(Specimens.)

# A. C. WOODWARD.

## ELASTIC FABRIC.

No. 419,395. Patented Jan. 14, 1890.

FIG 1

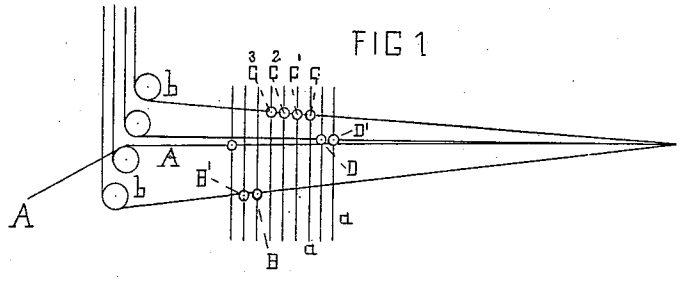


FIG 2

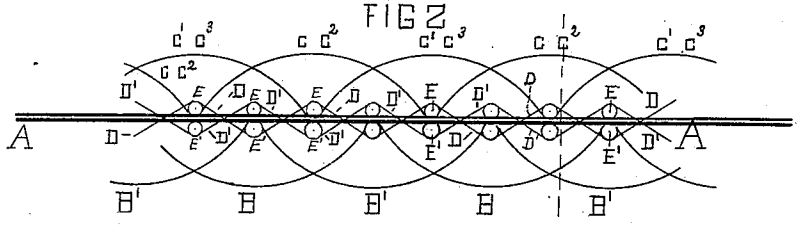


FIG 3

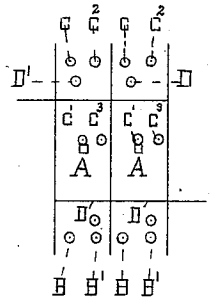


FIG 4

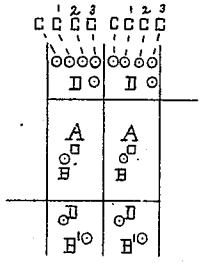


FIG 5

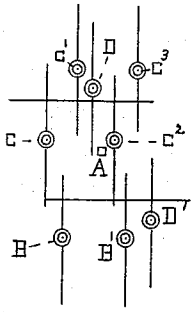
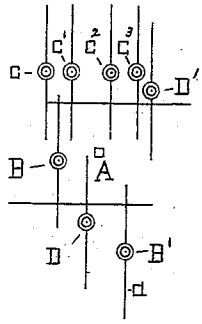


FIG 6



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# UNITED STATES PATENT OFFICE.

ALBERT C. WOODWARD, OF CAMDEN, NEW JERSEY.

## ELASTIC FABRIC.

SPECIFICATION forming part of Letters Patent No. 419,395, dated January 14, 1890.

Application filed July 2, 1888. Serial No. 278,878. (Specimens.)

*To all whom it may concern:*

Be it known that I, ALBERT C. WOODWARD, a citizen of the United States, residing at Camden, in the county of Camden and State of New Jersey, have invented an Improvement in Elastic Fabrics, of which the following is a specification.

My invention consists in a woven elastic fabric embodying in its structure a face-cloth, a back cloth, and an intervening rubber cloth, all bound together in the operation of weaving and composed of face-warps, back warps, binder-warps, rubber warps, and upper and lower wefts. The wefts appear in the fabric in pairs, one weft of each pair lying above the rubber warps and the other below such warps. There are also two binder-warps, which respectively pass above and below the face and back wefts and between successive pairs of wefts cross to opposite sides of the rubber warps alternately. The face and back warps, respectively, are bound by alternate face and back wefts to form the face and back cloths, and are each divided into portions, one portion of each being bound by the first face or back weft, as the case may be, and another portion being bound by the third face or back weft. These wefts on face and back in turn are bound to the rubber warps by one of the binders, while the remaining wefts, which do not serve to secure the face and back warps, are bound to the upper and lower sides alternately of the rubber threads by the other binder. The rubber cloth therefore consists of the rubber warp-threads, the binder-warps, and the upper and lower wefts, although one of the binders and one of the wefts assist in the formation of both the face and the back cloths. It will be seen that the face-cloth, back cloth, and intermediate rubber cloth all unite in one homogeneous fabric.

In the accompanying drawings, Figure 1 is a diagram illustrative of the arrangement of warps, heddles, and guide-rods for the warps adopted in weaving my fabric. Fig. 2 is a view of the fabric in longitudinal section with the threads separated to show the structure more clearly. Figs. 3 to 6 are diagrams illustrative of the steps in weaving.

In the drawings, A are the rubber warp-threads.

B B′ are the back warp-threads.

C C′ $C^2$ $C^3$ are the face warp-threads.

D D′ are the binder warp-threads.

E E′ are the face and back weft-threads.

The diagrams shown in Figs. 3 to 6 illustrate the manner of weaving the fabric in a double-shuttle loom. It will be obvious, however, that the fabric may, if desired, be woven in a single-shuttle loom, and I have so produced the same in actual practice. The changes in the mode of weaving necessary in this latter case will be apparent to any practical weaver. When weaving in the double-shuttle loom, it is in general unnecessary to raise or lower the rubber warps from their intermediate position. For the first pick at the left of the dotted line in Fig. 2 (shown in Fig. 3) the face-warps C $C^2$ and binder D are raised to the highest position, face-warps C′ $C^3$ are moved to the middle position, and the binder D′ and back warps B B′ are all depressed to the lowest position. For the second pick (shown in Fig. 4) all the face-warps and binder D′ are raised into the highest position, back warp B is raised into the middle position, and binder D and back warp B′ are depressed into the lowest position. For the third pick (shown in Fig. 5) face-warps C $C^2$ are depressed into the middle position, binder D′ is depressed into the lowest position and binder D is raised into the highest position, and back warps B B′ are both depressed into the lowest position. For the fourth pick (shown in Fig. 6) all the face-warps and binder D′ are raised to the highest position, binder D is depressed into the lowest position, and back warp B is raised into the middle position. It will be seen that only the alternate face-wefts E bind down face-warps and that of these alternate face-wefts the first, third, &c., thereof bind down the portion C′ $C^3$ of said face-warps, and the second, fourth, &c., bind down the portion C $C^2$ of said face-warps. Similarly the back warps are bound by alternate back wefts, the first, third, &c., of such alternate wefts binding back warp B′, while the second, fourth, &c., thereof bind back warp B. Those face and back wefts which bind face and back warps are all in turn bound by one and the same binder-warp D, the remaining binder D′ simply binding the remaining face and back wefts against the rubber warps. The said binder D′, through

not having either face-cloth or back-cloth to bind, is buried between the face and back cloths in the middle of the web, this resulting in giving a superior face to the fabric, for such binder cannot be seen through either face or back threads. In the ordinary double-shuttle web there is a face-thread down every pick; but in a fabric constructed as herein described all the face or back warps are up or down at one pick, while at the next pick one half of each is up and the other half down.

I claim—

The herein-described elastic fabric, composed of a face-cloth, back cloth, and intermediate rubber cloth, and having face-warps, back warps, binder-warps, rubber warps, and face and back wefts, alternate wefts of each of the series of face and back wefts being bound to the rubber warps by one of the binder-warps, the other wefts being bound by the remaining binder and serving also to bind the face-warps and back warps, the said warps being each divided into groups, which groups are in succession bound by the last-mentioned wefts, substantially as described.

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