March 31, 1964 M. KIRKPATRICK 3,126,924

TEXTILE YARN AND FABRIC

Filed Aug. 15, 1962

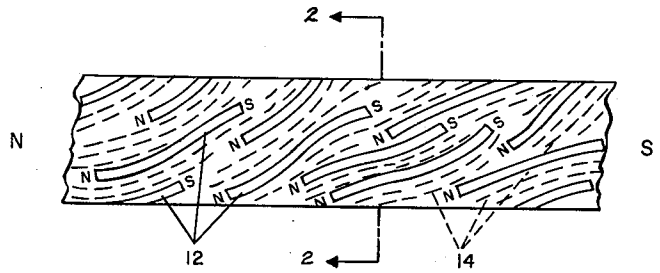


FIG. 1

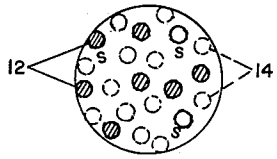


FIG. 2

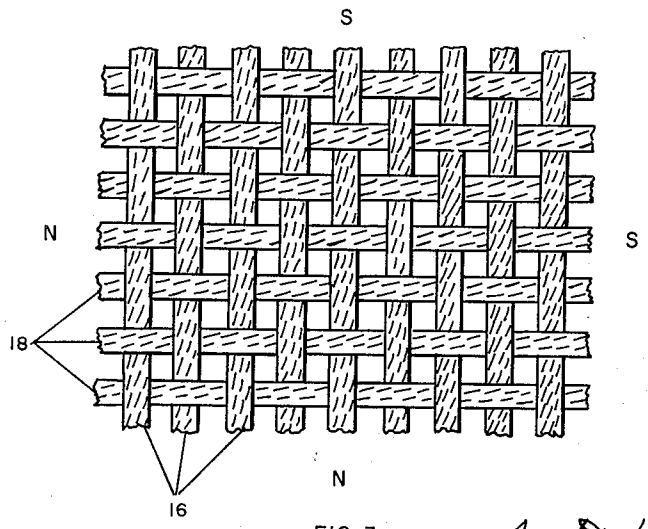


FIG. 3

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TEXTILE YARN AND FABRIC

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This invention relates to textile yarns and fabrics and more particularly to those having novel permanent magnetic properties.

It is a major object of the invention to provide permanently magnetic staple yarns and fabrics useful in a variety of applications, as substitutes for more conventional bar and horseshoe permanent magnets, for example.

It is a particular feature of the invention that the yarns and fabrics provided thereby may be cut into pieces as desired, which pieces will thereafter have the desired magnetic properties.

To accomplish these objects and features of the invention, a permanently magnetic twisted staple yarn is provided by incorporating therein a substantial proportion of permanently magnetic staple fibers with their like poles aligned in one direction, such fibers preferably being of small diameter, flexible, ferrous or other magnetic wires or strands of textile length at least about ¼ inch in length up to an inch or two in length and overlapping one another within the yarn. Other, conventional, non-magnetic textile fibers such as cotton, wool or synthetic fibers may be used in conjunction with the magnetic staple fibers in order to produce a composite yarn as desired.

Utilizing such yarns, a permanently magnetic fabric may also be provided in accordance with the invention, either knitted or woven, in the latter case with either one or both of the warp and filling sets of yarns including permanently magnetic fibers in accordance with the invention.

For the purpose of explaining further objects and features of the invention, reference is now made to the following detailed description thereof, together with the accompanying drawings, wherein:

FIG. 1 is a diagrammatic side view of a portion of a yarn according to the invention;

FIG. 2 is a cross sectional view of the yarn of FIG. 1 taken on the lines 2—2 thereof; and

FIG. 3 is a diagrammatic view of a woven textile fabric according to the invention.

In FIGS. 1 and 2 is diagrammatically shown a novel composite twisted staple fiber yarn according to the invention in which a substantial proportion of permanently magnetic staple fibers are combined with non-magnetic fibers. In these figures, which are greatly enlarged for clarity, the magnetic staple fiber component of the composite yarn is shown in full lines with the permanently magnetic fibers 12 having their poles designated north (N) and south (S) and with like poles generally aligned with one another throughout the length of the yarn. The other staple fibers 14, shown in dotted lines, which make up the remainder of the composite yarn of the invention may be of any well-known textile staple fiber such as wool or cotton among the natural fibers or any of the well-known synthetic fibers such as rayon, nylon, glass or the like. The proportion of permanently magnetic and other non-magnetic fibers is not critical but may be determined by the desired characteristics of the composite yarn, both magnetic and mechanical. Preferably the yarns are twisted together as in conventional staple yarns wherein the twist multiplier may be between 3 and 6, or more conventionally 3.50 to 4.75, but a binder may be utilized

if desirable. The fibers both magnetic and non-magnetic may conventionally be of textile length from about ¼ of an inch to upwards of an inch or two in length, but preferably the magnetic fibers may be from about ¼ inch to one inch in length, with the other fibers being of any desired length, even continuous. The like poles of the magnetic fibers must be generally aligned, and be maintained in aligned position within the yarn body, providing a north pole (N) at one end of the yarn and a south pole (S) at the other end of the yarn. Similiar north and south poles will be created whenever the yarn be cut to provide a pair of ends, as in the showing of FIG. 1.

In FIG. 3 is shown a textile fabric woven of such yarns both in the warp yarn set 16 and the filling yarn set 18 of yarns. With this arrangement, south poles (S) will be provided at one side and one end of the fabric and north poles (N) at the opposite side and opposite end of the fabric, and this magnetic configuration will be maintained as well within pieces of cut fabric. If it be desired to provide but a single south pole and a single north pole on either a side or an end of the fabric, conventional yarns may be utilized in one of the sets of yarns, either warp or filling, of the fabric. Not all of the yarns of even one set of yarns of the fabric need have magnetic properties but the proportion of magnetic yarns utilized should be substantial.

The fabric of the invention is not limited to plain woven fabrics but other types of fabrics such as braided or knitted may be utilized in accordance with the principles of the invention. Still further modifications within the spirit of the invention and the scope of the appended claims will occur to those skilled in the textile art.

I claim:

1. A permanently magnetic yarn, said yarn having a substantial proportion of permanently magnetic fibers with their like poles aligned in one direction, together with non-magnetic fibers of textile material.

2. A yarn as claimed in claim 1 wherein said permanently magnetic fibers overlap one another.

3. A permanently magnetic staple yarn of staple fibers twisted together, said yarn having a substantial proportion of permanently magnetic staple fibers with their like poles aligned in one direction, together with non-magnetic fibers of textile material.

4. A yarn as claimed in claim 3 having a twist multiplier of from 3 to 6.

5. A yarn as claimed in claim 3 wherein said fibers are of textile length at least about ¼ inch in length.

6. A permanently magnetic fabric including twisted staple yarns having a substantial proportion of permanently magnetic fibers with their like poles aligned in one direction, together with non-magnetic fibers of textile material.

7. A permanently magnetic fabric having warp and filling sets of yarns, at least one of said sets of yarns including twisted staple yarns having a substantial proportion of permanently magnetic staple fibers with their like poles aligned in one direction together with non-magnetic fibers of textile material.

8. A fabric as claimed in claim 7 wherein both of said sets include said permanently magnetic yarns.

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