

No. 712,987.

Patented Nov. 4, 1902.

S. W. WARDWELL.
PROCESS OF DYEING ENVELOPED YARNS.

(Application filed Mar. 20, 1902.)

(No Model.)

2 Sheets—Sheet 1.

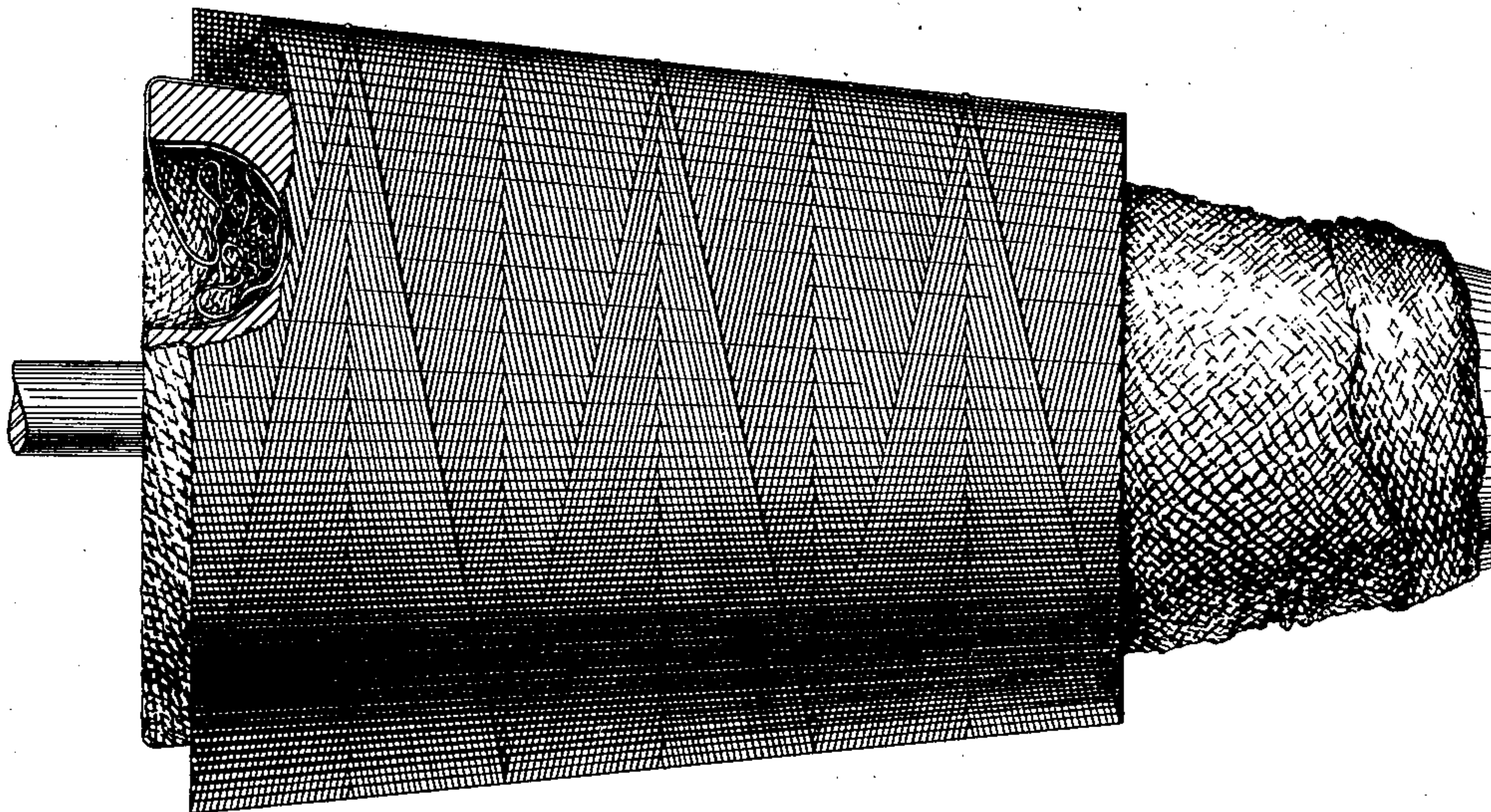


Fig. 1.

