United States Patent

Rider

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[54] **ADJUSTABLE RETAINABLE TOOL BALANCER**

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[52] **U.S. Cl.** .....**248/52,** 248/54 CS, 248/330, 267/156

[51] **Int. Cl.**.....**F16l 3/16**

[58] **Field of Search** .....248/51, 52, 54 CS, 330, 364; 242/107; 267/156

[56] **References Cited**

UNITED STATES PATENTS

3,211,473	10/1965	Schmid	248/52 X
2,854,680	10/1958	Wilson	248/330 X
2,635,282	4/1953	Trammell	267/156 X
460,178	9/1891	Matteson	248/364 X
1,993,961	3/1935	Groven	248/330 X

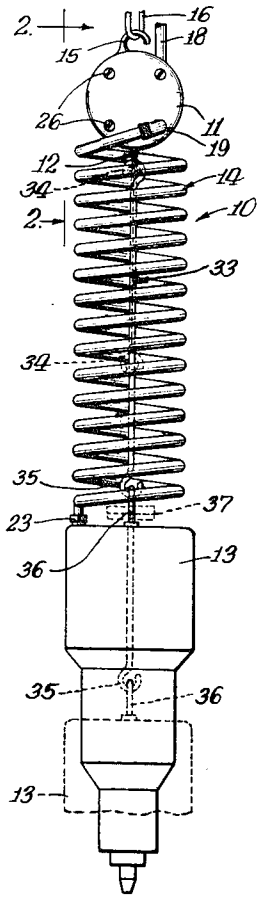
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[57] **ABSTRACT**

A tool balancer having means for adjustably retaining a tool in any one of a plurality of vertically related positions. The balancer includes means for powering the tool.

18 Claims, 3 Drawing Figures



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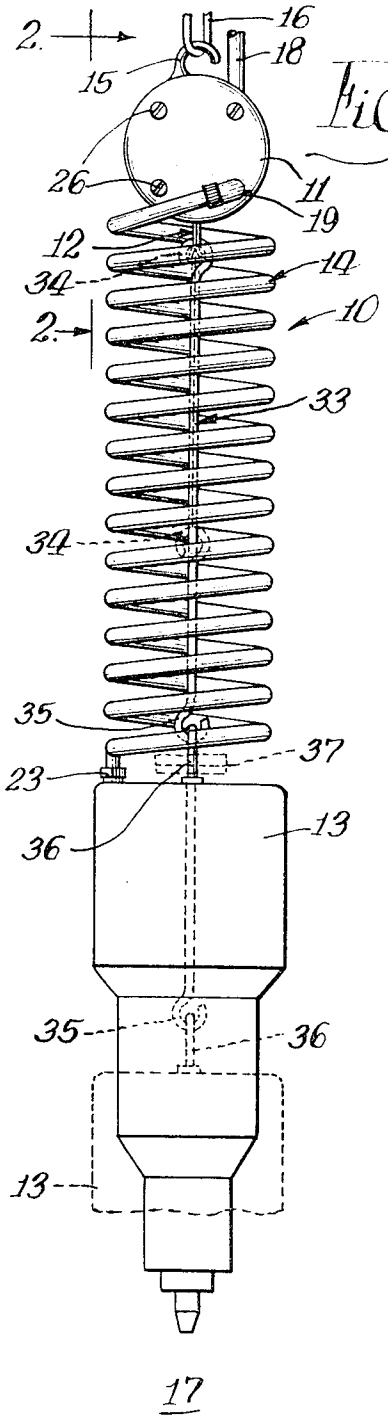


Fig. 1.

