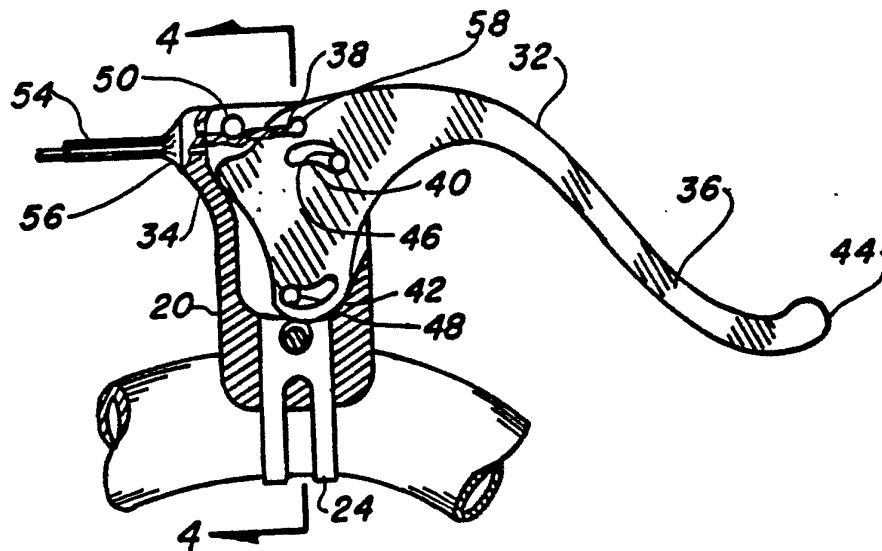




## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<p>(51) International Patent Classification<sup>4</sup> : B62K 23/06, B62L 3/02 F26C 1/18</p>	<p>A1</p>	<p>(11) International Publication Number: WO 87/ 05576 (43) International Publication Date: 24 September 1987 (24.09.87)</p>
<p>(21) International Application Number: PCT/US86/00555 (22) International Filing Date: 21 March 1986 (21.03.86) (71)(72) Applicant and Inventor: RYLANCE, Keith, N. [US/US]; 4338 Redwood Avenue, Suite 104, Marina Del Rey, CA 90292 (US). (74) Agent: COTA, Albert, O.; 5460 White Oak Avenue, Suite A-331, Encino, CA 91316 (US). (81) Designated States: AT (European patent), AU, BE (European patent), BR, CH (European patent), DE (European patent), DK, FI, FR (European patent), GB (European patent), HU, IT (European patent), JP, KP, KR, LK, LU (European patent), MC, NL (European patent), NO, RO, SE (European patent), SU, US.</p>		<p>Published With international search report.</p>

(54) Title: CAM ACTION BRAKE LEVER



(57) Abstract

A cam action bicycle brake lever with a support body (20) containing a cavity (22) inside. A lever (32) having a pair of pivotal slots (40 and 42) is positioned within the cavity of the body and attached with pivot pins (46 and 48). When the lever (32) is actuated, a pivotal movement is produced with a primary action on one of the pins and a secondary movement on the other. This forces the brake cable over a cam surface in the lever following the contour and compounding the travel of the cable in relation to the stroke of the lever.

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CAM ACTION BRAKE LEVERTECHNICAL FIELD

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The present invention relates to improvements in operating mechanisms for bicycles in general, and more specifically to hand brake levers having a cam action for increasing the actuating movement ratio.

10

BACKGROUND ART

Previously, hand brakes for bicycles have used a single pivot point lever arrangement for controlling the movement of a control cable for brake actuation. Attempts have been made in the past to improve the movement ratio by such means as ratchet-pawl systems, or spring loaded over-center devices.

A search of the prior art did not disclose any patents that read directly on the claims of the instant invention, however, the following U. S. Patents were considered related:

	<u>Patent No.</u>	<u>Inventor</u>	<u>Issue Date</u>
	4,193,318	Golobay	Mar. 18, 1980
25	4,066,154	Ross	Jan. 3, 1978
	3,943,794	Shimada	Mar. 16, 1976
	3,924,487	Huret et al	Dec. 9, 1975

Golobay teaches a single pivot point brake lever having a passageway extending longitudinally throughout essentially the entire length thereof. The cable is passed through and connected near the extreme end into a recessed area eliminating the need to pass the entire  
5 cable through the lever during cable installation.

Ross discloses a handle mechanism for operating the bicycle brake cable with a ratchet-pawl controlled cable drum. The cable wraps around a ratchet wheel that  
10 rotates automatically to adjust the cable length for brake shoe wear.

