

No. 657,368.

Patented Sept. 4, 1900.

T. J. STEARNS.
PILE SPREADER.

(Application filed Apr. 5, 1900.)

(No Model.)

3 Sheets—Sheet 1.

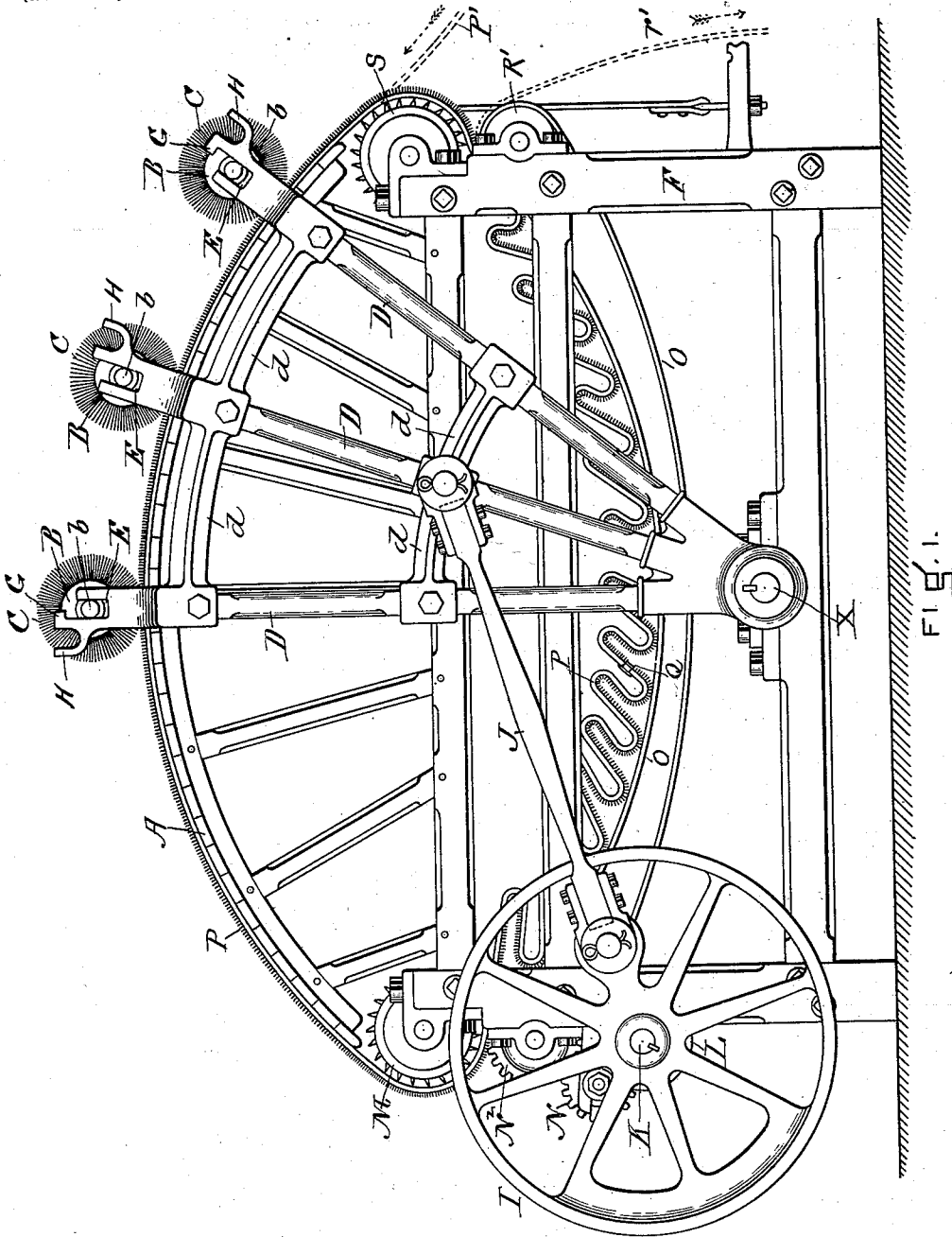


FIG. 1.

WITNESSES:

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S. G. O. Swanson.

