No. 882,313. PATENTED MAR. 17, 1908.

G. D. VON HOFE.

MACHINE FOR CUTTING PILE DESIGNS ON FABRICS.

APPLICATION FILED APR. 27, 1907.

2 SHEETS—SHEET 1.

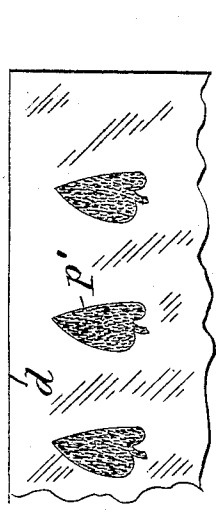


Fig. 2.

Fig. 1.

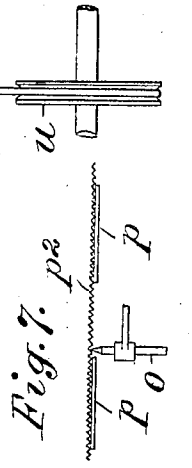


Fig. 7.

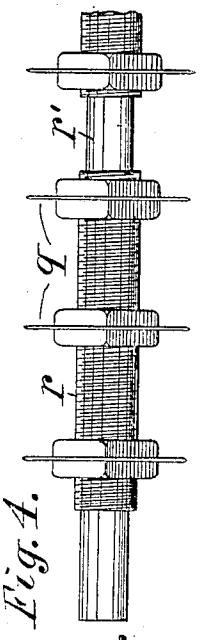


Fig. 4.



Fig. 3.

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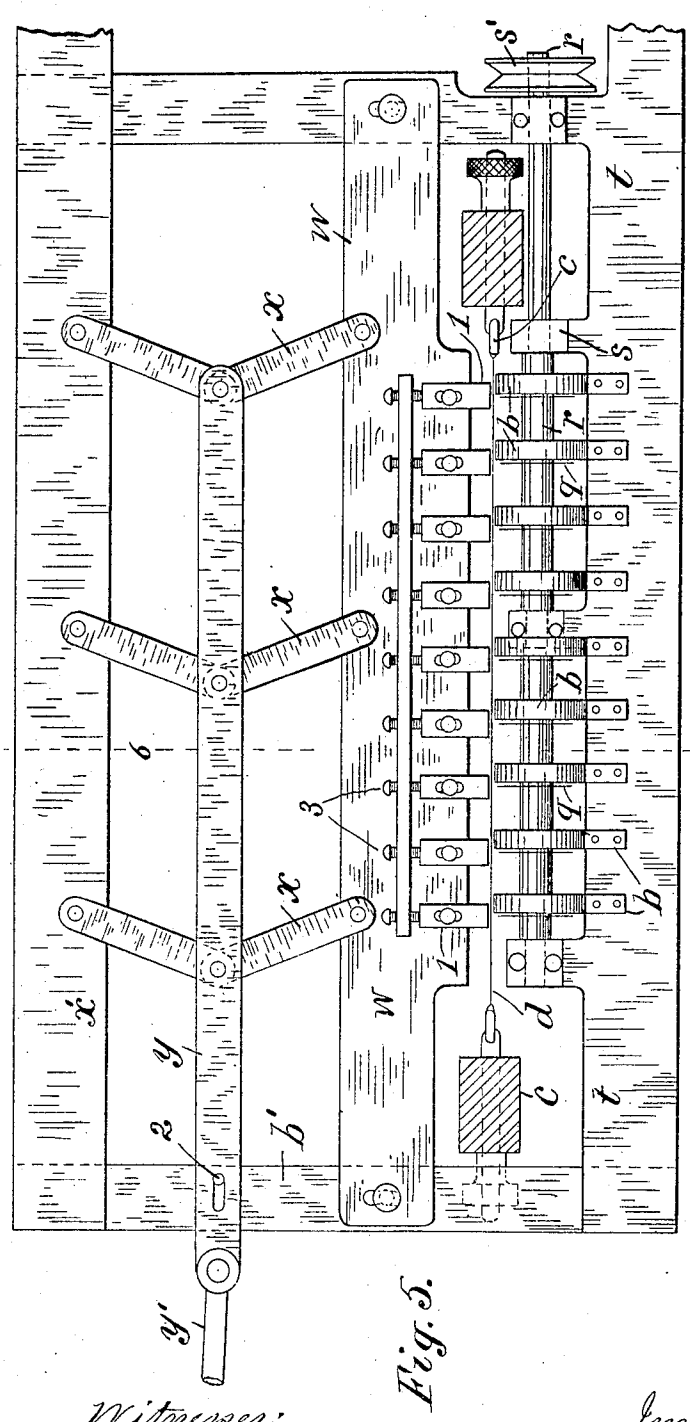


Fig. 5.

