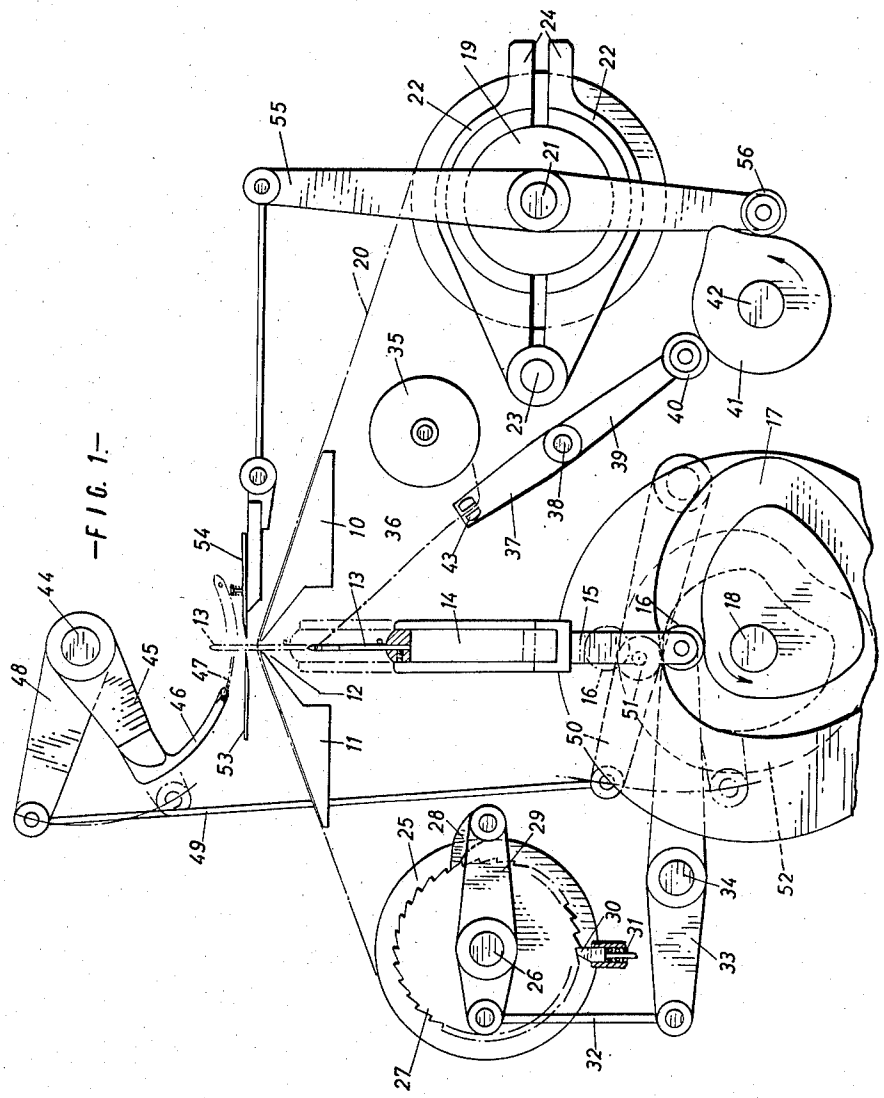
March 25, 1958 W. FELTON 2,827,865

METHOD OF AND APPARATUS FOR MAKING CARPETS

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-FIG. 1.-

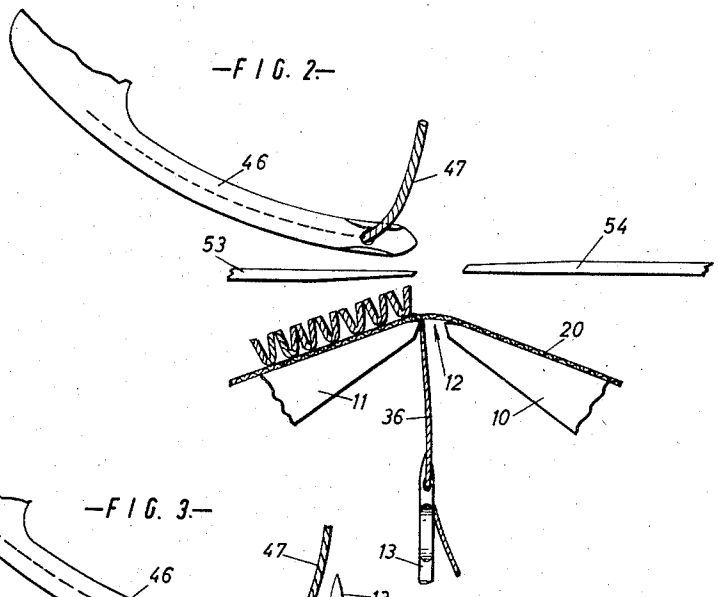
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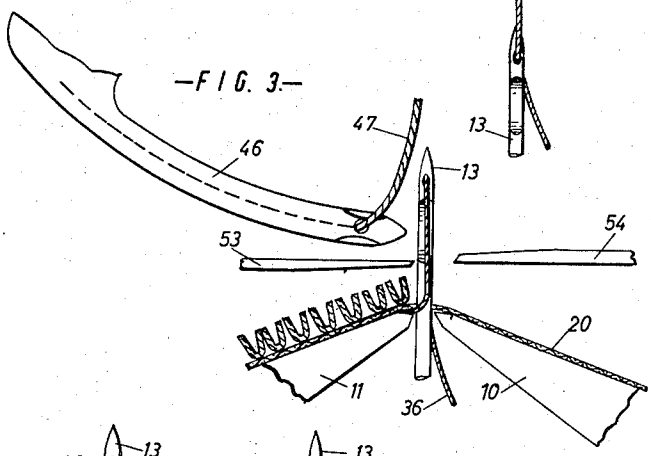
METHOD OF AND APPARATUS FOR MAKING CARPETS

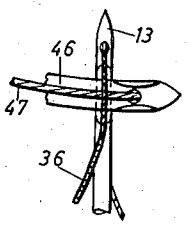
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—FIG. 2.—

