

No. 810,553.

PATENTED JAN. 23, 1906.

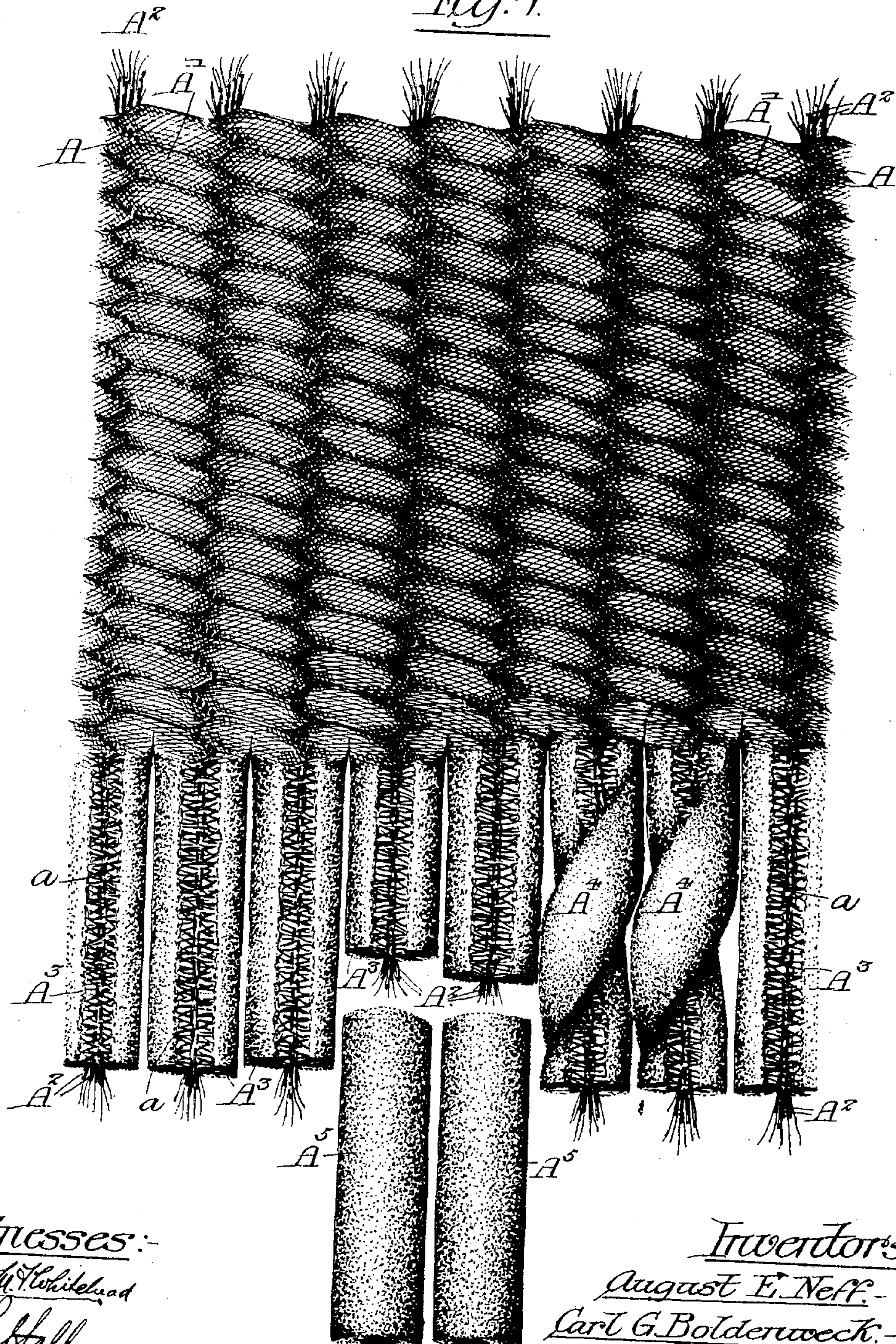
A. E. NEFF & C. G. BOLDENWECK.

WOVEN PILE FABRIC ROPE.

APPLICATION FILED JULY 18, 1904.

2 SHEETS—SHEET 1.

Fig. 1.



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2 SHEETS—SHEET 2.

