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(54) **TOOL COMBINATION FOR BICYCLE**

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(52) **U.S. Cl.** **7/138**; 7/118; 81/440; 157/1.3

(58) **Field of Search** 7/100, 118, 138, 7/165; 59/7; 81/437, 439, 440; 157/1.3

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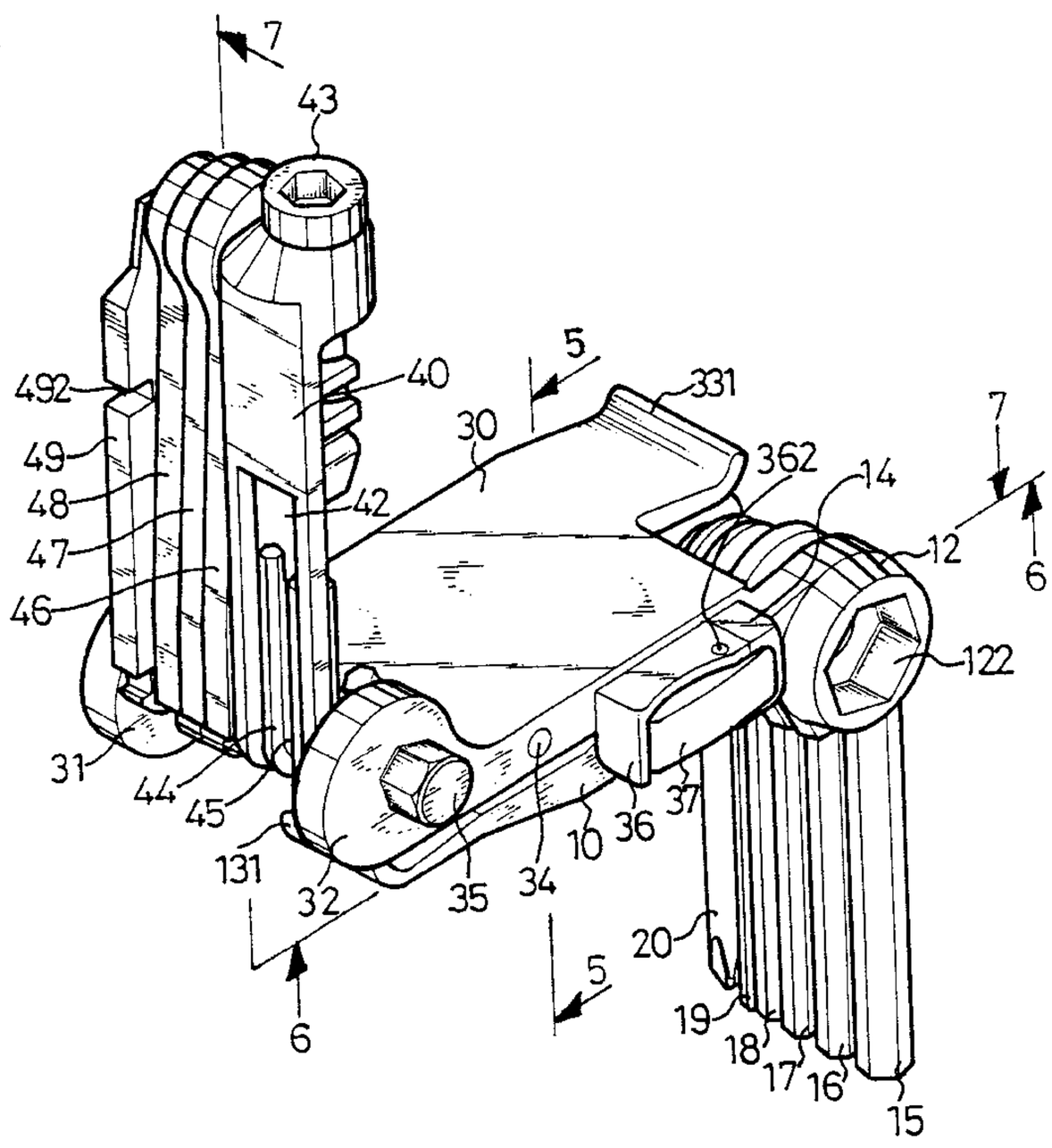
(57) **ABSTRACT**

A tool combination includes two tool assemblies that may be secured together by an engagement between a dovetail slot and a dovetail. The tool assemblies each includes a number of rotatable tools. One of the tool assemblies includes a rib formed on one side. The other tool assembly includes a knob pivotally engaged in a housing. The knob includes a projection for engaging with the rib. A spring may bias the projection of the knob to engage with the rib so as to secure the tool assemblies together. The tool assemblies each includes a spanner for engaging with and for repairing bicycle tire.