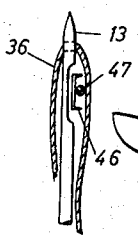


—FIG. 3.—

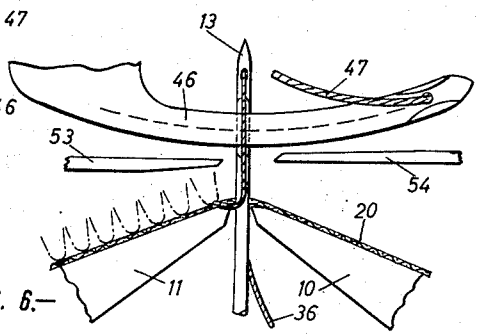




—FIG. 4.—



—FIG. 5.—



—FIG. 6.—

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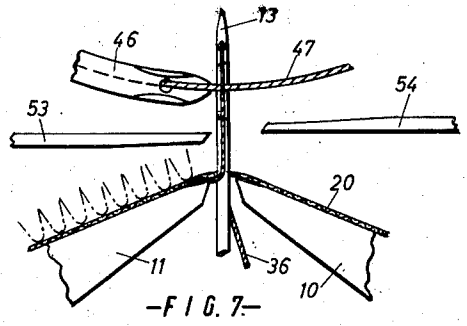
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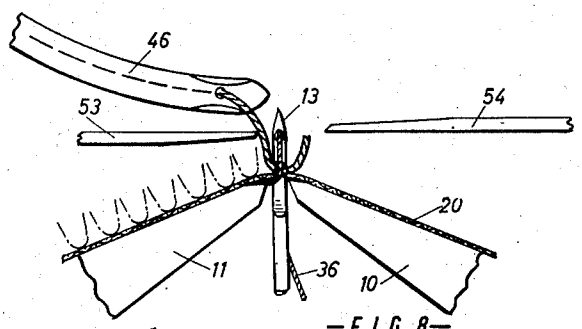
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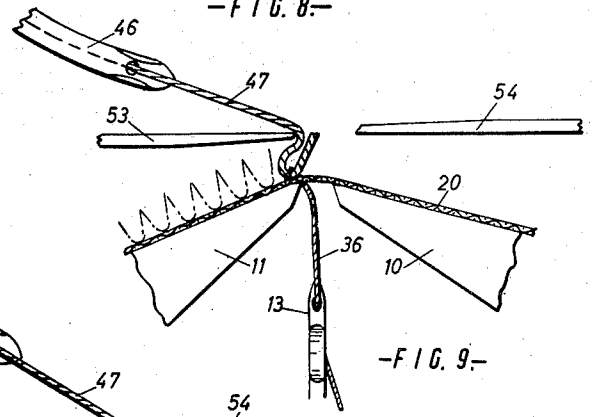
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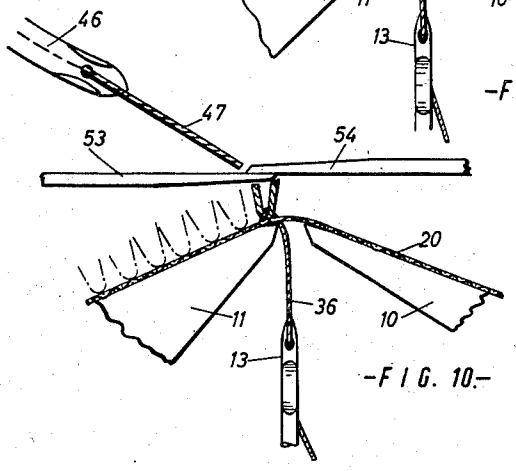
-FIG. 7.-



-FIG. 8.-



-FIG. 9.-



-FIG. 10.-

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United States Patent Office 2,827,865 Patented Mar. 25, 1958

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METHOD OF AND APPARATUS FOR MAKING CARPETS

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Application November 8, 1956, Serial No. 624,188

Claims priority, application Great Britain June 4, 1956

5 Claims. (Cl. 112—79)

This invention relates to a method of and apparatus for making tufted carpets.

Hitherto, such carpets have generally been made on carpet looms having a bank of needles which are each threaded with wool or the like for producing the tufts, the needles being reciprocated so as to pass through a length of pre-woven backing fabric to produce loops therein. These loops are cut to provide the tufts, and the backing fabric is progressed between the formation of each row of loops.

One disadvantage with such looms is that since the needle with the wool or the like threaded therethrough is actually passed into the backing fabric fibres are loosened from the wool or the like, and these enter the needle eye, clogging the latter with the result that the feeding of the wool or the like becomes difficult and it is not possible to obtain a perfect product.

