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(54) **ADJUSTABLE BRAKE LEVER ASSEMBLY FOR BICYCLE**

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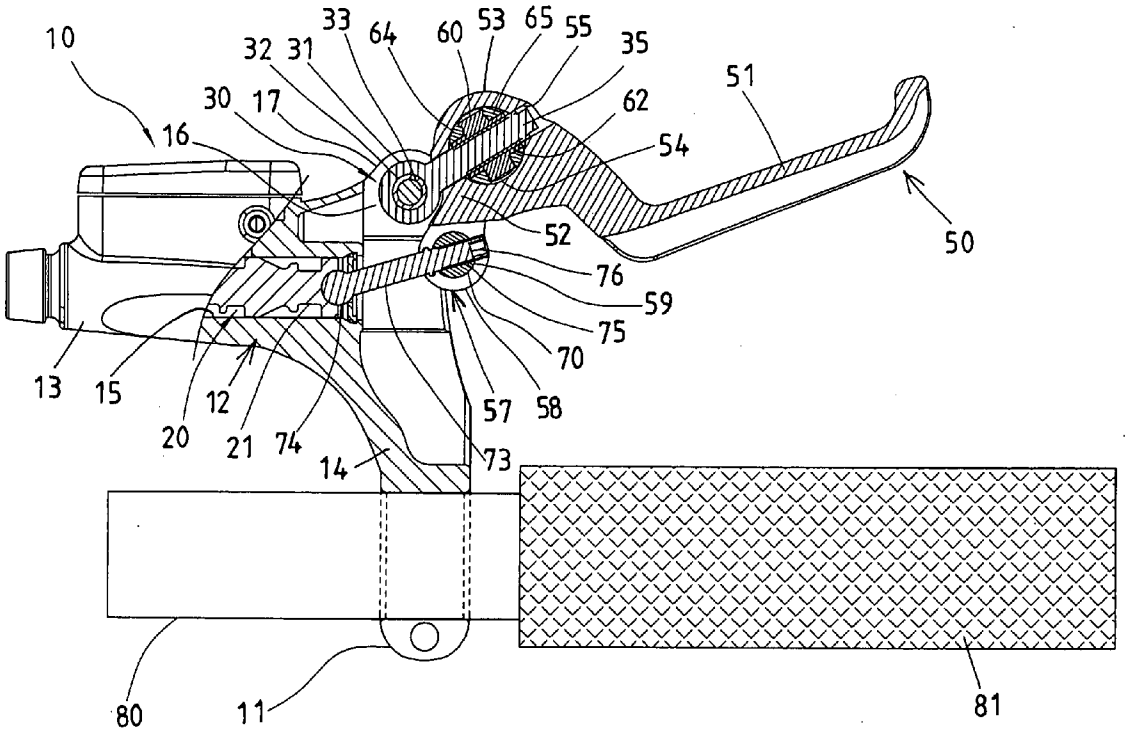
(57) **ABSTRACT**

An adjustable brake lever assembly includes a handle mount having a lever housing, a piston of a brake device slidably engaged in the lever housing, a rotary member pivotally coupled to the lever housing, a brake handle includes a mounting arm connected to the rotary member for adjusting the brake handle relative to the rotary member and the lever housing, a barrel is pivotally fitted into the mounting arm, and a link rod is pivotally coupled to the piston of the brake device and includes a threaded segment engaged with the barrel for adjusting the brake handle relative to the brake device and the lever housing and for allowing the brake handle to be operated by adults or children of different hand or palm sizes or dimensions:



