April 6, 1965 K. L. GRIFFIN 3,176,820

SYNTHETIC AND NATURAL FIBER INKED RIBBON SUBSTRATE MATERIAL

Filed Nov. 8, 1962

FIG-1

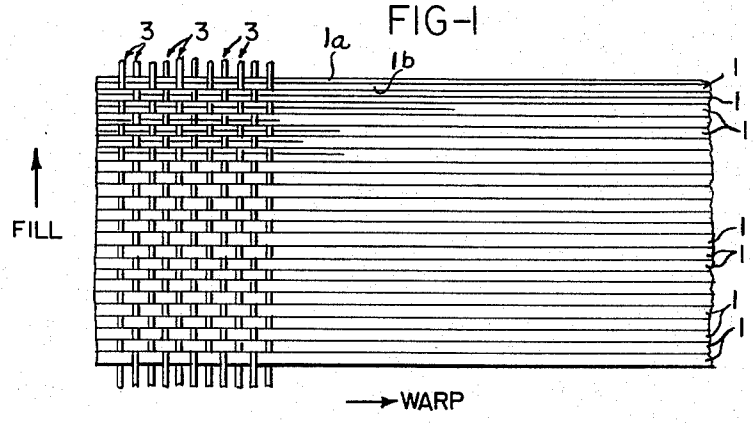


FIG-2

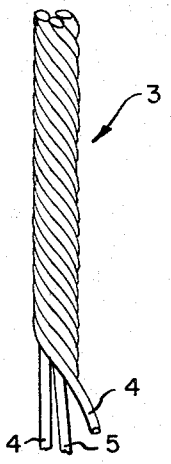
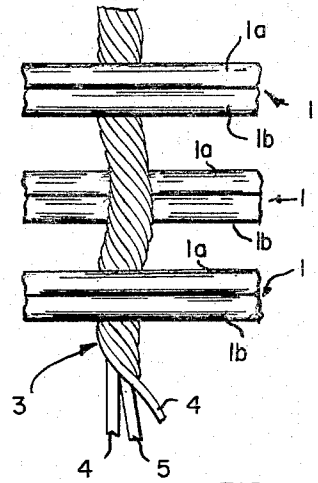


FIG-3



INVENTOR
KARL L. GRIFFIN

BY Smith, Pachuck & Gerdine

ATTORNEYS

United States Patent Office 3,176,820 Patented Apr. 6, 1965

3,176,820

SYNTHETIC AND NATURAL FIBER INKED RIBBON SUBSTRATE MATERIAL

Karl L. Griffin, Box 147, Allentown, Pa.

Filed Nov. 8, 1962, Ser. No. 236,285
4 Claims. (Cl. 197—172)

This invention is concerned with composite yarns and to a cloth manufactured from such yarns. In particular, the invention is concerned with a composite yarn and a cloth manufactured therefrom which has definite advantages when used as a base substrate for an impregnated product such as an inked ribbon for typewriters, computors, calculating machines, etc., where the absorbency and strength characteristics of the substrate must be both sufficient to assure absorption of adequate amounts of the impregnating substance and yet the base must be strong enough to resist tearing, ripping, fraying, etc. under the stress of high impact loads such as occur in the machines in point. At the same time, the cloth must be thin enough to conform to the type symbol or character and to the surface of the carrier to secure accurate reproduction thereof and yet, not cut or punch out in the event of heavy impression pressures.

Various combinations of natural and synthetic materials have been proposed for use in the manufacture of inked ribbons. These combinations have been intended to provide strength to the ribbon while, at the same time, assure sufficient absorbency wherein an adequate ink supply may be maintained in the base material to assure reproduction of the symbols being typed or recorded. Strength, on the other hand, is also a necessary characteristic of such material to assure that the impact pressures of the typed symbol will not tear, stretch, or punch out obliterating the typed character or symbol or resulting in blurred or fuzzy reproduction of the character or symbol being recorded. It might be noted that in many machines such as high speed computors and calculators, the impact forces created on the ribbon are far in excess of the loads which were anticipated merely a few years ago, so that strength of the ribbon is becoming more and more critical to continuous high speed operation of such equipment.

In all cases, it is also necessary that the surfaces of the ribbon, particularly the activated surface, be as smooth and flat as possible, such that the typed symbol will be as clear and concise as the type from which it is produced. Thus, the three characteristics, strength, absorbency and flatness or smoothness must be combined such that the best possible combination of all three is achieved in the complete product.

