In a device for printing colored patterns on plush and like fabrics, at least one vertically movable stencil of permeable fabric, a support for the fabric webs to be treated, means for intermittently feeding

the fabric webs over said support, a pair of pushers for each stencil for distributing the color over the surface of said stencil, a carrier for said pair of pushers and adapted to reciprocate over the surface of said stencil, a common vertically movable frame for said stencil and said pushers, means provided in operative connection with said carrier for imparting an alternate rising and falling movement to said pushers at both ends of said stencil, whereby one operative pusher is always rendered operative behind the mass of color considered in the direction of movement, said means comprising a double-armed rock-lever, a projection on each pusher and in operative connection with the respective arm of said rock-lever, tension members adapted to impart a rocking movement to said rock-lever, means whereby the relative position of said pair of pushers to said stencil may be adjusted, and power transmission means adapted to impart timed movements to the machine parts and the fabric from a single source of power.

11. In a device for printing colored patterns on plush and like fabrics, at least one vertically movable stencil of permeable fabric, a support for the fabric webs to be treated, means for intermittently feeding the fabric webs over said support, a pair of pushers for each stencil for distributing the color over the surface of said stencil, a carrier for said pair of pushers and adapted to reciprocate over the surface of said stencil, a common vertically movable frame for said stencil and said pushers, means provided in operative connection with said carrier for imparting an alternate rising and falling movement to said pushers at both ends of said stencil, whereby one operative pusher is always rendered operative behind the mass of color considered in the direction of movement, said means comprising a double-armed rock-lever, a projection on each pusher and in operative connection with the respective arm of said rock-lever, tension members adapted to impart a rocking movement to said rock-lever, means whereby the relative position of said pair of pushers to said stencil may be adjusted, an impermeable supporting band for the fabric to be treated and adapted to move with the fabric over said stationary support, means for applying an adhesive between said fabric and said supporting band, a pressing device for causing said band to adhere to said fabric during the printing operation, and power transmission means adapted to impart timed movements to the machine parts and the fabric from a single source of power.

In testimony whereof I hereunto affix my signature.

ARTHUR GÖRNER.