Oct. 15, 1940. H. A. WINTERMUTE 2,218,445

PRODUCTION OF PILE SURFACE MATERIALS

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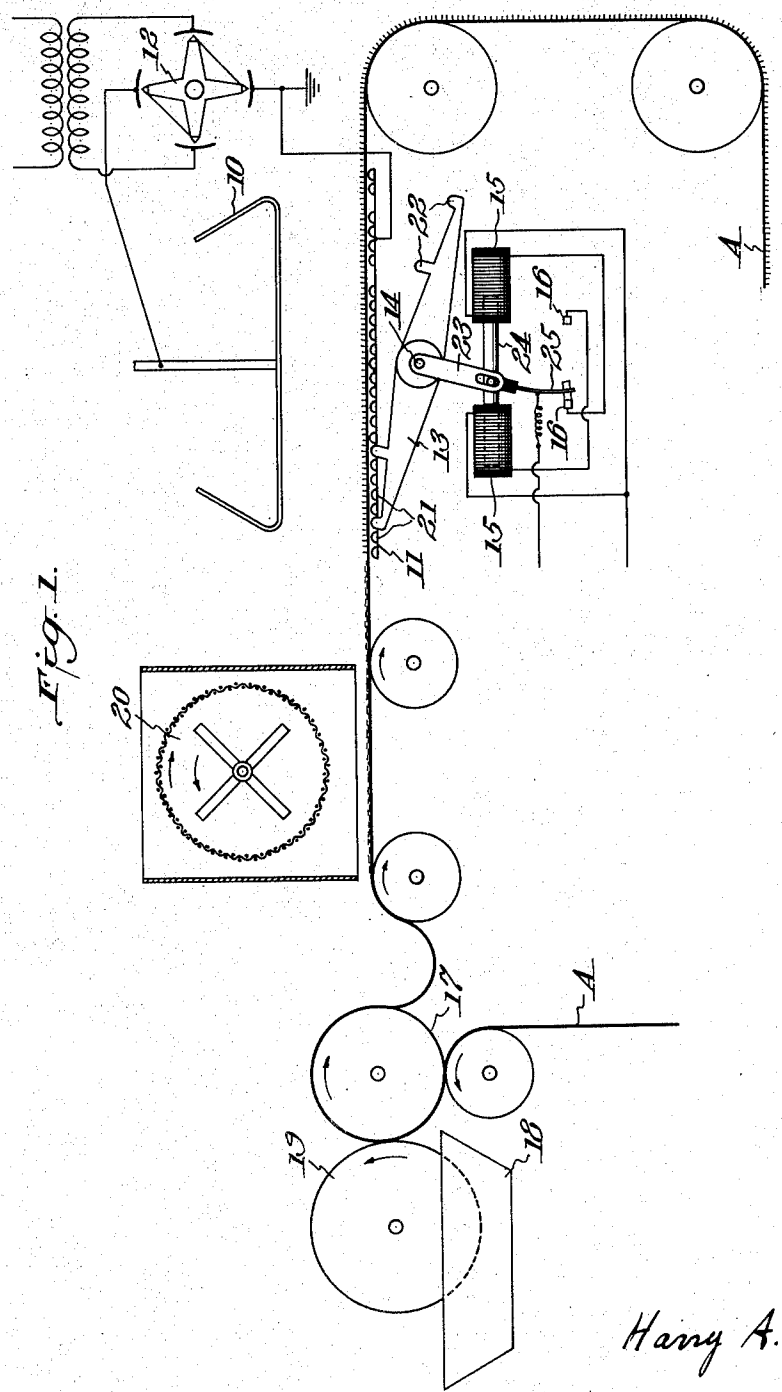

Fig. 1.