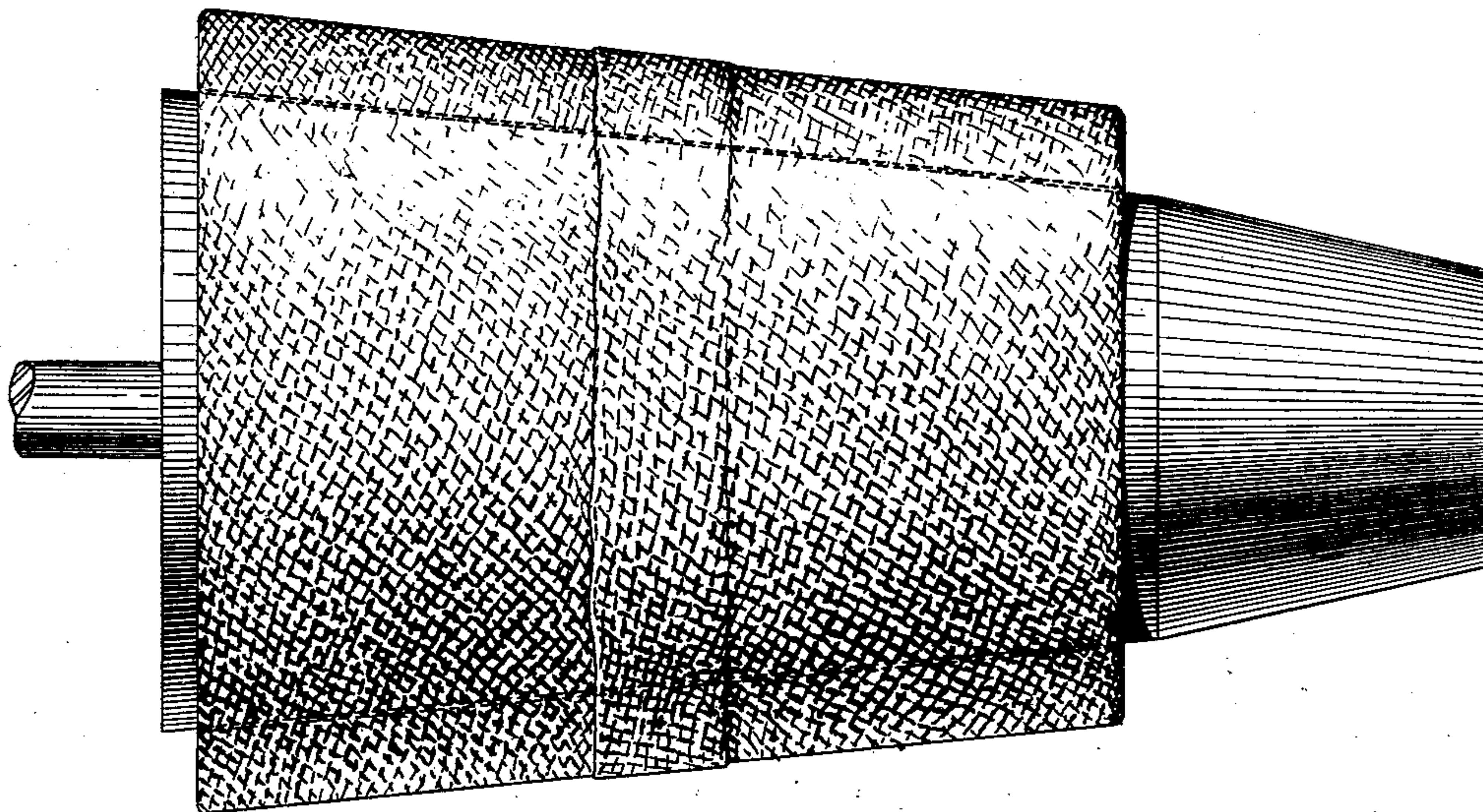


Fig. 2.

