April 23, 1963 O. VOSER 3,086,406

ARRANGEMENT FOR ADJUSTING THE PIVOTAL POINT OF A PART

Filed July 24, 1961 2 Sheets-Sheet 1

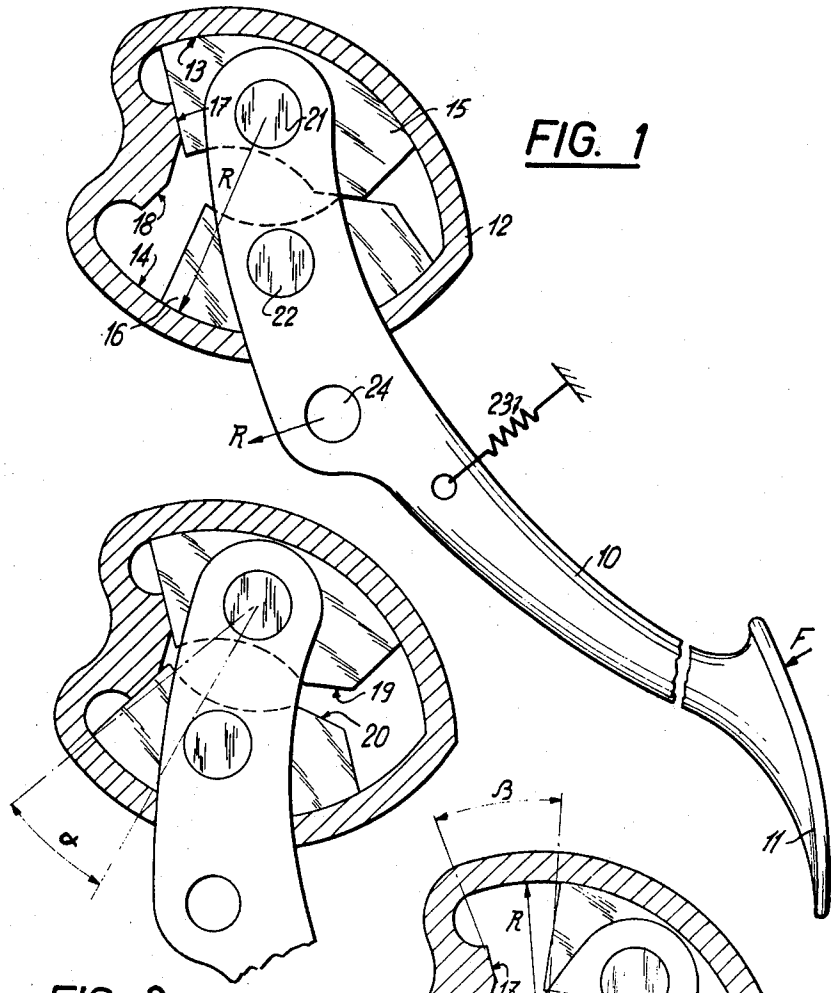


FIG. 1

FIG. 2

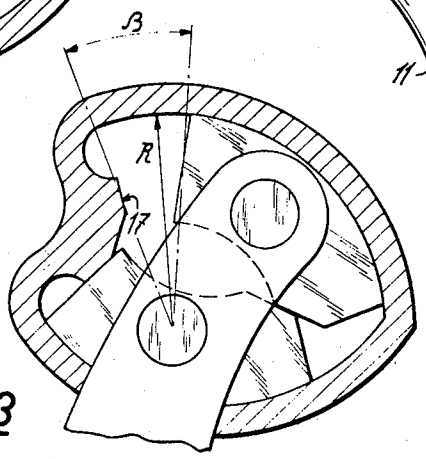


FIG. 3

April 23, 1963 O. VOSER 3,086,406

ARRANGEMENT FOR ADJUSTING THE PIVOTAL POINT OF A PART

Filed July 24, 1961 2 Sheets-Sheet 2

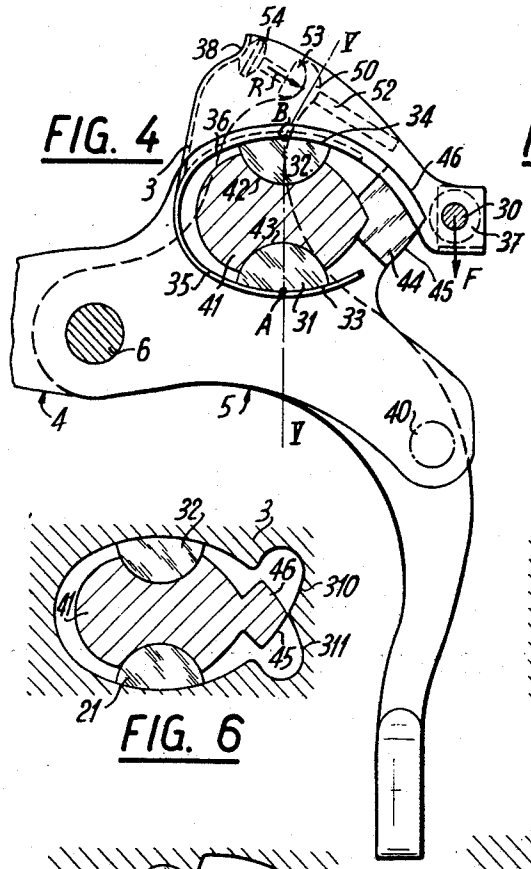


FIG. 4

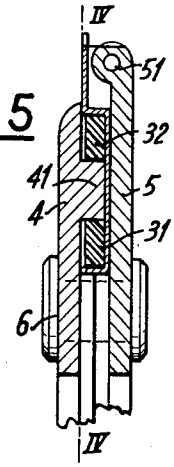


FIG. 5

FIG. 6

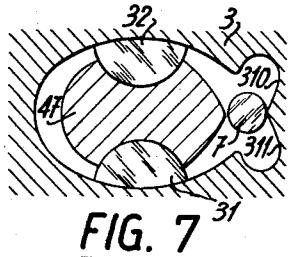


FIG. 7

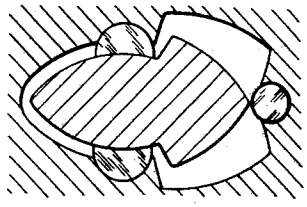


FIG. 8

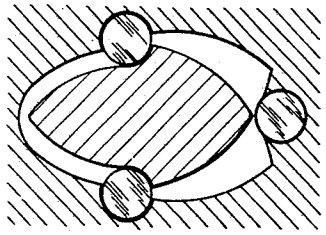


FIG. 9

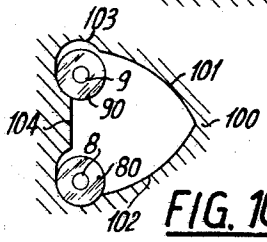


FIG. 10

United States Patent Office 3,086,406
Patented Apr. 23, 1963

3,086,406

ARRANGEMENT FOR ADJUSTING THE PIVOTAL POINT OF A PART

Otto Voser, Vieussieux 52, Geneva, Switzerland

Filed July 24, 1961, Ser. No. 135,692
Claims priority, application Switzerland July 25, 1960
13 Claims. (Cl. 74—518)

My invention has for its object an arrangement for adjusting the pivotal point of a lever, or the like part.

According to my invention, a first member is provided with at least two arcuate slopes facing each other, and pivoting elements associated each with one slope, each element being adapted to be shifted over the cooperating slope or, reversely, each slope being adapted to slide over the corresponding element, the center of curvature of each slope being adapted to register with the pivotal axis of the element associated with the opposite slope, while a second member is provided with means for keeping constant the spacing between the pivotal axes of the two elements, the whole arrangement being such that, a constant force being applied to any point of one of the two members, the latter moves with reference to the other member by rotating in succession around the two pivotal axes whereby the force transmitted to another point of the last mentioned member, varies throughout the duration of rotation of the latter.