Further, it will be obvious that with such arrangement, a length of the wool or the like equal to the distance the backing material is progressed between each row lies at the underside of the backing fabric. Wool and other materials suitable for making the tufts is comparatively expensive, and accordingly it is desirable to reduce the amount thereof between tufts to an absolute minimum, so as to keep the cost of the carpet as low as possible. However, with the prior construction of loom just described, if the distance between rows is reduced, to reduce the amount of wool or the like between the tufts, then this means that the tufts have to be closer, resulting in a denser piled carpet. Thus any attempts to reduce the length of material extending between tufts results only in the use of more material in producing denser tufts.

It is an object of the present invention to provide an improved method of and means for making tufted carpets wherein the aforementioned disadvantages are eliminated, the invention permitting the tufts to be secured to the backing fabric without the need for needles threaded with the tufting material to be passed therethrough, and at the same time permitting the tufts to be introduced at any desired spacing without there being any of the material extending between adjacent rows of tufts, so that wastage thereat which occurs when the tufts are widely spaced is avoided.

According to the present invention there is provided a method of making tufted carpets which comprises, for each tuft, introducing a loop of cotton or like thread through a backing fabric, inserting an end of a length of tufting material through said loop, and withdrawing the loop to tighten it so that it draws the length of tufting material into close contact with and anchors it to the backing fabric.

The method aforesaid is preferably characterised in that the tufting material is in a continuous length, this being severed after the tuft is formed and anchored.

According to a further feature of the invention, apparatus for making tufted carpets comprises a plurality

of needles adapted to introduce loops of cotton or like thread through a length of backing material and subsequently to withdraw such loops, and means for introducing into each of such loops a length of tufting material.

