May 23, 1950 J. H. F. KENT 2,508,675

APPARATUS FOR REMOVING AIR BAGS FROM RETREADED TIRES

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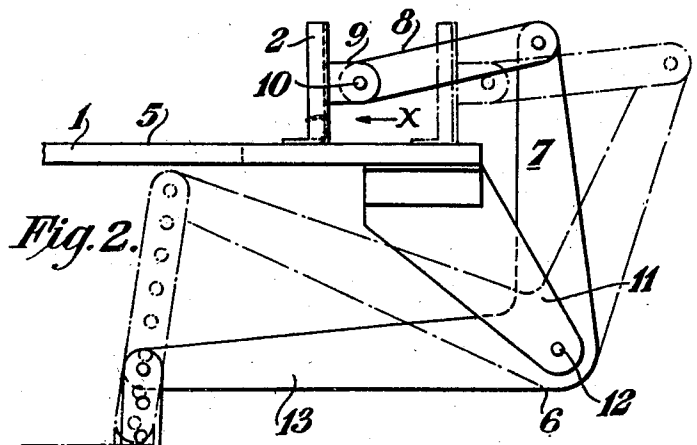


Fig. 2.

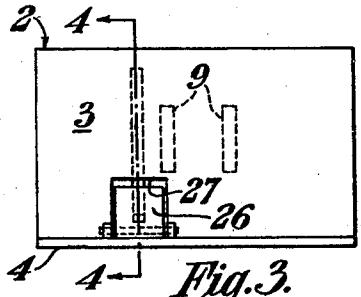


Fig. 3.

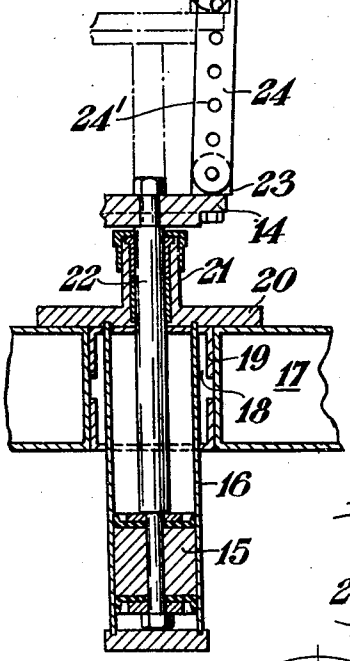


Fig. 4.

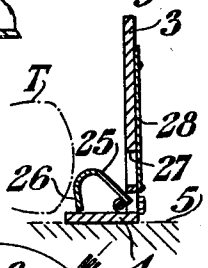
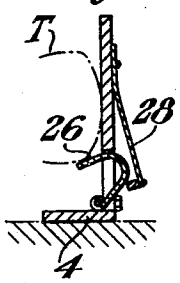


Fig. 5.



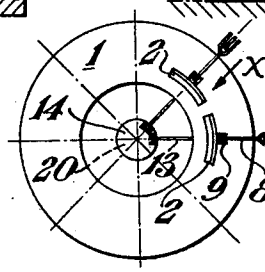


Fig. 1.

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APPARATUS FOR REMOVING AIR BAGS FROM RETREADED TIRES

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9 Claims. (Cl. 18—2)

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This invention relates to improvements in apparatus for handling tyre casings and more particularly in apparatus for removing cores or pressure bags from pneumatic tyre casings.

When retreading a tyre, it is necessary during the vulcanising operation to place inside the cover, what is known as a pressure bag in order to maintain the cover firmly pressed against the sides of the mould when undergoing vulcanization. The insertion and especially removal of the pressure bag, which consists of a rubber tube capable of inflation to certain pressure, is not an easy operation and requires a good deal of manipulation, frequently resulting in serious damage to the bag so as to render it incapable of further use.

This invention has for example a simple method and apparatus for manipulating the tyre cover so as to facilitate the withdrawal of the pressure bag from the tyre cover on completion of vulcanization, this operation being known in the trade as debagging.