I have illustrated, by way of example, in the accompanying drawings, a preferred embodiment of my invention, together with various modifications thereof. In said drawings:

FIG. 1 is a transverse sectional view of my improved arrangement as incorporated with a pedal.

FIGS. 2 and 3 are views similar to FIG. 1, showing the operation of such an arrangement.

FIG. 4 is a sectional view through line IV—IV of FIG. 5 of a bicycle brake incorporating my improved arrangement.

FIG. 5 is a sectional view through line V—V of FIG. 4.

FIG. 6 illustrates a modification of FIGS. 4 and 5 wherein the roller forming a cam-follower is replaced by a mere slideway.

FIGS. 7, 8 and 9 show further modifications of the camming means defining the shifting of operation between one center of curvature and another.

FIG. 10 illustrates a still further modification of the camming means.

The arrangement according to FIGS. 1 and 2 includes a member or casing **12** along opposite sloping sides of the inner surface of which are slidingly carried two elements **15** and **16** which are pivotally connected to a lever **10**. Said casing is in the shape of a heart and is provided inwardly with two sloping surfaces **13** and **14** meeting each other at one end, and the radius of curvature of which has a center registering with the pivotal center of the element sliding over the opposite sloping surface. The end of the casing opposed to the meeting between the sloping surface is provided with two stops **17** and **18**.

