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Description

This invention relates to door checks particularly, but not exclusively, door checks intended for use on the doors of motor vehicles.

Vehicle manufacturers and Government bodies are devising increasingly stiff tests which door checks must survive in order to be considered suitable for use. For example, one current test procedure consists of subjecting an unlubricated mechanism to 100,000 operations with the mechanism periodically dusted with desert soil.

Whilst there has been a multitude of previous proposals for door checks most of them would not stand up to such arduous tests, or at least the modifications required to meet the tests would be prohibitively expensive.

The major problem facing a door check designer is therefore to produce a check which will perform satisfactorily in use yet be inexpensive to manufacture.

One relatively inexpensive door check arrangement was proposed in our GB—A—1247755 in which a contoured check arm extends between a pair of rollers mounted in a bracket, and one of the rollers is resiliently biased towards the other roller by being mounted on one arm of a torsion bar. GB—A—1 597 747 shows a not dissimilar arrangement. In GB—A—1 449 671 instead of a torsion bar a coiled bar is employed, with the movable roller mounted on one free end of the bar.

We have realised that in those previous arrangements the problem can arise that the axis of the movable roller tilts in use relative to the axis of the fixed roller, and during prolonged use an edge of the check arm may dig into the roller, particularly if a plain roller is employed. Also tilting of the roller tends to twist the check arm which can result in excessive wear in other regions.

The present invention is aimed at reducing the relative tilting of the rollers.

GB—A—795867 discloses a door check in which a pair of rollers are mounted in a bracket and are spring biased towards the check arm extending between the rollers by a spring bar of U-shape, the rollers being rotatably carried by short parallel legs of the bar. The free ends of the legs are slidably guided in respective guide slots in the bracket, positioned closely adjacent to the rollers, the slots extending in the direction of separation of the rollers. Such slots would not appear to inhibit tilting of the spring bar legs in use.

According to the invention a door check comprises a contoured check arm adapted to be pivotally secured to a door or door pillar, and a bracket adapted to be secured to a door pillar or door respectively, first and second rollers mounted on or in the bracket with the check arm extending between the rollers, a spring bar carried by the bracket and providing a spring force to bias the rollers relatively towards each other, the spring bar comprising a leg on a portion of which the first roller is mounted, one

end of the leg being continuous with one end of a bent portion of the bar, characterised in that the opposite, free end of the leg is restrained to the bracket against movement in the direction of separation of the rollers which the spring force in the bar would otherwise produce, said portion of the leg on which the first roller is mounted is spaced substantially from the restrained free end, and the other end of the bent portion opposite to said one end of the bent portion is restrained directly or indirectly to the bracket against movement in the direction of separation of the rollers which the spring force in the bar would otherwise produce, the restraints on the bar helping to retain the axes of the rollers substantially parallel during deflection of the leg in use.

Since the free end of the leg is restrained to the bracket against movement urged by the spring bar force, the tilting of said portion of the leg can be resisted.

It will be appreciated that a sufficiently long leg must be employed to provide a sufficient length of the leg between the first roller and the restrained free end to accommodate the lateral movement of the roller.

Although the free end of the leg may be restrained by being clamped to the bracket it is preferred that the free end is pivotally supported on the bracket.

The free end of the leg is preferably provided with a recess in one side which engages with the bracket to provide a fulcrum for the pivoting, and to locate the free end.

The bent portion of the bar may be arranged to act as a torsion bar, or it may be arranged to be subjected to bending stresses only, or a combination of torsion and bending stresses may be employed.

Thus, we are in effect proposing substantially to extend one arm of previously proposed arrangements and to restrain the free end of that arm against lateral movement relative to the bracket which in the absence of the restraint would be produced by the spring force, and this principle is applicable to both bending bar and torsion bar arrangements.

Preferably the second roller is mounted on said other end of the bent portion of the bar.

In one such arrangement said other end is held directly against lateral movement relative to the bracket urged by the spring force, so that only the first roller is displaced relative to the bracket on movement of the check arm.

In another arrangement, however, both rollers are displaceable relative to the bracket, and said other end of the bent portion is continuous with a second leg of the bar on which the second roller is mounted, and the free end of the leg is restrained to the bracket against movement in the direction of separation of the rollers which the spring force in the bar would otherwise produce.