The needles may conveniently be in one or more banks, being fed with cotton or like thread individually, for example from a warp beam or creel, which are reciprocable to enter into and to withdraw from the backing fabric, each such reciprocation producing a row of loops, the backing fabric being progressed between each reciprocation.

The means for introducing the tufting material preferably comprises, for each loop, a second needle reciprocable substantially transversely of the needles which form the loops of cotton or the like, so as to enter into and introduce the tufting material into the loops.

A preferred embodiment of apparatus according to the invention comprises a substantially horizontal support over which a length of backing fabric is progressed under tension, there being a slot in said support, which slot extends transversely of the fabric, a bank of vertical needles disposed below the support and in alignment with said slot, means for reciprocating the needles vertically so that, when threaded with cotton or the like they penetrate said fabric from the underside thereof and each produce a loop extending upwards from the upper surface of the fabric and subsequently withdraw such loop, and a plurality of horizontally reciprocable needles, one associated with each of said vertical needles, for introducing one end of a length of tufting material through each loop as the latter is formed.

The invention will be described further, by way of example, with reference to the accompanying drawings in which:

Fig. 1 is a diagrammatic side elevation showing the operative parts of a preferred form of apparatus for making pile carpets in accordance with this invention, and

Figs. 2 to 10 are detailed views, on an enlarged scale showing the various stages involved in making a pile tuft, using the machine of Fig. 1.

Referring to Fig. 1, apparatus according to this invention for making tufted carpets comprises a substantially horizontal, crowned support **10**, **11** of length slightly greater than the desired width of carpet. Extending longitudinally of this support is a narrow slot **12** below which is disposed a bank of vertical needles **13** which are clamped in a needle bar **14**. The bar **14** is guided by means (not shown) for vertical reciprocation, and has secured thereto at its lower end a U-bracket **15** in which is journalled a roller **16**. This roller **16** rests on a cam **17** secured to a rotatable shaft **18**.

Mounted behind the support **10**, **11** and slightly below the latter is a beam or feed roller **19** for backing fabric **20** of width equal to the desired width of carpet, this feed roller **19** being carried by a horizontal shaft **21**. A pair of brake shoes **22** pivoted at **23** embrace the feed roller **19** at one end thereof and are urged together at their free ends **24** by resilient means (not shown) to apply a braking force to the feed roller **19**.

The backing fabric from the feed roller **19** is taken over the support **10**, **11** to a take-up roller **25** which is mounted in front of the support **10**, **11** and below the latter, on a shaft **26**. This take-up roller **25** has a ratchet-wheel **27** secured to one end thereof, this being engaged by a pawl **28** carried by an arm **29** pivotable about the shaft **26**.

A detent **30** loaded by a spring **31** engages the ratchet wheel **27** to prevent clockwise rotation thereof, and the arm **29** is connected, through a tie rod **32** to a lever **33** which is pivoted at **34** and has a roller (not visible in the drawings) thereon which engages with a cam (also

not visible in the drawings) on the shaft 18. The arrangement is such, therefore that the take-up roller 25 is progressed by one tooth of the ratchet wheel 27 upon each rotation of the shaft 18, and, consequently, upon each vertical reciprocation of the bank of needles 13.

Mounted between the feed roller 19 and the support 10, 11 is a warp beam 35 on which are wound a plurality of cotton, jute or like binding threads. These are threaded into the eyes of the vertical needles 13, so that each vertical needle 13 is fed individually with a cotton or like binding thread as indicated at 36. Tensioning means are provided therefor, more particularly to take up the slack in the threads 36 which occurs when the needles 13 move downwards in withdrawing from the fabric, as will later be described in more detail. Such tensioning means comprises a plurality of levers 37 secured to a rotatable shaft 38. An arm 39 fixed to the shaft 38 and depending therefrom carries a roller 40 which engages a cam 41 rotated by a shaft 42. Eyes 43 are provided on the levers 37 and the threads pass through these to the needles 13.