According to this invention, when handling tyres as in a retreading operation, pressure is applied to the tyre cover simultaneously at several points spaced around the periphery or tread of the tyre, the result of which pressure, is to cause the walls of the tyre to spread so that the distance separating the beads is increased, thus facilitating removal or insertion of the pressure tube.

A device for applying pressure to the tyre in accordance with this invention may comprise a plurality of members arranged in a ring and capable of displacement radially in relation to a common centre by which pressure can be applied to the tyre when placed inside the ring.

In one construction the device comprises a table for supporting the tyre in a horizontal or flat position and slidably or otherwise movably mounted in relation to the table are a plurality of tyre engaging elements, lever mechanism being associated with the elements by which they can be moved radially into and out of engagement with a tyre when placed on the table so as to apply the necessary pressure. The elements which may consist of plates having a base portion may be directly mounted on the table.

The lever mechanism may consist of a series of bell crank levers fulcrumed about centres arranged on a circle below the level of the table and having one arm projecting above the plane of the table for connection to links, whose inner or free ends are fitted with tyre engaging plates. The plates which may be curved in section are preferably hingedly attached to the ends of the

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links in order to accommodate themselves to the tread of the tyre.

The other and lowermost arm of each bell crank lever is extended inwardly for connection to an actuator common to the several bell crank levers so that an upward or downward movement of the actuator will rock the bell crank levers about their fulcrums and so move the plates inwardly or outwardly. The actuator may be controlled by means of screw gear or for example a hydraulic ram.

The invention is illustrated in the accompanying drawings in which Fig. 1 is a diagrammatic plan view of a tyre expanding apparatus in accordance with one embodiment of the invention. Fig. 2 is a part sectional elevation of the apparatus of Fig. 1 on an enlarged scale showing the actuating mechanism therefor. Fig. 3 is a separate view in elevation of a tread or pressure applying member as embodied in the mechanism of Fig. 2. Figs. 4 and 5 are sectional views on the line 4—4 of Fig. 3 and showing a tyre lifting device respectively in its inoperative and operative positions.

Referring to the drawings the apparatus comprises a support in the form of a table 1 on which a tyre to be expanded or debagged is positioned prior to engagement by a plurality of tread engaging elements 2, which are movable radially in relation to the centre of table 1 to engage and apply pressure to the tread of the tyre sufficient to cause separation of the walls thereof.

As diagrammatically shown in Fig. 1, conveniently there are at least six pressure elements 2, eight being sufficient for normal sizes of tyre. Each element consists of an upstanding arcuate plate 3 having a base portion 4 slidable on the surface 5 of table 1, which for convenience in operation, is arranged to support the tyre in a horizontal position.

Each of the elements 2 is displaceable by linkage comprising a bell crank lever indicated generally at 6, one arm 7 of which, being the short arm, is connected through a link 8 to lugs 9 attached to the back of the arcuate plate 3 by means of a pivot pin 10. The pin 10 is removably fixed in position so that the elements 2 can if necessary be substituted for other of smaller or larger size as for example when a machine is converted from handling small to giant size tyres.

As shown in Fig. 2, attached to the perimeter of the table 5 on the underside thereof are a series of brackets 11, to which the bell crank levers 6 are pivoted at 12, the lowermost and longer arms 13 of said levers being extended inwardly to the

centre of table 5 for operation by an actuator 14 which may be power or hand-operated and is common to each of the elements 2.

It will be apparent that axial displacement of the actuator 14 will produce a corresponding radial displacement of the elements 2 over the surface 5 of the table.

In the embodiment illustrated the table 1 serves firstly to position the tyre in relation to the pressure applying elements 2 and secondly as a support and guide for the elements 2 in their radial movement when transferring pressure to the tyre.

