

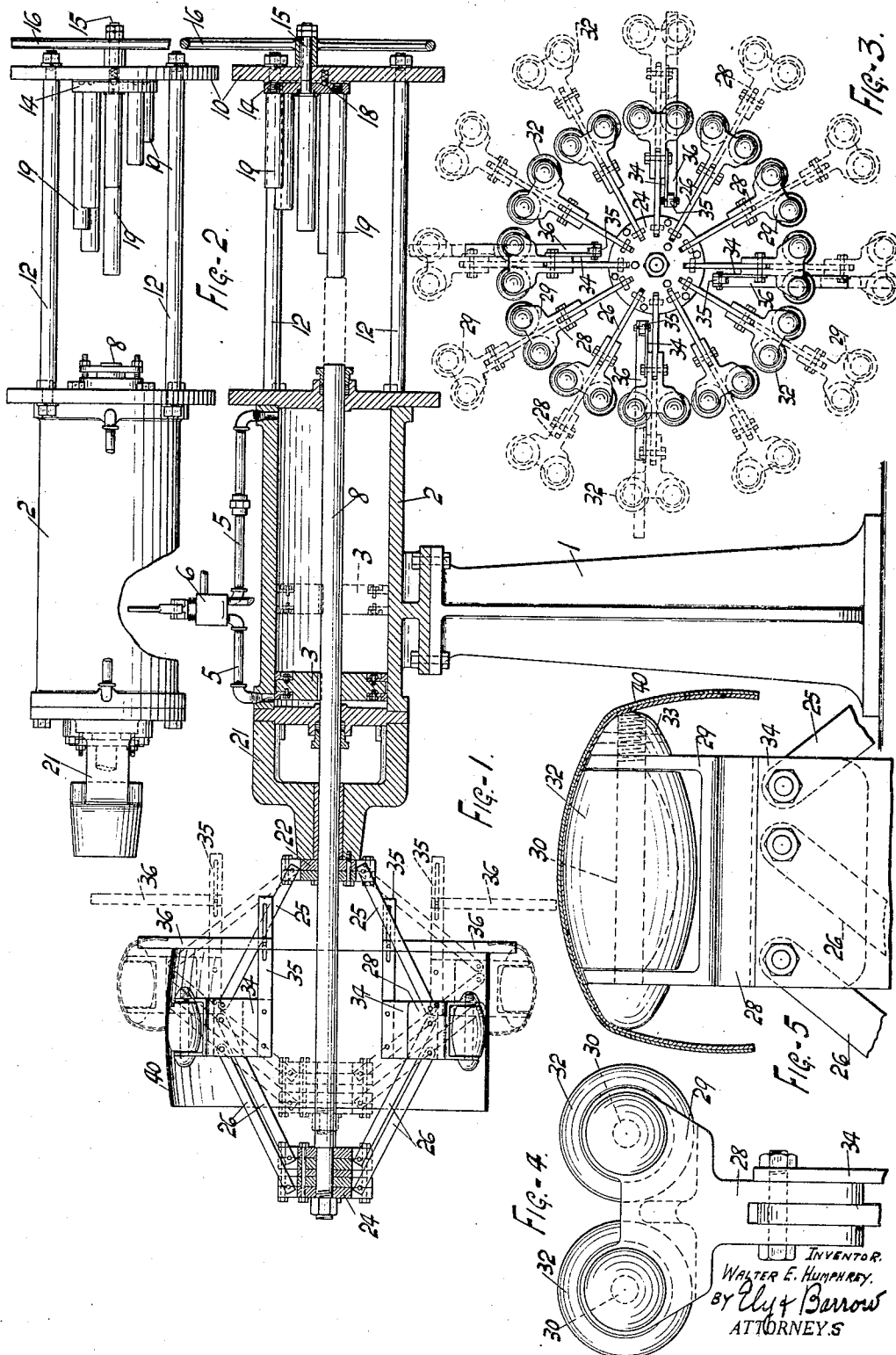
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BAND STRETCHING MACHINE

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BAND-STRETCHING MACHINE

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This invention relates to the manufacture of pneumatic tires, and particularly to the preparation of fabric bands for application to tire forms or cores. Band or ply stretching or expanding machines for the mechanical expansion and shaping of bands have usually comprised a series of shoes or segments which were carried by an expanding device which moved the shoes outwardly simultaneously after the band was applied. While the band would be expanded, the principal objection to this type of expander resided in the fact that the band would be over-stretched in the areas lying between the several shoes or segments of the expander, while that portion of the band lying over the shoes or segments would expand only slightly, if at all. As a result, the bands would be unevenly expanded, having areas of overexpanded fabric alternating with areas of unexpanded fabric.

The object of the present invention is to construct a band expander of the mechanical type in which the objectionable features described are eliminated and even expansion about the entire band is obtained.

While the invention is described with considerable detail in order that the features thereof may be understood, it will be appreciated that changes and modifications may be made without departing therefrom. The principles of the invention may be used in the expanding of tires made by the flat band or pulley method, or for the stretching of tread bands or bands made wholly of rubber, as well as in the preparation of bands for application to cores.

In the drawings, in which the preferred form of the invention is illustrated:

Figure 1 is a longitudinal section through the machine showing it in full lines in collapsed position and in dotted lines in expanded position;

Figure 2 is a plan of the rear or cylinder portion of the machine;

Figure 3 is an end elevation of the expanding unit; and

Figures 4 and 5 are side and front views of a unit of the expander.