Fig. 2.

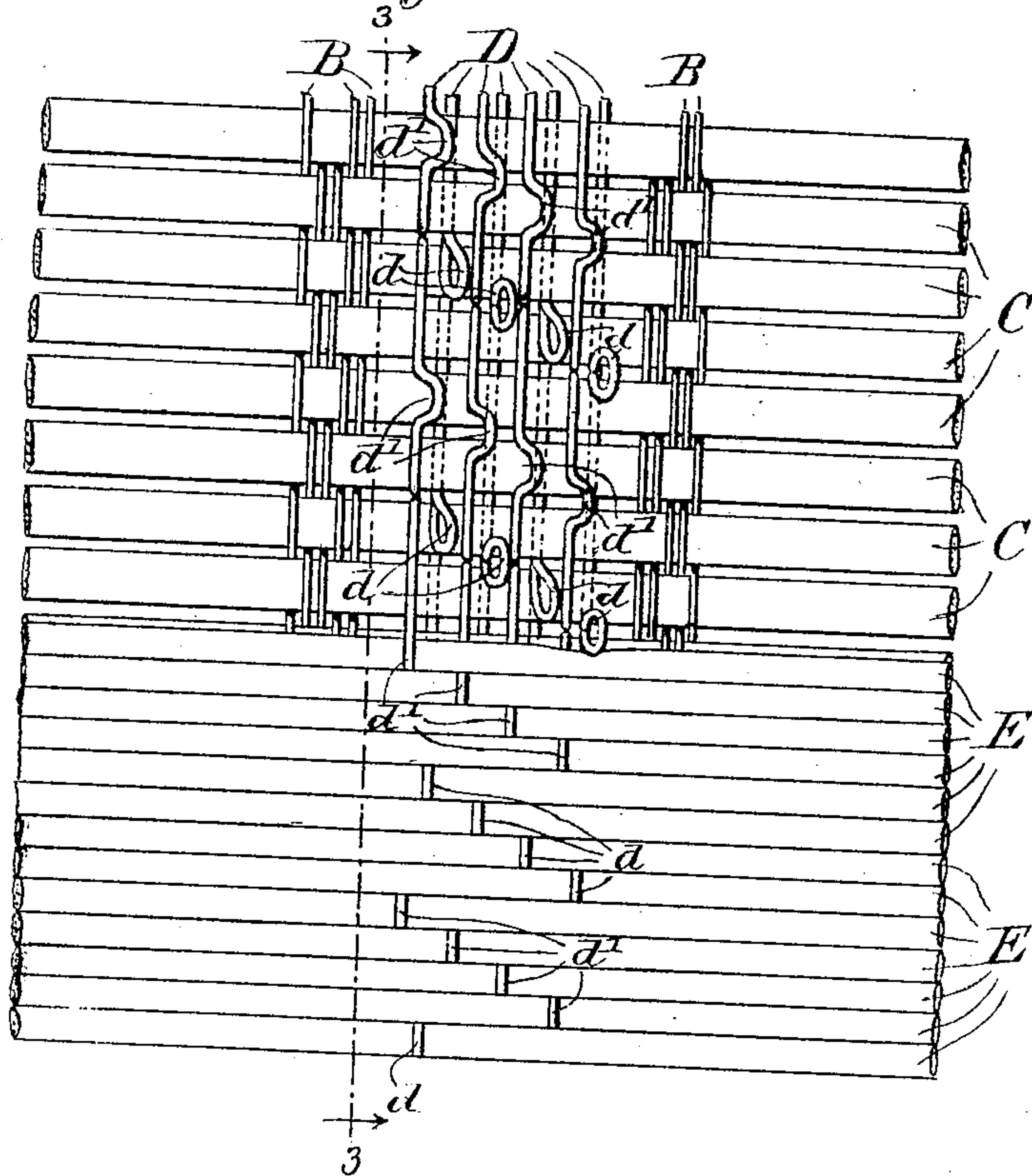
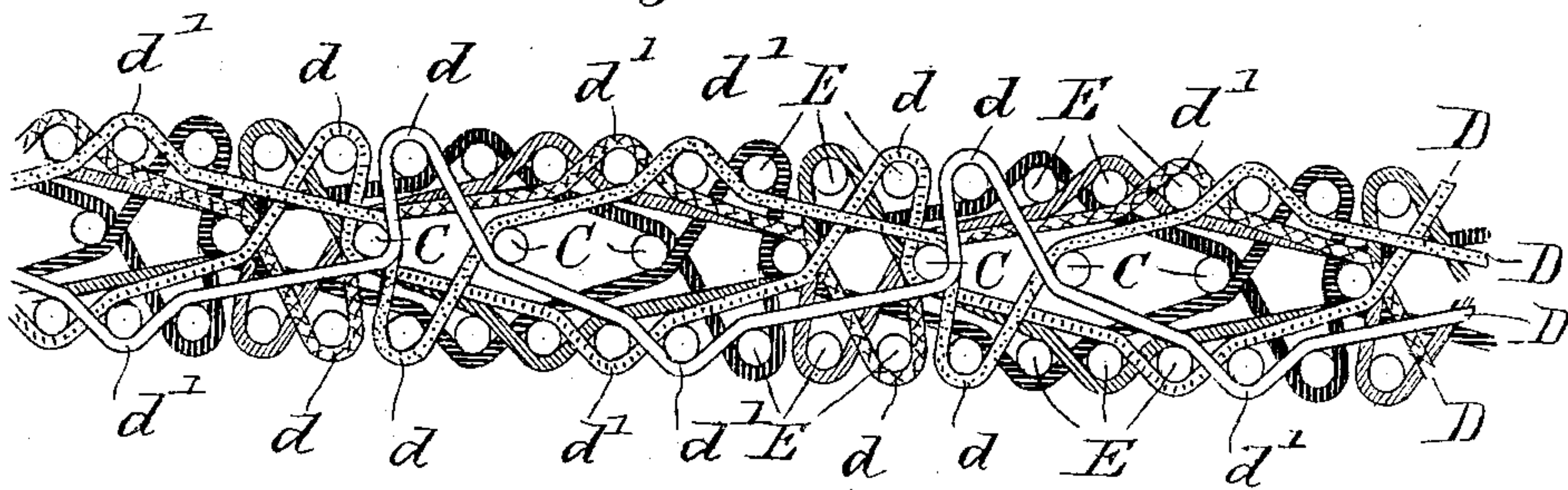