Shimada utilizes a winding body with a cable wrapped partially on the periphery thereof. This winding body is restrained by a clutch spring so formed that  
15 the coiled portion is released when the lever is actuated, making the winding body rotate in the desired direction. The purpose of this invention is to correct an inaccurate action, as the result of an elongated control wire.

Huret et al employs a traction and release device having a control lever which pivots about a drum in which a helicoidal spring is mounted. One end of a spring is  
20 mounted. One end of a spring engages the cable, and the other the body, so as to control the traction and release of the cable.

It will be noted that prior art has attempted to  
25 compensate for stretched cables, but has not addressed the problem by shortening the original stroke of the lever, as taught by this invention.

30 DISCLOSURE OF THE INVENTION

It is well known that bicycle brake cables have a tendency to slightly stretch over an extended period of use, and that brake pads wear, requiring a shortening  
35 of the cable as consumation of the sacrificial material progresses. To compensate for this retraction, many and

varied methods have been employed usually dealing with secondary mechanisms, such as previously described in the prior art. It is, however, the primary object of the invention to solve this long felt need by the use of a simple single handle that utilizes a dual lever arm movement combined with an over cam configuration. This is accomplished by the utilization of two separate pivot points for the lever, the first at a position relatively near the handlebar, as in conventional brakes, and the second disposed radially near the intersection of the cable interface. The first arcuate advancement pivots from the latter, creating a primary movement followed by a secondary movement shifting the pivot point while simultaneously causing the cable to follow a cam surface.

With this configuration, another object is realized, that of ultimately shortening the stroke of the lever from .75 inches (1.90 cm) to .62 inches (1.57 cm). This abbreviated stroke not only compensates for the stretching of the cable, but allows considerable wear of the brake pads without further adjustment.

Yet another object relies upon the simplicity of the design using only a handle within a support body and a pair of pivot pins with the usual ancillary elements to accomplish the task. This lack of sophistication allows the assembly to be produced in a cost effective manner eliminating labor intensive operations.

These and other objects and advantages of the present invention will become apparent from the subsequent detailed description of the preferred embodiment and the appended claims taken in conjunction with the accompanying drawings.

#### BRIEF DESCRIPTION OF THE DRAWINGS

FIGURE 1 is a partially cut-away side elevational view of the preferred embodiment with the lever in its

at rest position.

FIGURE 2 is a fragmentary partially cut-away side elevational view of the preferred embodiment with the lever in its partially energized position.

5 FIGURE 3 is a partially cut-away side elevational view of the preferred embodiment with the lever in its energized position.

FIGURE 4 is a cross-sectional view taken along lines 4-4 of FIGURE 1.

10 FIGURE 5 is a cross-sectional view taken along lines 5-5 of FIGURE 2.

FIGURE 6 is a cross-sectional view taken along lines 6-6 of FIGURE 1.

15 FIGURE 7 is a fragmentary view in partial isometric of the brake lever mounted on the handlebar of a bicycle.

#### BEST MODE FOR CARRYING OUT THE INVENTION

The best mode for carrying out the invention is presented in terms of a preferred embodiment. The preferred embodiment, as shown in FIGURES 1 through 5 is com-  
20 prised of a structural support body 20 having an internal cavity 22 therein. The body 20 is fabricated of a metallic casting, or the like, and is configured with a radial end, the same approximate shape as a bicycle handlebar. The opposite end contains the cavity 22 with an opening  
25 for a cable at right angles to the cavity. This body 20 is connected to the handlebar of a bicycle by the use of fastening means utilizing a clamp strap 24 that encompasses the outside diameter and pulls the body into intimate contact. This strap 24 has a clearance hole 26 near  
30 one end and a threaded hole 28 on the other. As it loops around the handlebar, a screw 30 penetrates the body 20 projecting through the clearance hole and engages the threads of the threaded hole 28. As the screw 30 is

rotated, the distance between the two ends is shortened, thereby tensioning the clamp strap 24 directly upon the handlebar in a compressive manner. This strap 24 is depicted pictorially in FIGURE 4 in cross section indicating the installed and tensioned position. In another embodiment, shown in FIGURE 6, the action is identical with all of the same features of the elements, except the screw 30 penetrating the body 20 is disposed within the cavity 22. This embodiment requires almost complete disassembly of the elements for installation, as the screwdriver is positioned from the top through the cavity 22, however, no fastening means are visible from the outside.