INVENTOR:

Thomas J. Stearns,
By Roberts & Cushman
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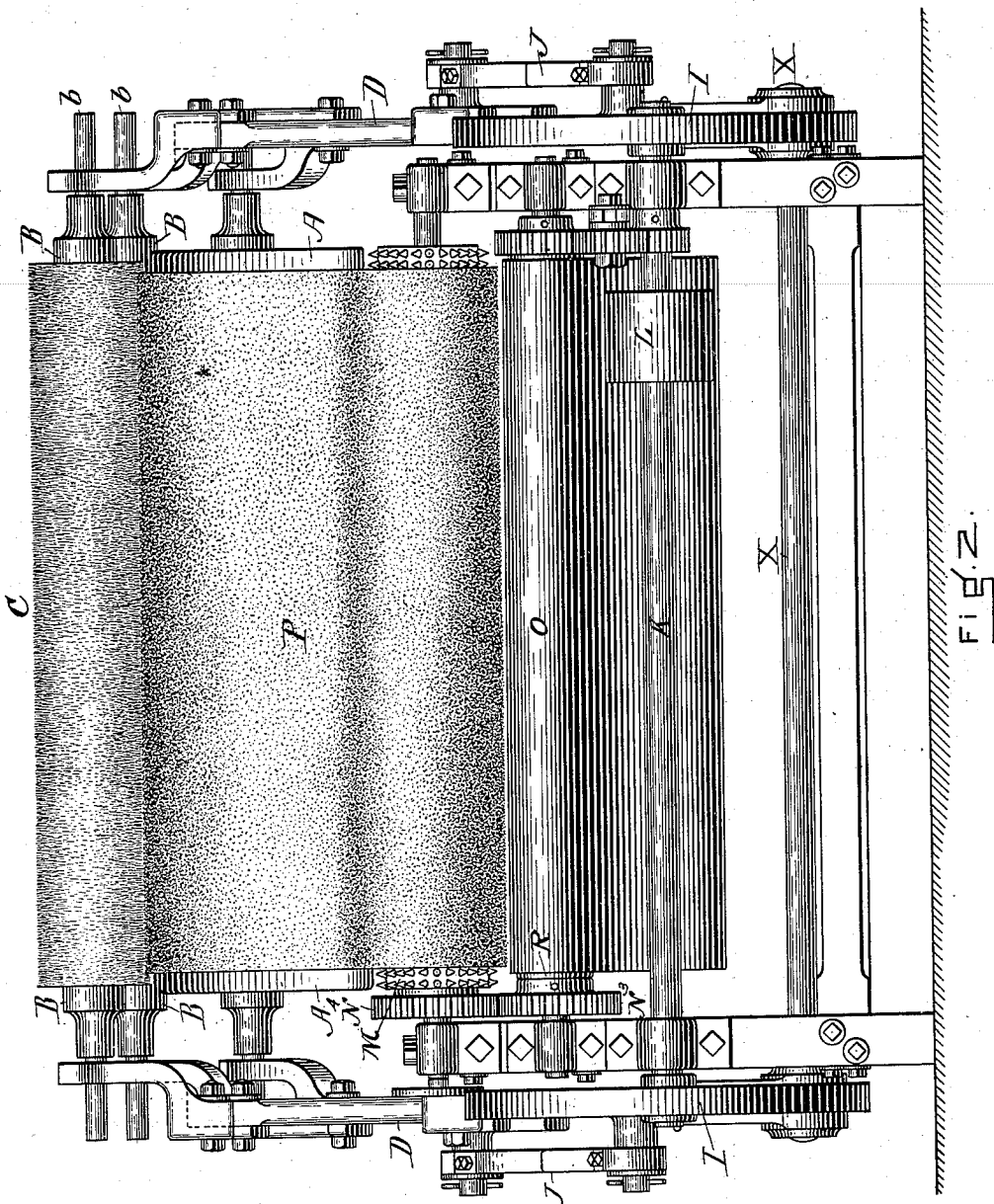
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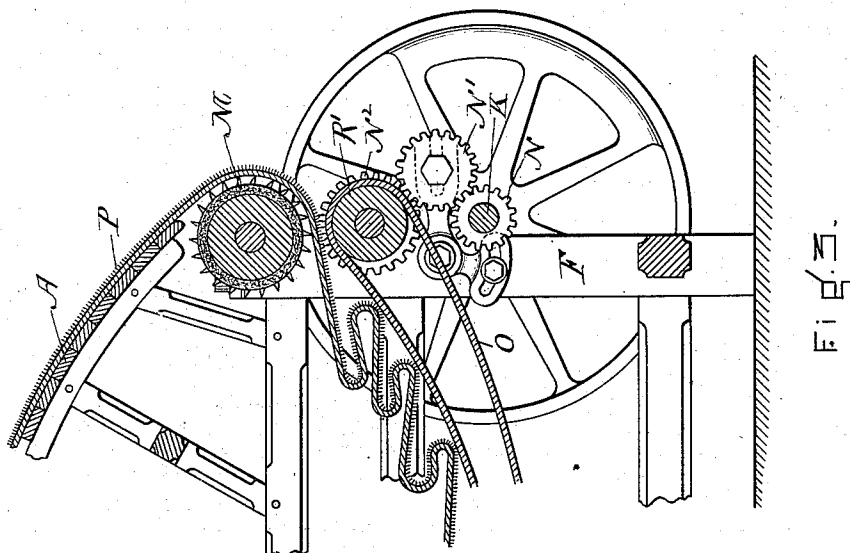
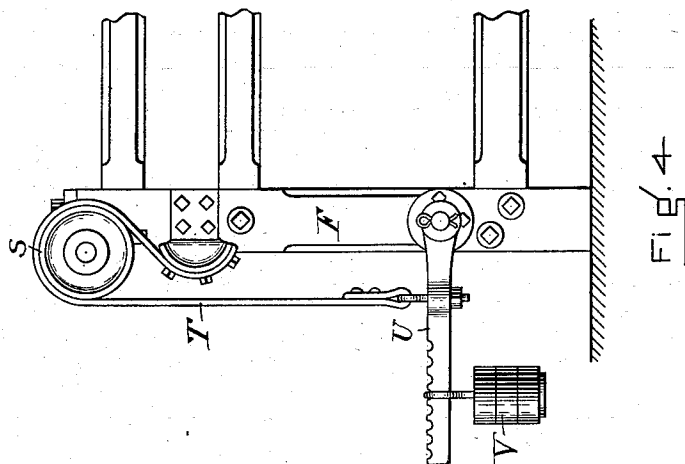
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UNITED STATES PATENT OFFICE.

