Note: Within nine months from the publication of the mention of the grant of the European patent, any person may give notice to the European Patent Office of opposition to the European patent granted. Notice of opposition shall be filed in a written reasoned statement. It shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).
Description

[0001] This invention relates in a totally general sense to tyres without an inner tube and, more particularly, concerns a device for their inflation.

[0002] Said tyres without an inner tube, generally known as tubeless tyres, have their beads suitably dimensioned and shaped, with the corresponding wheel rims presenting matching bead retention flanges with which said beads must necessarily make tight contact to form the seal.

[0003] Various systems are known for inflating such tyres when locked on a usual tyre removal machine, which is generally provided with a unit for supporting and locking the wheel (wheel rim + tyre) in a bedded position, from example a self-centering unit.

[0004] A first known system disclosed in US 3,675,705, comprises a hollow annular body provided with a circumferential series of orifices and connected to a compressed air source, and combined with a flexible hose, also connected to said source, to be coupled to the tyre inflation valve.

[0005] To inflate the tyre with said first known system, the lower bead (i.e. that facing the self-centering unit) must firstly be brought into contact with the respective wheel rim flange, after which the upper bead must be inserted into the channel of the wheel rim, flush with its seat. Having done this the said hollow annular body is disposed above the gap between the tyre upper bead and the upper flange of the wheel rim, with the respective orifices orientated towards said gap; the flexible hose is connected to the inflation valve; and the two are fed with compressed air.

[0006] The simultaneous action of the two air flows creates a pressure pulse within the tyre, with the result that the upper bead is urged into its seat in the wheel rim, after which the tyre is inflated with the air fed through the inflation valve.

[0007] Said first known system has proved unsatisfactory because to operate on wheel rims of different nominal diameters correspondingly different hollow annular bodies are required, with all the ensuing problems.

[0008] In the second known system the jaws of the self-centering unit are provided with at least one through hole generally orientated towards its axis of rotation, and connected to a compressed air source via a valve.

[0009] In this case to inflate the tyre, the upper tyre bead must firstly be made to engage the respective wheel rim seat, then the lower side wall of the tyre has to be raised to suitably distance the lower bead from its seat, after which the compressed air is fed in through the holes in the jaws.

[0010] By being suddenly fed into the tyre through the gap created in this manner, the compressed air produces a pressure shock which causes the tyre lower bead to tightly adhere to its seat in the wheel rim.

[0011] After said shock any intervention by the operator is obviously no longer necessary.

[0012] Said second known system has firstly proved uncomfortable because the operator has to maintain the tyre raised, and is secondly generally complex and costly because it requires a rotary joint associated with the self-centering unit to enable the air to reach the jaws.

[0013] A third known system comprises two separate members disposed on one and the other side of the axis of the wheel locking unit, they being provided with respective air delivery apertures which face generally downwards and are each positioned on a manipulating and positioning unit provided with locking means.

[0014] Before proceeding to inflate a tyre, its lower bead has to be engaged with the respective wheel rim seat, while the upper bead is at a distance from the respective flange of the wheel rim.

[0015] Having done this the operator positions said units such that said apertures are aligned with the annular gap existing between the wheel rim and the upper bead; he then locks the whole assembly in position and commands the arrival of the compressed air, which generally operates as already stated.

[0016] This third known system has also highlighted various problems, which can be summarized as follows.

[0017] Firstly it is generally bulky and complex because of the presence of said two separate members and the relative accessories.

[0018] Secondly the separate positioning of said two units and of their respective locking means involves relatively complex and lengthy operations.

[0019] Thirdly such a system can be dangerous should the operator omit to lock the component elements of the system in position.

[0020] This is because in such situations at least some of said elements, no longer retained due to said omission, can undergo untimely movement because of the sudden reaction thrust generated on opening the compressed air.

[0021] A fourth known system is disclosed by DE 2449515, comprising a wheel mounting machine having a working column.

[0022] On the vertical part of the working column, by means of a journal bearing a rocker arm is swivel-mounted, which is provided with a sleeve attachment , in which is held a sliding shaft , which carries on its lower end an inflation ring. The inflation ring is held in a raised position by a pressure spring surrounding the sliding shaft. At the upper free end of the sliding shaft, a pusher is provided, which has to be pressed by the operator when the inflation ring has to be positioned against a tyre, mounted on a rim, being held in position by the mounting head.

