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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

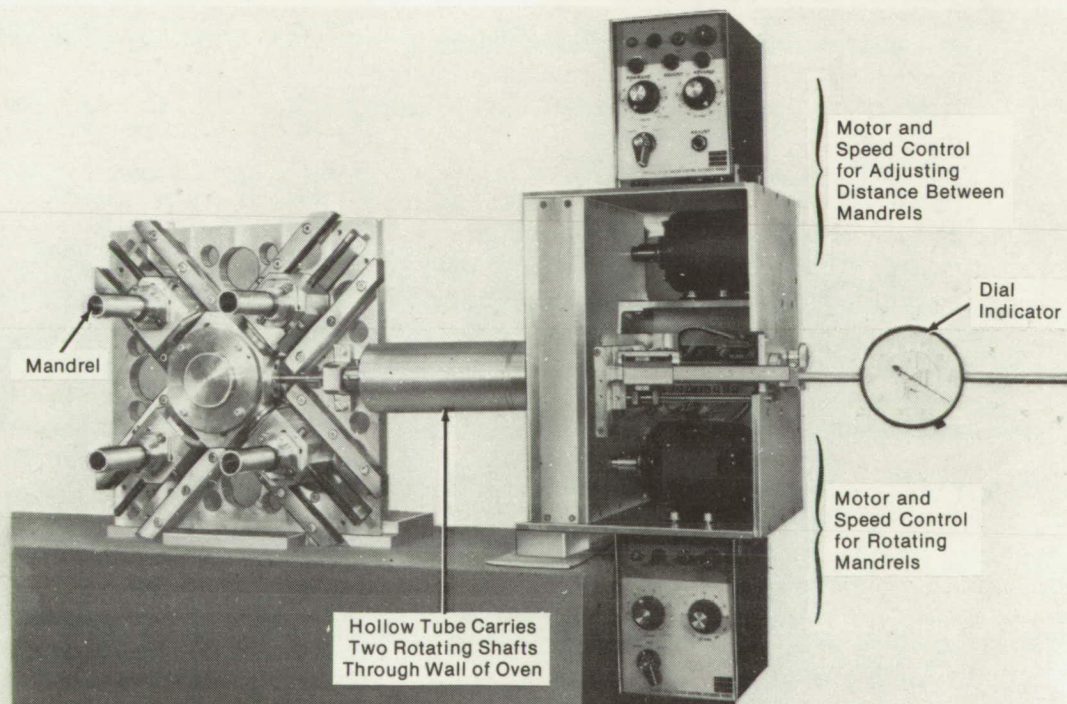


Figure 1. Heat Treatment Equipment and Controls

(continued overleaf)

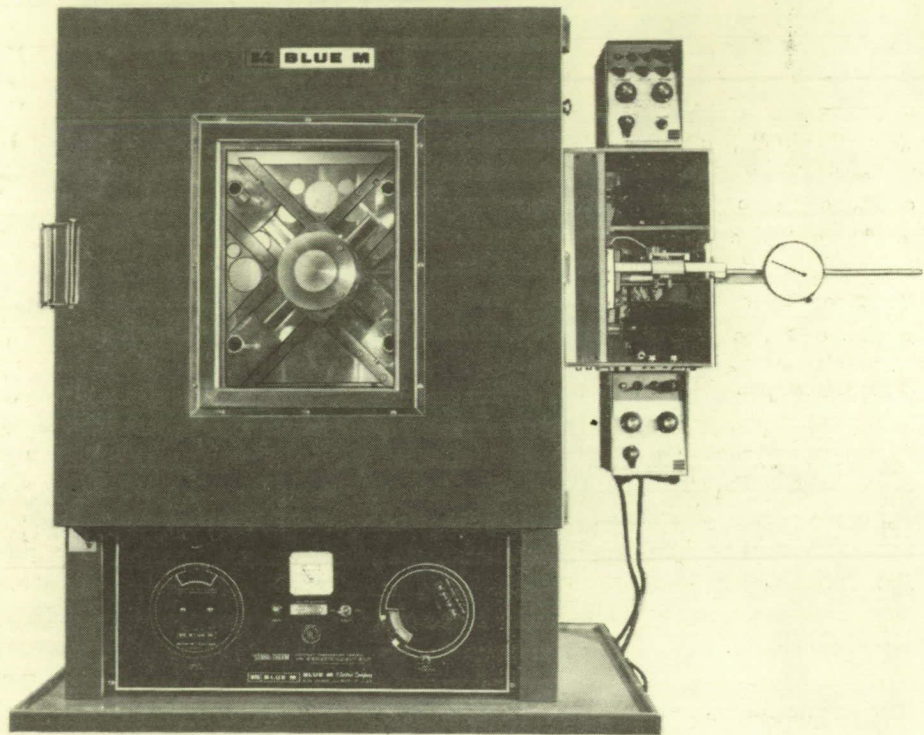


Figure 2. Heat Treatment Oven With Apparatus Installed

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 $\pm 1^\circ\text{C}$.

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:

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