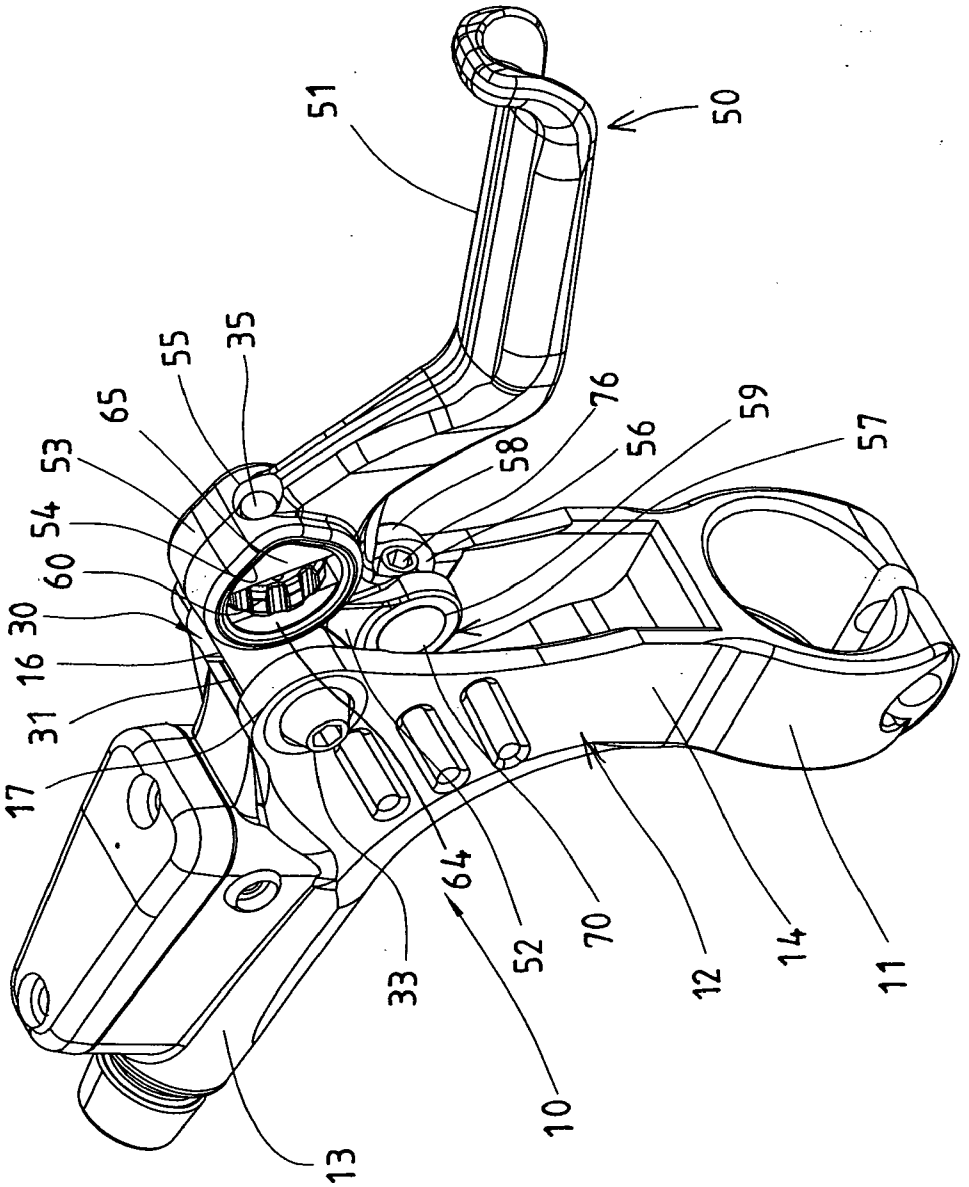

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FIG. 1

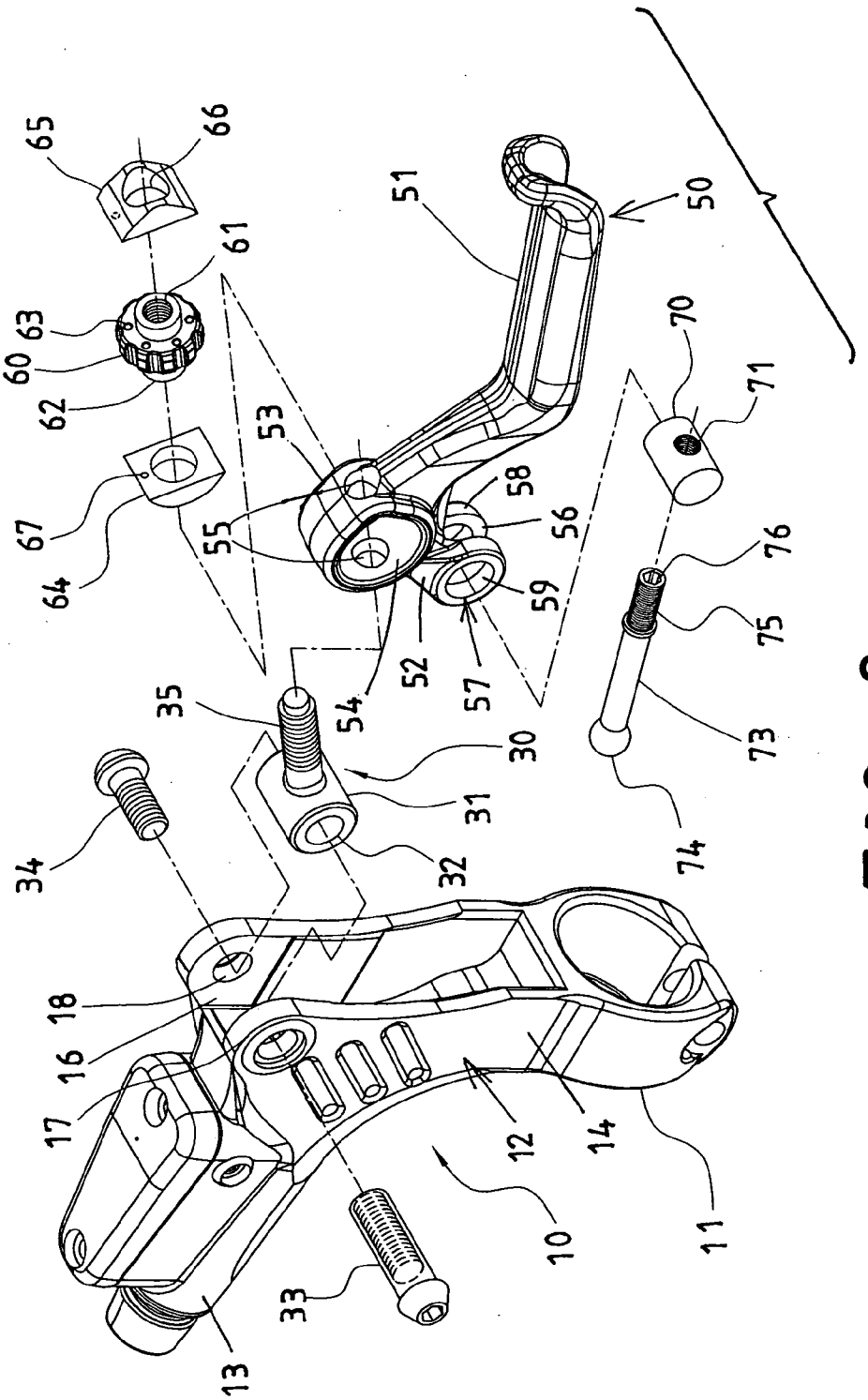
