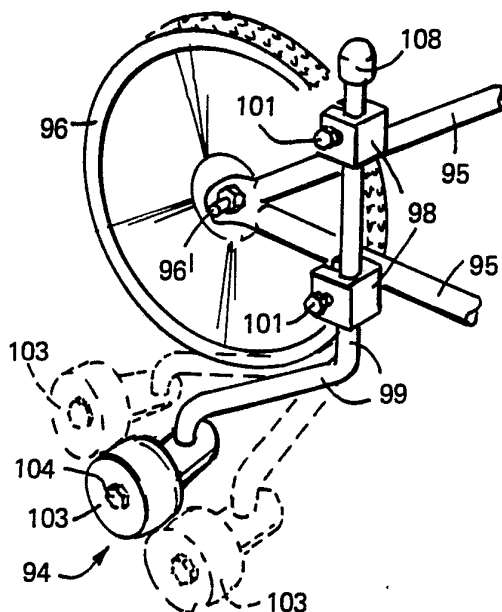




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(54) Title: IMPROVED STABILIZER DEVICE FOR LEARNING TO RIDE A BICYCLE



(57) Abstract

A stabilizer device (94) for a bicycle or tricycle comprising support means supporting a stabilizer wheel (103) or other rolling ground-engaging means and mounting means (98) for mounting the support means on such a cycle; said ground-engaging means (103) being locatable or adjustable laterally nearer to or further from any vertical plane, which intersects said mounting means (98) and is oriented along the normal direction of travel when said device is in its normal operating position; during the said lateral adjustment of said ground-engaging means (103) its axis of rotation remains, or is adjustable to be, at right angles or substantially at right angles to said plane; said ground-engaging means (103) securable in more than two positions or securable in any position in its adjustment range or ranges.

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IMPROVED STABILIZER DEVICE FOR LEARNING TO RIDE
A BICYCLE

The present invention relates to an improved adjustable stabilizer device for a bicycle or tricycle and normally two of such devices will be provided for a bicycle - one either side of the rear wheel. In the case of the tricycle a pair of the said devices would replace the tricycles rear wheels and part of their supports.

It is known to fit stabilizers to a bicycle to assist in learning to ride the bicycle and such are subsequently removed once the rider is confident and able to balance. A known stabilizer comprises a wheel rotatably mounted in fixed position at the lower outer end of an L-shaped bracket with the other end or end portion of the bracket being secured to the rear spindle. An inclined bracing strut may be provided between the ends of the bracket for additional strength. To accommodate for different sized bicycles, the mounting bracket has been provided with a single vertically arranged line of apertures to enable appropriate and only vertical adjustment of the mounting bracket. This adjustment can only be intermittent because of the gaps between the apertures. Two such similar and known stabilizers have been fitted one on each side of a bicycle. Another attachment, to the L-shaped bracket, has been provided to stop it rotating about the spindle. This is usually attached to the bicycle's chain stay at its other end. Known stabilizer wheels are set at a fixed distance laterally away from the bicycle's rear wheel and must suddenly be removed completely from the stabilizer wheel position that the learner rider started learning in, so leaving him or her with no further assistance in balancing. Known tricycles rear wheels are similarly set at a fixed lateral distance apart and

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cannot be moved closer together to gradually improve the learner rider's balance.

It has therefore now been realized that such known stabilizers only provide a limited training effect and not progressive degrees of stabilization depending upon the stage of bicycle balancing development of the user and this may be particularly relevant with handicapped persons where a progressive training by way of stabilizers is important.

According to the present invention there is provided an improved stabilizer device for a bicycle or tricycle comprising support means supporting a stabilizing wheel or other rolling ground-engaging means, and means for mounting the support means on the bicycle or tricycle; said stabilizing wheel or other ground-engaging means being located spaced at a distance laterally of the mounting means and being adjustable laterally nearer to or further from and/or continuously vertically relative to the said mounting means, and hence, when located on a bicycle, relative to the rear wheel of a bicycle, or when located on a tricycle laterally nearer to or further from the other stabilizer device of the pair providing the rear tricycle wheels.

Generally reference will be made subsequently to a stabilizing or stabilizer wheel although other rolling ground-engaging means may be provided such as rollers or ball type wheels as are known.

Generally references will be made subsequently either to bicycles fitted with improved stabilizer devices or to the devices themselves. These references are to be taken as applying also to tricycles

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where appropriate, particularly in the case of lateral adjustability.

The wheel supporting means of this improved stabilizer will usually be continuously upwardly and downwardly adjustable relative to the bicycle in its normal upright position of use.

The lateral and fine continuous vertical adjustability of the stabilizing wheel position enables the restoring moment exerted and the amount the bicycle must tilt when the wheel engages the ground to be adjusted as the proficiency of the learner rider increases. The lateral and fine continuous vertical adjustability of the stabilizer wheel is intended to mean adjustment of the position of the stabilizer wheel to enable, before use, the position of the stabilizer wheel relative to the bicycle to be adjusted to achieve different restoring moments and different degrees of inclination from upright of a bicycle having the device thereon when the stabilizer wheel engages the ground.

Also according to the invention an improved stabilizer device for a bicycle comprises mounting means for mounting stabilizer wheel support means on a bicycle and having adjustment means enabling the wheel support means to be adjustable substantially vertically and wherein said support means carries a stabilizing wheel adjustable laterally for example along its spindle in the support means, at right angles in plan to the rear bicycle wheel. The adjustment of the said stabilizer wheel may alternatively, for example, be by adjustment of the mounting position of the wheel on the support means or by a pivoting or twisting of the support means about a substantially vertical axis parallel or substantially parallel to the plane of the upright bicycle's rear

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wheel, to adjust the spacing of the stabilizer wheel from the bicycle's rear wheel. In the latter instance a further parallel pivoting or twisting means is needed at the end of the support means furthest from the rear wheel of the bicycle. This will enable the stabilizer wheel plane to be refixed parallel with the rear bicycle wheel plane after pivoting adjustment of the support means.

Thus, at first the stabilizer wheels will have maximum lateral spacing from the mounting means and bicycle rear wheel and may be positioned close to the ground as well so that the stabilizing wheel on one side engages the ground even with minor "wobble" or tilting of the bicycle towards that side and then provides the rider with a considerable restoring moment but as the learner rider progresses in proficiency the lateral and/or vertical location of the wheel relative to the bicycle and mounting means is adjusted in stages, as gradual as prove necessary, so that the lateral spacing between the stabilizer wheel and the bicycle rear wheel is gradually reduced until eventually the support means and stabilizer wheel can be removed.

*

The adjustment of the stabilizing wheel laterally relative to the mounting means and bicycle rear wheel when attached to the bicycle may be by way of mounting the stabilizer wheel so as to be adjustable in position along a central axle which extends laterally of the mounting means and thus of the bicycle when fitted thereto and suitable adjustable securing means will be provided to maintain the stabilizer wheel in any required position on the axle. Alternatively, the support means such as a support arm may be mounted so as to be adjustable in position or be extendable and retractable so as to enable the position of the stabilizing wheel to be adjusted laterally relative to the support means. For

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example, the support means may be a substantially L-shaped arm or bracket with the stabilizing wheel mounted at the free end of the horizontal limb with said stabilizing wheel being rotatable about a horizontal axle whilst said axle itself is adjustably pivotable about an upwardly extending axis; the end of the other limb of the L-shaped support arm which extends in use substantially vertically being adjustably and pivotably mounted in the mounting means mountable on said bicycle with said upwardly extending arm being pivotable about its own axis so as to adjust the lateral spacing of the stabilizing wheel and being securable in position and with said pivotal support arm of the support means preferably also being infinitely finely and continuously adjustable in said mounting means about an upwardly extending axis and securable at any desired position. The mounting of the stabilizing wheel spindle support arm so as to be adjustable pivotally about its upwardly extending axis and preferably vertical or near vertical axis enables the stabilizing wheel to be adjusted in use so as to be parallel to the main wheel of the bicycle for different positions of adjustment of the L-shaped support arm. Still further, alternatively, a support arm may be provided extending laterally of support means and being adjustable in length e.g. by being telescopic or otherwise and be securable in the required position of use.

The mounting means may be provided as an integral portion of the bicycle e.g. as an extension to the plate uniting the rear forks and bicycle chain stay which latter extends substantially horizontally between the pedal hub and rear wheel spindle, or may be a suitable mounting block or bracket fixed to said uniting plate or a rear fork and/or chain stay with the support means being removable in each instance once the rider

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has learnt to ride without stabilizing wheels.. The mounting means may be appropriately adapted for the left and right-hand sides of a bicycle or be usable without adaptation on both sides of a bicycle. The mounting means when provided as an attachment may have two extension arms or a bifurcated portion which may engage either side of the chain stay to prevent turning of the mounting means about the bicycle's rear wheel spindle when the stabilizer is knocked in use. In a simple embodiment of the mounting means such, for example, partly comprises an apertured strap locatable, via an aperture, on the rear wheel spindle and held thereon by the nut and having curved extension arms securable to the chain stay by a nut and bolt and U-shaped strap. The extension arms, when so secured, prevent the rotation of the stabilizer about the bicycle spindle.

The mounting means may comprise an apertured substantially horizontally extending plate locatable by an aperture therein on the rear wheel spindle and held thereon by the nut and having an end bent back towards itself to form, in use and viewed in plan, an open ended loop shaped clamp around the perimeter of the supporting means' vertical limb, tightenable by one or more sets of nuts and bolts to hold the supporting means in any required position of adjustment.

In some forms in addition to a main stabilizing or stabilizer wheel, as mentioned previously, an additional stabilizer wheel or emergency wheel of smaller exterior diameter than the main stabilizer wheel will be provided laterally outwardly of the main stabilizer wheel so that should the bicycle tilt further than the main stabilizer wheel is able to compensate for and should the bicycle begin to topple, then said smaller emergency wheel touches the ground and provides an

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additional supporting effect and tilt warning to the rider and also prevents the end of the support arm from catching on the ground - this is especially important when the main stabilizer wheel has been adjusted to a position relatively close to the mounting means and bicycle.