Among the various yarns proposed for use as a ribbon base are combinations of silk and cotton, cotton and a polymerized synthetic material such as nylon, or various combinations of such materials, designed to impart to the substrate the strength characteristic of the relatively non-absorbent synthetic fibers and the absorbent, yet comparatively frail characteristics, of the natural fibers such as cotton and silk.

This present invention deals with a combination of warp and fill yarns twisted and woven in a unique manner to obtain the ultimate in the properties of strength and absorbency of the yarns where the cloth woven from such yarns is used as a substrate for inked ribbons.

An object of the invention, therefore, is to produce a cloth having the property of absorbing fluids and semi-fluid impregnating agents.

A further object of the invention is to produce a cloth having high resistance to cutting and "fuzzing" due to tension or relatively high localized impact pressure.

Another object of the invention is to produce a cloth having utility as a substrate base for inked ribbons.

An additional object of the invention is to produce an inked ribbon having superior strength and reproduction properties.

An even further object of the invention is to produce a filler yarn having a unique combination of absorbent and strength properties when combined as a filler in cloth used for an inked ribbon base.

These and other objects of the invention not specifically referred to but, nonetheless, inherent in the novel product are accomplished by twisting together in a two-to-one ratio a plurality of ends of at least two dissimilar continuous filament yarns, preferably two ends of silk to one end of preshrunk nylon to form a filler yarn; thereafter incorporating said filler yarn in a cloth including, in a one-to-one ratio, parallel laid ends of dissimilar continuous filamet yarns, such as silk and preshrunk nylon, forming the warp ends of the cloth. To form an inked ribbon the combination of warp and filler yarns is such as to include approximately 152 warp ends per inch while the filler count is approximately 118 picks per inch; the ends of nylon being of from 15 to 30 denier, the silk being in the range of weight such that a cloth of approximately 3.2 to 3.7 thousandths of an inch in thickness is produced. In specifying the warp and filler count it will be appreciated that the selected figure is approximate, since normal variations in manufacture alone will produce a plus or minus count of 4 ends per inch.

Referring to the drawing appended hereto and forming a part of the disclosure, it will be seen that:

FIG. 1 illustrates in magnified form a section of cloth defined by the invention,

FIG. 2 is an enlarged illustration of the filler yarn used in the manufacture of the cloth illustrated in FIG. 1, and

FIG. 3 illustrates the manner of combining warp and filler yarns according to the invention.

As seen in FIG. 1, the substrate textile is comprised of warp yarns or ends 1 arranged in a regular alternating pattern parallel to one another. The warp ends are crossed in a regular over-and-under pattern by filler yarns 3, the weave being of the familiar square type.

The warp ends 1 are each comprised of parallel laid natural and synthetic continuous filament fibers, preferably silk and a polymerized synthetic fiber such as nylon. It has been found that a desirable arrangement results when the warp ends include equal amounts of each of the two dissimilar fibers so associated and woven in the cloth to give an apparent warp end count of 152 ends per inch. By apparent warp end count is meant that while under normal magnification such as used in the textile industry, usually magnification obtained by a 4× to 5× glass, the warp ends 1 appear as a single fiber, while actually, since warp end includes a one-to-one ratio of synthetic 1*a* to natural fiber 1*b*, there are 152 ends of synthetic and 152 ends of natural fibers included in the apparent count of 152 warp ends per inch. A preferable combination of dissimilar fibers is natural silk with preshrunk nylon comprising the synthetic polymerized fiber.

The filler yarn 3 is formed by twisting together a plurality of dissimilar yarn ends as illustrated in FIG. 2. As shown, yarn ends 4 are comprised of natural silk while ends 5 are again comprised of a synthetic polymerized material such as nylon. Thus, the filler yarn comprised two dissimilar, continuous filament fibers twisted together in a two-to-one ratio, silk to synthetic fiber, the resultant yarn being woven into the warp ends as illustrated in FIG. 3. Preferably the synthetic fiber is preshrunk as in the case of warp ends 1*a* which are also comprised of the preshrunk synthetic fiber.

In the case of the warp yarn, satisfactory substrate ma-

terials have been made where the filler count is about 118 picks per inch.

It will now be apparent that the cloth, because of the characteristics of the synthetic material 1*a*, will have good strength properties in warp direction. In addition, the silk ends 1*b* also impart some absorption characteristics to the cloth. Remembering, however, that the synthetic fiber is relatively non-absorbent, it is believed quite apparent that the addition of the filler ends, which are comprised of a greater ratio of absorptive silk to non-absorptive synthetic fiber, will provide a substantial increase in the receptivity of the cloth to an impregnating agent, while the addition of further synthetic fiber does enhance the strength properties of the cloth.