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FIG. 2

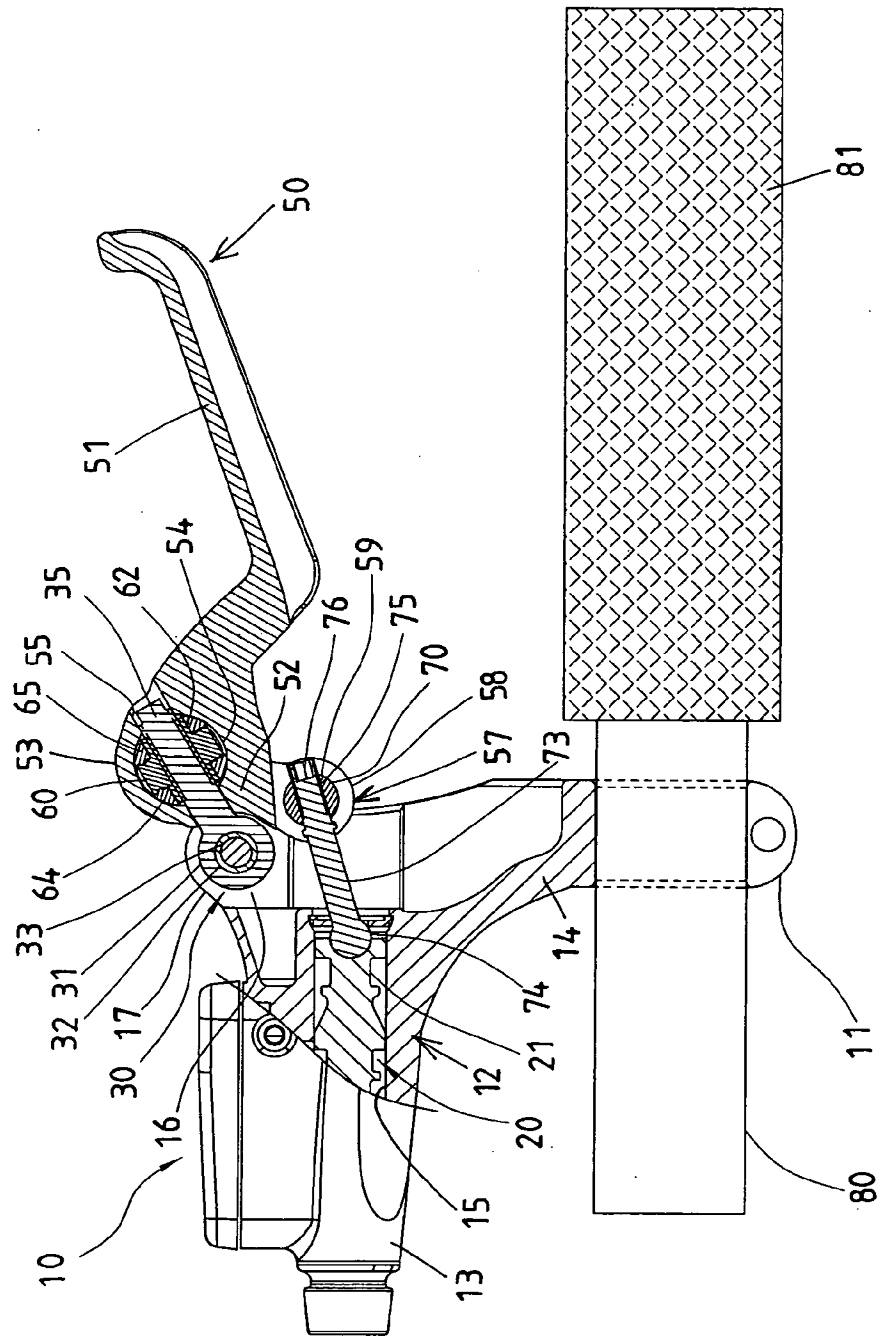
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FIG. 3