The support means may as mentioned, be mounted so as to be adjustable vertically to suit different bicycle sizes and to provide for appropriate continuous fine vertical adjustment of the device on individual bicycles and said support means may have elongated upwardly extending overlapping slots in 2 or more vertical parallel rows or a single longer continuous such slot to accommodate bicycle spindle nuts for the above mentioned purposes

It is also envisaged that the substantially vertical limb of the support means may in some forms of stabilizers be mounted or mountable so as to be adjustably inclinable or fixed inclined out of vertical in such a way as to permit, if variable, once set up, the variation of vertical spacing of the stabilizer wheel from the ground with the bicycle upright to be accomplished automatically as the stabilizer wheel is moved in, in the versions of the device which pivot about a vertical or near vertical axis. Where the stabilizer wheel moves inwards along a fixed spindle this can be permanently inclined to the horizontal to achieve the same effect.

Also according to the present invention there is provided a bicycle having improved stabilizer means on opposite sides of the bicycle and comprising support means for supporting a wheel adjustable laterally with respect to the bicycle to enable the spacing of the wheel

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from the bicycle to be adjusted. The adjustment may be along a line transverse to the plane in which the bicycle rear wheel lies or substantially parallel to the axle of the rear bicycle wheel. Preferably the support means will be adjustable upwardly and downwardly relative to the bicycle in its normal upright position and possibly also adjustable about an inclined axis.

The invention will be described further, by way of example, with reference to the accompanying drawings, in which:-

Fig. 1 is a perspective view from the front and above of a first embodiment of a stabilizer device according to the invention for attachment to the right-hand side of a bicycle; this embodiment would require right and left-handed versions; the embodiments shown in the other Figs. can have their parts turned round or assembled differently to suit both sides of the bicycle;

Fig. 2 is a perspective view from above and the rear of a stabilizer device forming a second embodiment of the present invention and assembled ready for attachment to the right-hand side of the bicycle;

Fig. 3 is a perspective view from above and to the rear of a stabilizer device assembled ready for attachment to the right-hand side of a bicycle wherein an L-shaped support arm is vertically adjustable in the mounting means and wherein the horizontal portion of said arm extends at right angles to the rear wheel of the bicycle and has a main stabilizer wheel adjustable therealong and has an additional smaller stabilizer wheel at the end thereof;

Fig. 4 is a perspective view from above and the rear illustrating a stabilizer device attached to a right-hand bicycle chain stay and rear bicycle wheel

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spindle end and forming a fourth embodiment according to the invention:

Fig. 5 illustrates a modification of the mounting means of Fig. 4 where the main L-shaped support bar is mounted in front of rather than behind the rear wheel bicycle spindle;

Fig. 6 is a perspective view from above and the rear having mounting means similar to the embodiment of Fig. 2 and with a modification of the stabilizer wheel adjustment means illustrated in Fig. 4;

Fig. 7 is a fragmentary detail showing alternative means for adjustment of the horizontal axle of the stabilizer wheel and comprising a modification of that of Fig. 6;

Fig. 8 is a perspective view from the rear and above of a further embodiment according to the invention wherein the stabilizer wheel (not shown) is mounted on the support arm in a similar manner to that of Fig. 7 but wherein the mounting means is modified and may comprise a separate part or parts of the bicycle; and

Fig. 9 illustrates a detail of an alternative mounting means.

Figs. 10 and 11 are perspective views, from the rear and above, of embodiments of the invention which provide some of the rear parts of tricycles including the tricycle's rear wheels.

Fig. 12 is a perspective view, from the rear and above, of a clamp type mounting means.

An embodiment of a stabilizer device is illustrated in Fig. 1 and comprises stabilizer wheel support means in the form of a substantially L-shaped support arm 1 having a horizontal limb or portion 2 from which three support arms 3, 3', 3" extend downwardly

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therefrom and support a spindle 4 extending through apertures in each and being secured by split pins 5 at each end. A main stabilizer wheel 6 is provided rotatable on spindle 4 and is adjustable in its position along spindle 4 by removal of the spindle 4 and repositioning of the stabilizing wheel 6 therealong. Suitable washers 7 or other devices acting as spacers will be provided on the spindle 4 and suitably arranged to achieve the required location of the wheel 6 which is held in position thereby or by a pair of hose clips or grub-screwed sleeves (not shown) which grip the spindle. It has been found of advantage to include devices such as two or more loose washers adjacent to each other on the stabilizer spindle which make a rattling noise when the stabilizer wheel 6 is rotating so as to warn the rider when the stabilizer is meeting the ground. Arrangements could be made for different noises for left and right stabilizers to warn the rider which stabilizer is meeting the ground. This could for example be achieved by using different sized or different shaped washers on the two stabilizers. Whilst only three downwardly extending members 3, 3', 3'' are illustrated as sub-dividers and supports for the spindle more of such may be provided as appropriate. An additional emergency stabilizer wheel 8 is provided of smaller outer diameter than the main stabilizer wheel 6 and such is located at the end of the spindle 4 remote from the mounting means 1, 9, 10 and acts to prevent or restrain toppling over of the bicycle (not shown) in an extreme tilting motion and also prevents the end of the spindle 4 from digging into the ground when the bicycle tilts. The slots 1' take the threaded end of the rear bicycle wheel spindle and the spindle nut and sometimes washer are tightened onto the support arm.

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The upwardly extending portion 1 of the support arm has five elongated upwardly extending vertically overlapping slots 1', staggered in two vertical rows for enabling the height of the stabilizer relative to the bicycle spindle end nut to be continuously and finely varied and adjusted vertically as necessary to suit particular use and provide requisite clearance prior to operation of the stabilizer wheel and forms part of the mounting means. Alternatively one single longer vertical slot could replace said five slots. The mounting means also comprises a plate 9 extending from limb portion 1 and having upwardly extending elongate slots 9' therein through which the shanks of bolts 9" pass to threadingly engage in a profiled plate 10 shaped to fit around the bicycle chain stay (not shown) to permit mounting of the whole device, as appropriate. These five slots 9' would be arranged to suit the other five slots 1' and similarly one long slot could be arranged to suit the one single longer vertical slot mentioned above.

It is to be appreciated that in all of the embodiments therein whilst only one stabilizer device is illustrated for the right-hand side of the bicycle, a similar device will be provided for the left-hand side of the bicycle and appropriately modified or turned around as will be readily apparent.

A modification of the embodiment of Fig. 1 is illustrated in Fig. 2 wherein a main stabilizer wheel 11 is adjustably mounted on a spindle 12 which itself is carried by support means in the form of a substantially inverted U-shaped member 13 with the spindle 12 being held in position thereon at each end for example by split pins 34 extending therethrough and also through the limbs of the U-shaped member 13 with said spindle being

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extended beyond the support member 13 at one end and carrying an additional wheel 14 acting as an emergency wheel and being of smaller diameter than the main stabilizer wheel 11. An end cap 15 is provided for the spindle 12. A suitable loose washer 14' can be provided between the wheel 14 and the support 13. Another such loose washer can be provided between the wheel 14 and the end cap 15. This washer is hidden behind end cap 15 in Fig. 2.

The main stabilizer wheel 11 is rotatably mounted on spindle 12. This wheel has a loose washer 16 also rotatably mounted on spindle 12 on either side of it. Immediately beyond these two washers are two adjustable locating means 17, (only one of these is visible in Fig. 2). The said adjustable locating means 17 comprise for example hose clips or grub-screwed sleeves either side of the main stabilizer wheel 11 to grip spindle 12 and so hold wheel 11 in position for each of its positions of adjustment.

In the arrangement of Fig. 2 the mounting means 18 comprises a main backing plate 19 having an aperture therein through which the threaded end of the bicycle wheel spindle 20' extends and is secured by spindle nut 20. An alternative aperture 20" is provided in backing plate 19 for the wheel spindle at the same horizontal level. This allows alternative forward or backward horizontal adjustment of the mounting means relative to the bicycle which may for example allow obstructions on the bicycle to be avoided by the assembled stabilizer. The two or more horizontally level holes could be replaced by a horizontally elongated slot or slots. Two locating arms 21 extend forwardly from mounting plate 19 and are shaped and arranged to fit over and under the bicycle chain stay (40 in Fig. 3). These

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locating arms act to prevent turning of the stabilizer about its fixing at the wheel spindle. A mounting block 22 is fixed to plate 19 and has a passage extending therethrough shaped to correspond to the shape of the part of the support member 13' which extends therethrough in slidable manner. A grub-screw 23 is located in a threaded hole in block 22 to engage with limb 13' of support member 13. As mentioned the grub-screw 23 acts to hold the support member 13 at a required position of adjustment and such enables infinitely variable vertical adjustment over the vertical length of limb 13'. The aperture in the block 22 may, for example, be square or round to correspond to the section of limb 13' of the support member 13 and in this the embodiment is of square section. This square section is to prevent turning of the support member 13 in plan view, within block 22 if the support member 13 or its attached wheels should be knocked in use.

The stabilizer device illustrated in Fig. 3 comprises a support means in the form of an L-shaped arm or bar 35 which has an upwardly extending limb 35" slidable in an upwardly extending passage in a mounting block 36. The limb 35" is secured in position by means of a grub-screw 37 in tapped hole in block 36. A mounting extension arm 36' extends from block 36 and has an aperture therein for the passage of the bicycle wheel spindle 38' and securement by spindle wheel nut 38 to the plate at the base of the rear fork of the bicycle (not shown). An additional part of the mounting means in the form of an inverted substantially U-shaped arm or "swan-neck" 39 is provided having the base of the end of its horizontal projection flattened in some versions for better and increased contact area on the bicycle chain stay tube 40 illustrated in broken line. The swan-neck 39 has an upwardly extending portion 39' extending

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through and slidable in a passage in block 36. The swan neck 39 is securable in position by a grub-screw 37' extending through tapped hole in mounting member 36 to permit requisite securement. The swan-neck prevents knocks received by the stabilizer causing rotation of the stabilizer assembly about the bicycle spindle.