Fig. 3.



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UNITED STATES PATENT OFFICE.

AUGUST E. NEFF AND CARL G. BOLDENWECK, OF CHICAGO, ILLINOIS.

WOVEN-PILE-FABRIC ROPE.

No. 810,553.

Specification of Letters Patent.

Patented Jan. 23, 1906.

Application filed July 18, 1904. Serial No. 217,016.

To all whom it may concern:

Be it known that we, AUGUST EDWARD NEFF and CARL GEORGE BOLDENWECK, citizens of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Woven-Pile-Fabric Ropes; and we do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to a novel round or cylindric strand or rope of pile fabric—such, for instance, as is used in making rope-portières or for other decorative purposes.

A pile-fabric strand made in accordance with our invention consists of a core comprising a plurality of warp-threads and a filling consisting of short threads which are engaged at their middle portions with the warp-threads and the ends of which extend radially from the core in such manner as to form a rope-strand the surface of which has the appearance of a pile fabric. In making such round strands of pile fabric we proceed generally as follows: We first produce by a weaving operation upon a Jacquard loom a fabric consisting of a plurality of parallel groups of warp-threads, and a heavier loosely-laid weft or filling, such as yarn, the woven strip of fabric being made as wide as desired or as the loom will produce. The woven fabric thus made is composed of a plurality of parallel longitudinal sections, each section having a central group of warp-threads. Said fabric is cut or divided along the median longitudinal lines midway between the groups of warp-threads, thus producing separated strips each consisting of one of the groups of warp-threads, constituting the core of the strip, and short transverse filling-threads interwoven with and joined by said warp-threads. The woven fabric produced by the loom is a three-ply fabric. Each group of warp-threads in such fabric consists of three sets of threads—namely, two laterally-separated sets of warp-threads which are interwoven with a set of weft-strands to form the middle ply of the fabric, and a third set of warp-threads which are located between the two other sets and are interwoven with the weft-strands of the middle ply and also with the weft-strands of