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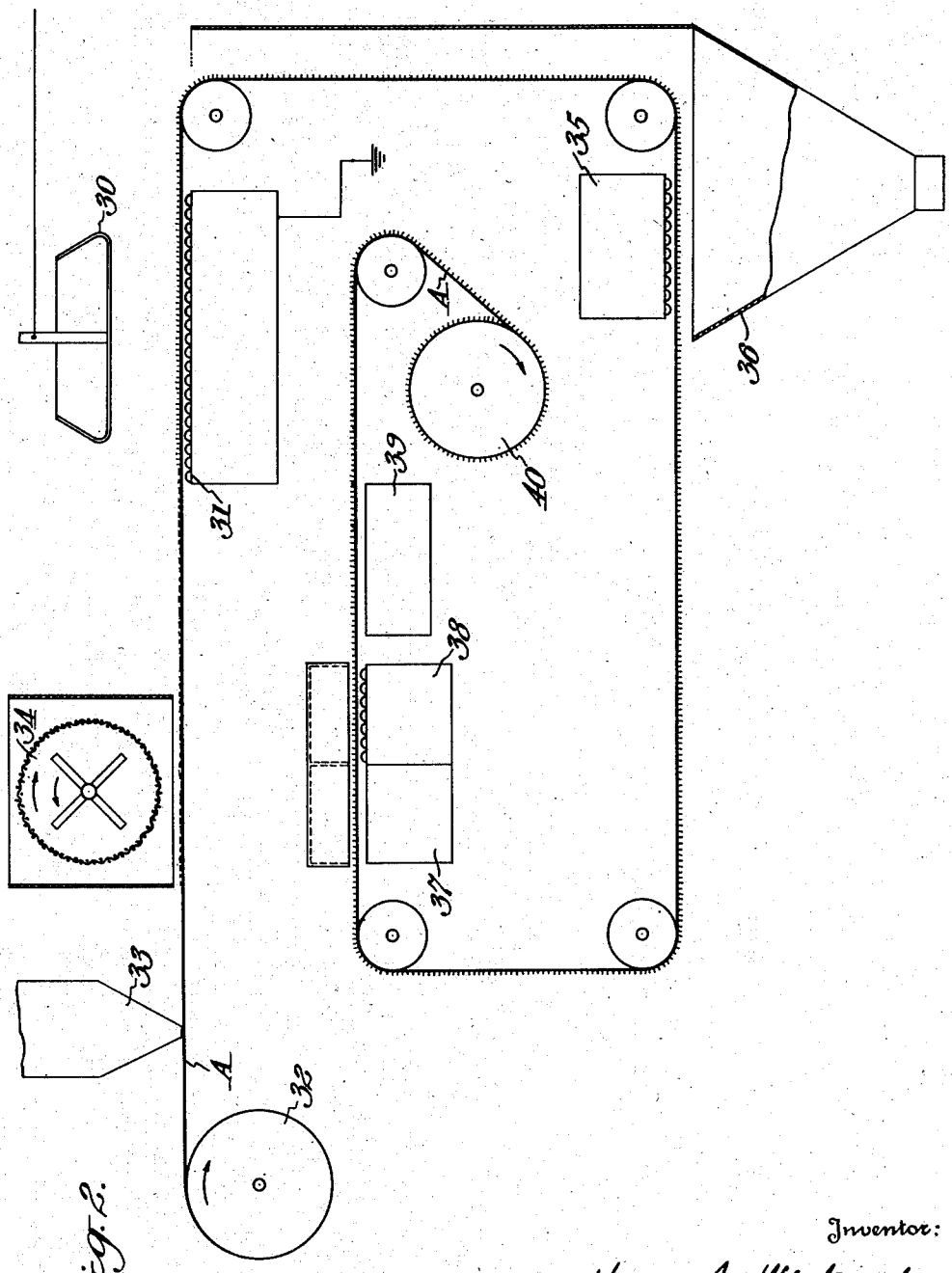

Fig. 2.

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Patented Oct. 15, 1940 2,218,445

UNITED STATES PATENT OFFICE

2,218,445

PRODUCTION OF PILE SURFACE MATERIALS

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Application September 24, 1936, Serial No. 102,395

2 Claims. (Cl. 91—70)

This invention relates to the production of pile-surfaced material and is particularly directed to a process and apparatus for the utilization of the combined effects of electrical and mechanical forces to produce artificially piled surfaces having a high degree of uniformity of appearance and an enhanced durability.

In the production of pile-surfaced materials by the deposition of pile-forming material, such as rayon flock, for example, upon adhesive coated bases, it has been found very difficult to obtain piles having a satisfactory uniformity of appearance and a satisfactory durability. Uniformity of appearance requires that the pile-forming material be uniformly distributed and also positioned at uniform angles. It has also been difficult to obtain artificial products having satisfactory resistance to wear.

It has now been found that pile-surfaced products of highly satisfactory durability and uniformity may be obtained by the method of the invention which comprises depositing pile-forming material upon an adhesive-surfaced backing, and subjecting the deposited pile material, before the adhesive is fully hardened, to a shaking or vibratory action while bringing within the orienting influence of a strong electric field, either alternating or unidirectional.