This above swan-neck arrangement allows adjustment and attachment to suit many bicycle model's chain stays which are above, at, or below bicycle rear spindle level, to avoid many obstructions such as chain guards and also sometimes to be attached to the bicycle's rear forks where the preferable chain stay attachment is not possible.

The horizontal or nearly horizontal limb 35' of the L-shaped support arm 35 has a main stabilizing wheel 41 rotatably mounted thereon and held in position between two hose clips or sleeves with grub screws on either side 42 (only one being visible in Fig. 3). The main stabilizing wheel 41 is thus adjustable as desired along the limb 35'. Limb 35' of the L-shaped support arm may be inclined slightly from the horizontal (with the bicycle upright) in such a way that the stabilizer wheel will be automatically raised from, or more likely lowered towards, the ground as it is adjusted inwardly towards the rear bicycle wheel. This automatic raising or lowering would be accomplished without any vertical adjustment of the support means in the mounting means being required. The end of limb 35' is preferably of reduced diameter to receive an additional stabilizer wheel or emergency wheel 43 of smaller outside diameter than the main stabilizer wheel 41. This emergency wheel 43, shown partly cut away, prevents the end of limb 35' catching on the ground and also provides second stage ground contact after the main stabilizer wheel in most of

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its positions, in the case of excessive tilting or toppling. This emergency wheel 43 provides rider assistance in addition to that provided by the main stabilizer wheel. This assistance is available and especially appropriate when the latter has been moved fairly well inwardly towards the bicycle rear wheel (not shown). The wheel 43 may have a suitable loose washer 44 or loose washers on both sides. Wheel 43 may be held in position by an end cap 45 mounted on the spindle 35' or by means of a split pin or the like (not shown) at the outer end. At the inner end the increased spindle diameter keeps wheel 43 from moving inwards towards the bicycle rear wheel. It is to be observed that in this embodiment the horizontal spindle i.e. limb 35' remains at or near right-angles in plan to the rear bicycle wheel throughout use. A strap 46 or hose clip is provided to hold the swan-neck 39 rigidly against the chain stay 40. As with Fig. 2 two alternative and horizontally level holes (visible one labelled 38") are provided for the bicycle's rear wheel spindle for the same reasons mentioned in the description of Fig. 2.

In the embodiment of Fig. 4 the support means comprises an L-shaped support arm 47 adjustably mounted in mounting means 48 and carrying a stabilizer wheel 49 (shown partly cut away) at its free-end.

The upwardly extending limb 47' of support arm 47 extends through passages in a box-like mounting bracket 48 forming part of the mounting means similar to block 36 in Fig. 3. The limb 47' is vertically adjustable in bracket 48 and securable by means of a grub screw 37, extending through the box section and through a loose plate 50 tapped for receiving the grub screw, or through captive nuts, or the tapped wall of the member shown. Thus the position of the L-shaped arm 47 is

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infinitely variable and adjustable as required. In a similar manner to the embodiment of Fig. 3 a mounting extension arm 36' extends from mounting box 48 for mounting on the bicycle's rear wheel spindle 38' and securement by spindle nut 38. A swan-neck 39 is adjustably mounted in box 48 and securable by means of a grub screw 37' extending through loose tapped plate 50. The other end of swan-neck 39 is clamped to bicycle chain stay 40 by means of a strap 46' having apertures for a nut and bolt securement. A hose clip may be used instead of the strap 46' and its bolt and nut. The threading arrangements to receive grub screw 41 would normally be the same or similar to those described above for grub screw 37.

An alternative modification of the mounting means of Fig. 4 is illustrated in Fig. 5. Here a box-like mounting member 51 is provided with passages for adjustment of upwardly extending limb 47' which is securable by means of grub-screw 37 extending through loose tapped plate 50. In this arrangement the main support means 47' is located in front of the rear wheel spindle 38' and nut 38 of the bicycle (not shown). Here a rearwardly extending flange 52 of the mounting member 51 is provided with an aperture for the rear wheel spindle 38'. The mounting member 51 also has two forwardly extending arms or a bifurcated portion 53 which fit over and under or fits the bicycle chain stay 40. In either arrangements of the mounting means of this embodiment, the stabilizer wheel 49 is mounted at the distal end of the support means 47 at the end of substantially horizontal support arm 47" by way of a substantially L-shaped spindle 54. The spindle 54 has a horizontal portion on which the wheel 49 is rotatably mounted and held between a split pin 55 and loose washer 56 and an end cap 54' for retaining the wheel 49 in

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position. The spindle 54 is adjustably mounted on the free-end of limb 47" by means of nuts 57 on a threaded portion of the spindle which extends through a passage in the end of limb 47" with said nuts 57 being above and below the main limb 47" and tightened to hold the L-shaped spindle 54 in the required position (the bottom nut being hidden). The pivotable mounting of the spindle 54 is to enable the position of the stabilizer wheel 49 to be adjusted back to sensibly parallel with the bicycle rear wheel once the position of the pivotable support arm 47 has been adjusted to achieve the requisite lateral spacing of the wheel 49 from the mounting means and rear bicycle wheel.

In other words in this embodiment rather than displacement of a stabilizing wheel along a spindle as in the previous embodiments, the spacing of the stabilizer wheel 49 from the main support means 48 is achieved by a pivotable action of the limb 47' in the support box 48 when grub screw 37 is released. The outer end of the substantially horizontal limb 47" will thus move in an arc either forwardly or rearwardly towards or away from the bicycle rear wheel. The vertical limb 47' can be secured in position by way of grub screw 37 when the requisite spacing of the wheel 49 away from the bicycle rear wheel is achieved. Since the horizontal end of the limb 47 moves in an arc it is necessary to release nuts 57 and adjust the position of the wheel 49 at the end of limb 47' so that it's axle is parallel to the axle of the rear wheel of the bicycle.

In this embodiment whilst a single wedge may be used, a pair of wedges 58 are illustrated and are used to aid in the setting up if required so that both wheels 49 (only one shown) of the devices secured to the left and right-hand side of the bicycle are appropriately

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spaced at the same suitable approximate height above flat ground level. The two wedges 58 are juxtaposed with their toes against each other under, or against, the main wheel (not shown) of the bicycle. The spacing there being approximately the minimum height difference needed to ensure that the rear bicycle wheel touches the ground and can drive the bicycle along the ground (i.e. the bicycle rear wheel should not be held up too much by the stabilizer wheels 49). The higher outer end of each wedge would be sized for the first learning stabilizer wheel position to ensure that some reasonable but safe non-toppling amount of tilting could occur before the stabilizer wheel in its outer position contacted the ground. The wedges 58 are set transverse to the bicycle axis when being used.

In this arrangement wherein the support arm 47 is rotatable to achieve the lateral adjustment of the stabilizer wheel 49 the supporting clamps might alternatively be used which have been used in the previous embodiments wherein the support arms are fixed i.e. wherein the support arm is held at right angles to the rear bicycle wheel throughout all repositionings of the main stabilizer wheel. This applies to all the fixed supporting arms except that illustrated in Fig. 1. In Fig. 2 the vertical passage in the mounting block 22 would have to be circular or curved in section to allow rotation. (A square section passage is shown in Fig. 2).

An alternative embodiment of stabilizer device is illustrated in Fig. 6 which is a modification of the embodiment with pivotal support arm illustrated in Figs. 4 and 5. In this embodiment a substantially L-shaped support arm 59 has an upwardly extending limb 59' extending through a passage in a support block 60 which has a grub screw 61 extending through a threaded passage therein to permit the limb 59' to be secured in a desired

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vertical position and also in any desired rotary position. This thereby achieves the requisite horizontal spacing of a stabilizing wheel (not shown in this embodiment) away from the bicycle's rear wheel. The rotation of the L-shaped support arm 59 will enable the necessary adjustment of the wheel distance, from the bicycle's rear wheel, to be achieved. A mounting plate 62 extends from mounting block 60 and has two alternative apertures for receiving the threaded spindle of the rear wheel and for location and fixing of the bicycle stabilizer by way of a bicycle spindle nut 63 threaded and tightened onto spindle 63' thereon. As with Figs. 2 and 3 these two alternative horizontally level apertures (visible one labelled 63'') are provided for the bicycle's rear wheel spindle for the same reasons mentioned in the description of Fig. 2. Two locating arms 64 extend from mounting plate 62 and fit over and under a bicycle chain stay (not shown) to prevent twisting of the mounting means about the bicycle's rear wheel spindle. The end of the substantially horizontal limb 59'' of the support arm is turned vertically downwards. A mounting block 65 is rotatably mounted and securable in position by means of a grub screw 66 located in a threaded passage in the block 65. A spindle 67 extends from block 65 and a rotating stabilizing wheel (not shown) is rotatably mounted thereon together with loose washer 68. The spindle end cap 69 keeps the stabilizing wheel on it's spindle. It will be appreciated that the end of limb 59'' is turned down to fit into the circular hole in the end block 65. Another loose washer like 68 may be located on the spindle between the stabilizer wheel and the spindle end cap 69.

A modification of Fig. 6 is illustrated in Fig. 7 in which the detail shows an alternative arrangement wherein a bolt 70 is provided threadingly

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engaged in a mounting block 71 with the threaded aperture in block 71 extending into communication with the turndown end of limb 59" and such that the bolt 70 also forms a grub screw for adjustment and securement of the block 71 at the end of limb 59". The stabilizer wheel (not shown) is held captive and rotatably mounted between loose washers 72 on the unthreaded length of bolt 70. The circular hole which accommodates the vertically turned down end of limb 59" would often not pass through the base of the block 71. The block could then not be forced up, and jammed onto, the bend of limb 59". This jamming would also force the stabilizer wheel out of vertical. The blind end of the said circular hole may be penetrated by a considerably smaller hole to drain any trapped liquid.