[0023] The swivel-mounted arm swivels only in the horizontal direction, to leave free the space for the mounting tool.

[0024] No means is provided to adjust the inflating ring to the tyre diameter.

[0025] The main object of this invention is to provide means able to overcome the aforesaid problem.

[0026] Another object of the invention is to attain said main object within the context of a simple, rational, reli-
able and flexible construction which is of small overall size, of low cost and safe.

These objects are attained by a device presenting the characteristics indicated in the claims.

With regard in particular to said safety problem, according to the invention the device is structured such as to compel the operator to retain it in position during tyre inflation, otherwise said inflation cannot proceed.

For this purpose the device of the invention comprises a movable implement generally shaped as a symmetrically deformable handlebar intended to be associated with a fixed part of a tyre removal machine, and provided with at least two air delivery nozzles which can only be activated by the operator gripping the handlebar with both hands.

The device can be readily and easily manipulated and positioned both because of said handlebar shape and because it is suitably counterweighted to automatically assume its rest configuration when released.

Moreover, with regard to the flexibility of utilization of the invention, the aperture between the arms or handles of the handlebar can be advantageously adjusted ready by the operator in order to adapt it to the nominal diameter of the wheel rim.

These other characteristics of the invention, together with the constructional merits and details thereof, will be apparent from the ensuing detailed description given with reference to the figures of the accompanying drawings which illustrate a preferred embodiment thereof by way of non-limiting example.

Figure 1 is a schematic front view of a usual tyre removal machine with which a device of the invention is associated, this latter being shown in two opposing operative positions, namely its raised or rest position and its lowered or working position.

Figure 2 is a perspective view from above showing the device in its working position.

Figure 3 is a perspective view thereof taken from below.

Figure 4 is a part of the section IV-IV of Figure 2, shown on an enlarged scale.

Figure 5 is a scheme showing the feed system for the compressed air delivery nozzles of the device.

Said figures, and in particular Figures 1 and 2, illustrate a tyre removal machine, indicated overall by the reference numeral 1, which is shown schematically as it is substantially extraneous to the invention.

In this respect the teachings of the invention can be easily adapted to all types of tyre removal machine having a unit for supporting and locking a wheel (wheel rim + tyre) in a bedded position.

In the present case the tyre removal machine 1 comprises a base frame 2 from which there upwardly projects a rotatable vertical shaft 3, at the top of which there are provided the means for locking the wheel rim 5, these not being shown for reasons of clarity and simplicity.

The frame 2 presents a tool turret 4 which also carries the device of the invention.

This comprises a plate 6 which is fixed to the turret 4 and carries, hinged thereto on a substantially horizontal axis 60, one end of a profiled arm 7 which extends towards the shaft 3.

Between said plate 6 and said arm 7 there is interposed a gas spring 66 arranged to maintain the arm 7 constantly urged into its raised rest position (shown by dashed lines in Figure 1).

Equivalent means for this purpose could instead be provided, such as a helical tension or compression spring, a torsion spring or a leaf spring.

The same results are also attained if instead of the counterweight system defined by the arm 7 and the gas spring 66, a descending cable is provided hooked to a system of upwardly/downwardly movable type.

A blower implement, generally in the form of a flat handlebar (see Figures 2 and 3), is suspended from the opposite end of the arm 7.

Said handlebar is defined by a plate 8 positioned to the side of the axis 33 of the rotatable shaft 3, and by two tube pieces 9 positioned on one and the other side of said axis 33, these being slightly bent such that their concave parts face said axis 33.

As can be seen in Figure 3, the front edge of the plate 8 presents a central hole 100 forming the coupling seat for an articulated suspension.

Said suspension is in the form of a fork 10, the crosspiece of which is pivoted to said hole 100, said arm 7 being pivoted to the fork arms. The first of said two pivotings enables the handlebar to be rotated within the plane in which it lies, the second enabling it to be rotated within the vertical plane containing the handlebar support arm 7. Said two tube pieces 9, forming the handles of said handlebar, are projectingly pivoted to the opposing ends of the plate 8 on the axes indicated by 99.

Said pivotings 99 enable the distance between the handles 9 to be adjusted in order to adapt it to the nominal diameter of the wheel rim 5 on which it is to intervene.

The two handles 9 are linked together in such a manner that they oscillate symmetrically during their opening and closure.