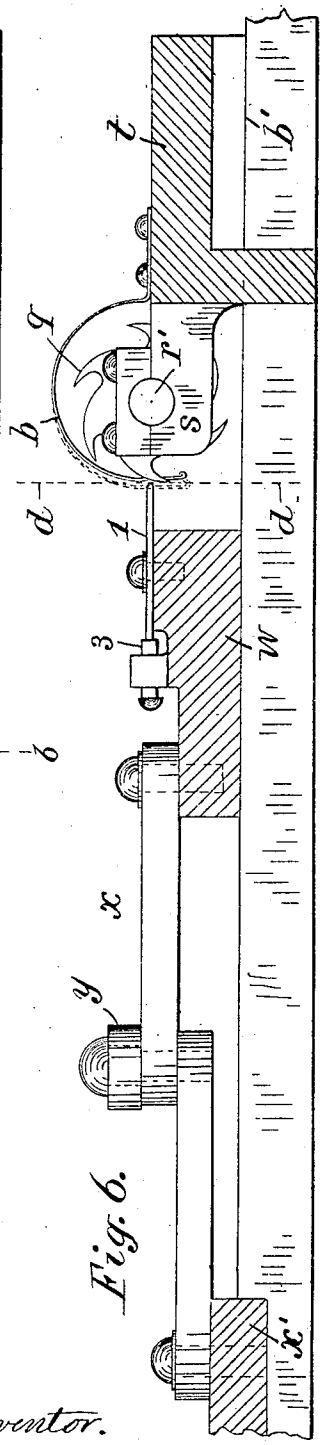


Fig. 6.

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GEORGE D. VON HOFE, OF NEW YORK, N. Y.

MACHINE FOR CUTTING PILE DESIGNS ON FABRICS.

No. 882,313. Specification of Letters Patent. Patented March 17, 1908.

Application filed April 27, 1907. Serial No. 370,542.

To all whom it may concern:

Be it known that I, GEORGE D. VON HOFE, a citizen of the United States, residing at 118 East Eighty-seventh street, New York, county of New York, and State of New York, have invented certain new and useful Improvements in Machines for Cutting Pile Designs on Fabrics, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

The present invention is adapted to produce upon the surface of a fabric a series of ornamental designs having a raised pile, and this is effected by applying to an embroidering machine, (for example, such as is shown in U. S. Patent No. 840,933 issued January 8, 1907,) a series of pile cutting devices which operate to sever the threads upon one side only of the fabric. The fabric for pile cutting is woven, so that the cut fibers project and produce a velvety surface.

In embroidering machines, the fabric to be ornamented, which may be as much as ten yards in length, is mounted upon a vertical stretcher-frame, which holds the fabric constantly in flat form, and is movable laterally and vertically in accordance with the design under the control of a so-called "pantograph," and the series of embroidering needles are spaced apart laterally in correspondence with the design to be made; so that the completion of similar designs is effected simultaneously by all of the needles upon the whole length of the fabric. My pile-cutting devices similarly operate upon the fabric at a series of points simultaneously, and the entire length of the fabric is thus ornamented at all parts with similar pile designs.

The apparatus may be readily attached to any embroidering machine, and is of such a character that it can be applied to and removed from the machine without impairing its utility as an embroidering machine; and the functions of an embroidering machine may thus be greatly enlarged, to perform two entirely different classes of work, namely, the embroidering of designs by a needle, and the cutting of designs in a raised "pile."

The devices for making the pile designs can be made removable from the embroidering machine, or secured in place intermediate to the rows of stitching needles; but such arrangement is immaterial, and the devices are shown in the annexed drawing mounted upon frame-bars which may be attached to the embroidering machine either permanently or temporarily.

The invention will be understood by reference to the annexed drawing, in which

Figure 1 represents diagrammatically the parts employed in cutting the pile design; Fig. 2 illustrates a portion of a fabric thus ornamented; Fig. 3 shows one of the rotary pile-cutters; Fig. 4 shows a portion of the spindle used for driving the cutters; Fig. 5 is a plan of the pile cutting devices; and Fig. 6 a section upon line 6 6 in Fig. 5. Fig. 7 is a cross section of part of the pattern and the corrugated back plate. Fig. 6 is drawn upon a scale twice as large as Fig. 5, showing the apparatus nearly of the natural size.

a designates longitudinal portions of the framing of an embroidering machine, and *b* the transverse frames or stands for supporting the same. Only a few of such frame-bars are indicated, which furnish the necessary supports for the working parts thereon.

c designates the stretcher in which the fabric *d* is stretched in any suitable manner, and such frame is commonly balanced so as to be movable either vertically or longitudinally, as by the horizontal bars *e* resting upon rollers *f* carried by arms *g*, and such arms connected by drums *h* and band *i*, and the drums provided with a weight *j*.