In the embodiment of Fig. 8 the stabilizing wheel (not shown but similar to 49 in Fig. 4) is mounted in a similar manner to that shown in Fig. 7 and the embodiment differs mainly in respect of the mounting means for the support arm 59. In this arrangement an extension 73 of the bicycle itself is provided by the manufacturer of the bicycle in the region of the bicycle spindle 38' and spindle nut 38 securement and has an angled end to which a U-shaped channel member 74 is fixed or forms a part thereof. The U-shaped channel member 74 is positioned substantially laid on its side and has apertures 75 in each limb through which the upwardly extending limb 59' of support arm 59 is slidably extending. The upwardly extending limb 59' is securable by means of a grub screw 76 extending through the wall of the U-shaped member 74 and through a loose tapped plate 77 to achieve the requisite securement of the limb 59'. In this embodiment the vertical adjustment of the limb 59' is possible, as also is the rotary angular displacement to achieve the necessary variable lateral

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spacing and positioning of the stabilizer wheel relative to the bicycle's rear wheel. The alignment of the stabilizer wheel once it's lateral spacing has been selected is achieved by way of adjusting the mounting block of the wheel to turn it, in it's new position, back to parallel with the bicycle's rear wheel.

Fig. 9 is a modification of a part of the device of Fig. 8, the extension 73' is simply a straight extension of the bicycle itself and has a mounting block 78 fixed thereto with an aperture therethrough into which the upwardly extending limb 59' slidably extends and is retained by split pin 79. A grub screw 80 enables the limb 59' to be secured in position in any rotary position of adjustment to enable the lateral position and spacing of the stabilizing wheel from mounting means 78, to be adjusted. In fact two split pins 79 are provided above and below member 78 (the bottom split pin is hidden). The member 78 is fixed rigidly to the rear wheel spindle plate of the bicycle. The hole in block 78 could alternatively be drilled so as to not quite penetrate the top of the block in order to prevent the vertical limb 59' from rising vertically above its correct position.

The direction in which the L-shaped support member would normally pivot as it is adjusted from the outermost towards the innermost position is shown by the curved arrows on Figs. 11, 8, 6 and 4. Pivotting could alternatively be forwards when this would not be in the way of the bicycle's rider.

The holes in the blocks 78 (Fig. 9) and 60 (Fig. 6), box-shaped members 48 (Fig. 4) and 51 (Fig. 5) and in U-shaped member 74 (Fig. 8) could all be positioned in some forms of stabilizer so that the holes

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tilt the inserted support member limb 59' (Fig. 8) slightly out of vertical in the way mentioned below.

The top of support members limb 59' would be nearer the rear of the bicycle, in plan, than the bottom of the said limb. This tilt would be made enough to give automatic lowering of the stabilizer wheel, nearer to the ground by appropriate amounts, as the stabilizer wheel is adjusted in stages backwards and closer and closer laterally to the bicycle's rear wheel.

The split pins 79 (Fig. 9) would be provided by the bicycle manufacturer to keep the stabilizer wheel at the correct heights above ground for that particular model and size of bicycle.

When fully pushed on the soft rounded cap 81 (Fig. 8) could not only protect the user if they fell on it but also, when fully pushed on, just meet the top of the U-shaped member 74 when member 59' is correctly fitted. In that position it could be made to indicate that the support member and thus the stabilizer wheel were in the correct position.

By continuous vertical adjustability there is meant the possibility of adjustment over the whole of the range of the vertical or upward/downward adjustment compared to known devices wherein the vertical adjustment holes or slots were separated by portions of the mounting means which thus meant that adjustment in such portion regions within the adjustment range was not possible.

Whilst reference is made herein to a stabilizer device for a bicycle the device may be applied generally as a device for use in training to ride any cycle e.g. for use in training to ride a monocycle or,

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more likely, in the training of people to ride a bicycle, as a transition from riding a tricycle wherein two devices as described or claimed herein are provided and attached to the rear frame of a tricycle whose rear wheels have been removed. The lateral adjustability enables the spacing of the hitherto stabilizer wheels, now forming the rear support wheels, to be adjusted in spacing as required to assist in the transition to bicycle riding.

Alternatively a pair of laterally adjustable stabilizers could form an integral part of the tricycle, as manufactured, by permanently replacing the tricycle rear wheels and part of the rear of the tricycle frame.

Two possible forms of stabilizers providing some of the rear part of a tricycle are shown in Figs. 10 and 11.

In Fig. 10 the tricycle rear forks 82 support the horizontal spindle 83. This is driven by the gear wheel 84 which is itself driven by the tricycle's chain and pedals. The main stabilizer wheels 85 here form the tricycle's rear wheels. Only the right hand wheel is shown in Fig. 10. The said stabilizer wheel 85 can be adjusted laterally, between the outside of the rear forks 82 and the smaller wheel 88, along the spindle 83. The stabilizer wheel 85 can be fixed where required by tightening the grub screw 86 onto the said spindle. Grub screw 86 is threadingly engaged in a threaded hole in the sleeve 87 which is rigidly attached to wheel 85. Two further wheels 88 (only one shown) are similarly mounted, or loose turning but retained laterally, and remain near the ends of the spindle. In the latter case lateral retention could be by a split pin through the spindle and washers and end cap 93. These emergency stabilizer

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wheels 88 are of smaller diameter externally than the main wheels 85. The wheels 88 prevent the ends of the spindle 83 catching on the ground and also provide restoring moment when the main wheels 85 have been adjusted considerably inwardly and the tricycle tilts sufficiently when being used. This is as mentioned in connection with Fig. 1.

Fig. 11 shows the rear frame 89 and seat 90 of a tricycle supported at the rear by a pair of stabilizer devices similar to the one shown above it in Fig. 8. The vertical limbs 59' of the supporting arms 59 extend through holes in the rear of the tricycle frame 89, so preventing rotation in the plane of the stabilizer wheel 91, and are retained in position vertically by split pins 79. Grub screws 80, located in tapped holes, enable limbs 59' to be retained in any rotary position to allow adjustment of the lateral position and spacing of the stabilizer/rear tricycle wheels 91 relative to each other. In this instance bearing plates 92 are rigidly and concentrically fixed to the vertical limbs 59' to transfer the upthrust from the wheels to the tricycle frame 89. However, if plates 92 and split pins 79 were omitted vertical adjustment would be possible to allow for different sized riders. The stabilizer wheel 91 (shown partly cut away) is mounted in a similar manner to that shown in Figs. 7 and 8. Soft rounded caps 81 protect the user against the tops of the vertical limbs 59' to which they are fitted. In Fig. 11 the tricycle would be driven by the tricycle's front wheel, usually with the pedal assembly mounted directly on its spindle.

Fig. 12 shows an alternative mounting means consisting of a plate 93 locatable, via an aperture, on

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the bicycle rear wheel spindle 38' and held thereon by the spindle nut 38. One end of the said plate 93" is bent back towards itself to form, viewed in plan, an open ended loop shaped clamp. This clamp passes around the perimeter of the supporting means' vertical limb 59'. When the limb 59' has been slid substantially vertically up or down in the clamp to the required position the two sides of the clamp would be pulled together, to grip the limb, by tightening the two sets of nuts and bolts 94. These pass through holes in both sides of the clamp.

If the stabilizer wheel is mounted directly on the horizontal portion of the supporting means (which therefore remains at right angles to the rear bicycle wheel) an extra bar 59"" can be fixed to the vertical limb 59'. This would prevent rotation of limb 59' in the clamp if the stabilizer receives a blow in use. This extra bar 59"" would be omitted if the stabilizer wheel's lateral adjustment is by pivoting limb 59'. The far end of the plate 93' is cut and bent to form a curved fork whose arms locate above and below the bicycle chain stay.

An alternative to clamping with this type of arrangement would be to fix the doubled back part of the plate back onto itself so as to surround vertical limb 59' with little clearance. Nut and bolt sets 94 could then be replaced by a grub screw threaded into a tapped hole in the plate positioned and tightened so as to engage the substantially vertical limb 59' and hold it at the different heights required.

The grub screws shown in the Figs. are generally shown with hexagonal heads, however other sorts could be used for example socket cap screws.

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Various modifications may be made without departing from the scope of the invention including the exchange of features of the various embodiments. Spring means or other shock absorbing means such as elliptical leaf springs may be provided at the end of the support means supporting the wheel to reduce vibration on rough surfaces.

Springs, for example elliptical leaf springs, or other shock absorbing means may in some forms be incorporated, probably at the outer end of the support means near the stabilizer wheel. Alternatively, for example, the whole of the support means can be made of a springy or resilient material such as spring steel. The objects would be to make cycles, fitted with this sort of stabilizer, easier to ride on cambered roads and also to reduce vibrations and increase the rider's comfort on rough roads.

*It should be noted that the word 'limb' is usually used in this document in the sense that, and to indicate that, it is a portion of an object such as a substantially L-shaped arm.

A preferred embodiment is illustrated in Figs. 13-15 wherein Fig. 13 is a perspective view of one stabilizer device 94 fitted to the chain stay 95' and rear fork 95 adjacent to rear wheel 96 of a cycle, Fig. 14 is an exploded view of the device of Fig. 13 and Fig. 15 is a plan showing one of two identical mounting means 97, in position for securing to the rear fork of a cycle. Each mounting means 97, comprises a clamping block 98 having a normally vertical aperture therethrough in which an L-shaped support bar 99 is

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slidable. Each clamping block 98 has a slot 100 down one side extending into the vertical aperture such that when the thus formed parts 98' are drawn together by tightening a dome nut 101 on the threads 102' of a hook bolt 102 extending through holes 98" in parts 98', the block 98 flexes and bar 99 is clamped in a position of vertical adjustment. Bolts 102 each have hooked ends 102' or like fixed thereon for retaining engagement with the cycle frame 95. The mounting means 97 are readily securable in any suitable position on frames 95.