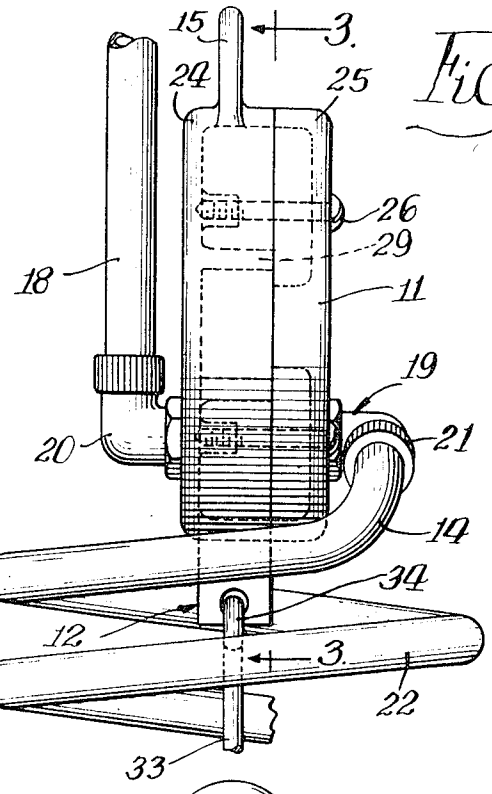


Fig. 2.

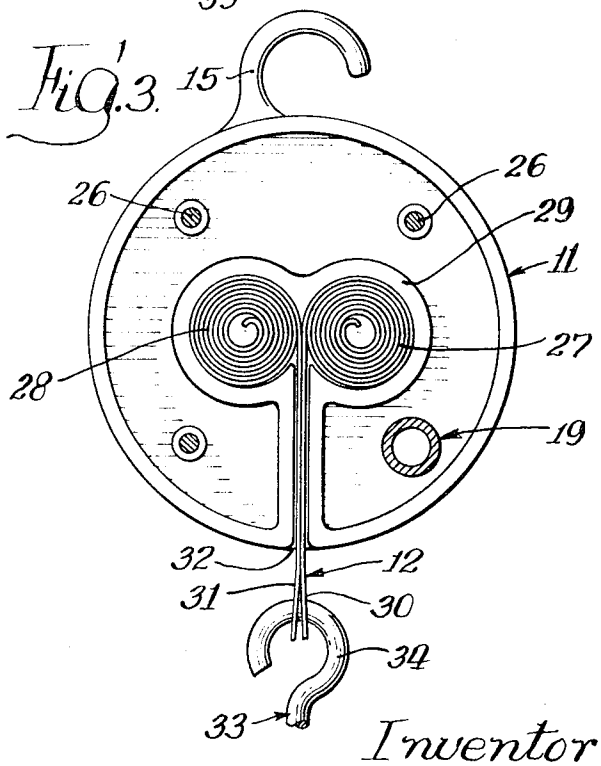


Fig. 3.

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ADJUSTABLE RETAINABLE TOOL BALANCER

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to tool balancers and in particular to tool balancers having means for powering the tool while retaining the tool in an elevated position at a work space.

2. Description of the Prior Art

In one form of conventional tool balancer, a coiled hose is supported at an upper end on an overhead support. The hose carries at its lower end a tool such as a pneumatic hand tool. Pressurized fluid is delivered through the coiled hose to operate the hand tool as desired. When the user wishes to use the tool, he merely pulls down on the tool against the resilient resistance of the coiled hose and utilizes the tool as desired. Upon release of the tool, the coiled hose contracts to elevate the tool to an out of the way retracted position.

One problem arises in the use of such a conventional tool balancer construction in that the tool is always returned to an uppermost retracted position requiring the user to again fully lower the tool to the working position upon subsequent need therefor. There are times in the operation of such hand tools when it is desirable to have the tool remain in a preselected position notwithstanding the release thereof by the user, while at other times, it is desirable to have the tool moved to the out of the way retracted position.

SUMMARY OF THE INVENTION

The present invention comprehends an improved tool balancer which provides the above discussed retained position functioning in a novel manner. The tool balancer of the present invention is extremely simple and economical of construction while yet providing this highly desirable functioning.

More specifically, the invention comprehends providing a tool balancer including a support means, extensible constant force spring means carried by the support means and having means for vertically adjustably carrying a tool to remain in any one of a plurality of vertically related positions when positioned thereat, and means extending from the support means for powering the tool in the positions. The spring means may comprise a coil spring extending about a horizontal axis and arranged to support any one of a plurality of different weight tools. The means for powering the tool may comprise a coiled tube for powering a fluid operated tool. The means for powering the tool may include a plurality of elements permitting delivery and return of the powering medium which illustratively may comprise duct means, electric wiring, etc.