The bracket is conveniently formed from sheet material that is bent into an angular S-shape, the rollers are held captive between two of the horizontal limbs of the S, and the free end of the or

each leg is pivoted on the third horizontal limb of the S.

Various door checks for vehicles in accordance with the invention will now be described, by way of example only, with reference to the accompanying drawings in which:—

Figure 1 is a plan view of a first check shown mounted in a vehicle, with the door in the closed position;

Figure 2 is a side elevation of the check of *Figure 1* looking in the direction of the arrow A;

Figure 3 is an end view looking in the direction of the arrow B in *Figure 1*;

Figure 4 is a partial cross-section on the line 4—4 of *Figure 1*;

Figure 5 is a plan view of the spring bar in its relaxed condition;

Figure 6 is a view of the relaxed spring bar looking in the direction of the arrow C in *Figure 5*;

Figure 7 is a plan view of a second check;

Figures 8 and 9 are views of the check of *Figure 7* on the arrows D and E respectively;

Figure 10 is a view corresponding to *Figure 9* but of a modification of the second check; and

Figure 11 is two views of a modified spring bar.

With reference to *Figures 1 to 3*, the first check illustrated comprises a bracket 11 formed from a rectangular strip of sheet material by bending about five transverse lines so as to be substantially of angular S-shape, as shown in *Figure 2*, comprising three parallel, horizontally extending walls 2, 3, and 4, and vertical walls 5 and 6 for connection by screws engaging holes 7 to a door or door pillar. The walls 2 and 3 of the bracket are connected by a further vertical wall 8 which is apertured at 11 to receive a contoured horizontal check arm 9 provided with a pivot hole 10 for attachment to a door pillar or door respectively.

In *Figure 1* the bracket 1 is shown mounted in a vehicle door, with the pivot 10 secured to a further bracket 10' mounted on a door post. The hinge axis of the door is indicated at X.

First and second plain cylindrical rollers 12 and 13 respectively are mounted on a spring bar 14 and vertically between the bracket walls 2, 3. The spring bar comprises parallel vertical legs 15 and 16, and a bent portion 17 which inter-connects the legs 15, 16. Leg 15 is substantially longer than leg 16 and extends through a hole 18 provided in lower wall 4 with which it has a pivotal abutment to restrain it against lateral movement.

In order to locate the free end 19 of leg 15 against vertical movement relative to wall 4, the end 19 is provided with a recess 20 on the side remote from leg 16 which receives the edge of the material of wall 4, and the recess 20 thereby acts as a fulcrum for pivotal movement of the lower part of leg 15. Notch 20 is produced by local flattening of the bar. Leg 15 extends through respective aligned open-ended slots 21, *Figure 1*, in the walls 2, 3, the slots extending in the direction away from leg 16 to enable the first roller 12 to move laterally of the bracket 1.

The shorter leg 16 extends through aligned holes 22 in the walls 2, 3, and the leg 16 and

second roller 13 are thereby held against lateral movement relative to the bracket 1.

The bent portion 17 of the bar 14 comprises a horizontally extending substantially U-shaped part 23 extending substantially perpendicularly to the walls 5, 6, that is generally in the direction of movement of the check arm 9, and a pair of right-angle bend parts 24, *Figure 2*, which connects the limbs of the U respectively to the upper ends of the legs 15, 16. The limbs of the U-shaped part 24 converge slightly towards their free ends.

Check arm 9 is contoured in the usual way to provide two hold-open positions of the door in use. Movement of the check arm between the rollers 12, 13 causes first roller 12 to be deflected away from roller 13 against the spring force exerted by bar 14. Displacement of the roller 12 away from roller 13 is accommodated by a relative movement apart of bar parts 24 to open the U-shaped part 23, and by pivoting of leg 15 about free end 19.

It will be appreciated that in this arrangement the bar 14 is subjected to both torsional and bending stresses. Displacement of the roller 12 produces both bending and twisting of the limbs of the U-shaped part 23. In the unstressed condition of the bar 14, shown in *Figures 5 and 6*, prior to assembly to bracket 1, the legs 15, 16 each extend at an angle of 77° to the plane of U-shaped part 23, diverging from each other, so that substantial torsional stresses are present in the assembled bar, these being resisted by the engagement between bar end 19 and lower wall 4.