An elongated lever 32 has a radial cam surface 34 on one end and a handle portion 36 on the other, with a cable keeper slot 38 in close proximity to the cam surface 34. This lever 32 also contains an upper pivot slot 40 and a lower pivot slot 42, and is retainably disposed within the support body cavity 22. This lever 32 is then captivated on two sides within the cavity 22 and yet free to move therein. The handle portion is contoured to fit one hand with a knob 44 on the extreme end to prevent slipping when in use. The shape of this part of the element is radially reversed, creating a smooth flowing line from one end to the other and is compatible in configuration to the handlebar of the bicycle in a somewhat parallel manner. The handle 36 allows manual gripping relative to the handlebar providing a rotational movement of the lever 32 within the cavity 22.

A pair of pivot pins are positioned through the body 20 with the first pin 46 slideably engaging the upper slot 40 in the lever 32, and a second pin 48 similarly engaging the lower slot 42 in such a manner as to provide dual movement of the lever 32 within the body 20. This arrangement completely captivates the lever 32, while allowing a dual movement within.

A grooved roller 50 is rotatably positioned within the cavity 22 in close proximity to the radial cam surface 34 of the lever 32 providing a coterminous relationship therebetween. This roller 50 has a loose fit between the sides of the cavity 22 allowing movement, while  
5 a roller pin 52 penetrates through the center and the walls of the body in a tensioning manner holding the pin 52 captive, yet allowing the roller 50 to rotate freely thereupon. This roller 50 provides direction and main-  
10 tains the relationship between the body and the cable keeper slot 38.

A cable 54 having a flexible metallic braided wire rope surrounded by a non-compressible stationary sheath is connected on one end to the brake mechanism of a bi-  
15 cycle, and on the other end to the lever 32 through the cable keeper slot 38. The cable 54 further contains a retainer 56 on each end of the sheath and a keeper lug 58 on one end of the flexible cable. The keeper lug 58 is slightly smaller than the slot 38, allowing insertion  
20 within. The retainer 56 contiguously engages the body 20 into a recess captivating the cable in place with tension maintained by the connection to the rotating lever. The cable 54 is positioned into the groove of the roller 50 and is tensioned between the brake and the lever 32,  
25 so as to maintain the lever into the distended position.

In operation when the lever handle 36 is manually rotated toward the bicycle handlebar the lever 32 pivots from the first pin 46, allowing advancing of the lower slot 42 upon the second pin 48, creating a primary move-  
30 ment as shown in FIGURE 2. As the handle 36 is further compressed and rotated, a secondary movement is realized by the first pin 46 shifting in the upper slot 40 drivingly forcing the cable 54 over the apex of the cam surface 34, allowing the cable to follow the contour,

35

thereof compounding the travel of the cable 54 in relation to the stroke of the lever. This action is pictorially illustrated in FIGURE 1 with the mechanism in the rest position, FIGURE 2 illustrates the primary movement and the full stroke of the lever as shown in FIGURE 3. This compounded action allows an improved stroke of the cable 54 at the brake while not effecting the actual movement of the handle 36 in relation to the handelbar of the bicycle. In actual tests, this cable extension has been measured and an improvement of 20 percent in length of travel has been realized.

While the invention has been described in complete detail and pictorially shown in the accompanying drawings it is not to be limited to such details, since many changes and modifications may be in the invention without departing from the spirit and the scope thereof. Hence, it is described to cover any and all modifications and forms which may come within the language and scope of the appended claims.

20

CLAIMS

1. A cam action bicycle brake lever comprising:
  - (a) a structural support body having an internal cavity therein and attaching means for connecting to the handlebars of a bicycle;
  - (b) an elongated lever having a radial cam surface, an upper and lower pivotal slot therein, and a cable keeper slot, said lever retainably disposed within said support body cavity for manually gripping relative to the handlebar providing rotation therewithin;
  - (c) a pair of pivot pins with the first pin slideably engaging the upper slot in the lever in the middle and the support body on each end with the second pin similarly engaging the lower slot and body in such a manner as to provide dual movement of the lever within the body;
  - (d) a grooved roller rotatably joined into the support body cavity in close proximity to the radial cam surface of said lever providing a coterminous relationship therebetween; and,
  - (e) cable means having a flexible cable surrounded by a stationary sheath, further including an end retainer on the sheath and a keeper lug on the terminous, with the retainer contiguously engaging the support body and the keeper lug disposed within the lever keeper slot and the cable positioned over the radial cam surface into the groove of the roller in such a manner as to intersect the cable with the apex of the cam when the lever is manually rotated toward the bicycle handlebar, said lever further pivoting from the first pin allowing advancing of the lower slot

upon the second pin creating a primary movement sustained by a secondary movement characterized by the first pin shifting in the upper slot drivingly forcing the cable over the apex of the cam surface following the contour thereof compounding the travel of the cable in relation to the stroke of the lever.