22 Claims, 6 Drawing Sheets



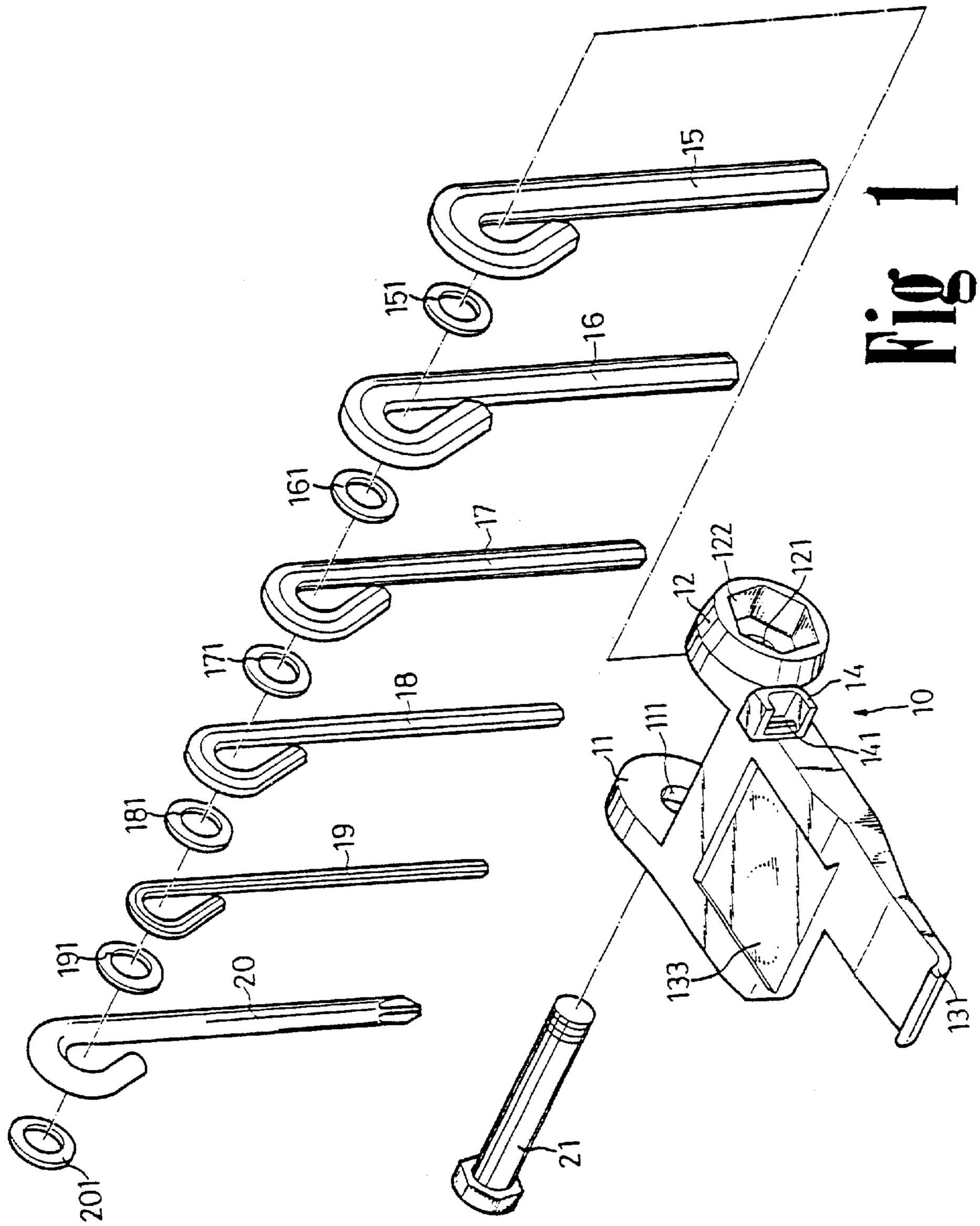

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Fig 1