The pivotal deflection of the leg 15 is shown in *Figure 4* and it will be seen that control of the position of the free end 19 of leg 15 results in control over the inclination of the axis of the first roller 12 relative to the vertical. Although there will usually be a slight change in the inclination of the roller 12 this will usually be much less than with previous arrangements.

It is preferred that the contoured side of the check arm engages with the anchored roller 13, but the reverse would be possible. This reduces the wear produced in the engagement between bar 14 and the slots 21.

Figures 7 to 9 show a second check, and corresponding reference numbers have been applied to parts corresponding to the check of *Figure 1*.

The check differs from that of *Figure 1* only in the shape of the bent portion 17 of the bar 14, the right-angle parts 24 being omitted, so that the U-shaped part 23 extends vertically. This is useful in circumstances where space is limited.

It will be appreciated that the operation of the check of *Figures 7 to 9* is identical to that of *Figure 1*, except that the limbs of part 23 are not subjected to torsional stresses.

Figure 10 shows a more significant departure from the arrangement of *Figure 1* in that the legs 15, 16 are made of equal length, and the free ends 19, 19' of the legs both have pivotal abutments with the bracket lower wall 4. The rollers 12, 13 are both capable of lateral movement relative to

bracket, slots similar to slots 21 of Figure 1 being provided also for the leg 16 to accommodate the lateral movement of roller 13. Thus the arrangement of the bar 14 and rollers 12, 13 is entirely symmetrical in this arrangement.

The shape of the bent portion 17 of the bar is identical to that of Figure 9.

Figure 11 shows a modified bar arrangement which may be used in a check similar to that of Figure 10. In this case the bent portion 17 is in the form of a coil.

It will be appreciated that the construction of the check arm is not relevant to the invention and that many forms of check arm may instead be employed. For example, a laminated check arm may be employed where the rollers engage with the wider sides of the arm rather than with the narrow edges.

Claims

1. A door check comprising a contoured check arm (9) adapted to be pivotally secured to a door or door pillar, and a bracket (1) adapted to be secured to a door pillar or door respectively, first and second rollers (12, 13) mounted on or in the bracket with the check arm extending between the rollers, a spring bar (14) carried by the bracket and providing a spring force to bias the rollers relatively towards each other, the spring bar (14) comprising a leg (15) on a portion of which the first roller (12) is mounted, one end of the leg being continuous with one end (24) of a bent portion (17) of the bar, characterised in that the opposite, free end (19) of the leg (15) is restrained to the bracket against movement in the direction of separation of the rollers which the spring force in the bar would otherwise produce, said portion of the leg (15) on which the first roller (12) is mounted is spaced substantially from the restrained free end (19), and the other end (24) of the bent portion opposite to said one end (24) of the bent portion is restrained directly or indirectly to the bracket against movement in the direction of separation of the rollers which the spring force in the bar would otherwise produce, the restraints on the bar helping to retain the axes of the rollers (12, 13) substantially parallel during deflection of the leg (15) in use.

2. A door check as claimed in claim 1 in which the free end (19) of the leg (15) is restrained by being pivotally supported on the bracket.

3. A door check as claimed in claim 2 in which the free end (19) of the leg is provided with a recess (20) in one side which engages with the bracket to provide a fulcrum for the pivoting, and to locate the free end (19).

4. A door check as claimed in claim 2 or claim 3 in which the bracket is formed from sheet material that is bent into an angular S-shape, the rollers (12, 13) are held captive between two of the horizontal limbs (2, 3) or the S, and the free end of the leg (15) is pivoted on the third horizontal limb (4) of the S.

5. A door check as claimed in any of the pre-

ceding claims in which the second roller (13) is mounted on a second leg (16) of the bar which is continuous with said other end of the bent portion (17) of the bar.

6. A door check as claimed in claim 5 in which the second leg (16) is restrained to the bracket against said movement urged by the spring bar force, at locations axially on either side of the second roller (13).