A stabilizer wheel 103 is rotatably mounted on a spindle bolt 104 which extends into an internal threaded aperture 105' of a swivel mounting member 105, with the thread handed such that rotation of wheel 103 acts to further tighten bolt 104. The aperture 105' leads into a normally blind hole 106 which receives deep circular sectioned grooved end 107 (or a flange or like retention means) of a downturned end portion of support bar 99 rotatable therein. End of bolt 104 is releasably engageable in groove 107 (or like means) to enable wheel 103 to be adjusted and secured in positions so that its axis of rotation is parallel or substantially parallel to that of wheel 96 on axle 96' in any position of lateral adjustment of bar 99 towards or away from wheel 96. Three possible positions of bar 99 are shown in Fig. 13. A protective cap 108 is provided on the end of bar 99.

By "adjustable" there is intended to be the possibility of relocation of the stabilizing wheel in different positions, e.g. if the wheel were positionable and securable at different locations on the support means.

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CLAIMS

1. A stabilizer device for a bicycle or tricycle comprising support means supporting a stabilizer wheel or other rolling ground-engaging means and mounting means for mounting the support means on such a cycle; said ground-engaging means being locatable or adjustable laterally nearer to or further from any vertical plane, which intersects said mounting means and is oriented along the normal direction of travel when said device is in its normal operating position; during the said lateral adjustment of said ground-engaging means its axis of rotation remains, or is adjustable to be, at right angles or substantially at right angles to said plane; said ground-engaging means being securable in more than two positions or securable in any position in its adjustment range or ranges.

2. A device as claimed in claim 1 in which, when the said device is in its normal operating position, the said ground-engaging means is additionally adjustable to, and securable in, more than one or any position in a vertical or substantially vertical adjustment range.

3. A device as claimed in claim 1, in which said support means is adjustably mounted by said mounting means so as to be continuously and infinitely finely displaceable over its adjustment range along a line lying in a plane which plane in the position of use of the device, extends vertically or substantially vertically and said ground-engaging means is adjustable linearly and laterally nearer to or further from said mounting means or said plane or angularly adjustable relative to said mounting means or said plane.

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4. A device as claimed in claim 1 or 2, in which the lateral adjustment, relative to an attached upright cycle or mounting means, of the said stabilizer wheel is by a backward or forward pivoting of the support means in the mounting means about a vertical or approximately vertical axis; a further pivoting means having a pivotal axis parallel to said vertical or substantially vertical axis is also provided at the outer end of the support means, spaced further from the mounting means, to enable the axis of the stabilizer wheel plane to be realigned parallel with the plane of the mounting means or cycle after said pivoting adjustment of the support means.

5. A device as claimed in claim 4, in which said further pivoting means may have a vertical, upward or downward, projection locating in a hole in a rotatable block which is secured where required to said projection by tightening a grub screw threaded into the threaded aperture in the said block; said grub screw either extending far enough, beyond the block for an unthreaded portion to form the stabilizer wheel spindle or a separate stabilizer wheel spindle being attached directly to the block; alternatively said further pivoting means may be L-shaped and pivot about its vertical leg, in a hole in the outer part of the supporting means, with the horizontal leg forming the stabilizer wheel spindle.

6. A device as claimed in claim 1, in which said support means may be mounted on an uprightly disposed bicycle, so as to be inclined slightly out of vertical in a direction giving automatic variation of vertical

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spacing of stabilizer wheel from ground as it is adjusted laterally towards or away from the cycle.

7. A device as claimed in claim 1, in which the lateral adjustment of the said stabilizer wheel is by mounting it so as to be adjustable and securable anywhere along an axle part, of the support means, which extends and is fixed at or near right angles to the cycle frame to which it is attached; said axle may be the horizontal limb of a substantially L-shaped support means or may be supported by, and near the bases of, the arms of an inverted approximately U-shaped supporting member; said support means will normally have a smaller outside diameter stabilizer wheel, or other rolling ground-engaging means, mounted at its outer end such that, when the main stabilizer wheel has been adjusted nearer to the cycle frame, should the cycle tilt further than the main stabilizer wheel is able to compensate for the smaller diameter wheel will touch ground, provide additional anti-toppling restoring moment, and prevent the outer end of the support arm from catching on the ground; said axle may be inclined slightly out of horizontal, in some bicycle applications, in such a way as to raise or more likely lower the stabilizer wheel automatically relative to the ground as it is adjusted nearer and nearer to an upright bicycle to which it is attached.

8. A device as claimed in any of claims 1 to 7 in which the support means (such as a support arm) is mounted so as to be adjustable in position or be extendable and retractable so as to enable the position of the stabilizing wheel to be adjusted laterally relative to the support means; said support means may

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be mounted, on an upright bicycle viewed in plan, in front of or opposite to or behind the bicycle's rear wheel spindle, and in the former case may, for example, be mounted by clamp mounting means on the rear fork and/or chain stay of the cycle.

9. A device as claimed in any of claims 1 to 8, in which a support arm is provided extending laterally of support means and being adjustable in length, e.g. by being telescopic or otherwise, and being securable in the required position of use.

10. A device as claimed in any of claims 1 to 9, in which the mounting means is provided as an integral portion of the bicycle or tricycle (e.g. as an extension to the plate uniting the rear forks and bicycle chain stay which latter extends substantially horizontally between the pedal hub and rear wheel spindle) or is a mounting block or bracket fixed to said uniting plate or a rear fork and/or chain stay with the support means being removable in each instance.

11. A device as claimed in any of claims 1 to 10 in which the mounting means is appropriately adapted for the left and right-hand sides of a bicycle or tricycle or be usable without adaptation on both sides of a bicycle or tricycle.

12. A device as claimed in any of claims 1 to 11, in which the mounting means has two integral extension arms or an integral bifurcated portion fixed permanently to it which is engageable either side of

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the chain stay to prevent turning of the mounting means about the bicycle's rear wheel spindle.

13. A device as claimed in any of claims 1 to 12, in which the mounting means comprises, in use, a substantially horizontally extending plate locatable, via an aperture, on the bicycle rear wheel spindle and held thereon by the nut and having an end bent back towards itself to form, viewed in plan, an open ended loop shaped clamp around the perimeter of the supporting means vertical limb tightenable, for example by one or more sets of nuts and bolts, to hold the supporting means in any required position of adjustment or alternatively with the said loop fixed back to the plate and the supporting means held in the required position by, for example, a grub screw threaded into a tapped hole in the plate.

14. A device as claimed in any of claims 1 to 13, in which in addition to the main stabilizing or stabilizer wheel, an additional stabilizer wheel or emergency wheel of smaller exterior diameter than the main stabilizer wheel is provided laterally outwardly of the main stabilizer wheel such that, when the main stabilizer wheel has been adjusted nearer the bicycle rear wheel, should the bicycle tilt further than the main stabilizer wheel is able to compensate for and should the bicycle begin to topple, then said smaller emergency wheel is such that it touches the ground and provides an additional restoring moment and tilt warning to the rider and also prevents the end of the support arm from catching on the ground; said emergency wheels would also be provided on some forms of tricycle to act in the above way when the pair of main

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stabilizer wheels, forming the tricycle's rear wheels, have been adjusted laterally relatively close together.

15. A device as claimed in any of claims 1 to 14, in which the mounting and/or support means has elongated upwardly extending overlapping slots in two or more vertical parallel rows or a single longer continuous such slot to accommodate different heights of bicycle spindle nuts and provide for continuous fine vertical adjustment of the height of the stabilizer wheel above ground level when fitted to a particular bicycle in its normal upright position.

16. A device as claimed in any of claims 1 to 15, in which the support means is mounted so as to be pivotable and inclinable or inclined slightly out of vertical in and/or relative to the mounting means, or the mounting means is in two or more parts with the one supporting the support means being fixed, inclined or inclinable or angularly adjustable, to permit the variation of vertical spacing of the stabilizer wheel from the ground with the bicycle upright to be accomplished automatically as the stabilizer wheel is moved in, towards the rear bicycle wheel, without any vertical adjustment of the support means in the mounting means being required.

17. A device as claimed in any of claims 1 to 15 in which the stabilizer wheel is mounted on a spindle, and can be moved towards the bicycle rear wheel in stages along said spindle, which is inclined slightly from horizontal (with the bicycle upright) in such a way that the stabilizer wheel will be automatically raised from or more likely, lowered towards the ground

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as it is adjusted inwardly towards the rear bicycle wheel: said raising or lowering would be accomplished without any vertical adjustment of the support means in the mounting means being required.

18. A bicycle having improved stabilizer devices on opposite sides of the bicycle and each comprising support means for supporting a stabilizer wheel or like adjustable laterally with respect to the bicycle to enable the spacing of the wheel from the bicycle to be adjusted.

19. A bicycle as claimed in claim 17, in which the stabilizer wheels lateral adjustment is along a line transverse to the plane in which the bicycle rear wheel lies or substantially parallel to the axle of the rear bicycle wheel.

20. A bicycle as claimed in claim 14, in which the stabilizer wheels support means is continuously and finely adjustable upwardly and downwardly relative to the bicycle in its normal upright position.

21. A bicycle as claimed in claim 19, in which the stabilizer wheels support means is also adjustable about an inclined axis.

22. A bicycle as claimed in claims 18 and 19, to which improved adjustable stabilizers are permanently fixed, as integral parts, for rider learning purposes.

23. A mounting means made adjustable in a substantially horizontal direction, when the bicycle to which it is attached is in its normal upright position,

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by, for example, the provision of alternative extra holes at substantially the same horizontal level, or one or more horizontally elongated slots, to take the bicycle spindles end and allow alternative fastening positions for it and its nut, or by for example, providing one or more piece clamp mounting means which can be fixed to the chain stay or rear fork of the bicycle.

24. A stabilizer device as claimed in any of claims 1 to 23, in which the mounting means (and hence the remainder of the stabilizer) is prevented from rotating about the rear spindle of an upright bicycle, in use and to which it is fitted, by an inverted substantially U-shaped member with a projection which can be rigidly attached to the bicycle frame whilst the substantially vertical limb of the U furthest from the said projection passes through one or more substantially vertically aligned passages or holes in the mounting means, in such a way as to be upwardly and downwardly and/or rotationally adjustable to avoid obstructions on and fit onto different sorts of bicycle frame, and is fixed in position for example by a grub screw screwed into a threaded passage in the mounting means; said projection's base may be flattened and would usually bear, and be strapped or otherwise fixed, onto the top of the bicycle's chain stay.