the outer plies, each weft-strand of the outer plies being caught or engaged by a single loop only of one of the threads of the third or intermediate set of warp-threads. Each strip cut from the fabric therefore consists or is made up of a middle ply or layer which is in itself a complete woven fabric and embraces a set of weft-strands and two separated or exterior sets of warp-threads interwoven therewith, and two external plies or layers consisting of weft-strands and an intermediate set of warp-threads which pass between the weft-strands of the intermediate ply between the two exterior sets of warp-threads, and each of which is at intervals passed over or around a weft-strand of one of the outer plies and binds the same at a point between its ends to the middle ply.

In a strip made as described by reason of the fact that the short weft or filling strands of the outer plies are held or confined each at a single point between its ends by a loop of one of the warp-threads, the severed filling-strands, when the strip is cut from the fabric, tend to spread apart at their outer ends and to assume a folded position with their opposite ends near each other and in radial relation to the group of warp-threads constituting the core. The fullness thus produced at the margins of the severed strips results in the opposite end portions of the severed filling-strands assuming uniformly radial positions about the central core, so that the fabric-strands as a whole are thereby given a round or cylindric contour. A fulling operation may be employed, if desired, to give a completely-cylindric form to the strips or strands.

As shown in the accompanying drawings, Figure 1 is a plan view showing the upper end of woven fabric from which the strips are to be cut and showing at their lower ends a plurality of severed strips and also showing two sections of the rope produced from the severed strips after the fulling operation. Fig. 2 is a diagrammatic view of a part of a woven strand in its flat form with the wefts or filling strands shown straight and parallel with each other and spaced as in the actual fabric and the warp-strands separated widely, the upper part of the figure illustrating the intermediate or middle ply of the strip, while the lower part of the figure shows the surface of the outer ply. Fig. 3 is a sectional view

taken on line 3 3 of Fig. 2, but illustrating the weft or filling strands of the three plies of the fabric widely separated from each other.

As shown in the said drawings, Fig. 1, A 5 designates a fragment of the woven fabric from which is cut the strips which produce the cylindric pile-fabric strands. Said fabric is made up of a filling A', made of loosely-laid yarn and a series of groups or sets of warp-threads, each group being indicated in said 10 Fig. 1 by A². The said warp-threads are arranged in longitudinal parallel separated groups arranged at such distances apart laterally that when the fabric is cut midway be- 15 tween the groups of warp-threads short transverse strands of filling or weft threads will be formed of a length approximately equal to the diameter of the cylindric strands to be made.

20 Now referring to Figs. 2 and 3, which illustrate in detail the arrangement of the warp-threads and weft-strands in one of the strips cut from the fabric shown in Fig. 1, these are arranged as follows: The intermediate or 25 middle layer of the three-ply fabric consists of two groups B B of warp-threads which are interwoven with the transverse weft-strands C C so as to constitute a flat fabric, said weft-strands C C being arranged substantially in 30 the same plane with each other. The warp-threads in each group B B are arranged closely adjacent to each other; but the two sets of warp-threads are laterally separated from each other, as shown in Fig. 2. The 35 outer plies or layers of the three-ply fabric are formed by means of transverse weft or filling strands E E E and a set of warp-threads D D, which are interwoven with the weft-strands C C' of the middle ply and with the 40 weft-strands E E of the outer plies and bind the said weft-strands of the outer plies, at the middle portion thereof, to the said inner ply.

In the particular construction shown in the drawings the set of warp-threads D D consists 45 of eight threads, each of which is interwoven with the weft-strands C C and E E of the inner and outer plies in such manner that the said warp-thread is carried through or between the weft-strands C, first to one and 50 then to the other side of the middle ply, and is looped over the weft-strands E of the outer ply, first on one side and then on the other side of the middle ply. Said warp-threads D D are, in weaving the fabric, placed as closely 55 together as possible and completely fill the space provided for them between the two exterior sets of warp-threads B B, so that the warp-threads of all three sets B, B, and D are located closely adjacent to each other and 60 constitute, in effect, a central core for the finished strand. The several warp-threads of the sets B, B, and D are shown in Fig. 2 as separated from each other; but this is for the purpose of clearly showing them, and they 65 will be closely spaced in practice.