The machine is supported upon a pedestal

or stand 1, to the upper end of which is bolted a horizontal cylinder 2 having piston 3 therein, the movement of which is controlled by the admission of pressure into the ends of the cylinder through piping 5 controlled by valve 6.

The piston rod 8 extends through stuffing boxes at either end of the cylinder and at the rear thereof is carried a backing plate 10 supported from the cylinder by a plurality of parallel rods 12. A small disk or plate 14 is mounted upon a shaft 15 located eccentrically of the plate 10 and provided with a hand wheel 16 by which it may be turned. A spring actuated ball detent 18 is arranged to yieldingly hold the disk in any one of several adjusted positions. Mounted about the periphery of the plate 14 are a plurality of pins 19 of varying lengths, which pins may be selectively brought into register with the piston rod 8 as desired, thus limiting the rearward movement of the piston and the maximum diameter of the expander.

On the front of the cylinder 2 is located a cross-head 21 in which the forward end of the piston rod is guided, and to the cross-head is secured a fixed collar 22. To the end of the piston is secured the double collar 24. To the collar 22 are pivoted a plurality of toggle links 25, and to the double collar 24 are pivoted a plurality of parallel or double toggle links 26. Each set of the links, including a link 25 and a pair of links 26, are pivoted at their outer ends to a cross-head or carrier 28, the outer end of which carries a yoke 29 in which are mounted two pins 30. On each of the pins 30 is mounted a freely rotatable roller 32. Preferably the rollers are bulb-shaped and the heads of the pins and the nuts 33 are rounded to conform to the outline of the rollers. The rollers may be of other shapes as found desirable.

It is desirable to provide centering devices, preferably adjustable, in connection with the expanders so as to properly locate and center the bands upon the expander. For this purpose, several of the carriers 28, usually four in number, are provided with extension plates 34 carrying laterally ex-

tending arms 35, the outer ends of which are slotted and to which are adjustably secured radial fingers 36 projecting outwardly beyond the perimeter of the expander and operating as a device by which the center line of the band may be brought into register with the center line of the expander.

In the operation of the device, the expander is contracted to the position shown in full lines in Figure 1 and the proper adjustment is made at the rear of the device so as to limit the outer movement of the shoes. The band 40 is then placed over the shoes and centered by the guides 36 and pressure admitted to the cylinders so that the piston is moved inwardly, forcing the shoes outwardly and simultaneously stretching the band to the position shown in dotted lines in Figure 1. The rollers upon the outer ends of the shoes, which contact with the fabric, permit the fabric in the band to move about its entire periphery so that the stretching action is not localized in those portions of the band lying between the shoes. In former constructions in which the shoes were in the forms of plates, little or no slippage was permitted over the surfaces of the shoes, the adhesion of the rubber to the shoes preventing such an adjustment of the fabric. In the present form of the invention, however, the rollers permit the fabric to shift properly so that the expansion is transmitted about the entire circumference of the band.

What is claimed is:

1. In an apparatus for mechanically expanding a continuous band, the combination of a plurality of carriers arranged in a circle, a support for said carriers, means to move the carriers radially of a central axis to expand the circle, said means operating through said support, and a roller mounted in each carrier, the several rollers supporting the band throughout its circumference.

2. In an apparatus for mechanically expanding a continuous band, the combination of a plurality of carriers arranged in a circle, means to move the carriers radially to expand the circle, a roller mounted in each carrier, the several rollers supporting the band throughout its circumference, and means mounted on the carriers to center the band with respect to the rollers.

3. In apparatus for expanding a continuous band of fabric, a plurality of pairs of levers, a roller supported between each pair of levers, one end of each pair of levers being pivotally connected to a fixed support, the other end of each pair being pivotally connected to a common member, and means for moving said member to radially move the rollers, said means extending and operating through the fixed support whereby one end of the apparatus is free from obstructions.

4. In apparatus for expanding a continuous band of fabric, a cylinder, a piston and

rod slidable therein, a plurality of links pivotally connected to the end of said piston rod, a plurality of links pivotally connected to said cylinder, a plurality of carriers pivotally connected between said links, rollers mounted on said carriers, and means to keep the axis of said rollers parallel with the piston rod.

5. In apparatus for expanding a continuous band of fabric, a cylinder, a piston and rod slidable therein, a plurality of links pivotally connected to the end of said piston rod, a plurality of links pivotally connected to said cylinder, a plurality of carriers pivotally connected between said links, rollers mounted on said carriers, and means to keep the axis of said rollers parallel with the piston rod, said means comprising an additional link pivotally connecting each carrier to the end of said piston rod.

6. In apparatus for expanding a continuous band of fabric, a cylinder, a piston and rod slidable therein, a plurality of links pivotally connected to the end of said piston rod, a plurality of links pivotally connected to said cylinder, a plurality of carriers pivotally connected between said links, rollers mounted on said carriers, and guide arms adjustably mounted on said carriers for centering a continuous band upon the rollers.

7. In apparatus for expanding a continuous band of fabric, a cylinder, a piston and rod slidable therein, a plurality of links pivotally connected to the end of said piston rod, a plurality of links pivotally connected to said cylinder, a plurality of carriers pivotally connected between said links, rollers mounted on said carriers, and means at the end of the cylinder opposite the links for controlling the expanding movement of the rollers, said means including rotatable means supporting a plurality of stops for limiting movement, any selected stop being adapted to engage with a rearward extension of the piston rod.

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