The spring means may comprise a pair of constant force coil springs connected in tandem for cooperatively carrying the tool. The constant force springs are arranged to support preselected range of weights. In the illustrative embodiment, the spring means range varies from a preselected minimum weight to a maximum approximately 50 percent greater than the minimum weight.

The spring means may comprise a plurality of different springs having different strengths to provide selectively different weight ranges of tools carried by the tool balancer. The coil springs may have similar or dissimilar strengths as desired. To extend the range of the tool weights to be balanced by the balancer, a balance weight means may be provided at the lower end of the spring means for selective removal or addition.

The support may further include means for connecting the means for powering the tool to a source of supply.

BRIEF DESCRIPTION OF THE DRAWING

Other features and advantages of the invention will be apparent from the following description taken in connection with the accompanying drawing wherein:

FIG. 1 is a front elevation of a tool balancer embodying the invention supporting a tool in an upper position in full lines and in a lower position illustrated fragmentarily in broken lines;

FIG. 2 is a fragmentary side elevation looking to the right as shown by the arrows in FIG. 1; and

FIG. 3 is a vertical section taken substantially along the line 3—3 of FIG. 2.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In the exemplary embodiment of the invention as disclosed in the drawing, a tool balancer generally designated **10** is shown to comprise a support **11** carrying extensible constant force spring means **12** for supporting an object, illustratively a tool, **13** selectively in any one of a plurality of vertically related positions. The balancer further includes means **14** extending between support **11** and tool **13** for powering the tool in any one of the different positions.

More specifically, support **11** comprises a carrier having a hook **15** adapted to be secured to an upper hanger **16** over a working space **17**. Tool **13** illustratively may comprise any conventional tool, including pneumatic, hydraulic, electrical, etc. tools. In the illustrated embodiment, tool **13** comprises a pneumatic hand tool. The power supply means includes a duct **18** for delivering pressurized pneumatic fluid, such as air, from a suitable source (not shown). As shown in FIG. 2, duct **18** is connected to a power means duct **14** by means of a connector **19** extending through the support **11** and having opposite connecting elements **20** and **21**. Duct **14** comprises a helical coiled duct having turns **22** which are resiliently extensible from a normal compacted arrangement wherein the turns are closely juxtaposed. Illustratively, the duct may be formed of a plastic, such as nylon-**11**, having a preselected memory to provide such resilient return to the original coil configuration. At its lower end, duct **14** may be connected to tool **13** by a suitable connector **23**.

Support **11** may comprise a split housing having a rear portion **24** and a front portion **25**. The support portions may be removably secured together by suitable means such as screws **26**.

The extensible constant force spring means **12** herein comprises a pair of conventional metal band springs **27** and **28** which are spirally coiled and received within a suitable recess **29** in support **11**. The springs include distal ends **30** and **31** respectively projecting outwardly through an opening **32** in the support. A connecting rod **33** includes an upper hook **34** connected to the spring ends **30** and **31**, and a lower hook **35** connected to a mating hook **36** on the upper end of tool **13**. As best seen in FIG. 1, rod **33** extends coaxially within the powering means coiled duct **14**.

The constant force springs **27** and **28** comprise a prestressed spiral strip of flat spring stock. The spiral spring configuration stores energy when the distal ends **30** and **31** are drawn outwardly (downwardly as seen in FIG. 1). Upon release of this energy, the coil springs **27** and **28** recoil around their horizontal axes exerting an upward force on tool **13**. The upward force is preselected herein to be similar to the weight of the tool so that the tool will thereby be retained in any preselected position as desired by the user.

Illustratively, in one such tool balancer, the tool may have a weight in the range of approximately 2½ to 3.9 lbs. The constant force springs may have a corresponding load carrying characteristic to support a tool having a weight within this weight range in any desired vertically related position between the uppermost position as shown in FIG. 3, and a maximum lower position wherein the spring means are substantially fully withdrawn. Illustratively, the springs may have a substantial length such as up to 6 feet permitting a wide range of adjusted positioning of the tool by the balancer. In the illustrated embodiment, the springs have a width of three-eighths inch and the duct **14** has a coil diameter of approximately 3½ inch. Any suitable number of turns of the coiled duct may be provided. In the retracted position, the illustrated coiled duct may have an axial length of approximately 10 inches and the connecting rod **33** may similarly have a length of approximately 10½ inches whereby the tool is carried approximately 11 inches below support **11** in the uppermost retracted position.