The usual pantograph *k* is shown, having fulcrum at *l*, and its shorter end jointed to the embroidering frame by pin *m*. The longer end has the usual lever *n* with pointer or index *o* to move in vertical lines over the pattern *p* and transmit such vertical movements at narrow intervals to the fabric.

The pattern may be of paper with the design forming an aperture or opening through the same, and pasted upon a back-plate p^2 which is shown, by parallel lines, as corrugated vertically, to guide the index *o* where it projects through the opening of the pattern into contact with the metal. Each of the designs is formed by a cutter held at one side of the fabric, and a gage upon the opposite side of the fabric, with means for pressing either toward the other, the movement of the fabric in vertical lines causing the threads of the fabric to be cut in such lines as it is pressed toward and moved past the cutter.

A spring-guard attached to the cutter

support is arranged adjacent to the cutter to force the fabric clear of the same, except when pressed by the gage; and it is obvious that the cutting may be caused, when the fabric moves vertically, by pressing the cutter toward the gage in the place of pressing the gage toward the cutter.

In Fig. 1, rotary cutters q are spaced at intervals upon a spindle r having journals r' fitted to bearings s upon a bearing-bar t. The bar t is secured upon the transverse frames b by brackets b', and a pulley s' upon the spindle r is driven by cord t' from a driving-wheel u, to rotate all the cutters simultaneously.

As shown in Fig. 5, the fabric d is held vertically by the stretcher c close to the edges of the cutters, and the spring-guards b shown in Figs. 5 and 6 serve to hold the fabric normally away from the edges of the cutters. A gage 1 is shown opposite to each of the cutters and mounted adjustably upon a bar w which is movable to and from the cutters, and is pressed toward the same prior to each vertical movement of the fabric, so that the cutter may operate during such vertical movement.

Eccentrics, wedges, or any other means may be used for actuating the cutter-bar; toggles x, shown in Figs. 5 and 6, being shown attached at one end to the gage-bar and at the opposite end to a fixed bar x'. Toggles are shown connected by a link y and a rod y' to a hand-lever z, illustrated in Fig. 1 only, and the movement of such hand-lever by straightening the toggles forces the gage-bar w toward the cutters and brings all the gages close to the cutters simultaneously. A stop 2 limits the movement of the link and toggles, and thus forces the gage-bar w always forward through a definite movement. Each gage, as shown in Figs. 5 and 6, is adjustable upon the gage-bar by a screw 3, by which it may be set into suitable adjustment to the opposed cutter so that the cutter may penetrate only part way through the fabric.

To guide the index o in its movement over the designs, a corrugated metal back-plate p^2 shown in Fig. 7 is preferably used, presenting closely spaced vertical grooves, and the paper pattern is pasted upon such back-plate and the portion cut away which forms the design, as represented by the leaf p in Fig. 1. The corrugated surface is thus exposed behind the design and the index is readily moved successively in the grooves from the upper to the lower edge of the designs.

With the apparatus so far described, the operator moves the lever z in the direction indicated by arrow z' in Fig. 1 to straighten the toggles and force the fabric against the cutters, the gages pressing the spring-guards v backwardly in a sufficient degree, and the fabric being held firmly between the elastic guard and the gage during the cutting operation. The pantograph index is then moved vertically in one line of the pattern; the movement of the lever z' is then reversed which retracts the gages and permits the guards to force the fabric away from the cutters. The index o is then transferred to the opposite end of the design and to the adjacent groove. The lever z is then moved again to press the fabric toward the cutter and the index moved downwardly in such groove, and such alternate operation of the lever z and the index o is repeated until the whole design has been traversed by the index, which produces a repetition of the design upon the fabric opposite to each cutter, as is clearly indicated by the series of figures p' in Figs, 1 and 2. Such designs are necessarily formed in a straight row opposite to the row of cutters upon a spindle r, and similar designs may be formed above and below such row by suitably moving the pattern or the connections of the pantograph to the stretcher c, as is common in embroidering machines.

The essential feature of the invention is the production of a pile design upon a fabric, by pressing the fabric toward the cutter and then moving the fabric to produce a severing of the threads by the cutter for a suitable distance to produce one line of the design, such cut lines being repeated, with an intermediate retraction of the fabric from the cutter, until the entire design is cut.