The elements **15** and **16**, the extent of travel of which is limited, on the one hand, by the stops **17** and **18** and, on the other hand, by the impact between their abutment surfaces **19** and **20**, are pivotally secured to the lever member **10** through the agency of two points **21** and **22** respectively.

The lever **10**, of which one end carries the spaced pivots **21** and **22** for the slider elements **15** and **16** is provided at its outer end with a flaring section **11** adapted to form a pedal for the operator's foot. A spring **23** urges the pedal back into its starting position.

When the slider element **16** moves out of the position shown as occupied in FIG. 1 to that shown in FIG. 2 (operative stage I), the lever **10** rocks round the pivot

21 and describes the angle α. When the slider element **15** moves between the positions defined in FIGS. 2 and 3 (stage II) the arm pivots round the pivot **22** and describes the angle β beyond the angle α. This double pivotal shifting is controlled through operation of the pedal **11** against the return spring **23** and, conversely, it is controlled in the opposite direction by the action of said spring **23**.

If the force F applied on the pedal **11** is held constant throughout the rotation of the lever, the resultant force R applied at the point **24** of the latter has a tendency to increase as the lever **10** moves from its starting position (FIG. 1) into its final position illustrated in FIG. 3. During said rotation, as a matter of fact, the lever arm defining the value of the force R decreases and the operative pivotal center of the lever originally at **21** is shifted to the point **22**.

In a second embodiment, the arrangement may be applied to a bicycle brake, so as to allow an instantaneous and protracted braking without any breaking of a cable or any straining of the cyclist's hand.

Said brake illustrated in FIGS. 4 to 6 includes two jaws **4** and **5**, pivotally secured together at **6** and between which is positioned an intermediate member **3**. A brake cable which is not illustrated slidingly engages the jaw **4** at **40** and it is secured at **30** to the member **3**, so as to act on the latter with a force F which urges it towards the jaw **4**.

The member **3** in the general shape of a lever, is provided along its inner surface with two ridges or ribs **33** and **34** forming slopes **35** and **36** over which the sliders **31** and **32** are adapted to move. Said sliders of a semicircular shape, are held fast between the said slopes and recesses **42** and **43** formed in a projecting section of the jaw **4**. Said sliders may rock in said recesses round their axes A and B respectively.

The lateral centering of the member **3** with reference to the jaw **4** is obtained, on the one hand, by reducing the curvature of the inner slope sections **35** and **36** and by inserting an abutment roller **37**. The latter is secured to the member **3** at **30** and is adapted to move over the lateral arcuate surfaces **45** and **46** of a cam **44** rigid with the jaw **4**. The center of curvature of the surface **46** is at A and of the surface **45** at B.

The jaws **54** and **36** are provided at their upper end with a spur-shaped extension in which is formed an opening **51** slidably carrying a threaded rod **52**. Said extension **50** is adapted to be subjected to a stress R exerted by the member **3** and which varies when the force F transmitted to said member at **30** remains constant.

The stress R is transmitted by the projection **38** of the lever **3** to the head **54** of the rod **52**. A part spherical nut **53** screwed over the rod **52** and engaging the extension **52** allows transmitting said stress whatever may be the relative position of the member **3** with reference to the jaw **5**.

At the beginning of the braking, the lever **3** is in its raised position; the roller **37** engages the upper end of the surface **46** of the cam **44**. The pivotal center of the lever member **3** lies then at A. The lever arm defining the stress R is equal to the shortest distance separating the point A from the axis of the rod **52**.

At the end of the braking operation, said lever **3** lies in its lowest position and the roller **37** engages the lower end of the surface **45** of the cam **44**. The pivotal center of the lever **3** is now at B. The torque with reference to the point B produced by the constant force F is substantially identical to that with reference to A in the preceding stage. In contradistinction, the point B being much nearer the axis of the rod **52** than the point A, the stress R is now much larger than at the beginning of the braking operation. It is thus apparent that the trac-

tional effort exerted on point 30 of member 3 with reference to the jaw 4 urges the roller 37 over the successive cam surfaces 46 and 45 on the jaw 4 while the engagement of the projection 38 on said member 3 with the head 54 rigid with the jaw 5 urges the latter into relative movement with reference to the jaw 4; this leads to a movement of the outer free ends of the jaws 4 and 5 towards each other so as to clamp between said ends a bicycle wheel rim for instance, which is thus efficiently braked by the cable extending between 40 and 30 on parts 4 and 3.

According to a modification illustrated in FIG. 6, the roller 37 may be replaced by suitable slideways 310 and 311 cut in the member 3 and over which the cam surfaces 45 and 46 rigid with the projection 41 of the jaw 4 are adapted to move.