WITNESSES

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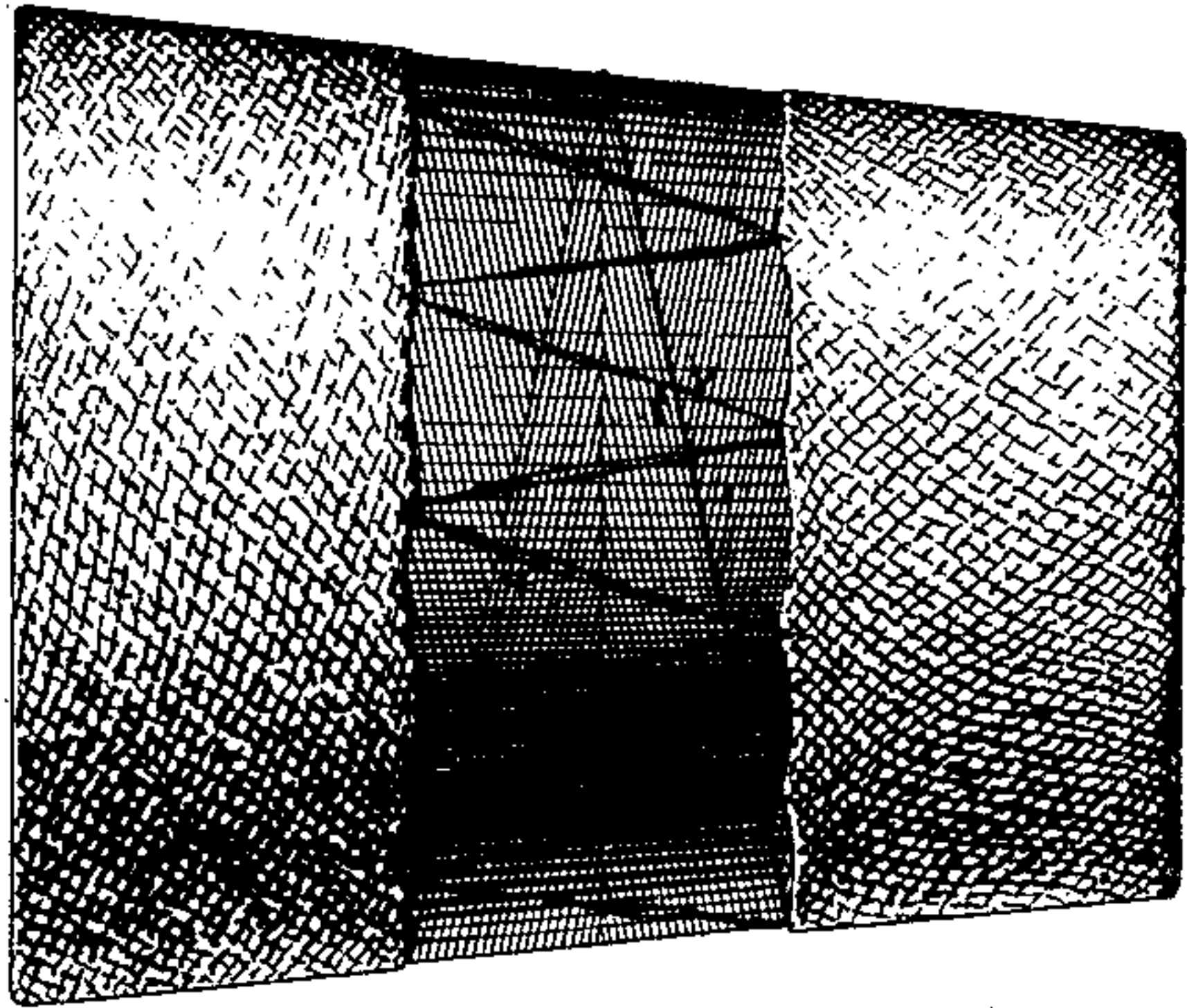


Fig. 3.