In the illustrated example this is achieved by a connecting rod 77 (see Figures from 1 to 3) which connects together the handles 9 in proximity to their respective pivotal axes 99, its longitudinal axis intersecting the plane containing the two axes 99 (Figure 3).

Alternatively this can be achieved by two mutually engaging threaded sectors rigid with the handles 9, and having their centre coinciding with said axes 99.

As a variant the distance between the handles 9 can be adjusted by a manually controlled linkage system in the form of a male-female thread combination.

Moreover, as an aid in adapting the aperture between the handles 9 to the nominal diameter of the wheel rim 5, at least one of said handles 9 can be provided with an index with corresponding reference markings on
the plate 8 relative to the nominal diameters of currently available wheel rims.

[0056] Starting from the respective pivoting 99, each individual handle 9 comprises a first lower air delivery nozzle 11, an upper manipulation and control handgrip 12, and a second lower air delivery nozzle 11. Each nozzle 11 is orientated downwards, and is inclined towards the shaft 3 where it presents an exit mouth of elongate form (Figure 3) arranged to lie against the bead retention flange 55 of the wheel rim 5 (Figure 4).

[0057] The nozzle 11 communicates with the handle 9 (see Figure 4), which is closed at one end, its opposite end being connected to a flexible service hose 17 (Figures 2 and 3).

[0058] The two hoses 17 are preferably connected to a compressed air source via a common valve unit, which will be described hereinafter. In addition, to the inner side of the nozzle 11 there is fixed a fin 13, the lower edge of which is situated to the rear of the exit mouth of the nozzle 11.

[0059] In this manner a right angled recess is formed able to engage the peripheral edge of the bead retention flange 55 in such a manner as to position the exit mouth of the nozzle 11 below said peripheral edge and within the gap existing between said bead retention flange 55 and the bead 14 of the tyre 15.

[0060] Moreover, as shown in Figure 2, each handgrip 12 is provided with a control member 18 with which to activate the arrival of compressed air to the two handles 9 of the shaft.

[0061] The two members 18 are operatively connected together and to said common valve unit to allow the compressed air to reach the nozzles 11 only if said two members 18 are both activated.

[0062] For this purpose the members 18 can consist for example of pneumatic or electronic switching valves connected in series and to said common valve unit.

[0063] The aforesaid is illustrated by way of example in Figure 5, which shows a compressed air arrival conduit 170 connected to a suitable source and presenting three branches indicated by 171, 172 and 173 respectively.

[0064] The first 171 of said branches opens into a reservoir 271 provided with an overpressure valve 371. The second branch 172 is connected to the two flexible hoses 17 by way of a closing and opening valve 272, which constitutes the aforesaid common valve unit.

[0065] The third branch 173 is connected at its end to a change-over valve 273, and is intercepted by said control members 18, which are connected in series and are generally in the form of cocks.

[0066] There are also provided a vent conduit 174 which connects the closing and opening valve 272 to the change-over valve 273, and a branch 175 which connects the vent conduit 174 to the second branch 172.

[0067] The aforesaid device operates substantially in the following manner.

[0068] At the commencement of operations, the handlebar occupies its raised rest position shown in Figure 1; the pneumatic air feed system is disconnected from the handles 9 as shown in Figure 5; and the tyre 15 has its lower bead engaged with its seat (Figure 1) and its upper bead 14 positioned in correspondence with the lower edge of the respective seat (Figures 1 and 4).

[0069] The tyre fitter grips the handgrips 12, lowers the handlebar against the resistance offered by the gas spring 66, and positions the nozzles as in Figure 4, with their outsides pressing against the side wall of the tyre 15, their exit mouths generally facing the bead 14, and their right angled recesses engaged with the outer edge of the bead retention flange 55.

[0070] Having done this, and while continuing to maintain the handlebar thrust downwards, he operates both the members 18, with the result that the compressed air enters the tyre 15 and urges the bead 14 into its seat.

[0071] In this respect, with reference to Figure 5, on simultaneously operating the two members 18 the compressed air is able to reach the change-over valve 273, which opens. Said opening enables the compressed air present in the vent conduit 174 to discharge, so that the valve 272 opens to feed the air to the hoses 17 connected to the handles 9.

[0072] When the tyre fitter releases the members 18 and the handgrips 12, the pneumatic system automatically assumes the configuration of Figure 5, with the handlebar rising without aid.