7. A door check as claimed in claim 5 in which both rollers (12, 13) are displaceable relative to the bracket, and the second roller is mounted on a portion of the second leg (16) that is spaced substantially from the free end (19') of the second leg, that free end (19') being restrained to the bracket against movement in the direction of separation of the rollers which the spring force in the bar would otherwise produce.

Patentansprüche

1. Türfeststeller

mit einem konturierten, schwenkbar an einer Tür oder einem Türpfosten befestigbaren Feststellarm (9),

mit einem an einem Türpfosten bzw. einer Tür befestigbaren Haltestück (1),

mit ersten und zweiten Rollen (12, 13), die an oder in dem Haltestück derart befestigt sind, daß sich der Feststellarm zwischen den Rollen hindurch erstreckt,

mit einem von dem Haltestück gehaltenen Federbügel (14), der eine Federkraft liefert, um die Rollen gegeneinanderzudrücken und einen Schenkel (15) aufweist, auf welchem die erste Rolle (12) angeordnet ist und dessen eines Ende in ein Ende (24) eines gebogenen Teils (17) des Federbügels übergeht, dadurch gekennzeichnet,

daß das gegenüberliegende, freie Ende (19) des Schenkels (15) gegen eine Bewegung in Richtung einer Trennung der Rollen, die die Federkraft sonst hervorrufen würde, an dem Haltestück festgelegt ist,

daß der Teil des Schenkels (15), auf welchem die erste Rolle (12) angeordnet ist, in erheblichem Abstand von dem festgelegten freien Ende (19) gelegen ist,

daß das andere, dem einen Ende (24) gegenüberliegende Ende des gebogenen Teils direkt oder indirekt an dem Haltestück gegen eine Bewegung in Richtung einer Trennung der Rollen festgelegt ist, die die Federkraft in dem Federbügel sonst hervorrufen würde,

und daß die Festlegungen an dem Federbügel dazu verhelfen, die Achsen der Rollen (12, 13) bei der im Betrieb stattfindenden Biegung des Schenkels (15) im wesentlichen parallel zu halten.

2. Türfeststeller nach Anspruch 1, dadurch gekennzeichnet, daß das freie Ende (19) des Schenkels (15) durch eine schwenkbare Abstützung an dem Haltestück festgelegt ist.

3. Türfeststeller nach Anspruch 2, daß das freie Ende (19) des Schenkels (15) mit einer Ausnehmung (20) auf einer Seite versehen ist, in der das Haltestück angreift, um einen Lagerpunkt für die

Schwenkbewegung zu bilden und das freie Ende (19) zu fixieren.

4. Türfeststeller nach Anspruch 2 oder 3, dadurch gekennzeichnet, daß das Haltestück aus Blech hergestellt ist, welches in eine winklige S-Form gebogen ist, daß die Rollen (12, 13) zwischen zwei horizontalen Schenkeln (2, 3) des "S" festgehalten und das freie Ende des Schenkels (15) an dem dritten horizontalen Schenkel (4) des "S" schwenkbar abgestützt ist.

5. Türfeststeller nach einem der vorangehenden Ansprüche, dadurch gekennzeichnet, daß die zweite Rolle (13) auf einem zweiten Schenkel (16) des Federbügels angeordnet ist, der in das andere Ende des gebogenen Teils (17) des Federbügels übergeht.

6. Türfeststeller nach Anspruch 5, dadurch gekennzeichnet, daß der zweite Schenkel (16) an dem Haltestück gegen die besagte, durch die Kraft des Federbügels hervorgerufene Bewegung an Stellen festgelegt ist, die sich axial auf beiden Seiten der zweiten Rolle (13) befinden.

7. Türfeststeller nach Anspruch 5, dadurch gekennzeichnet, daß beide Rollen (12, 13) relativ zu dem Haltestück verlagerbar sind und daß die zweite Rolle auf einem Teil des zweiten Schenkels (16) angeordnet ist, der einen erheblichen Abstand von dem freien Ende (19') des zweiten Schenkels aufweist, und daß das freie Ende (19') an dem Haltestück gegen eine Bewegung in der Richtung einer Trennung der Rollen festgelegt ist, die die Federkraft in dem Federbügel sonst hervorrufen würde.