It is also possible according to a further modification illustrated in FIG. 7, to replace the camming surfaces by a roller 7, which latter is inserted between the member 3 and the projection 47 rigid with the jaw 4 and revolvably carrying said roller 7.

In a still further modification illustrated in FIGS. 8 and 9, the slopes on which the sliders slide, may, in contradistinction with the preceding embodiments, be provided on the inner member and the slider elements themselves may be held fast partly inside recesses formed along the periphery of the outer member. Said slider elements may be constituted, as precedingly, by elements adapted to slide each over the corresponding slope (FIG. 8) or, in contradistinction, by rollers rolling over the latter (FIG. 9). The abutment roller preventing the transverse movement of the inner member is, in this modification, housed inside the outer member, as illustrated in FIGS. 8 and 9. Of course, the radii of curvature of the slopes on which the slider elements slide or roll register as precedingly with the pivotal axes of the slider elements.

In yet another modification (FIG. 10), the arrangement includes a first member which is not illustrated, provided with two axes 8 and 9, carrying the rollers 80 and 90. The latter may move inside a second member 100 fitted over the former and provided with a recess, of which two walls, 101 and 102, form the raceways for the rollers 80 and 90. Said raceways, of which the radii of curvature have their centers on the axes 8 and 9 of the two rollers meet at one end and terminate at the other end with a depression 103. Each depression is adapted to lock in position one of the rollers at the center of curvature of the opposite slope while the other roller moves over the said opposite slope.

Obviously, my invention is by no means limited to what has been described or illustrated in the accompanying drawings. In particular, it is possible to reverse the parts played by the different members so as to make the first member rock, while holding the second member stationary, or else, it is possible to make the second member rock and to hold the first member fast. As a matter of fact, the sliders are adapted to slide over their slopes or reversely, the slopes may slide over their sliders.

The applications of my improved arrangement are obviously not limited to a foot-controlled brake or to a bicycle brake and its applications are manifold, in particular whenever it is desired to modify the point of pivoting of a lever with a view to increasing its efficiency.

What I claim is:

1. A lever system comprising a lever, two arcuate elements pivotally secured at points on said lever, a member provided with two arcuate surfaces guiding each one of said arcuate elements and the center of each of which lies on the path of the pivot carrying the element guided along the other arcuate surface, means constraining the lever to selectively move in unison with each element sliding over its guiding surface around the pivot carrying the other element within each of two predetermined adjacent angular areas, and an operative member controlled from a further point on the lever.

2. A lever system comprising a lever, two arcuate elements pivotally secured at points on said lever, a member provided with two arcuate surfaces mating and slidingly engaging each one of said arcuate elements and the center of each of which lies on the path of the pivot carrying the element guided along the other arcuate surface, means constraining the lever to selectively move in unison with each element sliding over its guiding surface around the pivot carrying the other element within each of two predetermined adjacent angular areas, and an operative member controlled from a further point on the lever.

3. A lever system comprising a lever, two arcuate elements pivotally secured at points on said lever, and bounded between a half circle and an arcuate line extending between the ends of said half circle and passing through the center of said half circle, a member provided with two arcuate surfaces matching each one of said arcuate lines and the center of each of which lies on the path of the pivot carrying the element guided along the other arcuate bounding line, means constraining the lever to selectively move in unison with each element sliding over its guiding surface around the pivot carrying the other element within each of two predetermined adjacent angular areas, and an operative member controlled from a further point on the lever.

4. A lever system comprising a lever, two rollers revolvably secured at points on said lever, a member provided with two arcuate surfaces serving as raceways for the rollers and the center of each of which lies on the path of the pivot carrying the element guided along the other arcuate surface, means constraining the lever to selectively move in unison with each element sliding over its guiding surface around the pivot carrying the other element within each of two predetermined adjacent angular areas, and an operative member controlled from a further point on the lever.

5. A lever system comprising a lever, two arcuate elements pivotally secured at points on said lever, a member provided with two arcuate surfaces guiding each one of said arcuate elements and the center of each of which lies on the path of the pivot carrying the element guided along the other arcuate surface, abutments rigid with said member and limiting the travel of the arcuate elements over the cooperating arcuate surfaces to constrain the lever to selectively move in unison with each element sliding over its guiding surface around the pivot carrying the other element within each of two predetermined adjacent angular areas, and an operative member controlled from a further point on the lever.