Claims

1. A device for tubeless tyre bead engagement and inflation, generally for tyre removal machines having a unit for supporting and locking a wheel (wheel rim + tyre) (5-15) in a bedded position, and comprising an inflating implement vertically movable at the free end of a movable arm hinged to the structure of the tyre removal machine, characterised in that said movable arm (7) is hinged to the structure of the tyre removal machine to swing in the vertical plane, and the implement comprise one handlebar of adjustable width (8, 9) having two handles (9) and two hangrips (12) located at the ends of the handlebar; each hangrip being provided with at least one compressed air delivery nozzle (11) and with a control member (18) with which to activate the arrival of compressed air to the at least one compressed air delivery nozzle; said control members being connected in series and to a common valve unit so that the compressed air is allowed to reach the nozzles only if the said two control members are both activated; said delivery nozzles being positionable in the gap between the wheel rim and the tyre when the implement is in its working position.

2. A device as claimed in claim 1, characterised in
that said movable arm (7) comprise an automatic repositioning system (66) of counterweight type for repositioning said handlebar in its rest position.

3. A device as claimed in claim 1, characterised in that said handles are each provided with a manipulating handgrip with which respective control means for causing compressed air to reach said at least one nozzle are associated.

4. A device as claimed in claim 3, characterised in that said control means are operatively connected together and to the compressed air supply source in such a manner as to feed air to the nozzles only if both control means are activated.

5. A device as claimed in claim 1, characterised in that said handles are pivoted to a common support body in such a manner that the distance between the respective nozzles can be adjusted while maintaining symmetry.

6. A device as claimed in claim 5, characterised in that said handles are connected together by a linkage system which causes them to oscillate by the same extent in the two opposing directions, such as a connection rod the longitudinal axis of which intersects the plane containing the axes on which the handles are pivoted to said common body.

7. A device as claimed in claim 1, characterised in that each individual nozzle presents an exit mouth generally orientated towards the axis of the wheel locking unit, and having an elongate shape.

8. A device as claimed in claim 7, characterised by presenting, on the inner side of each individual nozzle to the rear of its exit mouth, a recess which creates a seat for its resting against the outer edge of the flange of said wheel rim.

Patentansprüche

1. Vorrichtung zur Wulst-Positionierung und Füllung von schlauchlosen Reifen, insbesondere für Reifen-­demontiermaschinen, welche eine Einheit zum Halten und Verriegeln eines Rades (Radfelge + Reifen) (5-15) in einer gelagerten Position aufweisen, mit einer Aufblaseinrichtung, welche an dem freien Ende eines beweglichen Arms, der drehbar an der Struktur der Reifen­demontiermaschine angebracht ist, in vertikaler Richtung beweglich ist, dadurch gekennzeichnet, dass der bewegliche Arm (7) derart drehbar an der Struktur der Reifen­demontiermaschine angebracht ist, dass er in der vertikalen Ebene schwingen kann, und dass die Einrichtung eine Lenkstange mit einstellbaren Breite (8,9) aufweist, welche zwei Handhaben (9) und zwei Handgriffe (12) aufweist, die an den Enden der Lenkstange angebracht sind; wobei jeder Handgriff mit wenigstens einer Druck­luft­Ausgabedüse (11) und mit einem Steuerelement (18) versehen ist, mit welcher der Zugang der Druck­luft zu der wenigstens einen Druckluft­Ausgabedüse aktivierbar ist; wobei die Steuerelemente in Serie und mit einer gemeinsamen Ventileinheit derart verbunden sind, dass es der Druckluft nur erlaubt, die Düsen zu erreichen, wenn die zwei Steuerelemente beide aktiviert sind; wobei die Ausgabedüsen in dem Spalt zwischen der Radfelge und dem Reifen positionierbar sind, wenn sich die Einrichtung in ihrer Arbeitsposition befindet.

2. Vorrichtung nach Anspruch 1, dadurch gekennzeichnet, dass der bewegliche Arm (7) ein automatisches Rückführsystem (66) mit Gegengewichten zum Rückführen der Lenkstange in ihre Ruheposition aufweist.

3. Vorrichtung nach Anspruch 1, dadurch gekennzeichnet, dass die Handhaben jeweils mit einem Betätigungs­Handgriff versehen sind, mit welchem jeweilige Steuereinrichtungen zum Bewirken, dass die Druckluft die wenigstens eine Düse erreicht, verbunden sind.