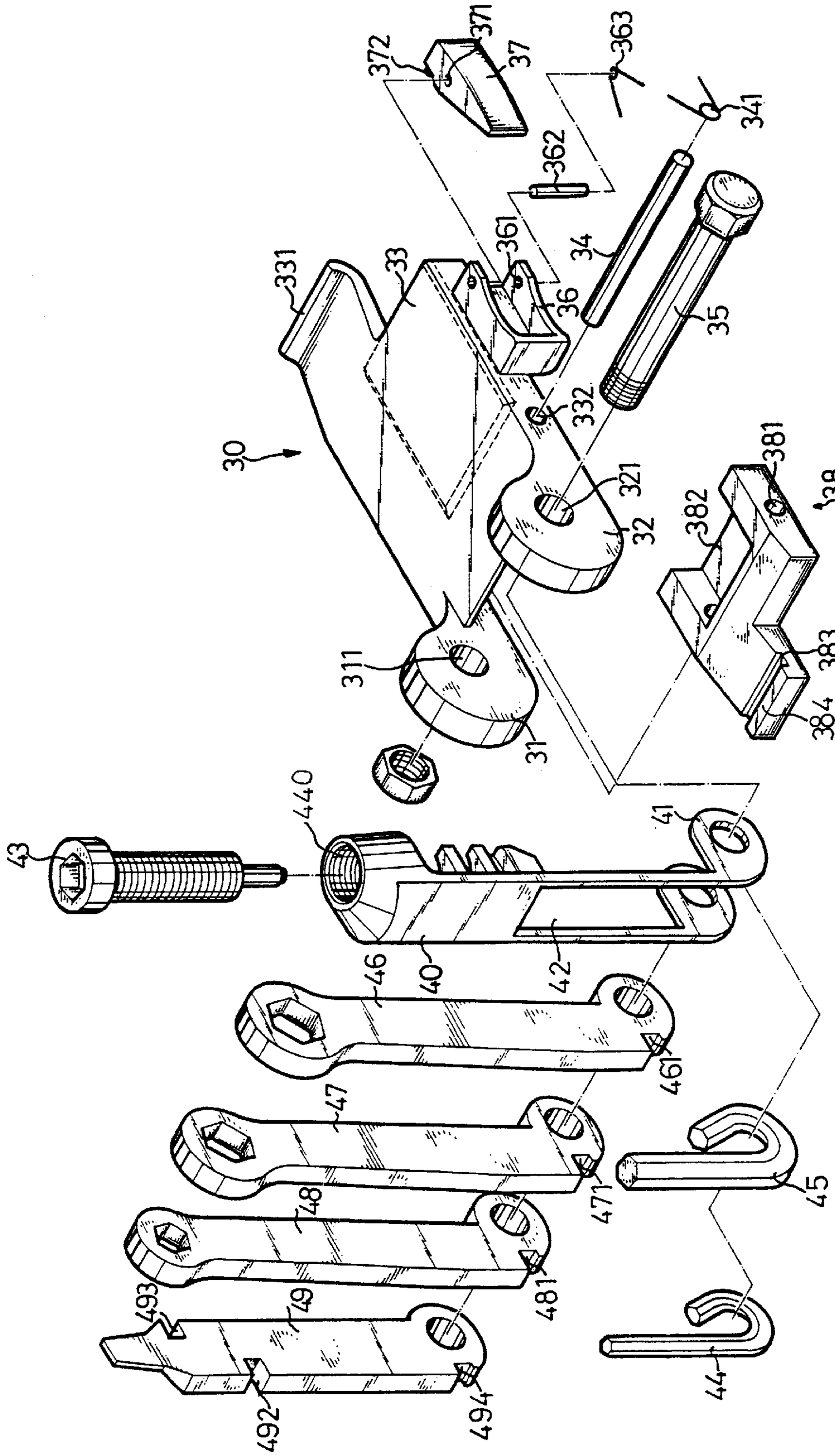

Fig. 2 Amended

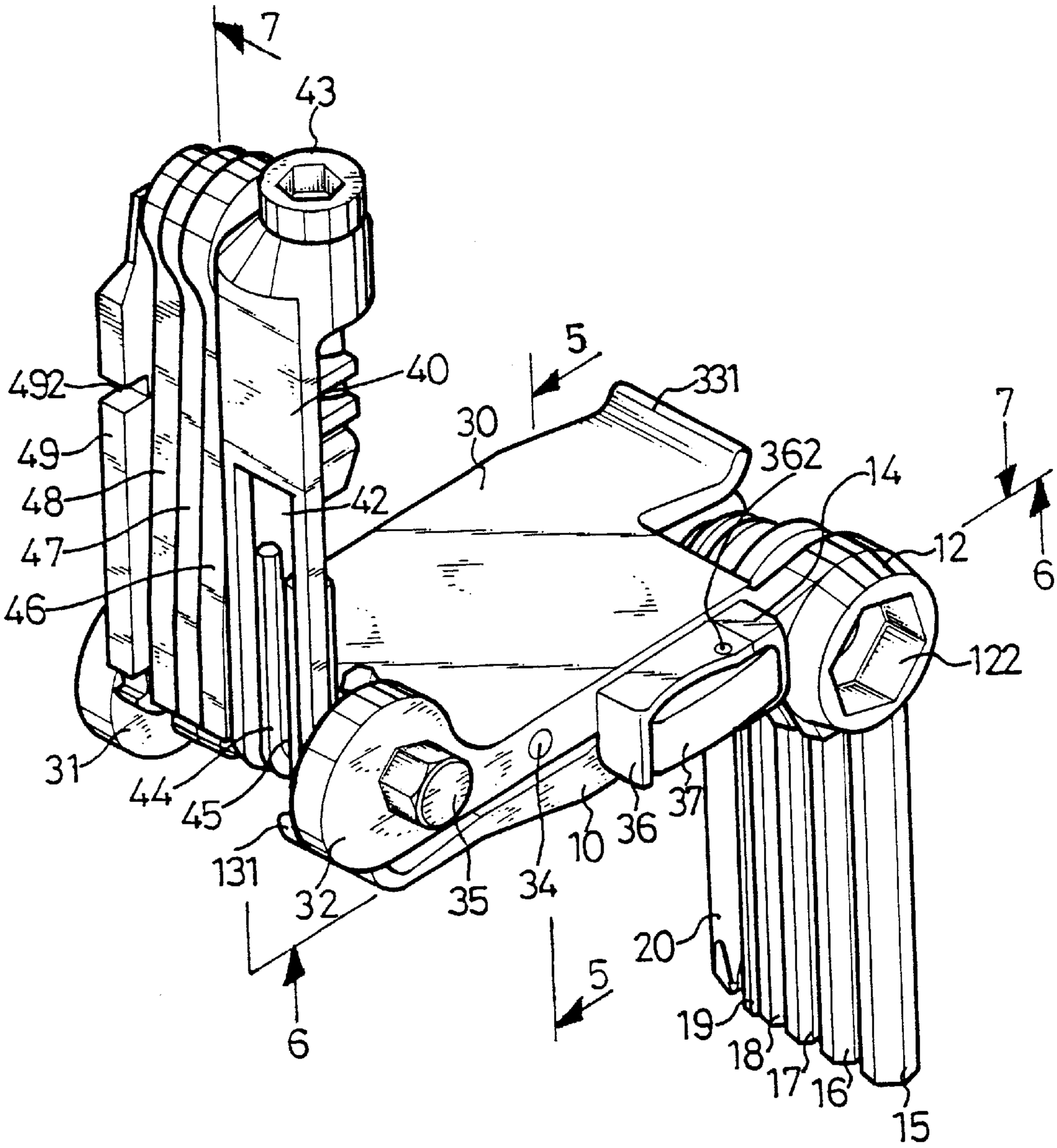
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Fig 3