It will be obvious that the annular form of the table 1 shown may be replaced by a support having radial arms to position and support the tyre, the bell cranks being mounted on a part of the machine frame. In another alternative the tyre may be supported by the elements 2 themselves by increasing the radial dimensions of the base portion 4.

In the construction shown the actuator is operated by a hydraulic ram having a piston 15 movable in a cylinder 16 supported by a part 17 of the machine framing. It will be noted that the framing 17 comprises a central opening 18 for insertion of a sleeve 19 supporting the cylinder 16 and attached to which is a thrust plate 20. Plate 20 is formed with an extension 21 providing a gland housing and a means of guiding a piston rod 22 connected at one end to the piston 15 of the ram and at its other end to the actuator 14. The actuator 14 consists of a plate having a number of lugs 23 to which are hingedly attached each of links 24 coupling the actuator 14 to the bell crank arms 13.

It will be obvious that on displacement of the piston 15 in 16, the piston rod 22 will be caused to move upwardly corresponding to the dotted line position shown in Fig. 2 where the bell crank 6 has pivoted about its hinge 12 with the tread plate 3 withdrawn towards the outer edge of table 5. In operation, therefore, a tyre to be debagged is placed on the table 1 when by admitting pressure to the upper side of piston 15, the latter will move downwardly to the position in which it is shown in Fig. 2, transmitting through rod 22 a downward pull on the arms 13, which in turn will be transferred into an inwardly directed and radially applied pressure as indicated by the arrows X in Figs. 1 and 2, causing the members 2 to move inwardly into engagement with the tread of the tyre on table 1 so reducing its diameter in the medial plane of the tyre. This reduction in diameter of the tread will cause the beads of the tyre to separate so that the pressure bag normally placed inside the tyre during the vulcanising operation can easily be withdrawn.

The apparatus according to a further feature of the invention incorporates means for producing a relative displacement between the tyre and its support prior to engagement of the tread elements with the tyre, the purpose being to provide sufficient clearance between the tyre and support for the wall of the tyre to expand.

As shown in Figs. 4 and 5 each of the tread engaging elements 2 is preferably fitted with a lifting device comprising a finger element 25 mounted to pivot about a horizontal axis on the base 4 of the arcuate plate. The finger 25 is preferably arch shaped as shown providing a tyre containing face 26, about which the tread section of the tyre will roll, when subjected to the levering action of finger 25 as it is forced backwardly against its pivot. An aperture is cut in wall 3 of the element 2 so as to permit displacement of the finger 25 to the position shown in Fig. 5 against pressure of a return spring 28 and where the further upward movement of the tyre, indicated at T, is arrested by coming into contact with the wall 3.

The purpose of the finger device 25 is to lift the tyre T from off the surface 5 of the table before it has made contact with the back wall 3 of the element 2. As already explained and as shown in Fig. 4 the finger 25 will first engage the tyre causing the same to lift without applying squeezing pressure at the tread until it is clear of the table and is in engagement with the arcuate face 3 as in Fig. 5: in this position continued movement of 3 will squeeze the tread, sufficient space being available between the tyre and the surface 5 to permit the lower bead to move downwards at the same time as the upper bead moves upwards as the tyre is compressed.

It will be obvious that by hingedly attaching the elements 2 to the thrust elements 8, the plates will automatically accommodate themselves to the tread of the tyre and for the same reason there may be provided a certain amount of play in the linkage connections in a plane parallel to the surface of the table for the same purpose. In order also to accommodate themselves to the tread of the tyre and in order to provide for the handling of varying sizes of tyres in the same apparatus the points of connection of the lever arms to the links may be adjustable. For this purpose the central links 24 may be provided with additional pivot holes 24'.

Movement of the elements 2 may be obtained in a number of ways and in place of lever mechanisms, it may be convenient to employ cam and roller mechanisms. Similarly we may substitute screw operating gear for displacing the actuator 14 upwardly and downwardly. Positive movement of the actuator may be unidirectional in a direction to compress the tyre, the inherent resiliency of the tyre being relied on to restore the parts to their open position with elements dispersed radially. Some form of quick release mechanism may be fitted which as applied to a hydraulically actuated ram may consist of a pressure release valve to release the fluid pressure behind the piston.