Revendications

1. Arrêt de porte comportant un bras profilé (9) apte à être fixé, de manière à pouvoir pivoter, sur une porte ou un montant de porte, une console (1) apte à être fixée respectivement sur un montant de porte ou une porte, des premier et second galets (12, 13) montés sur ou dans la console et entre lesquels s'étend le bras de l'arrêt de porte, une barre formant ressort (14) portée par le console et fournissant une force élastique servant à solliciter les galets l'un en direction de l'autre, la barre formant ressort (14) comprenant une branche (15) sur une partie de laquelle se trouve monté le premier galet (12), une extrémité de cette branche étant réalisée d'un seul tenant avec une extrémité (24) d'une partie coudée (17) de la barre, caractérisé en ce que l'extrémité libre opposée (19) de la branche (15) est retenue sur la console en étant bloquée contre tout déplacement dans la direction de séparation des galets,

que, sinon, la force élastique présente dans la barre produirait, que ladite partie de la branche (15), sur laquelle le premier galet (12) est monté, est espacée de façon substantielle de l'extrémité libre retenue (19) et que l'autre extrémité (24) de la partie coudée située à l'opposé de ladite première extrémité (24) de la partie coudée est retenue directement ou indirectement sur la console en étant bloqué contre tout déplacement dans la direction de séparation des galets, que, sinon, la force élastique présente dans la barre produirait, les contraintes appliquées à la barre contribuant à maintenir les axes des galets (12, 13) essentiellement parallèles pendant le fléchissement de la branche (15) en cours d'utilisation.

2. Arrêt de porte selon la revendication 1, dans lequel l'extrémité libre (19) de la branche (15) est retenue en étant supportée, de façon à pouvoir pivoter, sur la console.

3. Arrêt de porte selon la revendication 2, dans lequel l'extrémité libre (19) de la branche est munie d'un renforcement (20) dans une face qui contacte la console, de manière à former un pivot pour le mouvement de pivotement et à positionner l'extrémité libre (19).

4. Arrêt de porte selon la revendication 2 ou 3, dans lequel la console est constituée en un matériau en forme de feuille, qui est replié sous une forme angulaire de S, les galets (12, 13) sont maintenus captifs entre deux des éléments horizontaux (2, 3) du S et l'extrémité libre de la branche (15) pivote sur le troisième élément horizontal (4) du S.

5. Arrêt de porte selon l'une quelconque des revendications précédentes, dans lequel le second galet (13) est monté sur une seconde branche (16) de la barre, qui est d'un seul tenant avec ladite autre extrémité de la partie coudée (17) de la barre.

6. Arrêt de porte selon la revendication 5, dans lequel la seconde branche (16) est retenue sur la console, de manière à être bloquée contre tout déplacement provoqué par la force élastique de la barre, en des emplacements situés axialement des deux côtés du second galet (13).

7. Arrêt de porte selon la revendication 5, dans lequel les deux galets (12, 13) sont déplaçables par rapport à la console, et le second galet est monté sur une partie de la seconde branche (16) qui est espacée de façon substantielle de la console, cette extrémité libre (19') étant retenue sur la console en étant bloquée contre tout déplacement dans la direction de séparation des galets que, sinon, la force élastique contenue dans la barre produirait.