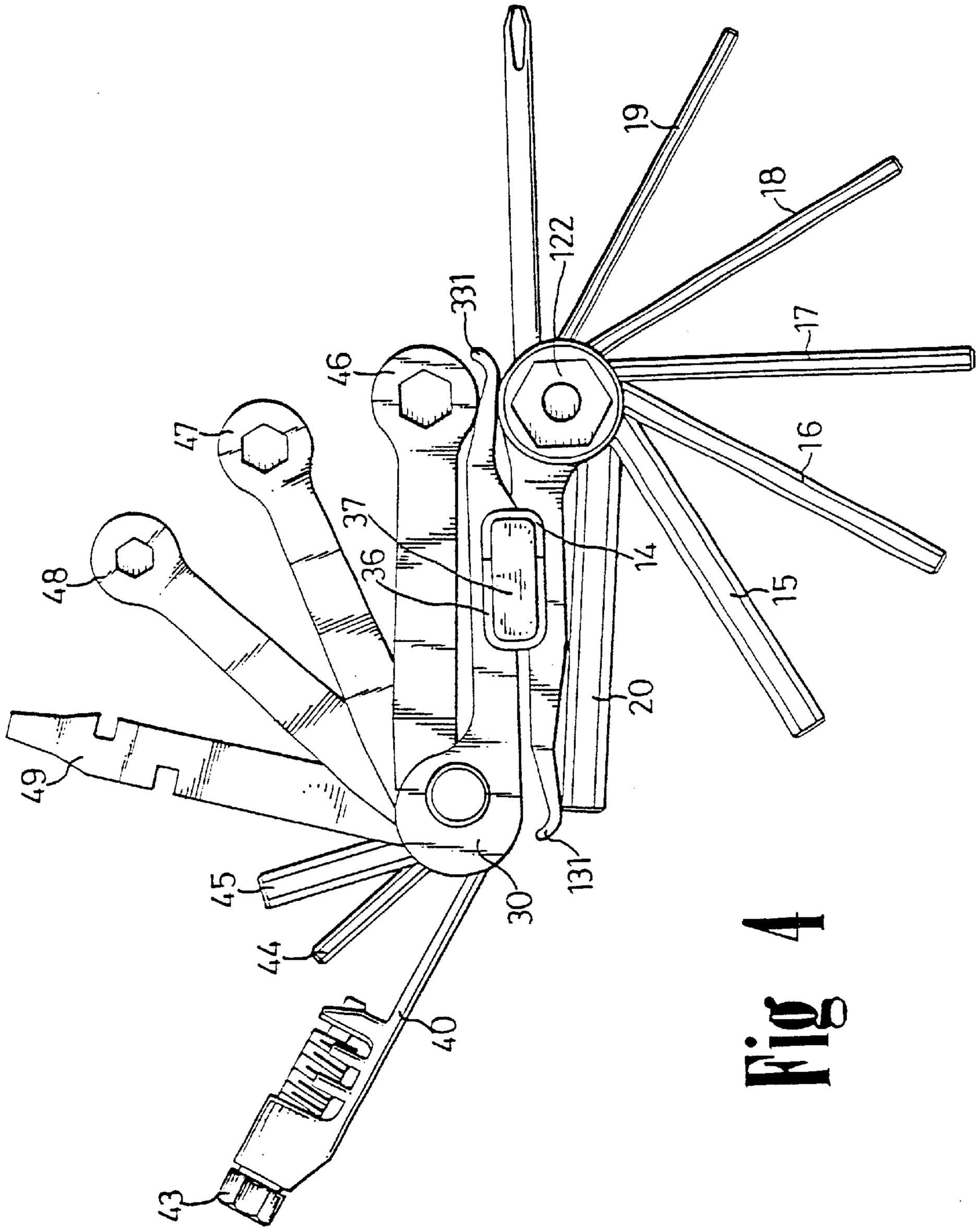

Fig 4

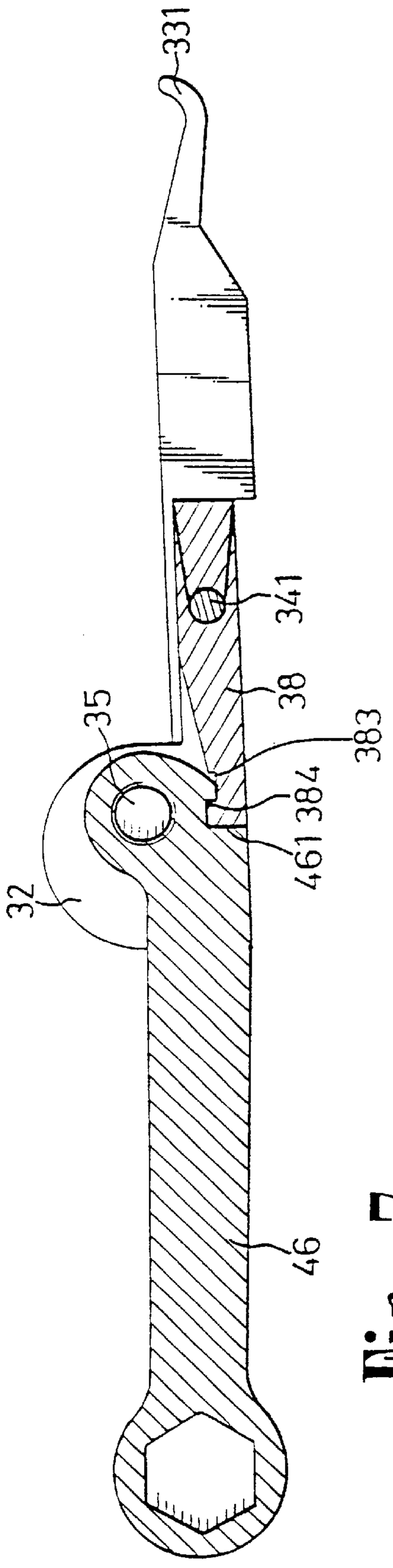

Fig 7

Fig 6

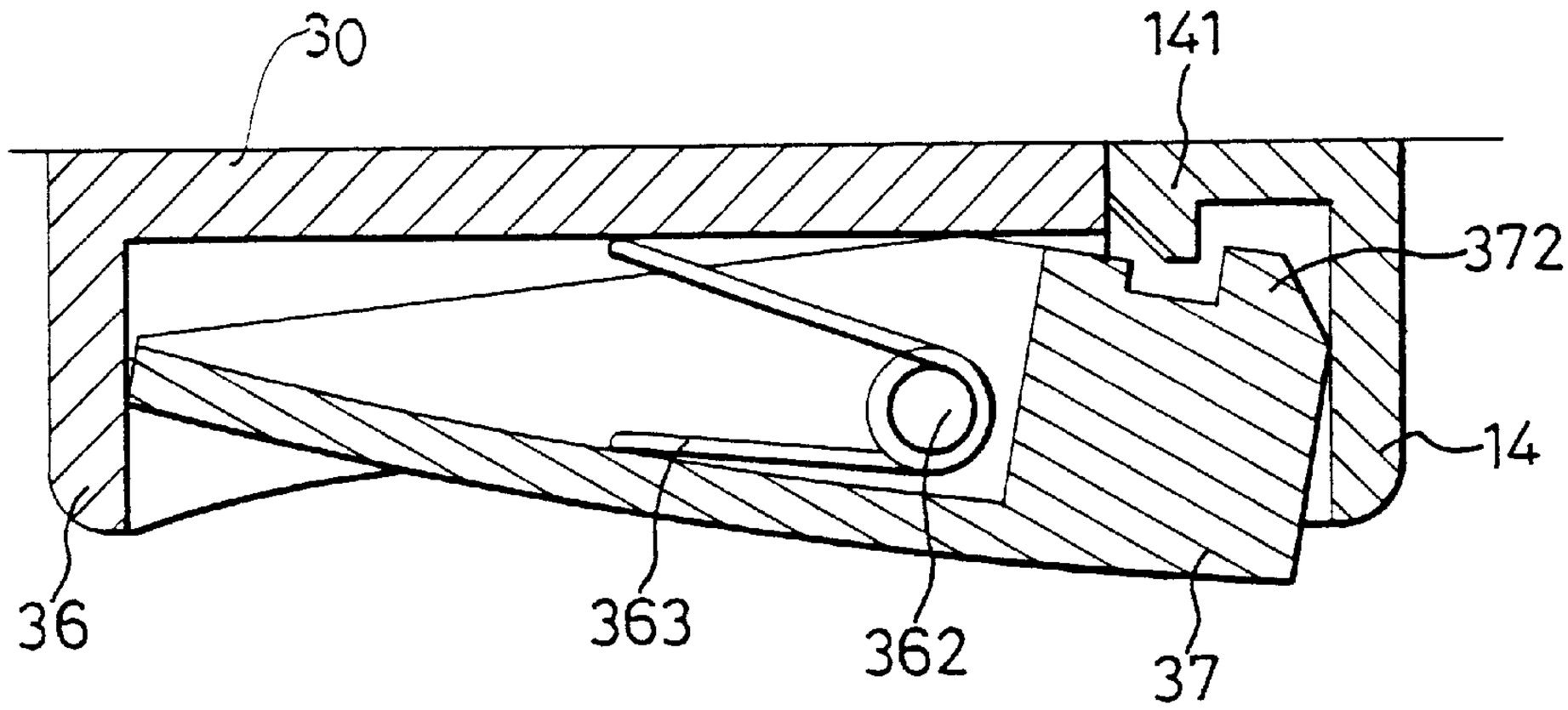

Fig 6

TOOL COMBINATION FOR BICYCLE

Matter enclosed in heavy brackets [ ] appears in the original patent but forms no part of this reissue specification; matter printed in italics indicates the additions made by reissue.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a tool, and more particularly to a tool combination for **[**bicycle**]** *bicycles*.

2. Description of the Prior Art

Typical bicycles comprise a number of elements and parts that are required to be fixed and repaired by a number of tools. The user **[**have**]** *has* to prepare a number of tools for engaging and disengaging the fastening members and for repairing the chains. It is inconvenient to prepare and to retain the tools in place.

The present invention has arisen to mitigate and/or obviate the afore-described disadvantages of **[**the**]** conventional tools for bicycles.

SUMMARY OF THE INVENTION

The primary objective of the present invention is to provide a tool combination which includes all of the required tools for fixing and repairing the bicycle.

In accordance with one aspect of the invention, there is provided a tool combination comprising a first tool assembly including a body having a dovetail slot formed therein and having a first bolt secured therein, at least one first tool rotatably engaged on the first bolt, a second tool assembly including a block having a dovetail formed thereon for engaging with the dovetail slot of the first tool assembly so as to secure the first tool assembly and the second tool assembly together, the block including a second bolt secured therein, at least one second tool rotatably engaged on the second bolt, and means for securing the first tool assembly and the second tool assembly together.