25. A stabilizer device as claimed in any of claims 1 to 24, fitted with means of making a noise when the stabilizer wheel contacts the ground, such as two or more adjacent loose washers mounted on the spindle of the stabilizer which can clatter together, and preferably means of making different noises for the

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left stabilizer's ground contacts compared with the right stabilizer's ground contacts for example by using different sized or different shaped washers on the two stabilizers.

26. A tricycle in which the rear two wheels and part of the support frame are replaced by a pair of improved stabilizer devices mounted so that the wheels can be adjustable laterally nearer to or further from each other as, for example, by adjusting the lateral positions relative to each other with a telescopic substantially horizontal member, or as claimed in claims 5 and 6 with the pivotable supporting arms, substantially vertical limbs, housed and fixable in the required position in the mounting means attached to or forming part of the rear part of the tricycle frame or as claimed in claim 6 with both stabilizer wheels fixable in the required positions along a horizontal spindle which would usually have smaller outside diameter wheels at it's ends.

27. A stabilizer device as claimed in any of claims 1 to 26 in which shock absorber/spring means are provided for the stabilizer wheel.

28. A stabilizer device as claimed in claim 1, in which the mounting means comprises at least one apertured and bifurcated clamping means for clamping the support means, with the limbs of the bifurcation being clampable and the support means thus adjustably securable, by tightening a nut on the threaded end of a hooked bolt or other frame engaging device extending through the limbs which thus also enables securement of the mounting means on the frame at the same time.

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29. A device as claimed in at least claim 1 or 2, in which said mounting means includes a clamping means comprising a clamping block with a hole through it sized to slidably fit the supporting means and with a slot stretching from one edge of said block through to said hole to form two projections of said block; said projections being drawn together in use by a hook bolt, or similar means, which passes through hole in both said projections and fastens with its hooked end onto the cycle frame, said hook bolt being tightened, against said clamping block by a nut or similar means threaded onto a threaded portion at the straight end of the hook bolt, to secure the supporting means to the cycle frame; in the clamping means and cycles normal positions of use of the cycle, this securement is at the required vertical level in its vertical adjustment range and also in some forms so that the horizontal or inclined part of the support means can be secured at various angles in plan to the cycle for lateral adjustment purposes; normally two such clamping means would be used to clamp the supporting means to both the chain stay and rear fork of the cycle.

30. A stabilizer device for a bicycle or tricycle or a bicycle or tricycle fitted with or incorporating one, or usually two stabilizer devices substantially as herein described with reference to the accompanying drawings.

31. A device as claimed in claim 2, in which the lateral and continuous vertical adjustability of the stabilizer wheel is adjustment of the position of the stabilizer wheel relative to the bicycle's rear wheel to achieve different restoring moments and different

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degrees of inclination from upright of a bicycle having the device thereon when the stabilizer wheel engages the ground.

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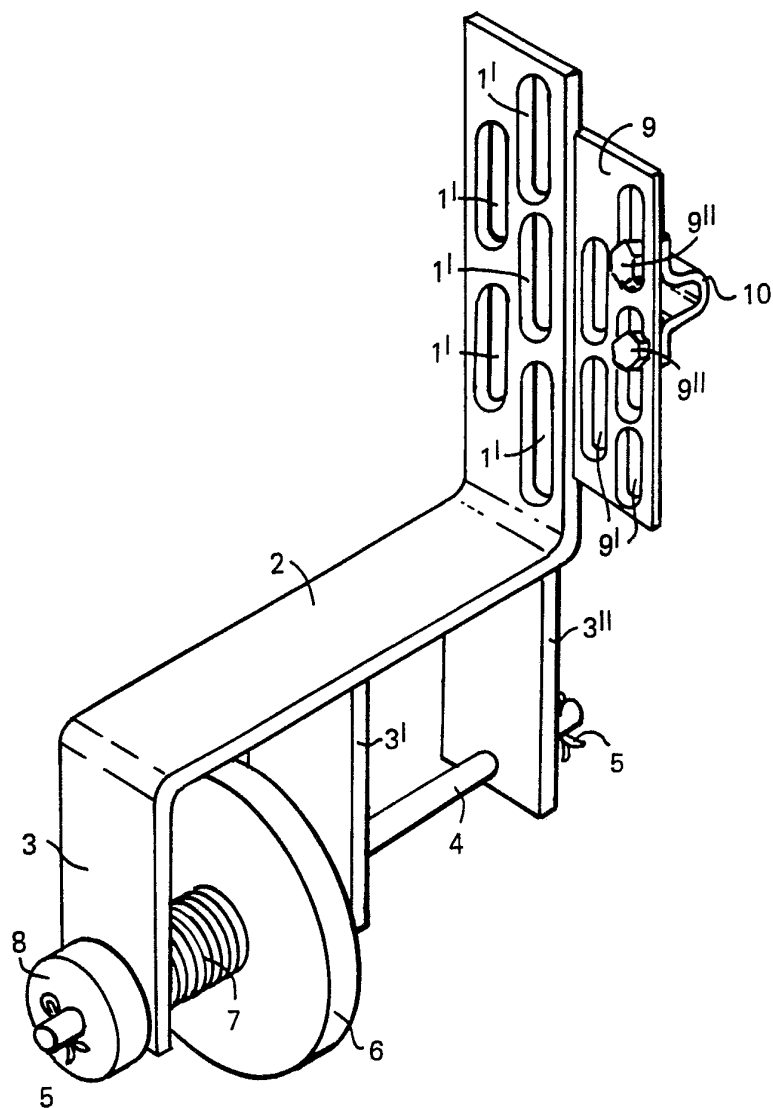
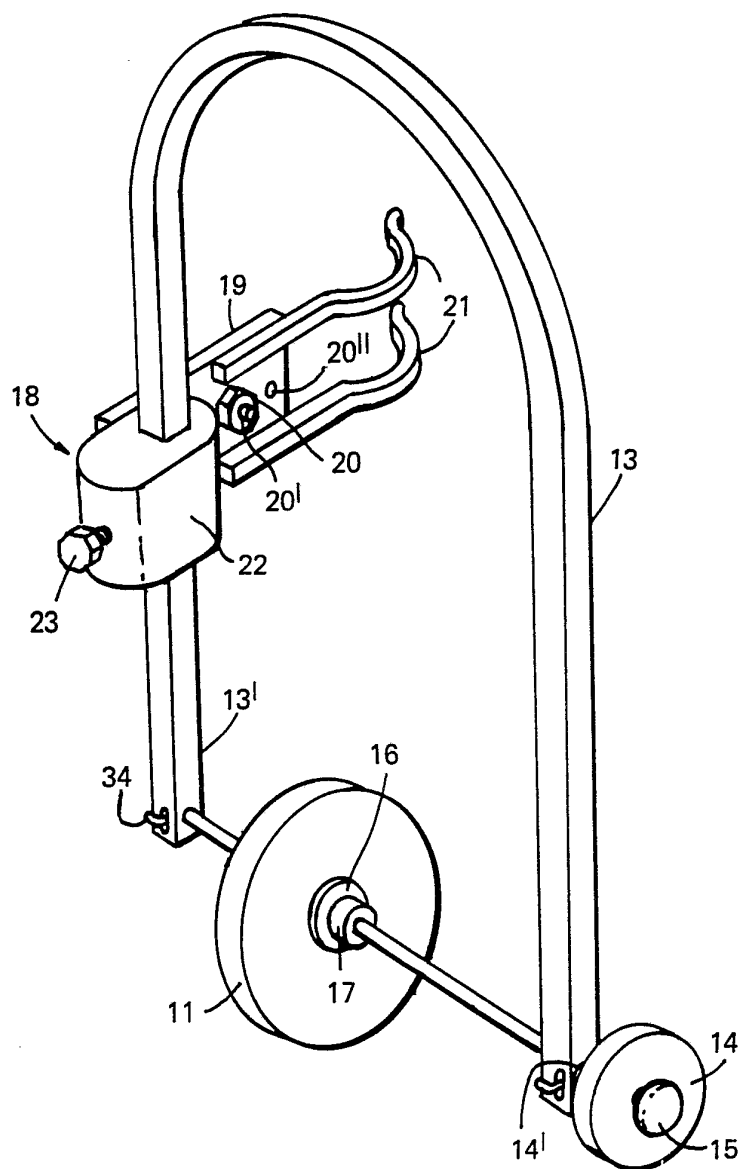
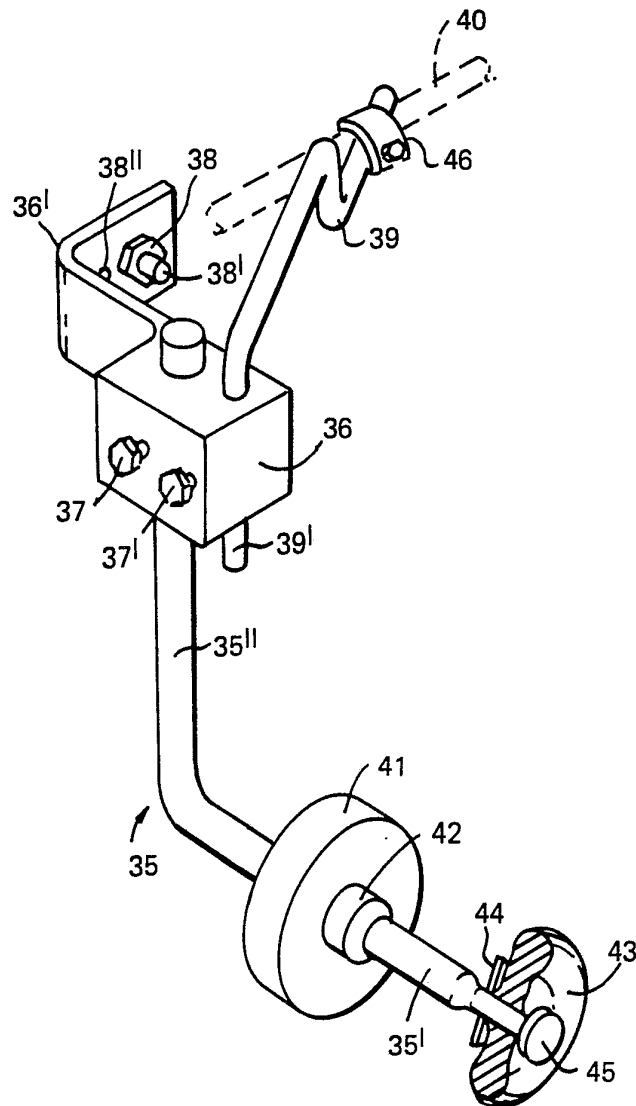