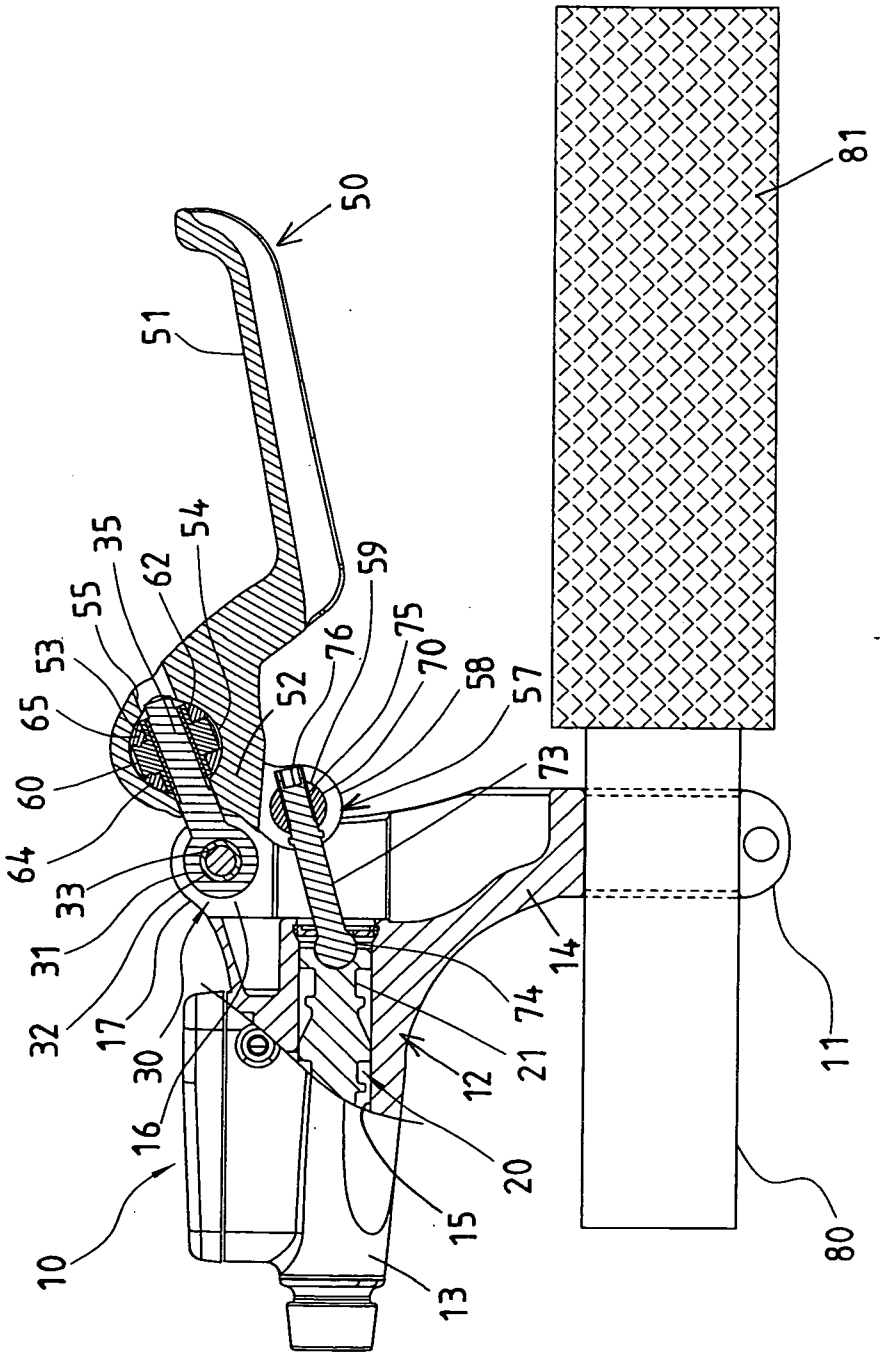
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FIG. 4