[THe**]** *The* body includes a pair of ears formed thereon, the ears each includes a hole formed therein for engaging with the first bolt, a first of the ears includes a socket formed thereon.

The body includes a cap formed thereon and having a rib formed in the cap, the block includes a housing formed thereon, the securing means includes a knob pivotally engaged in the housing, the knob includes a projection formed thereon for engaging with the rib of the cap, the securing means includes a biasing means for biasing the projection of the knob to engage with the rib so as to secure the body to the block.

The body and the block each includes a spanner for engaging with and for repairing *a* bicycle tire.

The second **[**tool**]** *tools* each includes a cavity formed therein, the second tool assembly includes a pole secured therein, a catch includes a middle portion pivotally coupled to the pole and rotatable about the pole, the catch includes a flange formed thereon for engaging with the cavity of the second tool so as to position the second tool, the catch includes a biasing means for biasing the flange to engage with the cavity.

A chain repairing tool is rotatably engaged on the second bolt, the chain repairing tool includes a notch formed therein, and at least one third tool is engaged in the notch of the chain repairing tool and rotatably engaged on the second bolt.

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

FIG. **1** is an exploded **[**views**]** *view* illustrating a tool assembly of a tool combination in accordance with the present invention;

FIG. **2** is an exploded **[**views**]** *view* illustrating the other tool assembly of the tool combination in accordance with the present invention;

FIG. **3** is a perspective view of the tool combination;

FIG. **4** is a **[**plane**]** *plan* view of the tool combination;