6. A lever system comprising a lever, two arcuate elements, spindles carrying said rollers and rigidly secured at points on said lever, a member provided with two arcuate surfaces serving as raceways for the rollers and the center of each of which lies on the path of the pivot carrying the element guided along the other arcuate surface, means constraining the lever to selectively move in unison with each element sliding over its guiding surface around the pivot carrying the other element within each of two predetermined adjacent angular areas, and an operative member controlled from a further point on the lever.

7. A lever system comprising a lever, two arcuate elements pivotally secured at points on said lever, a member provided with two arcuate surfaces guiding each one of said arcuate elements and the center of each of which lies on the path of the pivot carrying the element guided along the other arcuate surface, means constraining the lever to selectively move in unison with each element sliding over its guiding surface around the pivot carrying the other element within each of two predetermined adjacent angular areas, an operative member controlled from a further point on the lever and cooperating interengaging means on the lever and on the member and adapted to prevent relative transverse movement between the latter.

8. A lever system comprising a lever, two arcuate ele-

ments pivotally secured at points on said lever, a member provided with two arcuate surfaces guiding each one of said arcuate elements and the center of each of which lies on the path of the pivot carrying the element guided along the other arcuate surface, said member being provided with still further arcuate surfaces coaxial with said first-mentioned guiding surfaces, means carried by the lever and engaging the further arcuate surfaces on said member to prevent relative transverse movement between the lever and said member, and to constrain the lever to selectively move in unison with each element sliding over its guiding surface around the pivot carrying the other element within each of two predetermined adjacent angular areas, and an operative member controlled from a further point on the lever.

9. A lever system comprising a lever, two arcuate elements pivotally secured at points on said lever, a member provided with two arcuate surfaces guiding each one of said arcuate elements and the center of each of which lies on the path of the pivot carrying the element guided along the other arcuate surface, said member being provided with still further arcuate surfaces coaxial with said first-mentioned guiding surfaces, a roller revolvably carried by the lever to run in succession over further arcuate surfaces on said member to prevent relative transverse movement between the lever and said member, and to constrain the lever to selectively move in unison with each element sliding over its guiding surface around the pivot carrying the other element within each of two predetermined adjacent angular areas, and an operative member controlled from a further point on the lever.

10. A lever system comprising a lever, two arcuate elements pivotally secured at points on said lever, a member provided with two arcuate surfaces guiding each one of said arcuate elements and the center of each of which lies on the path of the pivot carrying the element guided along the other arcuate surface, said member being provided with still further arcuate surfaces coaxial with said first-mentioned guiding surfaces, the lever being provided with an arcuate recess, a roller housed inside said arcuate recess and running over said further arcuate surfaces on said member to prevent relative transverse movement between the lever and said member and to constrain the lever to selectively move in unison with each element sliding over its guiding surface around the pivot carrying the other element within each of two predetermined adjacent angular areas, and an operative member controlled from a further point on the lever.

11. A lever system comprising a lever, two arcuate elements pivotally secured at points on said lever, a member provided with two arcuate surfaces guiding each one of said arcuate elements and the center of each of which lies on the path of the pivot carrying the element guided along the other arcuate surface, said member being provided with still further arcuate surfaces, coaxial with said first-mentioned guiding surfaces, the lever being provided with arcuate races mating and engageable by the further arcuate surfaces on said member to prevent relative transverse movement between the lever and said member and to constrain the lever to selectively move in unison with each element sliding over its guiding surface around the pivot carrying the other element within each of two predetermined adjacent angular areas, and an operative member controlled from a further point on the lever.

12. A lever system comprising a lever, two arcuate elements pivotally secured at points on said lever, a member provided with two arcuate surfaces guiding each one of said arcuate elements and the center of each of which lies on the path of the pivot carrying the element guided along the other arcuate surface, a roller revolvably carried by one of the following parts: the lever and the member, and the other member being provided with arcuate slideways guiding said roller to constrain the lever to selectively move in unison with each element sliding over its guiding surface around the pivot carrying the other element within each of two predetermined adjacent angular areas, and an operative member controlled from a further point on the lever.

13. A lever system comprising a lever, two rollers revolvably carried by said lever, a member provided with two arcuate raceways engaging each the corresponding roller, said raceways meeting at one end and terminating each at its end opposed to said one end with a depression adapted to house the corresponding roller and the center of which registers with the center of the other raceway, the selective movement of the rollers on the corresponding raceways constraining the lever to selectively move in unison with each roller sliding over its guiding surface around the pivot carrying the other roller within each of two predetermined adjacent angular areas, and an operative member controlled from a further point on the lever.

References Cited in the file of this patent

UNITED STATES PATENTS

2,184,294	Fergueson	Dec. 26, 1939
2,977,817	Panasewicz	Apr. 4, 1961