ADJUSTABLE BRAKE LEVER ASSEMBLY FOR BICYCLE

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates to an adjustable brake lever assembly for a hydraulic disc brake device of a bicycle, and more particularly to an adjustable brake lever assembly including an adjusting structure or mechanism for micro-adjusting the brake lever assembly relative to the handlebar of the bicycle and for allowing the brake lever assembly to be easily. operated by adults or children of different hand or palm sizes or dimensions.

[0003] 2. Description of the Prior Art

[0004] Typical motorcycles or bicycles comprise a brake lever assembly attached to the handlebar of the bicycle for actuating or operating a brake device, such as a hydraulic disc brake device, and the brake lever assembly is normally adjustable relative to the handlebar of the bicycle to fit adults or children of different hand or palm sizes or dimensions and for allowing the brake lever assembly to be easily operated by adults or children.

[0005] For example, U.S. Pat. No. 5,448,927 to Lumpkin, U.S. Pat. No. 5,515,743 to Lumpkin, U.S. Pat. No. 5,660,082 to Hsien, U.S. Pat. No. 6,053,068 to Yamashita et al., and U.S. Pat. No. 6,098,488 to Vos disclose several examples of the typical brake lever assemblies of the bicycle adjustable to vary the leverage applied to a bicycle brake device and each including a brake handle having an elongated finger grip and a transverse elongated mounting arm attached to a handle mount for pivotal movement about a fixed axis.

[0006] However, the transverse elongated mounting arms are normally pivotally attached to the handle mount with a pivot shaft and may not be adjusted relative to the handle mount such that the typical brake lever assemblies may not be suitably adjusted to the selected or suitable or predetermined position or location relative to the handle mount.

[0007] U.S. Pat. No. 7,389,642 to Takizawa et al. discloses another typical brake lever assembly of the bicycle providing two-stage braking by operatively connecting a lever to first and second pistons contained in a master cylinder, in which the first and second pistons are operatively connected to one another such that they move together until the first piston reaches a threshold distance from a top end of the master cylinder.

[0008] However, the brake lever of the typical brake lever assembly of the bicycle may not be adjusted relative to the handle mount or the handlebar of the bicycle such that the typical brake lever assembly may not be suitably adjusted to the selected or suitable or predetermined position or location relative to the handle mount or the handlebar of the bicycle.

[0009] The present invention has arisen to mitigate and/or obviate the afore-described disadvantages of the conventional adjustable brake lever assemblies.

SUMMARY OF THE INVENTION

[0010] The primary objective of the present invention is to provide an adjustable brake lever assembly including an adjusting structure or mechanism for micro-adjusting the brake lever assembly relative to the handlebar of the bicycle and for allowing the brake lever assembly to be easily operated by adults or children of different hand or palm sizes or dimensions.