FIG. **5** is *a* cross sectional view taken along lines **5—5** of FIG. **3**;

FIG. **6** is a cross sectional view taken along lines **6—6** of FIG. **3**; and

FIG. **7** is *a* cross sectional view taken along lines **7—7** of FIG. **3**.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawings, and initially to FIGS. **1** to **4**, a tool combination in accordance with the present invention comprises a first tool assembly as shown in FIG. **1**, and a second tool assembly as shown in FIG. **2**. The first tool assembly and the second tool assembly each includes a number of tools provided therein which are good enough for fixing and repairing all of the elements and parts of the bicycle. The first tool assembly and the second tool assembly **[**includes**]** *include* a securing device for securing the tool assemblies together such that the tool combination can be easily stored and carried.

As shown in FIG. **1**, the first tool assembly includes a body **10** having a pair of ears **11**, **12** extended therefrom. The ears **11**, **12** each includes a hole **111**, **121** formed therein for engaging with a bolt **21**. The ear **12** includes a socket **122** for engaging with screws, bolts or nuts. The body **10** includes a dovetail slot **133** formed therein and includes a spanner **131** for engaging with the bicycle tire and for repairing the bicycle tire. The body **10** includes a cap **14** formed on one side portion and having a rib **141** (FIGS. **1** and **6**) formed therein. A number of screw drivers **15**, **16**, **17**, **18**, **19**, **20** include one end rotatably engaged on the bolt **21** so as to form the first tool assembly. A number of washers **151**, **161**, **171**, **181**, **191**, **201** are engaged on the bolt **21** and engaged between the screw drivers **15**, **16**, **17**, **18**, **19**, **20** respectively.