As has been mentioned, bulk, i.e. thickness or caliper and smoothness are also factors which must be considered in producing a satisfactory ribbon.

The use of continuous filament fiber, both natural and synthetic, assure that the ribbon surface will be smooth and will not "fuzz." Further, the use of a preshrunk synthetic fiber precludes "puckering" or dimpling of the cloth which could occur were the fibers not preshrunk before weaving. In the latter case, the synthetic fiber will shrink at a greater rate than the silk when exposed to a liquid causing uneven fiber length in the impregnated product, thus resulting in a cloth which is not perfectly flat.

When it is considered that thickness, i.e. caliper, is also important, the advantages of the combination become even more apparent. If the warp and filler yarns were of the same constituents, i.e. interjacent silk and nylon, the substrate would have sufficient strength but lack adequate absorption qualities. If, on the other hand, both warp and filler ends were made up by twisting one silk and one nylon or alternatively two silk and one nylon together and then weaving the two, while the absorption characteristics might be enhanced considerably, the thickness of the cloth becomes excessive. Since it has been found that a thickness or caliper of approximately 3.2 to 3.7 thousandths of an inch is most desirable, the combination of warp and filler yarn described in connection with the drawing produces a cloth within the caliper range found desirable. Preferably, the synthetic fiber is of a denier range of from 15 to 30 denier while the silk diameter or thickness is so selected as to combine with the synthetic fiber so as to produce a cloth withinn the most desirable caliper range.

In the manufacture of inked ribbons according to the invention, the filler yarn is twisted and thereafter woven with the parallel laid warp ends in the relationship described. The cloth, which is woven "in the wide," i.e. wide widths, is subsequently slit or cut into the ribbons of the usual and familiar widths and thereafter the ribbons are saturated or impregnated with a suitable ink to form the final product. Variations in caliper are provided within the specified range to satisfy the ultimate use of the inked ribbons. For example, where the ribbon is to be used on a conventional typewriter, the caliper is on the low side because legibility and clear reproduction of the typed symbol become a controlling factor along with

strength of the ribbon. However, where the ribbon is to be used on high speed, high impact calculators where legibility is essential, but cleanliness of reproduction less significant than the strength factor, the caliper of the ribbon will approach the high or thicker end of the acceptable range. In all cases, however, adjustments in the denier of the synthetic fiber can be made to secure adequate strength while adjustment in the thickness of the natural fiber can be made to secure adequate absorption regardless of the ultimate caliper of the product, if the warp and filler ratio of synthetic to natural fibers is maintained as taught herein.

Having thus described my invention, it will be apparent that various changes and modifications may be made therein, all falling within the spirit and scope thereof which is limited only as defined in the following claims.

What is claimed is:

1. A cloth substrate suitable for ink impregnation, characterized by high strength and high moisture absorbency properties, said substrate being manufactured of continuous filament natural and synthetic yarns comprising silk and nylon respectively; the warp of which includes 152 apparent ends each comprised of parallel laid natural and synthetic warp ends paired together in a zone to one ratio; the filler of which is comprised of approximately 118 picks per inch of synthetic and natural fibers twisted together, the ratio of natural to synthetic fibers being two to one, the caliper of said substrate being the range of 3.2–3.7 thousandths of an inch.

2. A cloth as defined in claim 1 wherein each of said paired, apparent warp ends is comprised of 152 actual ends of each a synthetic and natural fiber.

3. An inked ribbon for use in typing apparatus including a substrate comprised of continuous filament synthetic and natural fibers comprising nylon and silk respectively and having 152 parallel laid, paired natural and synthetic fiber apparent warp ends in the ratio of one to one, and approximately 118 filler ends per inch, the latter comprising natural and synthetic fibers in the ratio of two to one natural to synthetic fibers, twisted together, the caliper of said substrate being in the range of 3.2–3.7 thousandths of an inch, the whole being ink impregnated with ink.

4. A ribbon as defined in claim 3 wherein each of said paired, apparent warp ends is comprised of 152 actual ends of each a synthetic and natural fiber.

References Cited by the Examiner

UNITED STATES PATENTS

1,263,019	4/18	Beall	197—172
1,732,187	10/29	Pelton	197—172
2,054,091	9/36	McElrath	197—172
2,066,416	1/37	Neidich	197—172
2,477,652	8/49	Robbins	57—140
2,492,811	12/49	Moller	197—172
2,918,160	12/59	Thompson	197—172
2,996,872	8/61	Porczynski	57—140
3,022,880	2/62	Newman	197—172

ROBERT E. PULFREY, *Primary Examiner.*