Extending above the support 10, 11 in alignment with the slot 12 aforesaid is a horizontal shaft 44 having a plurality of arms 45 thereof on the end of each of which is a second arcuate needle 46. The length of each arm 45 and the radius of curvature of the needles 46 is such that when the shaft 44 is oscillated, each arcuate needle 46 performs an arcuate movement above the slot 12, the part of the needle closest to the slot 12 moving substantially horizontally thereover. There is one such arm 45 and arcuate needle 46 associated with each of the vertical needles 13, and the eye of each arcuate needle 46 is threaded with wool or other suitable tufting material 47 comparatively loosely, the material extending along the needle from the end remote from the eye, and projecting a short distance past the free end of the needle 46, as shown.

Oscillating means for the arcuate needle 46 is in the form of a lever 48 secured to the shaft 44 and joined, by a connecting rod 49 to a pivoted lever 50 having a roller 51 which rests on a third cam 52 on the shaft 18.

Disposed above the support 10, 11, but below and out of the paths of the arcuate needles 46 are two guillotine blades 53, 54, these being disposed one each side of the slot 12 in the support so that the vertical needles 13 can project therebetween. The blade 54 is displaceable horizontally, by means of a lever 55 pivoted on the shaft 21 and having a roller 56 which engages the cam 41, to sever the tufts as will later be described in detail.

The machine operates in the following way. Initially, the vertical needles 13 are at their lowermost positions and the arcuate needles 46 are away from the slot 12 as is shown in Fig. 2.

The vertical needles 13 move upwards to penetrate the fabric 30, and introduce the cotton or like threads 36 therethrough as is shown in Fig. 3. Because of the tension in the fabric 20, due to the action of the brake shoes 22 on the feed roller 19, the needles 13 penetrate cleanly. These needles 13 are then lowered very slightly by the cam 17 so that the cotton or like threads 36 separate somewhat from their needles 13 and form loops, so that there is a line of loops extending transversely of the fabric.

The shaft 44 is then rotated by action of the cam 52 in a direction such as to cause each of the arcuate needles 46 to move adjacent its associated vertical needle 13 and to enter into the thread loop 36 thereof as is shown in side elevation in Fig. 4 and corresponding part-sectional front elevation in Fig. 5, so that the end of the length of tufting material 47 threaded through the arcuate needle is taken through the loop in the thread 36. The shaft 44 is rotated until the free end of the tufting material 47 is taken completely through the loop as shown in Fig. 6 and is then rotated in the opposite direction, and whilst this serves to withdraw the arcuate needles 46 from the loops in the threads 36, the part of the tufting material 47 projecting therefrom still projects through its associated loop in the thread 36 as shown in Fig. 7.

The vertical needles 13 are now caused to move downwards, the lever 39 being moved by the cam 41 to pivot the eye 43 around the pivot 38 to take up any slack in the cotton or like thread 36 as previously described, so tending to withdraw the loop in the thread 36 which pulls the tufting material 47 into contact with and anchors it to the fabric 20 at a point about midway of the portion of the material 47 projecting from the arcuate needle 46. At the same time, the arcuate needle 46 swings away from the support 10, 11 so that the tufting material 47 is drawn through the eye thereof to provide a projecting length of material 47 for the next tuft. The stages of these operations are shown in Figs. 8 and 9.

As soon as the vertical needles 13 withdraw from the fabric 20, this is progressed by a slight rotation of the take up roller 25 so that the tufts so far produced, but not yet severed, now lie just above the support 11 to one side of the slot 12 as is shown in Fig. 9, the tension on the fabric 20 gripping the cotton or other yarn 36 onto the support 11, and preventing the tufting material 47 unintentionally becoming loosened from the loop of cotton or like thread 36 which is anchoring it.

The guillotine blade 54 is then operated by the cam 41 to move scissor-like horizontally relative to the blade 53 above the slot 12 in the support 10, 11, so severing the tufts which are now anchored to the fabric 20 from their arcuate needles 46, and creating fresh free ends of such material 47 projecting from the arcuate needles 46 ready for introduction into the next row of loops. This sequence is repeated for each row of tufts.