As shown in FIG. **2**, the second tool assembly includes a block **30** having a pair of ears **31**, **32** extended therefrom. The ears **31**, **32** each includes a hole **311**, **321** formed therein for engaging with a bolt **35**. The block **30** includes a dovetail **33** formed therein for engaging with the dovetail slot **133** of the body **10** of the first tool assembly (FIG. **5**) such that the first tool assembly and the second tool assembly may be secured together so as to form the tool combination. The block **30** includes a spanner **331** for engaging with the bicycle tire and for repairing the bicycle tire. The block **30** includes a housing **36** formed on one side portion and having a pin **362** (FIGS. **2**, **3** and **6**) pivotably secured therein. The pin **362** has two ends engaged in the holes **361** formed in the housing **36**. A knob **37** has a center hole **371** formed **[**therien**]** *therein* for engaging with the pin **362** such that the knob **37** is rotatable about the pin **362**. The knob **37** includes a projection **372** (FIGS. **2** and **6**) formed thereon for engaging

with the rib **141** of the body **10**. A spring **363** is engaged on the pin **362** and is engaged between the block **30** and the knob **37** for biasing the projection **372** of the knob **37** to engage with the rib **141** of the body **10**, such that the first tool assembly and the second *tool* assembly may be secured together.

Referring next to FIG. **7** and again to FIG. **2**, the block **30** includes two orifices **332** formed therein for engaging with a pole **34** therein. A catch **38** includes an aperture **381** formed therein for engaging with the pole **34** such that the catch **38** is rotatable about the pole **34**. The catch **38** includes a recess **382** formed therein for engaging with a spring **341**. The catch **38** includes a groove **383** and a flange **384** formed therein. The spring **341** is engaged on the pole **34** and is engaged between the block **30** and the catch **38** for biasing the groove **383** and the flange **384** upward toward the ears **311**, **321**. A number of wrenches **46**, **47**, **48** and a screw driver **49** and a beam **40** are rotatably engaged on the bolt **35**. The beam **40** includes a notch **42** formed therein for engaging with two screw drivers **44**, **45** therein which are rotatably engaged on the bolt **35** so as to form the second tool assembly. A bolt **43** is threadedly engaged with the inner thread **[44]** *440* of the beam **40** so as to form a typical tool for engaging with and for repairing chains of bicycles. The screw driver **49** includes two notches **492**, **493** formed therein for engaging with and for repairing typical spokes. The wrenches **46**, **47**, **48** and the screw driver **49** each includes a cavity **461**, **471**, **481**, **494** formed therein for engaging with the flange **384** of the catch **38**. The spring **341** may bias the catch **38** for biasing the groove **383** and the flange **384** upward to engage with the cavities **461**, **471**, **481**, **494** of the wrenches **46**, **47**, **48** and the screw driver **49**, best shown in FIG.**7**, such that the wrenches **46**, **47**, **48** and the screw driver **49** may be retained in the opened or working position.

Accordingly, the tool combination in accordance with the present invention includes all of the required tools for fixing and repairing the bicycle. The tools are secured in two tool assemblies that may be secured together such that the tool combination can be easily stored and carried.

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. A tool combination comprising:

first tool assembly including a body having a dovetail slot formed therein and having a first bolt secured therein,

at least one first tool rotatably engaged on said first bolt,

a second tool assembly including a block having a dovetail formed thereon for engaging with said dovetail slot of said first tool assembly so as to secure said first tool assembly and said second tool assembly together, said block including a second bolt secured therein,

a chain repairing tool rotatably engaged on said second bolt, said chain repairing tool including a notch formed therein,

at least one second tool rotatably engaged on said second bolt, and

means for securing said first tool assembly and said second tool assembly together.

2. A tool combination according to claim **1**, wherein said body includes a pair of ears formed thereon, said ears each includes a hole formed therein for engaging with said first bolt, a first of said ears includes a socket formed thereon.

3. A tool combination **[**according to claim **1]** *comprising*:

first tool assembly including a body having a dovetail slot formed therein and having a first bolt secured therein,

at least one first tool rotatably engaged on said first bolt,

a second tool assembly including a block having a dovetail formed thereon for engaging with said dovetail slot of said first tool assembly so as to secure said first tool assembly and said second tool assembly together, said block including a second bolt secured therein,

at least one second tool rotatably engaged on said second bolt, and

means for securing said first tool assembly and said second tool assembly together; wherein said body includes a cap formed thereon and having a rib formed in said cap, said block includes a housing formed thereon, said securing means includes a knob pivotally engaged in said housing, said knob includes a projection formed thereon for engaging with said rib of said cap, said securing means includes a biasing means for biasing said projection of said knob to engage with said rib so as to secure said body to said block.

