Nov. 21, 1944. S. W. ALDERFER 2,363,457

PROCESS OF MAKING THREAD

Filed May 1, 1942

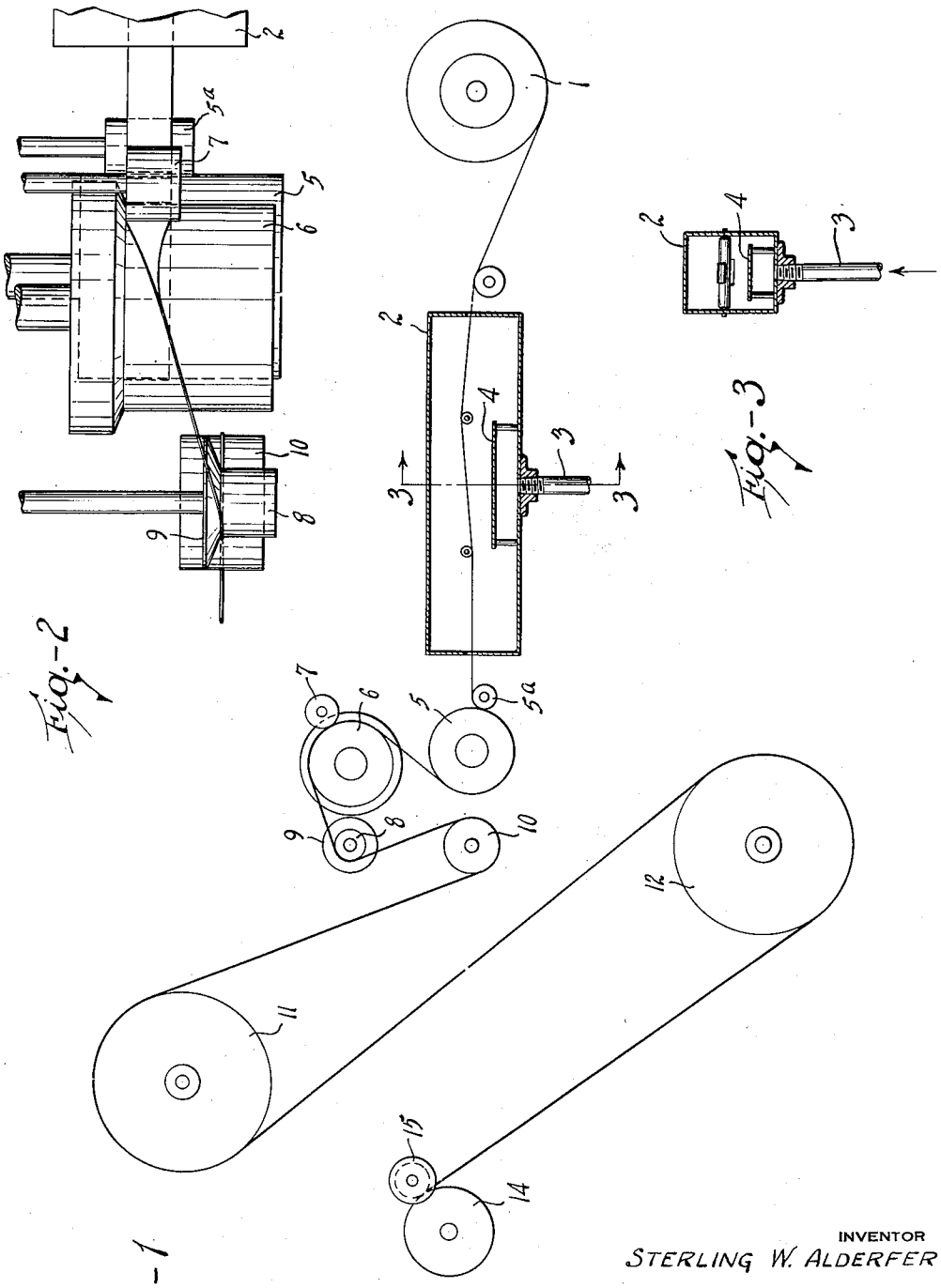

Fig. - 2

Fig. - 3

Fig. - 1

INVENTOR
STERLING W. ALDERFER

BY Clyde Frye

ATTORNEYS

Patented Nov. 21, 1944 2,363,457

UNITED STATES PATENT OFFICE

2,363,457

PROCESS OF MAKING THREAD

Sterling W. Alderfer, Akron, Ohio, assignor of one-half to Edward D. Andrews, Akron, Ohio

Application May 1, 1942, Serial No. 441,413

5 Claims. (Cl. 28—76)

The present invention relates to a process of making an elastic thread from non-rubber materials, such as polyvinyl alcohol, which will be similar in elastic properties to the usual rubber thread made from latex or cut rubber and may be used in place thereof.

In the drawing there is shown in diagrammatic form, a simple type of apparatus which may be employed to carry out the process, it being understood that the mechanism shown is only one of the several types which may be employed to secure a thread of the desired properties.

In the drawing:

Fig. 1 is a side elevation of a unit for the manufacture of elastic thread by the process described;

Fig. 2 is a plan view of the rolling elements; and

Fig. 3 is a cross-section on the line 3—3 of Fig. 1, showing the means for preparing the material while in tape form for the rolling operation.