THOMAS J. STEARNS, OF BOSTON, MASSACHUSETTS.

PILE-SPREADER.

SPECIFICATION forming part of Letters Patent No. 657,368, dated September 4, 1900.

Application filed April 5, 1900. Serial No. 11,591. (No model.)

To all whom it may concern:

Be it known that I, THOMAS J. STEARNS, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented a new and useful Improvement in Pile-Spreaders, of which the following is a specification.

My invention relates to the manufacture of pile fabric; and its object is to provide a machine to spread or swell the pile of any cut or uncut pile fabric. While adapted for use upon any pile fabric, it is especially useful in spreading or swelling the pile of plush or velvet carpets or rugs, and I will address this specification to a machine designed for that use.

When a velvet or plush carpet comes from the loom, the cut threads of the warp forming the nap or pile stand up in little tufts with spaces between. In order to give the carpet an even and velvet-like appearance and to increase the durability and beauty of the goods, it is desirable to spread or swell the pile and so close up the spaces between the tufts of the threads. Prior to the invention of my pile-spreader described in the United States patent granted to me dated May 8, 1900, and numbered 649,083 the pile has been spread, if at all, by the application of steam and to a small extent by brushing. The steam method has a deleterious effect upon the colors of a carpet and wholly or partially destroys the sizing in the back of the carpet. Brushing, if hard enough to spread the pile to any extent, pulls out and tears the pile. Consequently a great amount of carpet is put upon the market with the pile unspread. To spread the pile vastly, increases the beauty, the durability, and consequently the value, of the carpet. By the use of my invention, of which an embodiment will presently be described, the pile is evenly spread or swelled without injury to any portion of the fabric. Said Patent No. 649,083, dated May 8, 1900, describes a pile-spreader adapted for use as an attachment for a loom. My present invention is of a separate and independent machine for spreading the pile after the pile fabric has been completely woven and removed from the loom.

I lay upon a table or work-supporting surface the fabric whose pile is to be spread and

operate upon the face of the fabric with a spreader consisting of a carrier or roller covered with teeth or needles projecting perpendicularly therefrom, giving the mass of teeth or needles repeated wedging contacts with the face of the cloth. The roller is given a reciprocating movement over the face of the fabric and also a gradual movement of progression over the fabric by slowly drawing the fabric over the supporting-surface. The needles or teeth prick the pile by a wedging movement or pressure substantially normal to the fabric at the point of contact and are withdrawn again without sweeping or combing or pulling, and by repeated pricking of the pile spread the pile by wedging apart the threads in the pile-tufts. The tufts are thus broomed out into interlacing contact with the threads of adjacent tufts and the cloth put into the desired condition. There is no combing or brushing to tear or pull out the pile, since at the point where the needles prick the face of the cloth the points of the needles and the face of the cloth are relatively at rest, or substantially so, the needle-carrier having only a contact by pressure substantially normal with the cloth. I am aware of napping-machines and gigging-machines provided with cards which pull up the loose fibers by fine hooks or by combing action, and I do not claim such cards as new; but what I do claim is a mass of straight-pointed wedging-needles in the combination hereinafter specified. The needles or teeth may be placed upon the carrier in any number and with any degree of closeness to one another desired.