4. A tool combination according to claim **1**, wherein said body includes a spanner for engaging with and for repairing bicycle tire.

5. A tool combination according to claim **1**, wherein said block includes a spanner for engaging with and for repairing *a* bicycle tire.

6. A tool combination according to claim **1**, wherein said second tool each includes a cavity formed therein, said second tool assembly includes a pole secured therein, a catch includes a middle portion pivotally coupled to said pole and rotatable about said pole, said catch includes a flange formed thereon for engaging with said cavity of said second tool so as to position said second tool, said catch includes a biasing means for biasing said flange to engage with said cavity.

7. A tool combination according to claim **1** further comprising **[**a chain repairing tool rotatably engaged on said second bolt, said chain repairing tool including a notch formed therein, and**]** at least one third tool engaged in said notch of said chain repairing tool and rotatably engaged on said second bolt.

8. A tool combination comprising, in combination:

a first tool assembly including a body having a slot formed therein and having a first bolt secured therein, said first bolt having an axial extent,

at least one first tool rotatably engaged on said first bolt,

a second tool assembly including a block having a member formed thereon for engaging with said slot of said first tool assembly, said block including a second bolt secured therein, said second bolt having an axial extent, and

at least one second tool rotatably engaged on said second bolt, with the member being engaged with the slot when the first and second tool assemblies are secured together to form the tool combination with the first tool being within the axial extent of the second bolt and the second tool being within the axial extent of the first bolt.

9. A tool combination according to claim 8, wherein the slot is a dovetail slot and the member is a dovetail.

10. A tool combination according to claim 8, further comprising, in combination: means for securing said first tool assembly and said second tool assembly together.

11. A tool combination according to claim 8, wherein said body includes a pair of ears formed thereon, said ears each

includes a hole formed therein for engaging with said first bolt, a first of said ears includes a socket formed thereon.

12. A tool combination according to claim 8, wherein said body includes an extension portion which has a curved terminal end section and which forms a spanner for engaging with and breaking a bead between a tire and a rim for repairing a bicycle tire.

13. A tool combination according to claim 12, wherein said body includes an extension portion which has a curved terminal end section and which forms a spanner for engaging with and breaking the bead between the tire and the rim for repairing the bicycle tire.

14. A tool combination comprising, in combination:

a first tool assembly including a body having a slot formed therein and having a first bolt secured therein,

at least one first tool rotatably engaged on said first bolt,

a second tool assembly including a block having a member formed thereon for engaging with said slot of said first tool assembly, said block including a second bolt secured therein,

at least one second tool rotatably engaged on said second bolt, with the member being engaged with the slot when the first and second tool assemblies are secured together to form the tool combination, and

a beam rotatably engaged on said second bolt and including an inner thread; and a bolt threadably engaged with the inner thread of the beam to form a chain repairing tool.

15. A tool combination comprising, in combination:

a first tool assembly including at least one, rotatably mounted first tool;

a second tool assembly including at least one, rotatably mounted second tool; and

means for engaging the first tool assembly with the second tool assembly such that the first tool assembly and the second tool assembly may be secured together so as to form the tool combination with the first and second tool assemblies being attachable along a first plane and each of the first and second tools being rotatable in a second plane which is substantially perpendicular to the first plane.

16. A tool combination according to claim 15, further comprising, in combination: means for securing the first tool assembly and the second tool assembly together.

17. A tool combination according to claim 15, wherein the first tool assembly includes a body and the second tool assembly includes a block, and wherein the engaging means comprises a slot formed in the body and a member formed in the block for engaging with the slot.

18. A tool combination according to claim 15, wherein the first tool assembly includes a body and the second tool assembly includes a block, and wherein the body includes a first bolt secured thereto to which said at least one, rotatably mounted first tool is rotatably mounted, and the block includes a second bolt secured thereto to which said at least one, rotatably mounted second tool is rotatably mounted thereto.

19. A tool combination according to claim 18, wherein said body includes a pair of ears formed thereon, said ears each includes a hole formed therein for engaging with said first bolt, a first of said ears includes a socket formed thereon.

20. A tool combination according to claim 15, wherein the first tool assembly includes a body; and wherein said body includes an extension portion which has a curved terminal end section and which forms a spanner for engaging with and breaking a bead between a tire and a rim for repairing a bicycle tire.

21. A tool combination according to claim 20, wherein the second tool assembly includes a block; and wherein said block includes an extension portion which has a curved terminal end section and which forms a spanner for engaging with and breaking the bead between the tire and the rim for repairing the bicycle tire.

22. A tool combination comprising, in combination:

a first tool assembly including at least one, rotatably mounted first tool;

a second tool assembly including at least one, rotatably mounted second tool; and

means for engaging the first tool assembly with the second tool assembly such that the first tool assembly and the second tool assembly may be secured together so as to form the tool combination, wherein the second tool comprises, in combination: a beam including an inner thread; and a bolt threadably engaged with the inner thread of the beam to form a chain repairing tool.

* * * * *