4. Vorrichtung nach Anspruch 3, dadurch gekennzeichnet, dass die Steuereinrichtungen betriebsfähig miteinander und mit der Druckluft­Zufuhrquelle auf eine solche Art und Weise verbunden sind, dass die Luft nur zu den Düsen geleitet wird, wenn beide Steuereinrichtungen aktiviert sind.

5. Vorrichtung nach Anspruch 1, dadurch gekennzeichnet, dass die Handhaben an einem gemeinsamen Tragkörper auf eine derartige Weise drehbar gelagert sind, dass der Abstand zwischen den jeweiligen Düsen unter Beibehaltung der Symmetrie einstellbar ist.

6. Vorrichtung nach Anspruch 5, dadurch gekennzeichnet, dass die Handhaben mittels eines Gestängesystems miteinander verbunden sind, welches bewirkt, dass sie um denselben Betrag in den beiden entgegengesetzten Richtungen oszillieren, wie eine Verbindungsstange, deren Längsachse die Ebene schneidet, welche die Achsen beinhaltet, auf welcher die Handhaben an dem gemeinsamen Körper drehbar angebracht sind.

7. Vorrichtung nach Anspruch 1, dadurch gekennzeichnet, dass
Revendications

1. Dispositif destiné à venir au contact d’un talon de pneumatique sans chambre et à le gonfler, en général destiné à des machines d’extraction de pneumatiques ayant une unité destinée à supporter et bloquer une roue (jante de roue + pneumatique) (5-15) en position logée, et comprenant un accessoire de gonflage mobile verticalement à l’extrémité libre d’un bras mobile articulé sur la structure de la machine d’extraction de pneumatique, caractérisé en ce que le bras mobile (7) est articulé sur la structure de la machine d’extraction de pneumatique afin qu’il pivote dans un plan vertical, et l’accessoire comprend un guidon de largeur réglable (8, 9) ayant deux manches (9) et deux poignées (12) placées aux extrémités du guidon, chaque poignée étant munie d’au moins une buse (11) de distribution d’air comprimé et d’un organe de commande (18) avec lequel l’arrivée d’air comprimé à la buse au moins de distribution d’air comprimé est activée, les organes de commande étant raccordés en série et à une unité à soupape commune de manière que l’air comprimé puisse atteindre les buses uniquement lorsque les deux organes de commande sont tous deux activés, les buses de distribution étant destinées à être disposées dans l’espace compris entre la jante de roue et le pneumatique lorsque l’accessoire est dans sa position de travail.

2. Dispositif selon la revendication 1, caractérisé en ce que le bras mobile (7) comporte un système automatique (66) de remise en position du type à contrepoids destiné à remettre le guidon dans sa position de repos.

3. Dispositif selon la revendication 1, caractérisé en ce que les manches sont munies chacun d’une poignée de manipulation à laquelle des dispositifs respectifs de commande destinés à permettre à l’air comprimé d’atteindre la buse au moins sont associés.

4. Dispositif selon la revendication 3, caractérisé en ce que les dispositifs de commande sont raccordés pendant le fonctionnement l’un à l’autre et à l’alimentation en air comprimé de manière que de l’air soit transmis aux buses uniquement lorsque les deux dispositifs de commande sont activés.

5. Dispositif selon la revendication 1, caractérisé en ce que les manches sont articulés sur un corps commun de support de manière que la distance comprise entre les buses respectives puissent être ajustée avec conservation de la symétrie.

6. Dispositif selon la revendication 5, caractérisé en ce que les manches sont raccordées mutuellement par un système à tringlerie qui provoque leur oscillation de la même amplitude dans les deux sens opposés, tel qu’une tige de connexion dont l’axe longitudinal recoupe le plan contenant les axes sur lesquels les manches pivotent par rapport au corps commun.

7. Dispositif selon la revendication 1, caractérisé en ce que chaque buse individuelle présente une embouchure de sortie orientée de façon générale vers l’axe de l’unité de blocage de roue, et ayant une forme allongée.

8. Dispositif selon la revendication 7, caractérisé en ce qu’il présente, à la face interne de chaque buse individuelle vers l’arrière de son embouchure de sortie, une cavité qui crée un siège afin qu’elle puisse reposer contre le bord externe du flasque de la jante de roue.