2. The invention as recited in claim 1 wherein said grooved roller further comprises: a roller pin penetrating said roller defining a loose fit allowing rotation of the roller thereupon and further penetrating said body in a tensioning manner such that the pin is held captive within.

3. The invention as recited in claim 1 wherein said fastening means comprises: a clamp strap having a clearance hole near one end and a threaded hole on the other loopingly engaging a handlebar of said bicycle with a screw penetrating said body through the clearance hole into the threaded hole embracing the strap against the handlebar in an intimate and compressible manner.

4. The invention as recited in claim 3 wherein said screw penetrating said body is disposed on the outside surface of the body transverse thereunto.

5. The invention as recited in claim 3 wherein said screw penetrating said body is disposed within said internal cavity.

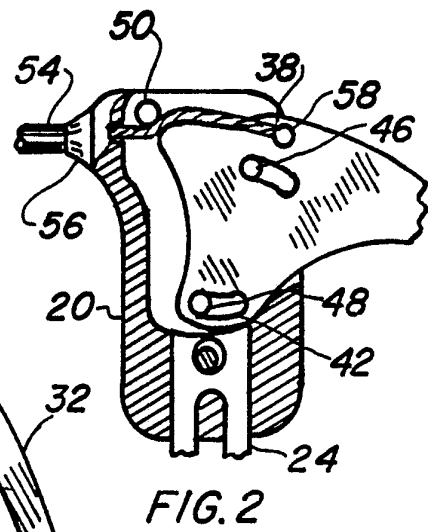
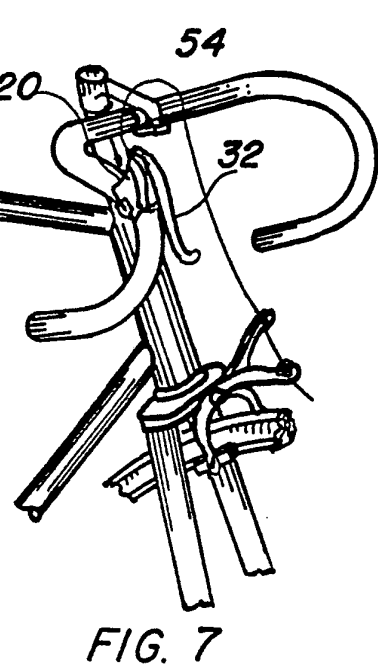
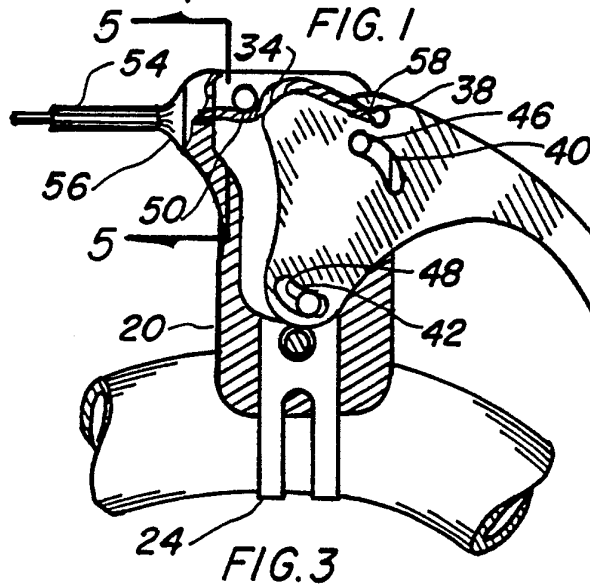
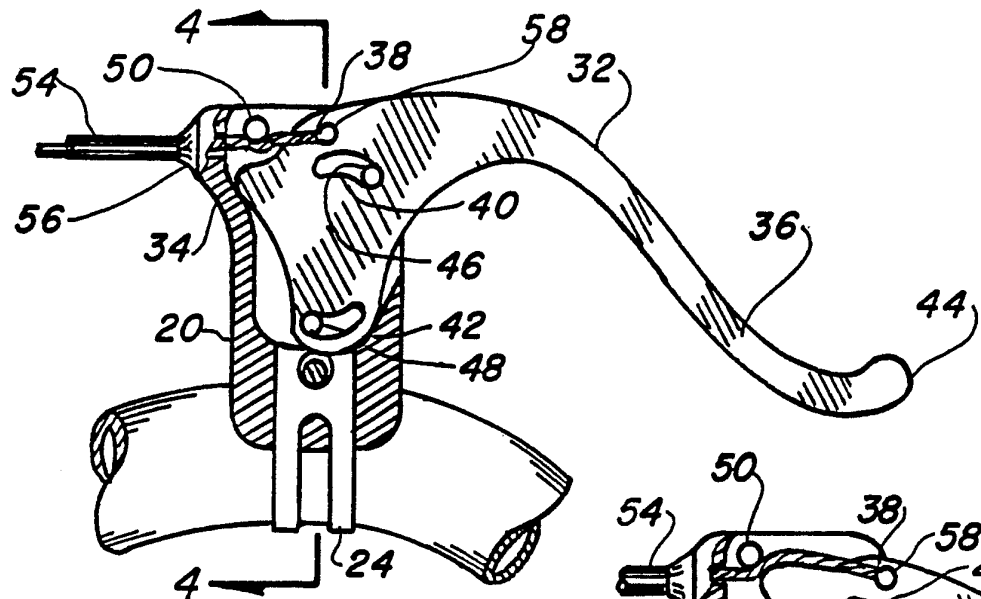