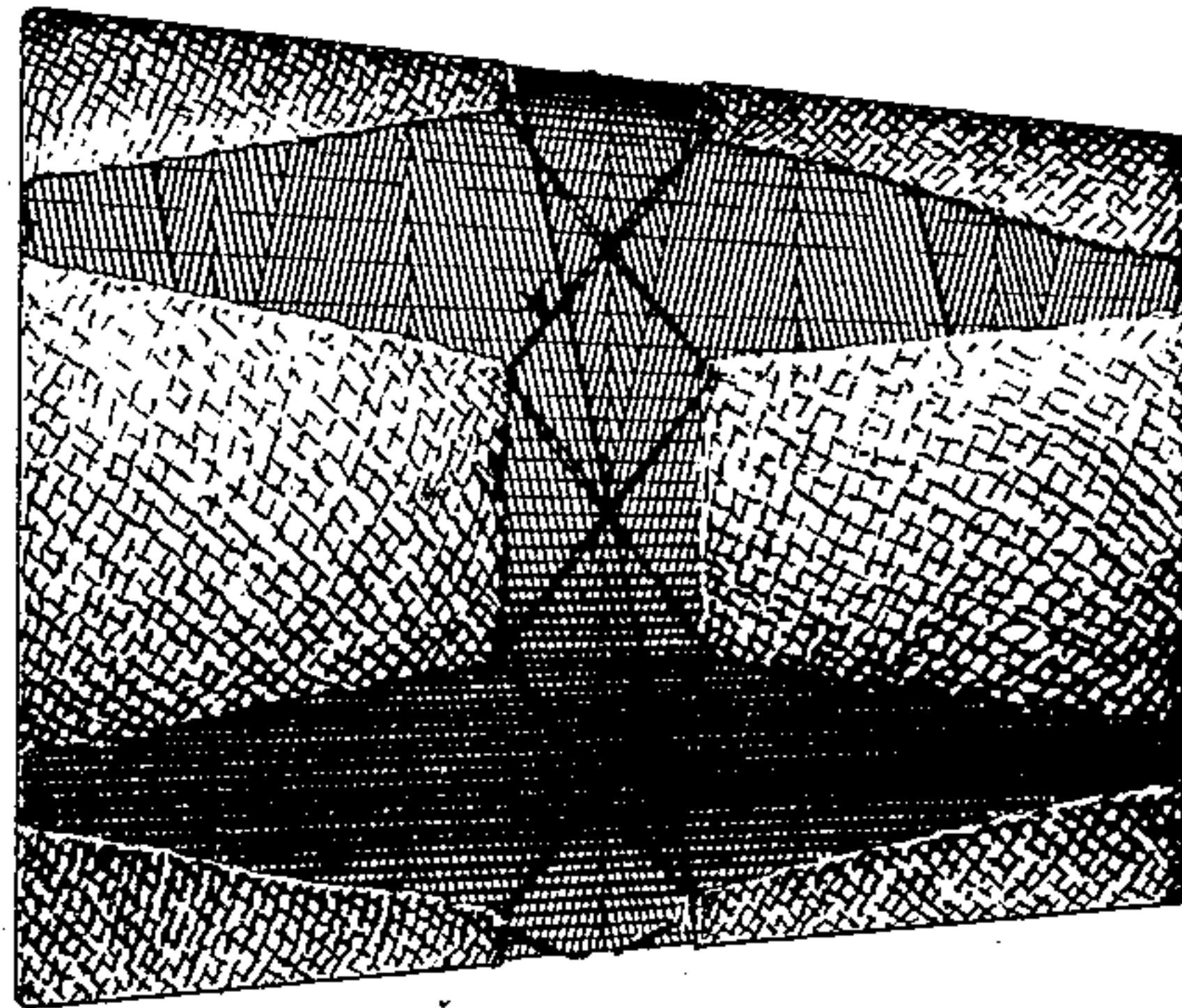


Fig. 4.