One embodiment of my invention is illustrated by the accompanying drawings, in which—

Figure 1 is a side elevation of my pile-spreading machine, showing the pile fabric in place therein. Fig. 2 is a front elevation of my pile-spreading machine, showing the pile fabric in place therein. Fig. 3 is a vertical longitudinal section of the front part of my machine through the middle, showing in detail the gearing on the right-hand side of Fig. 2. Fig. 4 is a detail showing in side elevation the friction-brake for the tension-roller at the rear of the machine over which the fabric is fed upon the work-supporting surface.

The same letters indicate the same parts in all the figures.

A represents the table or surface, which may be made of wood or any suitable material for supporting the pile fabric to be operated upon. It is in the form of a segment of a cylinder whose axis is through the center of the shaft X. B B are rollers clothed with a mass of radially-projecting needles C. These needle-rollers are held at either end and carried by the arms D D, which are pivoted at X and capable of being angularly vibrated about the pivot. Said arms D D are provided at their ends with the slots E E for holding the axes *b b* of the rollers B B. When the said rollers are in operative position upon the fabric, their axes *b b* should not rest in the bottoms of the slots; but their whole weight should bear upon the fabric. They are allowed freedom of play up and down in slots E E to equalize the pressure in case of any unevenness in the supporting-surface of the fabric. Said slots E E may also have shoulders, as G, or any usual lock device to prevent the needle-rollers being thrown out of the slots when the arms D D are vibrated at speed. The hooks H H are provided to hold the rollers when it is desired to remove them from their operative position. The machine may be constructed with one or more of these arms D D, according to the number of needle-rollers desired. When two or more arms D D are used, they are connected by braces *d d* in order that they may vibrate together. Three rollers are adequate to do the work, and if the fabric be light and fewer are required to do the work one or two of the rollers may be removed from operative position.

The operating mechanism of the machine is as follows: On either side of the machine is a driving-wheel I, connected with the vibrating arm D by the connecting-rod J, imparting a swinging or vibrating motion to said arm D. Said wheels I are driven by the shaft K, upon which is the belt pulley L, to which the power is applied. At the front of the work-supporting surface A is a spiked roller M for slowly drawing or feeding the carpet or other pile fabric P over said supporting-surface A and between it and the needle-rollers C C. The roller M is revolved on its axis by the train of gears N, N', N², N³, and N⁴. It is obvious that by changing the gear the speed of the roller M may be varied, and consequently the speed of the feed of the fabric. The slower the feed the greater will be the number of times which the needles will prick the pile-tufts and the more perfectly will the pile be spread. The fabric P passes rearwardly under the spiked roller M and is received by the traveling apron O and broad belt O, where it lies in folds. The apron O is hung between the rollers R and R', the roller R being mounted on the same shaft with gear N² and receiving its motion therefrom. The two ends of the fabric may be fastened together by hooks or rivets, as at

Q, making one continuous strip, and the fabric may be fed through the machine any number of times desired. The apron O has a slow movement from the front to the rear of the machine and carries the fabric which has been operated upon away from the spiked roller M. When the ends of the fabric are joined together, as at Q, the apron O also carries the folds of the fabric along to be fed upon the work-supporting surface A. When the ends of the fabric are not fastened together, as at Q, the fabric enters the machine, as shown in the dotted line P', and is received from the roller M and carried away by the apron O, as already described, and passes out at the rear of the machine, as shown in the dotted line P'.

The fabric is fed upon the work-supporting surface A over the spiked tension-roller S at the rear of the machine. To hold the fabric firmly in place and avoid possibility of its crinkling as the needle-rollers move forward, roller S is provided with a friction strap or brake T, Fig. 4, sustaining a weighted lever-arm U, having an adjustable weight V, by which any desired tension of the fabric may be attained. The whole structure is supported by the framework F, which rests upon the floor.

The amount of pressure of the needles may be varied by varying the material of which the rollers B B are made or by any other suitable means of increasing the direct pressure of the needles upon the fabric. The amount of pressure required depends upon the quality of the fabric and the length of the pile which is to be spread.

The machine may be adapted to any width of fabric.