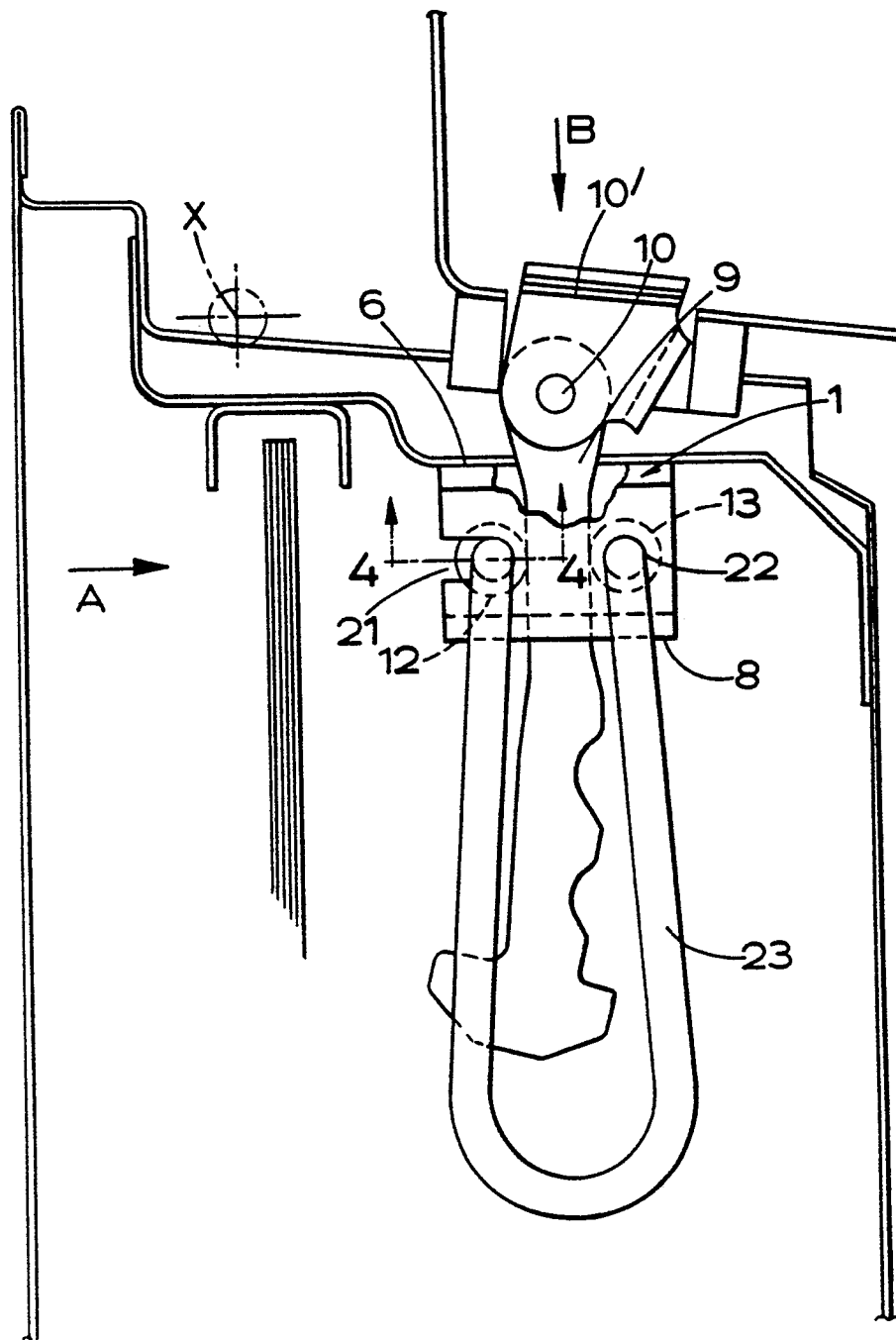


FIG.1.