FIG. 2

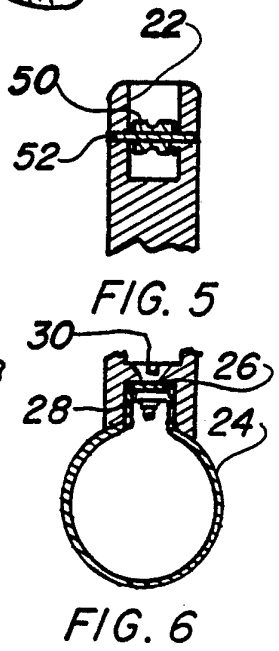
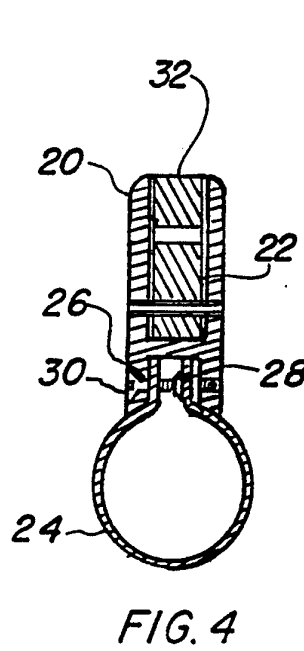


FIG. 5

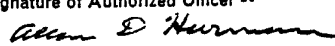
FIG. 6

FIG. 7

FIG. 4

# INTERNATIONAL SEARCH REPORT

International Application No PCT/US 86/00555

<b>I. CLASSIFICATION OF SUBJECT MATTER</b> (if several classification symbols apply, indicate all) <sup>3</sup>				
According to International Patent Classification (IPC) or to both National Classification and IPC				
Int Cl. <sup>4</sup> B62K 23/06; B62L 3/02; F16C 1/18				
U.S. Cl. 74/489, 502.2, 517				
<b>II. FIELDS SEARCHED</b>				
Minimum Documentation Searched <sup>4</sup>				
Classification System	Classification Symbols			
U.S.	74/489, 502.2, 517			
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched <sup>5</sup>				
<b>III. DOCUMENTS CONSIDERED TO BE RELEVANT</b> <sup>14</sup>				
Category <sup>6</sup>	Citation of Document, <sup>16</sup> with indication, where appropriate, of the relevant passages <sup>17</sup>	Relevant to Claim No. <sup>18</sup>		
A	US, A, 2,529,447 published 07 November 1950 Bondinaux et al			
A	US, A, 3,924,487 published 09 December 1975 Huret et al			
A	US, A, 3,943,794 published 16 March 1976 Shimada			
A	US, A, 4,066,154 published 03 January 1978 Ross			
A	US, A, 4,193,318 published 18 March 1980 Golobay			
A	FR, A, 914,367 published 07 October 1946 Sturmey-Archer et al			
A	IT, A, 458,361 published 10 July 1950 Leclercg			
<p><sup>15</sup> * Special categories of cited documents:</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none;"> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"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)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </td> <td style="width: 50%; border: none;"> <p>"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</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"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.</p> <p>"&amp;" document member of the same patent family</p> </td> </tr> </table>			<p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"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)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p>	<p>"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</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"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.</p> <p>"&amp;" document member of the same patent family</p>
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<b>IV. CERTIFICATION</b>				
Date of the Actual Completion of the International Search <sup>2</sup>	Date of Mailing of this International Search Report <sup>2</sup>			
10 April 1986	15 APR 1986			
International Searching Authority <sup>1</sup>	Signature of Authorized Officer <sup>20</sup>			
ISA/US	 Allan D. Herrmann			