It will be appreciated that the machine is such that the manufacture can progress automatically, and that the cotton or like threads extend warp-wise along the backing material in the finished carpet, along one side thereof, with the tufts projecting from the other side, and looped around said threads. The need for causing needles threaded with wool or the like to penetrate the fabric is eliminated and each tuft is completely independent, so that the spacings therebetween can be varied, as desired, without consideration having to be made of the amount of tufting material extending between the tufts of adjacent rows.

It is to be understood that the invention is not limited to the precise details of the foregoing example which is set forth merely as illustrating one way in which it can be carried into effect. The sequences in which the various operations occur can be varied within practical limits, and variations may be made to the various elements of the apparatus, if desired. For example, each of the vertical needles 13 could be fed with cotton or the like from its own individual bobbin. Straight horizontally reciprocating needles could be used, in place of the arcuate needles 46, for introducing the tufting material 47 into the loops.

It will be appreciated that the apparatus can be employed for producing a plain coloured carpet, or, if different colours are used in the arcuate needles 46, striped carpet. In this latter instance, zig-zag and like designs can be obtained by providing a suitable mechanism for shogging the needles 46. Where such mechanism is provided, no wastage occurs at the inoperative needles i. e. those which overhang the edges of the fabric 20, since only when the end of the tufting material 47 is anchored to the fabric 20 does feeding of such tufting material 47 occur as a result of oscillation of the arcuate needles 46.

While I have disclosed one embodiment of the present invention, it is to be understood that this embodiment is given by example only and not in a limiting sense, the scope of the present invention being determined by the objects and the claims.

I claim:

1. A method of making tufted carpets which comprises, for each tuft, introducing a loop of binding thread through a backing fabric, inserting an end of a continuous length of tufting material into said loop, withdrawing said loop to tighten it so that it draws said length of tufting material into close contact with and anchors it to said backing fabric, and severing the anchored part of said tufting material from the continuous length.

2. Apparatus for making tufted carpets comprising a bank of needles each of which is fed individually with a binding thread, means for reciprocating said needles so as to introduce said binding threads through a length of backing material to produce a plurality of loops and subsequently to withdraw said loops, means for introducing into each of said loops one end of a continuous length of tufting material which becomes anchored to said backing fabric when said loop is withdrawn, and means for severing said anchored ends from said continuous lengths of tufting material.

3. Apparatus for making tufted carpets comprising a plurality of first needles each of which is fed individually with a binding thread, means for reciprocating said needles so as to introduce said binding threads through a length of backing material to produce a plurality of loops and subsequently to withdraw said loops, and a plurality of second needles, one associated with each first needle and reciprocable transversely relative thereto, for introducing into each of said loops one end of a continuous length of tufting material, which becomes anchored to said backing fabric when said loop is withdrawn, and means for severing said anchored ends from said continuous lengths of tufting material.

4. Apparatus for making tufted carpets comprising a substantially horizontal crowned support, means for progressing a length of backing fabric under tension over said support, there being a slot in said support, which slot extends transversely of said fabric, a bank of vertical needles disposed below said support and in alignment with said slot, means for reciprocating said needles vertically so that, when threaded with binding threads, they penetrate said fabric from the underside thereof and each produce a loop extending upwards from the upper surface of said fabric and subsequently withdraw said loop, and a plurality of arcuate needles, one associated with each of said vertical needles, swingably mounted above said support and adapted each to introduce one end of a length of tufting material through the loop produced by its associated vertical needle as such loop is formed.

5. Apparatus for making tufted carpets comprising a substantially horizontal crowned support, means for progressing a length of backing fabric under tension over said support, there being a slot in said support, which slot extends transversely of said fabric, a bank of vertical needles disposed below said support and in alignment with said slot, means for reciprocating said needles vertically so that, when threaded with binding threads, they penetrate said fabric from the underside thereof and each produce a loop extending upwards from the upper surface of said fabric and subsequently withdraw said loop, a plurality of arcuate needles, one associated with each of said vertical needles, swingably mounted above said support and adapted each to introduce one end of a continuous length of tufting material through the loop produced by its associated vertical needle as such loop is formed, so that said tufting material becomes anchored to said fabric when said loops are withdrawn, and means for severing the anchored ends from said continuous lengths of tufting material.

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