Apparatus for Heat Treating Plastic Belts

The problem:
Minimum-weight transmission belts of the utmost reliability and stability are needed in many applications. Such belts are made of polyester and require elaborate heat treatment. The heat treatment apparatus must be capable of simultaneously rotating and stretching/shrinking the belts while in a heated oven. Belts having a wide range of dimensions must be accommodated.

The solution:
An apparatus to perform the programmed rotating, stretching/shrinking and heat treatment necessary to the fabrication of high-performance plastic belts has been developed.

How it's done:
The apparatus is shown in Figure 1. In operation it is enclosed in a modified, temperature-controlled oven as in Figure 2. A belt to be heat treated is loosely looped over two, three, or four mandrels, depending on its length (see Figure 1). The distance between mandrels is then increased just to the point that when they are rotating the belt also rotates. The distance between mandrels, their rate of rotation, and the oven temperature are then established and adjusted through a series of timed steps according to an established procedure.

A motor, operating through a rotating linkage and gear train, is used to adjust the distances between the four mandrels. A dial indicator suffices to determine

Figure 1. Heat Treatment Equipment and Controls

(continued overleaf)
the precise distances between them. A second
speed-controlled motor, also operating through a
rotating linkage and gear train, rotates the mandrels
at a uniform rate. The mandrels are crowned, like
conventional pulleys, so that a rotating belt rides at
their centers. The mandrels can rotate at from less
than 1 rpm to 75 rpm.
   Belts varying in length from 7 to 48 in. (18 to 122
cm), in widths up to 1 in. (2.5 cm), and in thicknesses
up to approximately 0.003 in. (0.008 cm) can be
treated. The shortest belts are placed around only two
mandrels, the longest around all four. The modified
oven (Figure 2) has a 2400-W supplementary heater
and is able to maintain an environment at a
temperature greater than 190° C. It can be held at any
desired temperature in its range ±1° C.

Note:
Requests for further information may be directed
to:
   Technology Utilization Officer
   NASA Pasadena Office
   4800 Oak Grove Drive
   Pasadena, California 91103
   Reference: TSP74-10299

Patent status:
This invention has been patented by NASA (U.S.
Patent No. 3,833,322). Inquiries concerning non-
exclusive or exclusive license for its commercial
development should be addressed to:
   Patent Counsel
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