In certain cases it may be desirable to increase the amount of separation of the beads at a particular point of the tyre and for this purpose, one of the plates may be arranged to have a "lead" in relation to the others, so that in operation it receives a greater displacement than the remainder.

It will be understood that the apparatus of this invention is equally applicable to debagging new tyres after vulcanisation.

What I claim is:

1. In apparatus for handling tyres the combination of a support adapted to receive a tyre, a series of tread engaging elements freely slidable on the support so as to be capable of movement into and out of engagement with the tread of said tyre, a series of lever members fulcrumed at points spaced around the perimeter of the tyre, a common actuating means connected respectively to said lever members for rocking said lever members about their fulcrums, and links respectively connecting said lever members to the tread engaging elements.

2. In apparatus for handling tyres the combination of a support adapted to receive a tyre, a

series of tread engaging elements freely slidable on the support so as to be capable of movement into and out of engagement with the tread of said tyre, a series of two armed levers, means mounting said levers on the support at points circumferentially spaced in relation to the tyre, links respectively connecting one arm of each of said levers to a tread engaging element, and a single actuating means adjustably connected to the other arms of said levers.

3. In apparatus for handling tyres, the combination of a support for the tyre, a series of tread engaging elements including a base portion and an upstanding rim portion adapted for engagement with the tread of a tyre, said base portion being slidable on the support, a common actuating means and a series of two armed levers spaced circumferentially in relation to the tyre, one arm of each of said levers being adjustably connected to the rim portion of the tread engaging element and the other to the actuating means.

4. Apparatus for handling tyres, comprising a support for the tyre, a series of tread engaging elements slidable over the surface of said support so as to be capable of movement into and out of engagement with the tread of the tyre, other support means for the tyre positioned on the support for lifting the tyre bodily in relation thereto, and a common actuating means for bringing about a displacement of the tread engaging elements and of said other support means so that before the tread engaging elements contact the tread, said other support means becomes operative to hold the tyre spaced from its support.

5. In apparatus for handling tyres, the combination of a support adapted to receive a tyre, a series of tread engaging elements freely slidable on the support so as to be capable of movement into and out of engagement with the tread of the tyre, a series of two armed levers, means mounting said levers on said support at points circumferentially spaced in relation to the tyre, links respectively connecting one arm of each of said levers to a tread engaging element, a single actuating means adjustably connected to the other arms of said levers, and means operable by said actuating means for causing relative displacement between the tyre and said support

prior to the application of pressure on the tyre through said tread engaging elements so as to provide for freedom of movement of the tyre wall adjacent said support.

6. Apparatus as claimed in claim 5 in which the means for causing relative displacement between the tyre and the support comprises a plurality of members adapted to exert a prying action on the tyre.

7. Apparatus as claimed in claim 5 in which the means for causing relative displacement between the tyre and the support comprises a plurality of members respectively carried by the tread engaging elements and being adapted to exert a prying action on the tyre.

8. Apparatus as claimed in claim 5 in which the means for causing relative displacement between the tyre and the support comprises a plurality of finger pieces pivoted respectively to the tread engaging elements at the bases thereof and being swingable about their respective pivots to move the tyre away from said support before the tyre is engaged by said tread engaging elements.

9. In apparatus for handling tyres the combination of a support adapted to receive a tyre, a series of tread engaging elements guided by the support for movements towards and from the tyre for engagement with the tread of said tyre, a common actuating means, and mechanism positively connecting said elements to said actuating means, said mechanism including a series of brackets attached to said support, a series of short and long armed levers fulcrumed respectively on said brackets, links respectively connecting the short arms of said levers to the tread engaging elements, and means connecting the long arms of said levers to said actuating means.

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