I do not intend to limit my invention to the curved or cylindrical work-supporting surface and needle-rollers reciprocally moved by means of a vibrating arm, but to include other forms of construction embodying my invention—as, for instance, a flat table with a reciprocally-moving needle-roller held either by side guides or by a carriage.

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

1. In a pile-spreading machine, a mass of wedging-needles, a surface opposed thereto and adapted to support a pile fabric, and means for reciprocally moving said needles upon and from the pile fabric in a direction substantially normal to the plane of the fabric.

2. In a pile-spreading machine, a mass of wedging-needles, a work-supporting surface opposed thereto, said mass of needles and opposed surface movable relatively to each other in such manner that the needles are reciprocally moved to and from said opposed surface in a direction substantially normal to the plane of said surface.

3. In a pile-spreading machine, a mass of wedging-needles and a carrier therefor, a surface opposed to said needles and adapted to

support a pile fabric, means for reciprocally moving said needles upon and from the pile fabric in a direction substantially normal to the plane of the fabric, and means for feeding the pile fabric between the needles and the opposed supporting-surface.

4. In a pile-spreading machine, one or more rollers clothed with radially-projecting wedging-needles, a surface opposed thereto and adapted to support a pile fabric, and means whereby said roller or rollers may be rolled upon said surface.

5. In a pile-spreading machine, one or more rollers clothed with radially-projecting wedging-needles, a surface opposed thereto and adapted to support a pile fabric, and means whereby said roller or rollers may be rolled upon said surface, and means for drawing the pile fabric between said roller or rollers and said opposed supporting-surface.

6. In a pile-spreading machine, a mass of wedging-needles, means for pressing the needles into the pile fabric in a direction substantially normal to the plane of the fabric in such a manner that the threads of the pile-tufts are wedged apart from each other and broomed out into interlacing contact with the threads of adjacent tufts, and a surface opposed to said needles and adapted to support the pile fabric.

7. In a pile-spreading machine, one or more rollers clothed with radially-projecting needles, a work-supporting surface consisting of a segment of a cylinder and means for rolling said roller or rollers circumferentially upon said surface.

8. In a pile-spreading machine, one or more rollers clothed with radially-projecting needles, a work-supporting surface consisting of a segment of a cylinder and means for rolling said roller or rollers circumferentially upon said surface, and means for drawing the fabric over said surface and between the surface and the roller or rollers.

9. In a pile-spreading machine, one or more rollers clothed with radially-projecting needles and supported by a pivoted arm, a cylindrical surface opposed to said roller or rollers, the axis of said cylindrical surface coinciding with the axis of said arm, and means for vibrating said arm angularly about the central pivot.

10. In a pile-spreading machine, one or more rollers clothed with radially-projecting needles and supported by a pivoted arm, a cylindrical surface opposed to said roller or rollers, the axis of said cylindrical surface coinciding with the axis of said arm, and means for vibrating said arm angularly about the central pivot.

11. In a pile-spreading machine, a needle-roller supported by a vibrating arm, a work-supporting surface opposed to said needle-roller consisting of a segment of a cylinder whose axis coincides with the axis of said vibrating arm, means for vibrating said arm, a spiked roller adapted to draw a pile fabric over said surface and means for rotating said spiked roller.

12. In a pile-spreading machine, a needle-roller supported by a vibrating arm, a work-supporting surface opposed to said needle-roller consisting of a segment of a cylinder whose axis coincides with the axis of said vibrating arm, means for vibrating said arm, a spiked roller adapted to draw a pile fabric over said surface and means for rotating said spiked roller, and a traveling apron adapted to receive the fabric from and feed it toward said surface.

13. In a pile-spreading machine, a needle-roller supported by a vibrating arm, a work-supporting surface opposed to said needle-roller consisting of a segment of a cylinder whose axis coincides with the axis of said vibrating arm, means for vibrating said arm, a spiked roller adapted to draw a pile fabric over said surface and means for rotating said spiked roller and a tension-roller.

14. In a pile-spreading machine, a needle-roller supported by a vibrating arm, a work-supporting surface opposed to said needle-roller consisting of a segment of a cylinder whose axis coincides with the axis of said vibrating arm, means for vibrating said arm, a spiked roller adapted to draw a pile fabric over said surface and means for rotating said spiked roller, and a traveling apron adapted to receive the fabric from and feed it toward said surface, and a tension-roller.

Signed by me at Boston, Massachusetts, this 2d day of April, 1900.

THOMAS J. STEARNS.

Witnesses:

ROBERT CUSHMAN,
E. F. GROLL.