FIG. 1

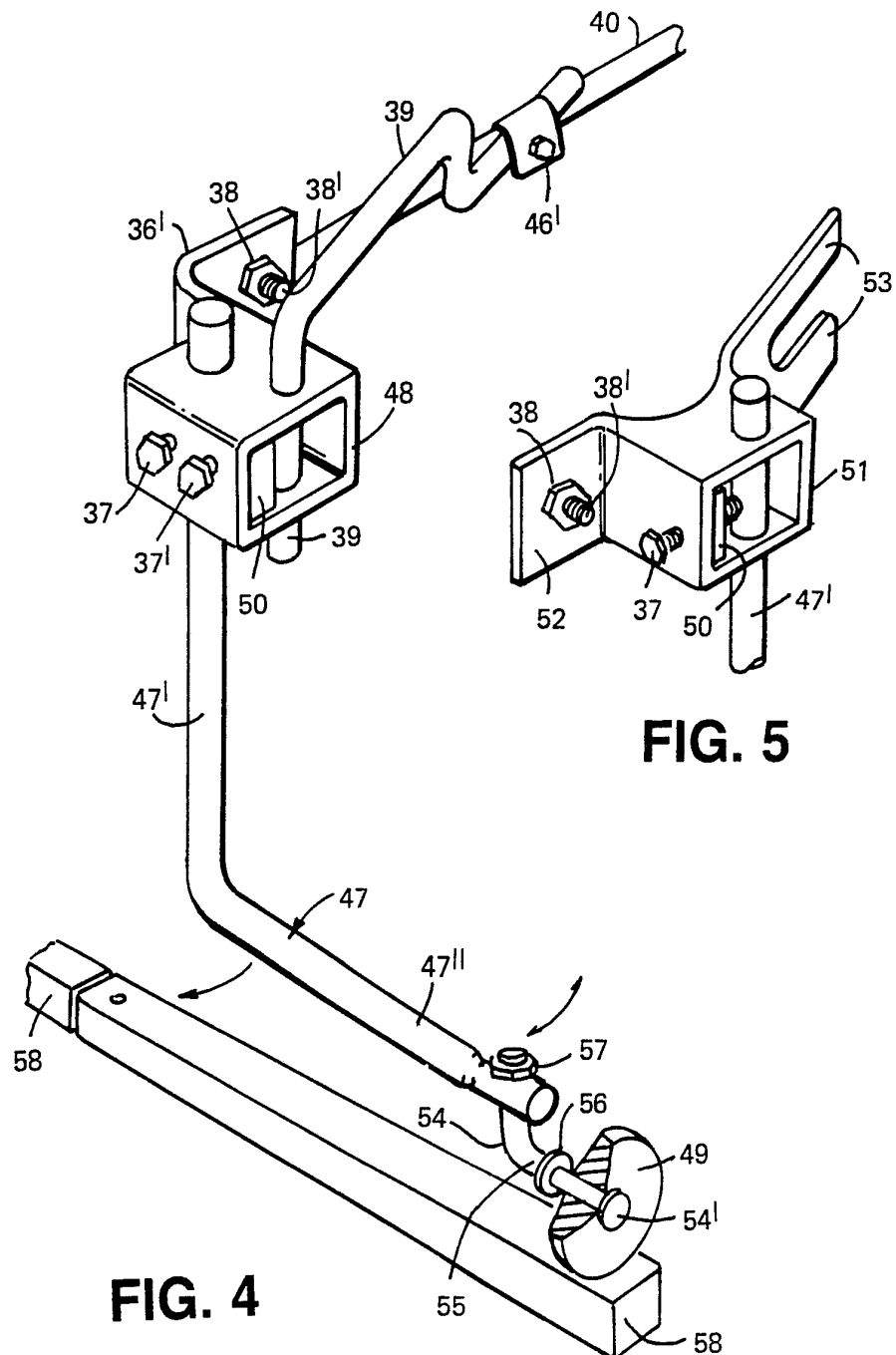
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**FIG. 2**

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**FIG. 3**

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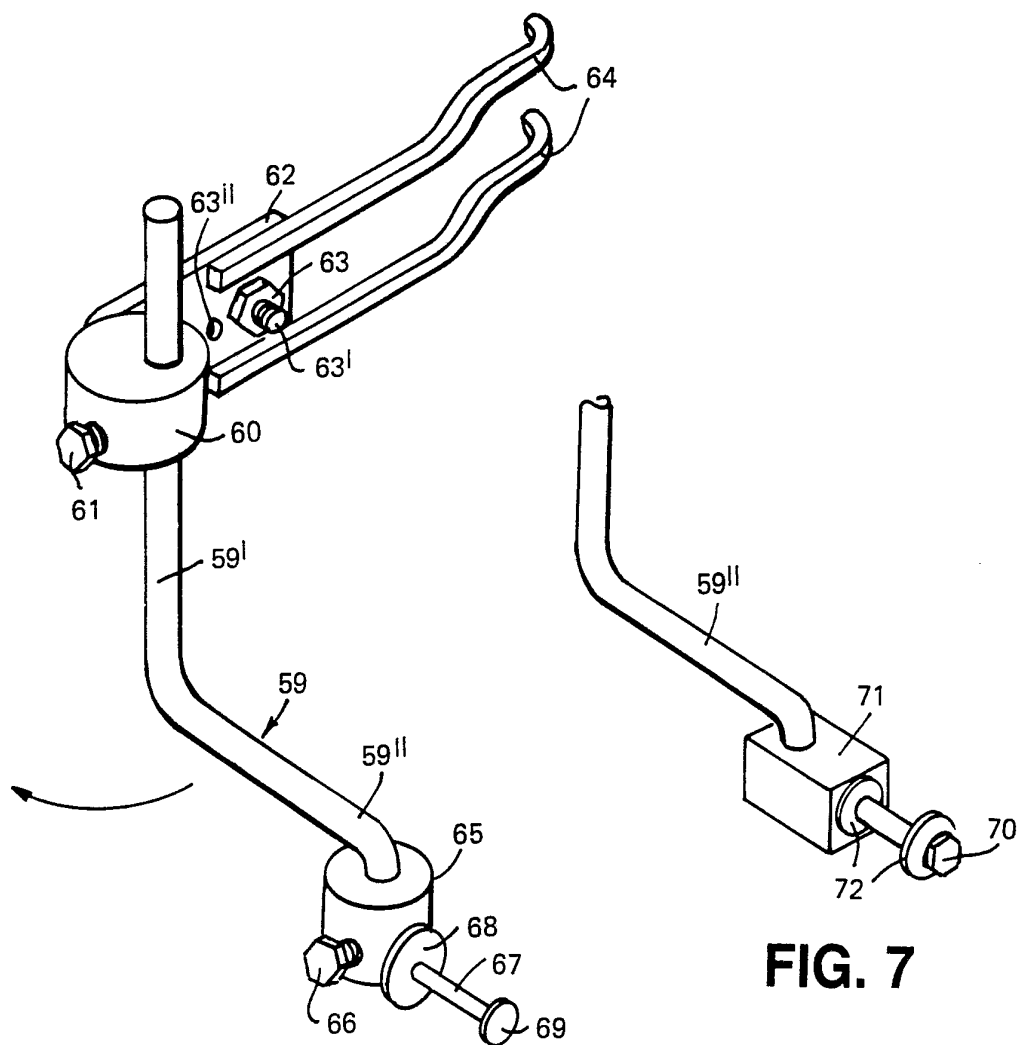
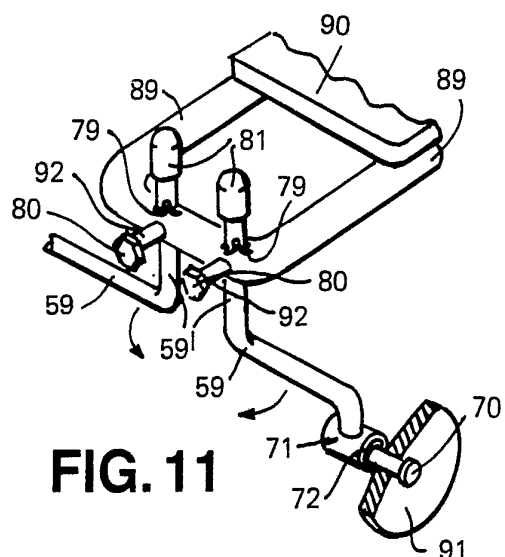
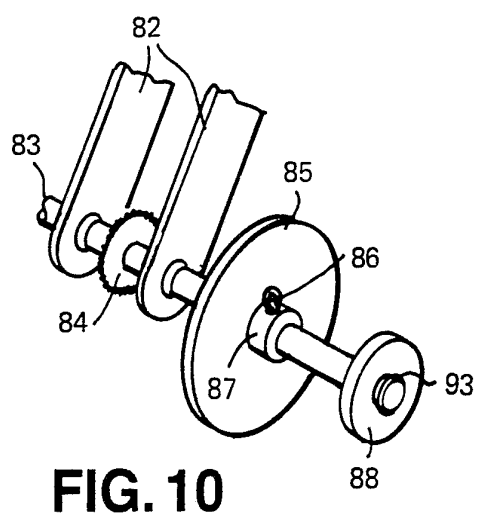
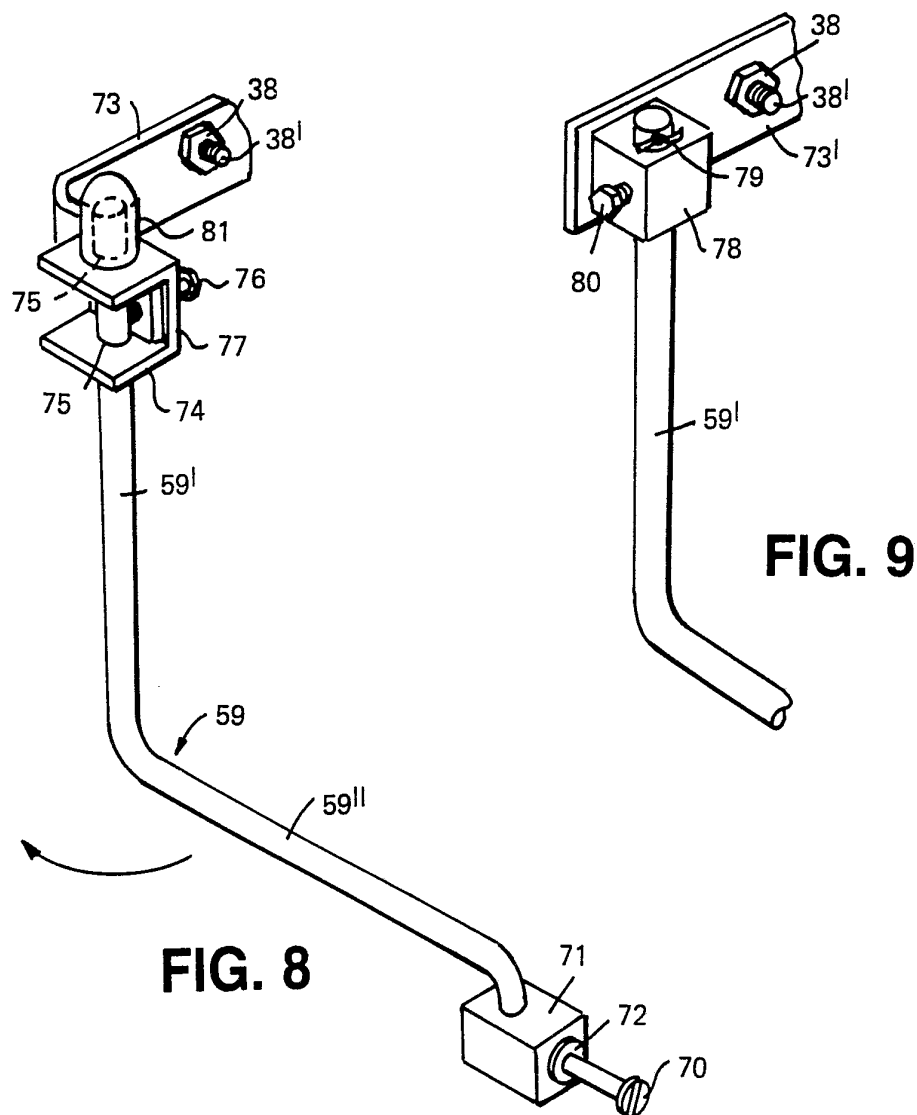