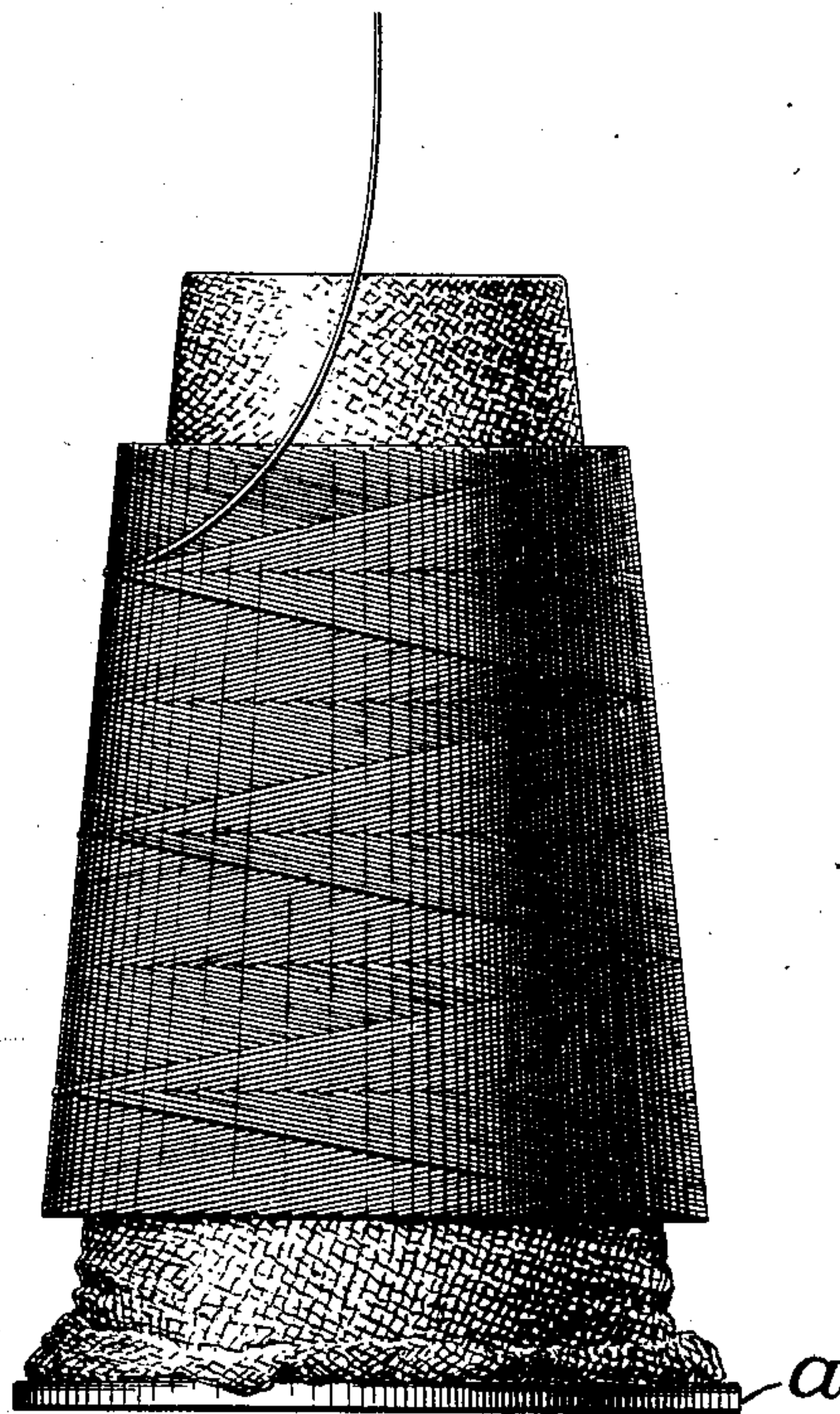


Fig. 5.

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UNITED STATES PATENT OFFICE.

SIMON W. WARDWELL, OF PROVIDENCE, RHODE ISLAND.

PROCESS OF DYEING ENVELOPED YARNS.

SPECIFICATION forming part of Letters Patent No. 712,987, dated November 4, 1902.

Application filed March 20, 1902. Serial No. 99,095. (No specimens.)

To all whom it may concern:

Be it known that I, SIMON W. WARDWELL, residing at Providence, in the county of Providence and State of Rhode Island, have invented a new and useful Improvement in the Art of Dyeing or Similarly Treating Yarn, Cord, Thread, &c., of which the following is a specification.

My invention relates to the art of dyeing yarn, thread, cord, &c., and has for its object to subject to the effective operation of the dyeing and other liquors every portion of a bundle or package of such material, hereinafter termed "yarn," but including all materials; and to this end I lay the yarn in coils to form a cop or package and secure the same in a holder and then subject the mass of material to the action of the liquor or liquors and thereafter remove the holder, as fully set forth hereinafter.

The drawings illustrate means whereby the coils of yarn may be properly secured to retain their position while in the liquor.

In said drawings, Figure 1 is a side view, in part section, showing a conical cop of yarn in position upon a holder supported upon a mandrel. Fig. 2 shows the cop enveloped in the holder. Fig. 3 illustrates a different means of securing the holder on the cop; Fig. 4, a different form of holder. Fig. 5 illustrates one manner of removing the yarn after dyeing.

The yarn is formed into a cop or package by winding it in coils one upon another in such manner that it will form a hollow package, self-supporting when on a mandrel and having no tendency to disintegrate or for the coils to become entangled even when not so supported. One means of forming a self-supporting cop is that set forth in Letters Patent No. 480,158, issued to me August 2, 1892; but I do not limit myself to this method of forming the cop or package. Whatever the manner of laying the yarn may be the cop is hollow, so that a suitable holder may extend through the same, across the ends, and over the outside of the cop, to thereby preserve the hollow form and general dimensions of the package and maintain the relation in which the coils are laid.