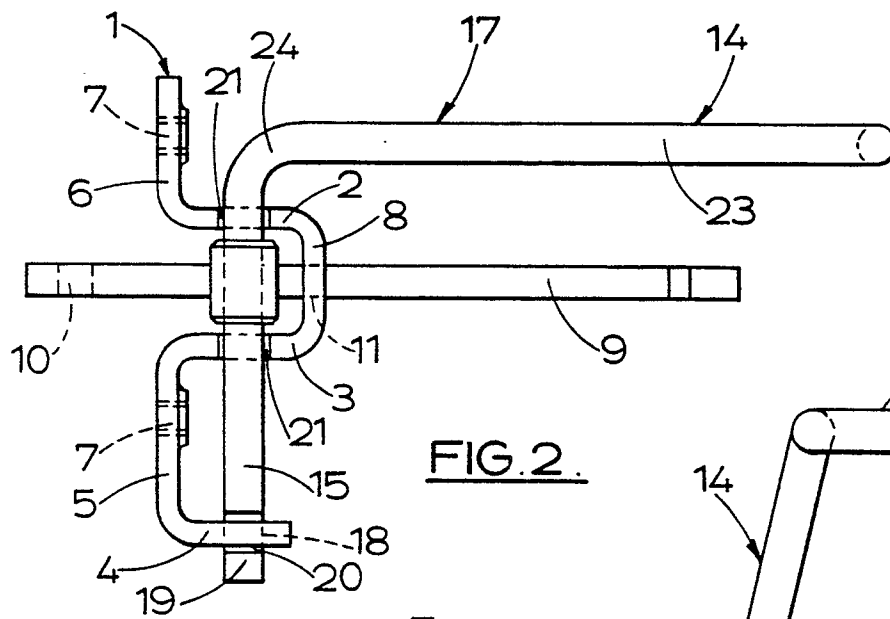


FIG. 2.

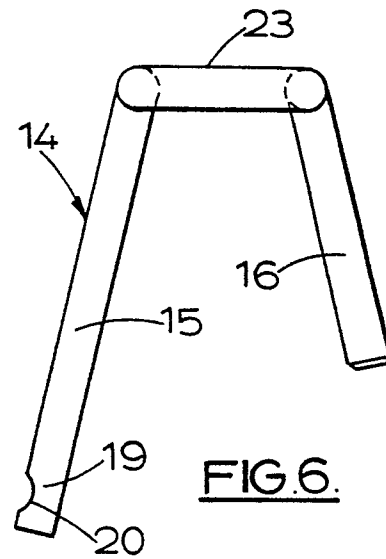


FIG. 6.

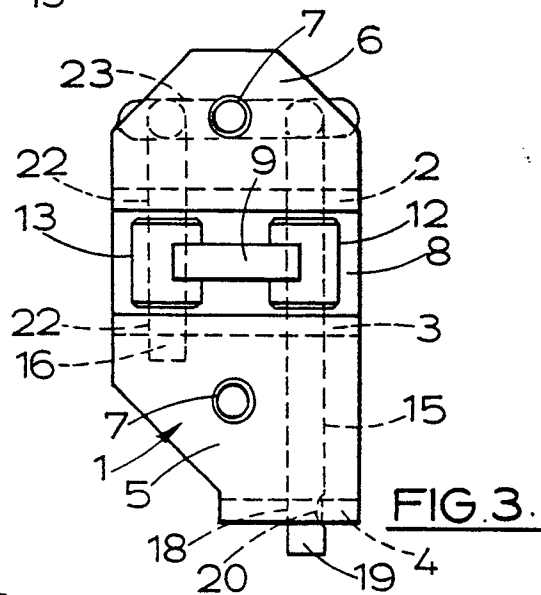


FIG. 3.

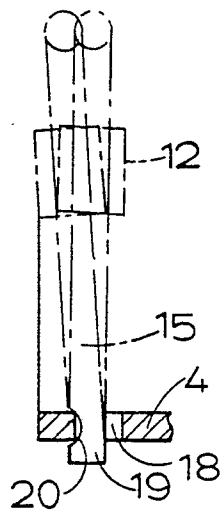


FIG. 4.

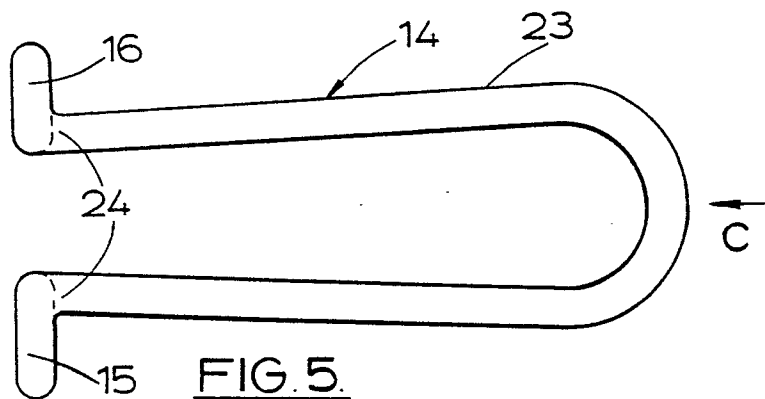


FIG. 5.