[0011] In accordance with one aspect of the invention, there is provided an adjustable brake lever assembly comprising a handle mount including a lever housing having an attachment mechanism for attaching to a handlebar of a bicycle, and including a chamber formed in the lever housing, a brake device including a piston slidably engaged in the chamber of the lever housing, a rotary member including a base pivotally coupled to the lever housing with a pivot shaft, and including a threaded shank extended outwardly therefrom, a brake handle including a finger grip bar and a mounting arm connected at a connected portion, and including a pivot hole formed in the connected portion of the brake handle, and including a pivot opening formed in the mounting arm, a knob rotatably fitted into the pivot hole of the brake handle, and including a screw hole formed in the knob for threading and engaging with the threaded shank of the rotary member and for rotating and adjusting the finger grip bar and the mounting arm of the brake handle relative to the rotary member and the lever housing, a barrel pivotally fitted into the pivot opening of the mounting arm, and including a screw hole formed in the barrel, and a link rod including a first end pivotally coupled to the piston of the brake device, and including a threaded segment engaged with the screw hole of the barrel for adjusting the mounting arm of the brake handle relative to the piston of the brake device and the lever housing and for allowing the brake handle to be easily and suitably adjusted relative to the piston of the brake device and the lever housing and thus for allowing the brake lever assembly to be easily operated by adults or children of different hand or palm sizes or dimensions.

[0012] The brake handle includes a slot formed in the mounting arm for forming two flaps, and the pivot opening is extended through the flaps of the mounting arm for receiving and engaging with the barrel and thus for pivotally attaching or mounting the barrel to the mounting arm of the brake handle. The screw hole of the barrel is aligned with the slot of the mounting arm.

[0013] The handle mount includes a compartment formed in the lever housing and defined between two walls and communicative with the chamber of the lever housing, and includes an orifice extended through the walls of the handle mount for engaging with the pivot shaft and thus for pivotally attaching or mounting the pivot shaft to the lever housing.

[0014] The brake handle includes at least one insert fitted into the pivot opening of the mounting arm and engaged with the knob for stably or solidly anchoring and positioning the knob in the pivot hole of the brake handle and for preventing the knob from being moved or disengaged from the brake handle.

[0015] The insert includes an aperture formed therein, and the knob includes a protrusion extended outwardly therefrom and engaged with the aperture of the insert for stably or solidly anchoring and positioning the knob in the pivot hole of the brake handle and for preventing the knob from being moved sidewise relative to the brake handle.

[0016] The knob includes at least one positioning member formed therein, and the insert includes a positioning element for engaging with the positioning member of the knob and for anchoring and positioning the knob to the brake handle at the suitable or selected angular positions.

[0017] The positioning member of the knob is preferably a recess, and the positioning element of the insert is preferably a projection extended from the insert for engaging with the recess of the knob. The first end of the link rod is preferably a

ball-shaped or universal joint for pivotally coupling the link rod to the piston of the brake device and thus for allowing the piston of the brake device to be suitably moved or actuated or operated by the brake handle with the link rod.

[0018] Further objectives and advantages of the present invention will become apparent from a careful reading of the detailed description provided hereinbelow, with appropriate reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019] FIG. **1** is a perspective view of an adjustable brake lever assembly in accordance with the present invention;

[0020] FIG. **2** is a partial exploded view of the adjustable brake lever assembly;

[0021] FIG. **3** is a side plan schematic view of the adjustable brake lever assembly, in which a portion of the adjustable brake lever assembly has been cut off for showing the inner structure of the adjustable brake lever assembly; and

[0022] FIG. **4** is another side plan schematic view similar to FIG. **3**, illustrating the operation of the adjustable brake lever assembly for the bicycle.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0023] Referring to the drawings, and initially to FIG. an adjustable brake lever assembly in accordance with the present invention comprises a handle mount **10** including a clamp or attachment mechanism **11** formed or provided thereon and configured to be fastened or attached to a handlebar **80** of the bicycle which includes a hand grip **81** for being grasped or held by the user, the handle mount **10** includes a hollow L-shaped lever housing **12** having an integrally formed nose cone **13** and post **14**, and includes a fluid chamber **15** formed therein and substantially parallel to the nose cone **13** of the lever housing **12**, and a brake device **20**, such as a hydraulic disc brake device **20** includes a piston **21** slidably engaged within the fluid chamber **15** of the lever housing **12** for actuating or operating the brake device **20**. The lever housing **12** of the handle mount **10** includes a space or compartment **16** formed therein and formed or defined between two side walls **17** and communicative with the fluid chamber **15** of the lever housing **12**, in which the walls **17** each include an orifice **18** formed therein (FIG. **2**) and the orifices **18** of the walls **17** are coaxial, or the orifice **18** is extended through the walls **17** of the handle mount **10**.