As shown in the drawings, each warp-thread D is carried at equal intervals between two of the weft-strands C C of the middle ply to form loops $d d$, each of which passes 70 around one of the weft-strands E of the outer ply, the successive loops appearing alternately at opposite sides of the fabric. Each warp strand or thread D is, moreover, carried beneath the weft-strands E E at both sides of 75 said loops $d d$ and engage with one of the weft-strands E at points between said loops $d d$, as indicated at d' . The eight warp-strands D D are, moreover, shown as arranged in four pairs, the threads constituting each pair being adjacent to each other and oppo- 80 sitely disposed in the fabric. The sectional view, Fig. 3, shows diagrammatically in side view the four pairs of warp-strands, being differently shaded to more clearly show their courses through the fabric. The weft-hold- 85 ing loops $d d'$ are arranged in laterally and longitudinally progressive order, so that on the surface of the fabric strip said loops $d d'$ appear in oblique or inclined groups, the individual loops of each group being engaged 90 in succession with four weft-strands E of the outer plies, as clearly seen in the lower part of Fig. 2. Each weft-strand E of both outer plies is thus held or confined against the mid- 95 dle ply by a single loop d or d' of one of the warp-threads D D, and as said warp-threads D D are closely spaced laterally each of the said weft-strands E is secured at a point very near its middle to the core formed by the several warp-threads. The weft-strands C 100 and E are, moreover, preferably each made up or formed by a number of strands or threads of yarn or other suitable filling, this construction giving desired size or body to the weft-strands. 105

The oblique or progressive arrangement of the loops $d d'$ of the warp-threads D D not only tends to produce a uniform radial disposition of the end portions of the weft-strands, but also results in the strip cut from the fab- 110 ric-web assuming a spiral or twisted condition, as shown at A⁴, Fig. 1, such spirality serving to give a more uniform cylindric appearance to the surface of the pile fabric in the finished rope or strand. 115

By reason of the fact that the surface weft or filling strands of the outer piles are each caught by one only of the warp-threads of each group as the filling is thrown through the shed the filling-strands are held at their 120 centers by single loops of the warp-threads and their ends tend to come together and to assume radial positions at one side of the flat fabric constituting the middle ply. It is of course to be understood that the ends of the 125 weft-strands C of said middle ply also constitute part of the external surface of the cylindric pile fabric. Said filling-threads, moreover, tend to adjust themselves uniformly about the core and produce a rounded com- 130

5 pact rope or strand, the groups or bunches of weft or filling threads being so closely held or confined by the loops of the warp-strands engaging them that their free outer ends when expanded meet to form a continuous exterior surface on the strand resembling the surface of a velvet or pile fabric.

We claim as our invention—

10 1. A pile-fabric strand or rope consisting of a middle ply and two outer plies, the middle ply consisting of weft-strands and two separated sets of warp-strands interwoven therewith, and the outer plies consisting of weft-strands and a set of warp-threads inter-
15 woven with the weft-strands of the middle ply between the warp-threads of the latter, and with said weft-strands of the outer ply.

20 2. A pile-fabric strand or rope consisting of a middle ply and two outer plies, the middle ply consisting of weft-strands and warp-strands interwoven therewith, and the outer plies consisting of weft-strands and warp-threads interwoven with the weft-strands of the middle ply, and with said weft-strands of
25 the outer ply, each of said weft-strands of the

outer plies being engaged at a point between its ends by a single loop only of one of the warp-threads.

3. A pile-fabric strand or rope consisting of a middle ply and two outer plies, the middle ply consisting of weft-strands and warp-threads interwoven therewith, and the outer plies consisting of weft-strands and warp-threads interwoven with the weft-strands of the middle ply, and with said weft-strands of
35 the outer plies, each of said weft-strands of the outer plies being engaged by a single loop only of one of the warp-strands and the loops of said warp-threads which engage said weft-strands of the outer plies being arranged ob-
40 liquely in uniformly-spaced groups.

In testimony that we claim the foregoing as our invention we affix our signatures, in presence of two witnesses, this 11th day of July, A. D. 1904.

AUGUST E. NEFF.

CARL G. BOLDENWECK.

Witnesses:

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