FIG. 6

FIG. 7

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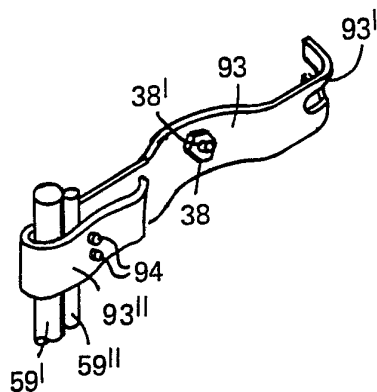


FIG. 12

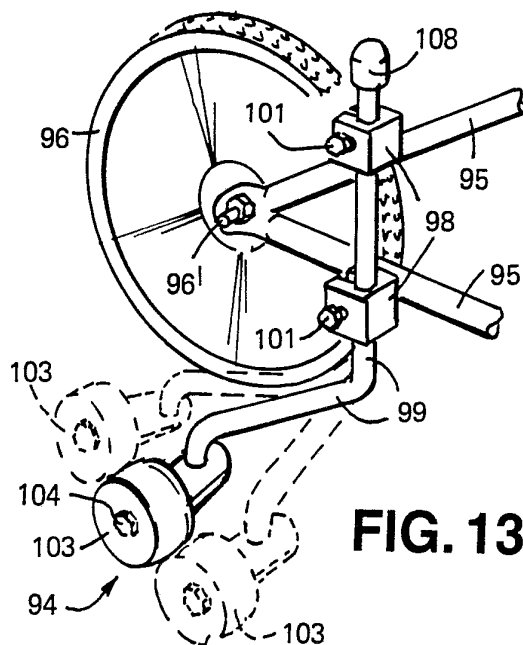


FIG. 13

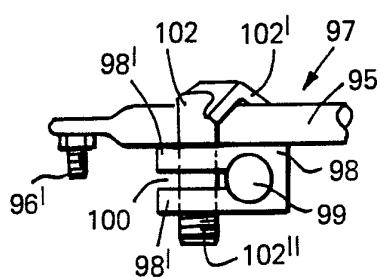


FIG. 15

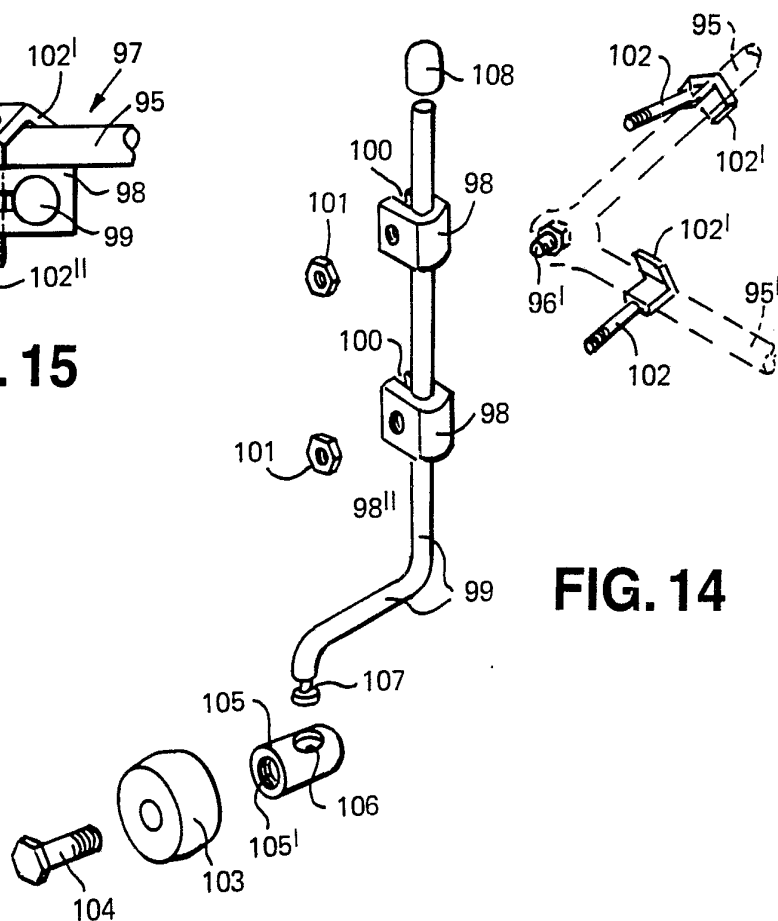
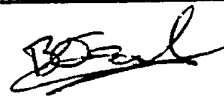


FIG. 14

INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 91/01428

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ⁶		
According to International Patent Classification (IPC) or to both National Classification and IPC		
Int.Cl. 5 B62H1/12		
II. FIELDS SEARCHED		
Minimum Documentation Searched ⁷		
Classification System	Classification Symbols	
Int.Cl. 5	B62H	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched ⁸		
III. DOCUMENTS CONSIDERED TO BE RELEVANT⁹		
Category ^o	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
X	FR,A,1 087 400 (A. BUSCONI) 23 February 1955	1-3, 6, 8, 11, 16, 18, 20-22, 30, 31
A	see the whole document ---	13, 24
X	FR,A,1 064 977 (ANCIENS ETABLISSEMENTS P. MAGGI) 19 May 1954	1, 2, 6, 8, 9, 11, 12, 16, 18, 19, 30, 31
A	see the whole document ---	20, 22, 24
A	FR,A,770 123 (C. TOURNEMIRE) 8 September 1934 see the whole document ---	23, 27
A	US,A,4 615 535 (D. K. MCMURTREY) 7 October 1986 see abstract; figures ---	28, 29
	-/--	
^o Special categories of cited documents : ¹⁰ "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. "&" document member of the same patent family		
IV. CERTIFICATION		
Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report	
2 19 DECEMBER 1991	22. 01. 92	
International Searching Authority EUROPEAN PATENT OFFICE	Signature of Authorized Officer FRANKS B.G. 	

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)		
Category *	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No.
A	US,A,2 647 764 (P. V. ANDERSON) 4 August 1953 see figures ---	4
A	GB,A,749 616 (H. A. BENNETT) 30 May 1956 see figures ---	15

ANNEX TO THE INTERNATIONAL SEARCH REPORT
ON INTERNATIONAL PATENT APPLICATION NO. GB 9101428
SA 50871

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
FR-A-1087400		None	
FR-A-1064977		None	
FR-A-770123		None	
US-A-4615535	07-10-86	None	
US-A-2647764		None	
GB-A-749616		None	