The material which is employed in making the elastic thread is polyvinyl alcohol in tape or ribbon form with which is compounded a certain percentage of plasticizer. For the purposes of the present invention, glycerol is used as the plasticizer and preferably in the proportion of 50% glycerol and 50% polyvinyl alcohol. This proportion of the ingredients gives a thread of excellent elastic qualities which may be used in place of the ordinary elastic thread for all of its known uses, but the relative proportions of polyvinyl alcohol and plasticizer may be varied and other plasticizers may be used if the results are found to be satisfactory. The thread is particularly suitable for manufacture of elastic garments, elastic tape and all forms of elastic fabrics. For use in many of these articles named, the thread should be covered with silk, cotton or other suitable covering.

In the operations as shown in the drawing, preformed tape in roll form is employed, but it is obvious that a tape making unit may be set up at the same point, in which case the tape will be rolled immediately after it is formed.

The method consists in treating the tape of the type described with sufficient moisture vapor so that its surface becomes sticky or stacky and then rolling the tape upon itself so that the sticky or tacky surfaces of the tape will adhere in the convolutions and a permanent thread-like product will be obtained. The tape should preferably be stretched and heated just after the vapor treatment and prior to rolling, and the rolling operation should take place while the tape is under tension.

In the drawing, 1 represents the supply of tape of the type described, which is led to a chamber or housing 2 in which the tape is treated to render its surface adhesive and tacky. A water bath is not suitable for this purpose as water will swell and dissolve the material. It has been found that by subjecting the tape to an atmosphere of steam for a short period, sufficient moisture will be supplied so that the requisite tackiness will be imparted to the material.

A steam pipe 3 leads to the box and discharges beneath a baffle plate 4 beneath the moving tape, which creates a warm, humid atmosphere ideal for the purpose.

The tape with the warm, sticky surfaces now passes over two rolls 5 and 6 which are driven at increasing surface speeds so that the tape is given the preliminary stretch. A spring pressed roll 5^a holds the tape against the face of the roll 5 and prevents the stretch from extending back of this point. A light, fabric covered roll 7, held by yielding pressure against the roll 6, may be employed to hold the tape in contact with the surface of the roll 6 and serves to prevent the tape from rolling upon itself back of this point. If the roll 6 is driven at four times the peripheral speed of the roll 5, excellent results are secured and the final thread will have elongation with quick recovery up to 150% of its normal length. The roll 5 should, for best results, be heated slightly and the roll 6 should be quite warm (about 200° F.). This heating apparently conditions the surface of the tape so that just sufficient tackiness remains to secure firm adhesion between the several convolutions of the finished thread.

The tape is warm and of the correct tackiness as it leaves the roll 6 and passes to a smaller roller 8 provided with the conical flange 9 set in such position that it will roll the tape from one edge into spiral convolutions to form a round thread. The number of convolutions will depend upon the width and thickness of the tape at the point of rolling and any desirable number of convolutions may be incorporated in the final thread. The several convolutions will adhere firmly together and when the thread is dried, the tape will not unroll and the convolutions are not visible to the naked eye.

From the roll 8 the thread in its completed form is passed over a series of rolls 10, 11 and 12 to a wind-up 14 where the completed thread is wound on a spool or bobbin 15. It is desirable to keep the completed thread under a mild tension until it is wound up, and during its passage from the roll 8 to the wind-up any moisture on the out-

side of the thread will be dissipated so that the turns of the completed thread do not adhere to one another on the spool or bobbin. The drying may be accelerated, if desired, by any suitable means.

While glycerol is preferred as the plasticizer, others may be employed. It will also be understood that if non-elastic thread of high tensile strength is desired, the glycerol or other plasticizer may be omitted; otherwise, the process is the same, except that in making non-elastic thread the tape is extended to approximately 6½ times its original length which orients the molecules and the thread loses its elastic properties. The appended claims are intended to cover this variation of the process.

Other changes and modifications may be adopted in carrying out the process as set forth and exact conformity with the detailed steps is not required to realize the benefits of the invention.

What is claimed is:

1. The process of making a thread comprising subjecting the surfaces of a tape made from a polyvinyl alcohol to a steam bath to render the surfaces of the tape tacky without causing the body of the tape to swell, heating and stretching the tape, and rolling the tape upon itself while its surfaces are in this condition from one edge so that the convolutions adhere to one another.

2. The process of making an elastic thread comprising subjecting the surfaces of a tape made from a polyvinyl alcohol and a plasticizer to a steam bath to create a tacky condition confined to the surfaces of the tape only, stretching and heating the tape, and while the surfaces of the tape are tacky rolling it from one edge upon itself to form a thread the convolutions of which adhere by the tacky surfaces.

3. The process of making an elastic thread comprising subjecting the surfaces of a tape made from a polyvinyl alcohol and glycerol to a steam bath to create a tacky condition confined to the surfaces of the tape only, stretching and heating the tape, and while the surfaces of the tape are tacky rolling it from one edge upon itself to form a thread the convolutions of which adhere by the tacky surfaces.

4. The process of making an elastic thread comprising subjecting the surfaces of a tape made from a polyvinyl alcohol and a plasticizer to a steam bath to create a tacky condition confined to the surfaces of the tape only, stretching and heating the tape, and while the tape is under tension and the surfaces of the tape are tacky rolling it from one edge upon itself to form a thread the convolutions of which adhere by the tacky surfaces.

5. The process of making an elastic thread comprising subjecting the surfaces of a tape made from a polyvinyl alcohol and glycerol to a steam bath to create a tacky condition confined to the surfaces of the tape only, stretching and heating the tape, and while the tape is under tension and the surfaces of the tape are tacky rolling it from one edge upon itself to form a thread the convolutions of which adhere by the tacky surfaces.

STERLING W. ALDERFER.