This method makes possible the production of a thicker pile than can be obtained by mechanical methods alone, while for a given thickness of pile the adherence of the fibers is greatly increased and the time required for the production of the pile is substantially shortened. The fibers stand more nearly normal to the surface, are more uniformly distributed, and are more uniformly oriented than when mechanical forces alone are used. The method of the invention is far less sensitive to air conditions, such as temperature and humidity, than methods involving the use of electric fields alone for depositing and orienting the fibers. Moreover, the fibers are more firmly fixed in the adhesive surface by the method of the invention than by the use of either the electric field or mechanical forces alone.

Various modifications of the method have been found to be advantageous for certain purposes. For example, a more durable bonding of the fibers may be obtained by subjecting the piled material to a subsequent conditioning whereby the adhesive is somewhat softened, for example, by heating. The further treatment may also advantageously include subjecting the material while in the conditioned state to mechanical vibration. The conditioning of the material by softening the adhesive after the depositing of the fibers, causes the fibers to be more firmly gripped by the adhesive and this effect is furthered by a concomitant vibration.

The method and apparatus of the invention will be more particularly described with reference to the illustrative embodiments shown in the accompanying drawings in which

Fig. 1 illustrates one form of method and apparatus embodying the principles of the invention; and

Fig. 2 represents a modified form of the invention.

In Fig. 1, 10 represents a high potential electrode and 11 a grounded electrode. The electrodes are supplied with unidirectional high potential current by means of mechanical rectifier 12. Electrode 11 comprises a plurality of fixed bars 21, preferably curved on their upper sides, and a number of movable striking bars 22 carried on rocker arm 13. Arm 13 is rocked about pivot 14 by means of lever arm 23 and armature 24 of electromagnets 15 which are energized in alternation by means of reversing switches 16 operated by extension 25 on lever arm 23.

A web A, for example, of fabric material, is passed over roller 17, where it is coated with adhesive from container 18 by means of dip roll 19. Suitable fibrous material, such as rayon flock, is strewn in predetermined amount on the adhesive-coated surface of the web by means of the rotating sifter 20. The web carrying the fibers on its adhesive-coated surface is then passed between electrodes 10 and 11, adjacent lower electrode 11 where it is subjected to the combined efects of the strong electrical field between the electrodes and the vibration of rapper 13. The combined action of the electrical and mechanical forces cause the flack to be worked endwise into the adhesive. The electrical field tends to orient the fibers in a direction perpendicular to the field and at the same time cooperates with the vibration in tending to force the flock further into the adhesive, while the vibration tends to make the fibers more responsive to the orienting effect of the electrical field.

In Fig. 2, 30 is a high potential electrode energized as shown in connection with electrode 10 in Fig. 1, while 31 is a grounded electrode provided with vibrator mechanism, for example, of the type shown in connection with electrode 11 in Fig. 1.

Web A is led from roll 32 under coater 33 which provides a coating of adhesive on the upper surface of the web, and then under sifter 34

which sprinkles a desired quantity of flock on the web. The web then passes between electrodes 30 and 31, where it is subjected to the combined effects of a high potential electrical field and mechanical vibration as in Fig. 1.

The pile-surfaced web is then passed under a vibrator 35 which may be of the same type as shown in connection with electrode 11 in Fig. 1, where excess fiber is shaken off and falls into hopper 36. The web is then led into heater 37 wherein the adhesive is softened. While the adhesive is in the softened condition it is subjected to further vibration by vibrator 38 in order to more firmly position the fibers in the adhesive. The web is then subjected to conditions for finally indurating the adhesive, for example, by means of drier 39, and the finished material is rolled up on roll 40.

The adhesive used in the practice of the invention should be sufficiently viscous to avoid a tendency to pull off or string in the electrical field, and also to prevent the fibers laid thereon from penetrating too far into the adhesive prior to passage into the electrical field. The adhesive may well be more viscous than when electrical forces alone are used for the deposition as the combination of mechanical and electrical forces will force the fibers into a more viscous adhesive.

The method and apparatus of the invention are particularly valuable for the deposition of fibers of short length and for operating under conditions such that the fibers have very low conductivity. The method is very flexible as to conditions of operation, type and size of fiber, character of adhesive, nature of base material and the like and permits of a wide variation in these and other factors.

I claim:

1. A method of making pile surfaces comprising forming a mat of pile-forming fibers on an adhesive-coated surface and then subjecting the surface and the pile-forming fibers to the conjoint action of a strong electrical field and mechanical vibration and thereafter softening the adhesive temporarily and subjecting the material to mechanical vibration while the adhesive is in softened condition.

2. In the production of pile-surfaced materials by the deposition of pile-forming fibers upon an adhesive-coated surface, the improvement which comprises subjecting the adhesive having pile-forming fibers imbedded therein to softening conditions and mechanically vibrating the material while the adhesive is in softened condition.

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