[0024] A rotary member **30** includes a block or base **31** disposed or engaged into the compartment **16** of the lever housing **12** and disposed or positioned between the walls **17** and having a bore **32** formed in the base **31** and aligned with the orifices **18** of the walls **17** for receiving or engaging with a pivot shaft **33** and for pivotally or rotatably coupling or attaching or mounting the base **31** of the rotary member **30** to the lever housing **12**, and one or more fasteners **34** may further be provided and engaged with the pivot shaft **33** and the lever housing **12** for solidly or stably securing the base **31** of the rotary member **30** to the lever housing **12**. The rotary member **30** further includes a threaded shank **35** extended outwardly therefrom and substantially perpendicular to the base **31** of the rotary member **30** and/or the pivot shaft **33**.

[0025] A brake handle **50** includes a finger grip bar **51** configured to be comfortably embraced by the fingers of a rider and an integrally formed or connected mounting arm **52**, in which the finger grip bar **51** and the mounting arm **52** are connected at their proximal ends or at a connected portion **53**; and includes a pivot hole **54** formed in the finger grip bar **51** and/or the mounting arm **52**, or formed in the proximal ends or connected portion **53** of the finger grip bar **51** and the mounting arm **52**, and further includes a channel **55** formed in the finger grip bar **51** and/or the mounting arm **52**, or formed in the proximal ends or connected portion **53** of the finger grip bar **51** and the mounting arm **52** and intersecting or communicating with the pivot hole **54** of the finger grip bar **51** and/or the mounting arm **52**, or of the brake handle **50** for receiving or engaging with the threaded shank **35** of the rotary member **30**, and further includes a gap or slot **56** formed in the other end or free end **57** of the mounting arm **52** for forming or defining two flaps **58**, and a pair of coaxial pivot openings **59** extended through the flaps **58** of the mounting arm **52**.

[0026] A control knob **60** is pivotally or rotatably engaged or fitted into the pivot hole **54** of the finger grip bar **51** and/or the mounting arm **52**, or of the brake handle **50**, and includes a screw hole **61** formed therein for threading or engaging with the threaded shank **35** of the rotary member **30** and for rotating and adjusting the finger grip bar **51** and/or the mounting arm **52** of the brake handle **50** toward or away from or relative to the rotary member **30** and the lever housing **12**. It is preferable that the knob **60** includes a protruding stem or two protrusions **62** oppositely extended outwardly therefrom, and includes a number of positioning members **63**, such as projections or recesses **63** formed in the outer peripheral portion thereof.

[0027] One or more (such as two) inserts **64**, **65** may further be provided and engaged with or into the pivot hole **54** of the finger grip bar **51** and/or the mounting arm **52**, or of the brake handle **50**; and each include an aperture **66** formed therein for engaging with the protrusions **62** of the knob **60** and for solidly or stably anchoring or positioning or securing the knob **60** in the pivot hole **54** of the finger grip bar **51** and/or the mounting arm **52**, or of the brake handle **50**, and each include a positioning element **67**, such as a recess or a projection **67** formed or extended outwardly therefrom for engaging with either of the recesses or positioning members **63** of the knob **60** and for anchoring or positioning the knob **60** to the finger grip bar **51** and/or the mounting arm **52** of the brake handle **50** at selected angular positions, and/or for anchoring or positioning the brake handle **50** to the lever housing **12** at the adjusted positions or locations.

[0028] A cylinder or barrel **70** is pivotally or rotatably engaged or fitted into the pivot openings **59** of the flaps **58** of the mounting arm **52**, and includes a screw hole **71** formed therein and aligned with or communicative with the slot **56** of the mounting arm **52**. A link rod **73** includes a ball-shaped or universal joint **74** formed or provided on one end or first end **74** thereof and pivotally or rotatably coupled to the piston **21** of the brake device **20**, and includes a threaded segment **75** formed or provided on the other end thereof for threading or engaging with the screw hole **71** of the cylinder or barrel **70** and for adjusting the other end or free end **57** of the mounting arm **52** of the brake handle **50** toward or away from or relative to the piston **21** of the brake device **20** and the lever housing **12**.

[0029] The link rod **73** includes a non-circular engaging cavity **76** formed or provided in the other end or free end thereof for engaging with the wrenches or other driving tools (not shown) and for rotating the link rod **73** relative to the barrel **70** and the mounting arm **52** of the brake handle **50**, and thus for adjusting the other end or free end **57** of the mounting

arm **52** of the brake handle **50** toward or away from or relative to the piston **21** of the brake device **20** and the lever housing **12**, in order to further adjust the finger grip bar **51** and the brake handle **50** relative to the lever housing **12** and the hand grip **81** of the handlebar **80** and thus for allowing the finger grip bar **51** of the brake handle **50** to be easily held or grasped or operated by adults or children of different hand or palm sizes or dimensions.