The "holder" is so termed because it thus holds the coils of the package in their desired

relation, and may consist of any suitable reticulated material—as, for instance, a sleeve of knit fabric longer than the cop and extending through the opening in the same. A preferable means of inserting the sleeve in the cop is to wind the yarn on the sleeve, which in the first instance is placed on the mandrel, so that the coils may be laid on it to build up the cop. After the cop and sleeve are thus arranged the ends of the sleeve are drawn across the ends of the cop and laid over onto the outside and secured by bringing them together, as in Fig. 2, or by lacing or tying threads, as in Figs. 3 and 4, thus forming the holder, whereby the coils are held in proper relation even if the mandrel is not within the opening of the package. Having thus disposed the thread in a hollow package and retained the coils in place, the package may be removed from the winding-spindle without damage to its ends and can then be introduced directly to the bath or subjected to the gas, as required in the desired treatment. The liquor or gas easily passes into the hollow package and circulates through the holder and through the comparatively thin walls of the tubular mass of yarn, and any shrinkage of the yarn occurring simply contracts the holder without binding the layers of yarn thereon or materially compacting the package. To facilitate the passage of liquor, the coils may be slightly separated, and in the special mode of winding illustrated the coils of yarn crossing and recrossing each other regularly between the ends of the package form each layer in a kind of network, and the combination of these layers forms a package with myriad pores, substantially uniform in size and relation, through which the dye fluid may penetrate freely and uniformly. The regular crossing of the yarns imparts stability to the package, and the abrupt reversal of each coil at the end of the package prevents the coils from falling over the end in handling or from other causes.

It is not required that the packages retain absolutely their cylindrical or conical form for and during their subjection to the permeating liquor. Therefore stiffening or sizing of the holder is unnecessary, and I have fully determined by experiment that after the holder has been folded over the ends of the

cop the latter may be flattened out and subjected to considerable rough handling without disarrangement of the general relation of the coils or injury to the yarn.

5 After the yarn has been finished and dried the holder may be placed on a mandrel or other suitable support, with the ends of the holder so disposed as to be out of the way in unwinding. As shown in Fig. 5, a hollow
10 support α is used, and the smaller end of the holder is tucked into the end of the support α , and the larger end is allowed to hang down loosely over the base of the support. The yarn, owing to the fact that the relation of
15 the coils has not been disturbed, is now free to be delivered by unwinding over the end to any appropriate machine in any process.

Heretofore the only practical method of dyeing and similarly treating yarns has been
20 to treat it in skeins. This method involves several distinct winding operations, all of which are slow and costly. Prior to dyeing the yarn must be reeled into skein form. Before the skeins are removed from the reels leases must
25 be tied in at various points to maintain the yarn in position in the skein and secure and locate the leading end. In the process of dyeing the yarn becomes more or less tangled between the leases, which are so few in number
30 and so far separated as to be inadequate to prevent entanglement of the yarns. In some processes the yarn is wound directly from the skein to the quill or bobbin which is to be employed in subsequent operations. This operation is a particularly slow one. Before the
35 skeins can be unwound they must be straightened and the yarns freed, performed by throwing one end of the skein over a pole or hook and pulling or jerking the other end sharply while shifting the skein about its support.
40 The skein is then placed upon the swift—a form of reel employed to support the skein during the unwinding—and again straightened in place, the leases cut, and the leading ends secured. The winding can be done only
45 at very low speed, for no matter how delicately hung and well balanced the swift its mass is so great that it cannot be started to rotate quickly and suddenly, and so great are

the difficulties of winding fine yarns from the skein that manufacturers have dyed the raw material before carding and spinning, thus obtaining their fine colored yarns direct from the spinning machinery. The disadvantages
55 of this method are obvious. Besides the additional expense attending this method of handling the exact character of the yarn and the purpose for which it is to be used must be determined prior to its manufacture. By the method of preparing and treating the
60 packages above set forth all these objections are fully overcome.

Without limiting myself to any special mode of laying the coils in the package, I claim—

1. The improvement in the art of dyeing
65 yarns consisting in inclosing hollow packages of yarn in reticulated holders extending through, across the ends and over the outside of the packages and in subjecting the packages thus secured to the action of the dyeing
70 liquors, and thereafter drying the packages and removing the holders, substantially as set forth.

2. The improvement in the art of dyeing
75 yarns consisting in inclosing hollow self-supporting packages of yarn in reticulated holders extending through, across the ends and over the outside of the packages and in subjecting the packages thus secured to the action of the dyeing liquors, and thereafter dry-
80 ing the packages and removing the holders, substantially as set forth.

3. The within-described improvement in the art of dyeing yarns, the same consisting in forming the yarn into a hollow package en-
85 veloping the package in a holder of open fabric extending through, across the ends and over the outside of the package, and then subjecting the enveloped package to the action of the dyeing liquors, substantially as
90 set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

SIMON W. WARDWELL.

Witnesses:

ARTHUR A. ARMINGTON,
JOSHUA B. HALE.