Rotary cutters are shown in the drawing, but it is immaterial what kind of cutter be used, and any means of guarding the cutting edge and for pressing the fabric intermittingly toward it, during the cutting operation, may be employed without departing from the spirit of my invention.

The independent adjustment of the gages is exceedingly important, as they must be set with great accuracy to produce the cutting of the pile without penetrating the fabric beyond the desired point, and I have therefore made a special claim to such independent adjustment.

It is obvious that other tools beside cutters, as for instance, a pencil, a blunt point, or pricking or perforating tool, would work the design from one side of the fabric as effectively as a cutter when the fabric is moved in the required design and pressed toward the tool by the gage, the elastic guard serving the function equally with any such tool to move the cloth away from the tool when the gage is retracted. My invention is not therefore restricted merely to a pile-cutting tool. It is also obvious that my invention may be practiced by inverting the arrangement and holding the cloth stationary while moving the design forming appliances in the desired pattern.

Having thus set forth the nature of the invention what is claimed herein is:

1. The means for forming a design upon a fabric, comprising a stretcher holding the fabric constantly in flat form, a tool contiguous to one side of the fabric for working the design from that side and held normally clear from the fabric, a movable gage or presser upon the opposite side of the fabric held normally clear from the fabric and means for moving the gage and tool intermittently toward one another to operate upon the fabric, and the fabric being shifted intermediate to the successive movements of the gage, to bring various parts of its surface in contact with the tool to produce the required design.

2. The means for forming a pile design upon a fabric, comprising a stretcher holding the fabric constantly in flat form, a cutter contiguous to one side of the fabric, means for intermittently moving the fabric contiguous to the cutting edge, means for intermittently moving the fabric from the cutting edge and a gage or presser to move the fabric to the cutter during the cutting movement.

3. The means for cutting a series of similar designs upon a fabric, consisting of a row of tools, means for moving the fabric contiguous to the tools, and a row of gages held movably opposite such tools with means for retracting them from the tools intermediate to the movements of the fabric.

4. The means for cutting a series of similar pile-designs upon a fabric, consisting of a spindle carrying a series of rotary cutters, means for moving the fabric in the desired design contiguous to such rotary cutters, spring-guards to hold the fabric normally from the edges of the cutters, and a series of gages opposed to the cutters with means for moving the gages to press the cloth upon the guards and into contact with the cutters.

5. The means for cutting a series of similar pile-designs upon a fabric, consisting of a spindle carrying a series of rotary cutters, a stretcher holding the fabric contiguous to the edges of the cutters, means, as a pantograph, for moving the fabric in the given design, a series of gages opposed to the cutters, and means provided with a hand-lever for pressing the gages toward the cutters during the cutting movement of the fabric.

6. The means for cutting a pile-design upon a fabric, consisting of a cutter, means for moving the cloth contiguous to the cutting edge, means for moving the cloth from the cutting edge, a gage or presser with means for moving the same definitely toward the cutting edge, and means for adjusting the gage to and from the cutting edge to regulate the pressure of the fabric upon the cutter.

7. The means for cutting a pile design upon a fabric, comprising a stretcher holding the fabric constantly in flat form, a series of cutters arranged in a right line at one side of the stretcher and held normally clear of the fabric, a series of corresponding gages arranged upon the opposite side of the stretcher, and means for pressing the gages and cutters upon the fabric intermittingly during the cutting of the design.

8. The means for cutting a pile design upon a fabric, comprising a series of cutters arranged at one side of the stretcher to operate upon the fabric, a gage-bar with gages movable to and from the fabric upon the opposite side, means for giving the gage-bar a definite movement, and means for adjusting the gages independently upon the gage-bar.

9. The means for cutting a pile design upon a fabric, comprising a stretcher holding the fabric constantly in flat form, bearings with a cutter-spindle mounted therein at one side of the fabric with a series of cutters spaced equally upon the said spindle, means for rotating the spindle with the cutters contiguous to one side of the fabric, and a gage-bar upon the opposite side of the fabric carrying a corresponding series of gages opposed to the cutters, and means for pressing the gage-bar toward the fabric to produce the operation of the cutters.

10. The means for cutting a pile design upon a fabric, comprising a cutter to form the design, a stretcher to hold the fabric contiguous to the cutter, a movable gage to press the fabric toward the cutter during the cutting movement, a pantograph for moving the stretcher in the required design, a corrugated metallic back-plate for the designs and a paper secured upon the back-plate with opening forming the design, and an index pointer attached to the pantograph to traverse the grooves in the exposed portions of the corrugated plate.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

GEORGE D. VON HOFE.

Witnesses:
L. LEE,
J. W. GREENBAUM.