[0030] In operation, as shown in FIGS. **3** and **4**, the proximal ends or connected portion **53** of the finger grip bar **51** and the mounting arm **52**, or of the brake handle **50** may be moved or adjusted toward or away from or relative to the rotary member **30** and the lever housing **12** by rotating the knob **60** relative to the brake handle **50** and the threaded shank **35** of the rotary member **30** in order to further adjust the finger grip bar **51** and/or the mounting arm **52** of the brake handle **50** relative to the lever housing **12** and the hand grip **81** of the handlebar **80**. The other end or free end **57** of the mounting arm **52** of the brake handle **50** may also be moved or adjusted toward or away from or relative to the piston **21** of the brake device **20** and the lever housing **12** by rotating the link rod **73** relative to the barrel **70** and the mounting arm **52** of the brake handle **50** in order to further adjust the finger grip bar **51** and the brake handle **50** relative to the lever housing **12** and the hand grip **81** of the handlebar **80** and thus for adjusting the actuation or operation to the piston **21** of the brake device **20**.

[0031] Accordingly, the adjustable brake lever assembly in accordance with the present invention includes an adjusting structure or mechanism for micro-adjusting the brake lever assembly relative to the handlebar of the bicycle and for allowing the brake lever assembly to be easily operated by adults or children of different hand or palm sizes or dimensions.

[0032] Although this invention has been described with a certain degree of particularity, it is to be understood that the present disclosure has been made by way of example only and that numerous changes in the detailed construction and the combination and arrangement of parts may be resorted to without departing from the spirit and scope of the invention as hereinafter claimed.

I claim:

1. An adjustable brake lever assembly comprising:

a handle mount including a lever housing having an attachment mechanism for attaching to a handlebar of a bicycle, and including a chamber formed in said lever housing,

a brake device including a piston slidably engaged in said chamber of said lever housing,

a rotary member including a base pivotally coupled to said lever housing with a pivot shaft, and including a threaded shank extended outwardly therefrom,

a brake handle including a finger grip bar and a mounting arm connected at a connected portion, and including a pivot hole formed in said connected portion of said brake handle, and including a pivot opening formed in said mounting arm,

a knob rotatably fitted into said pivot hole of said brake handle, and including a screw hole formed in said knob for threading and engaging with said threaded shank of said rotary member and for rotating and adjusting said finger grip bar and said mounting arm of said brake handle relative to said rotary member and said lever housing,

a barrel pivotally fitted into said pivot opening of said mounting arm, and including a screw hole formed in said barrel, and

a link rod including a first end pivotally coupled to said piston of said brake device, and including a threaded segment engaged with said screw hole of said barrel for adjusting said mounting arm of said brake handle relative to said piston of said brake device and said lever housing.

2. The adjustable brake lever assembly as claimed in claim **1**, wherein said first end of said link rod is a ball-shaped or universal joint.

3. The adjustable brake lever assembly as claimed in claim **1**, wherein said brake handle includes a slot formed in said mounting arm for forming two flaps, and said pivot opening is extended through said flaps of said mounting arm for receiving and engaging with said barrel.

4. The adjustable brake lever assembly as claimed in claim **3**, wherein said screw hole of said barrel is aligned with said slot of said mounting arm.

5. The adjustable brake lever assembly as claimed in claim **1**, wherein said handle mount includes a compartment formed in said lever housing and defined between two walls and communicative with said chamber of said lever housing, and includes an orifice extended through said walls of said handle mount for engaging with said pivot shaft.

6. The adjustable brake lever assembly as claimed in claim **1**, wherein said brake handle includes at least one insert fitted into said pivot opening of said mounting arm and engaged with said knob for anchoring and positioning said knob in said pivot hole of said brake handle.

7. The adjustable brake lever assembly as claimed in claim **6**, wherein said at least one insert includes an aperture formed therein, and said knob includes a protrusion extended outwardly therefrom and engaged with said aperture of said at least one insert.

8. The adjustable brake lever assembly as claimed in claim **6**, wherein said knob includes at least one positioning member formed therein, and said at least one insert includes a positioning element for engaging with said at least one positioning member of said knob and for anchoring and positioning said knob to said brake handle.

9. The adjustable brake lever assembly as claimed in claim **8**, wherein said at least one positioning member of said knob is a recess, and said positioning element of said at least one insert is a projection extended from said at least one insert.

* * * * *