As is well known to those skilled in the art, such constant force spring means may be provided in different sizes with different weight carrying characteristics. The invention comprehends that any one of such different strength springs may be utilized corresponding to the desired weight carrying ability of the balancer. As shown in FIG. 3, an improved balanced arrangement is supported by providing a pair of such springs 27 and 28 in back-to-back juxtaposition. Springs 27 and 28 may have similar strength characteristics or different strength characteristics as desired. To substitute springs, the user merely opens support 11 by removing screws 26, and makes the desired change in the springs in the recess 29, hooking the replacement spring ends onto hook end 34 of the connecting rod as shown in FIG. 3. The support may incorporate additional similar recesses 29 (not shown) to mount a plurality of different springs in the support permitting selective connection to such different springs individually or in combination as desired. A plurality of tool balancers 10 may be utilized in side-by-side relationship on hanger 16, each tool balancer having different weight lifting characteristics so that different weight tools may be connected to the different tool balancers so associatedly mounted.

The invention further comprehends the provision of a relatively high weight range spring means 12 and the provision of balance weights 37 which may be selectively installed or removed corresponding to the weight of the selected tool 13. Thus, for example, a relatively strong spring means 12 may be utilized to balance a relatively lightweight tool by adding suitable weights 37 to bring the total weight supported by the spring means into its operating range. When a heavier tool is substituted for the lightweight tool, one or more of the weights 37 may be suitably removed to again bring the total weight of the tool and remaining weights 37 into the range of the spring means.

As discussed above, in illustrating the invention, a single duct 14 is shown to conduct pressurized pneumatic fluid to the pneumatic tool 13. The duct means may include return means such as where the tool is a hydraulic tool requiring return of the hydraulic fluid. Further illustratively, where the tool is an electrical tool, the coiled means 14 may comprise a conventional coiled wire means having a pair of electrical conductors for conducting the electrical current in a completed circuit.

Thus, tool balancer 10 provides an improved weight carrying structure for selectively disposing any one of a plurality of different weight objects in any one of a plurality of different elevated positions in and above a work space. As the balancer permits the object to remain in any position as controlled by the user, improved facilitated access and/or use of the object is provided. The positionable balancer avoids undesirable shock to the object which may occur with conventional balancers where the object is retracted by the spring means to an uppermost retracted position upon each release thereof. The present balancer avoids the necessity for the user to have to go to the maximum retracted position each time he wishes to reposition the object subsequent to prior release.

The use of the constant force springs provides an improved control permitting relatively large vertical range of positioning with a wide range of weights including not only very light weights, but also very heavy weights. In this respect, the invention comprehends that the weight carried by the balancer need not be a tool, but may be any device or object desired to be selectively elevated. Illustratively, the object 13 could be an engine block or similar relatively heavy metal work piece permitting the facilitated access to the adjustably elevated work piece as desired. The use of the back-to-back arrangement of the springs effectively prevents twisting, thus further facilitating the use thereof. The use of coil means 14 for delivering power to the tool provides a retractable structure eliminating interference and catching thereof on adjacent structures while providing long, trouble-free delivery of power to the tool as desired.

The foregoing disclosure of specific embodiments is illustrative of the broad inventive concepts comprehended by the invention.

I claim:

1. A tool balancer comprising:
a support means;
extensible constant force spring means carried by said support means and having means for exerting an upward support force; and
coiled spring means extending from said support for carrying and powering a tool in said positions and exerting a variable upward support force for augmenting the upward support force of said constant force spring means, said support forces being preselected to cumulatively vertically adjustably carry the tool to remain in any one of a plurality of vertically related positions when positioned thereat.

2. The tool balancer of claim 1 wherein said constant force spring means comprises coiled spring means supported by said support means to have a horizontal axis.

3. The tool balancer of claim 1 wherein said constant force spring means is preselected to support any one of a plurality of different weight tools.

4. A tool balancer comprising
a support means;
extensible means carried by said support means and having means for exerting an upward support force; and
coiled spring means extending from said support for carrying and powering a tool in said positions and exerting a variable upward support force for augmenting the upward support force of said extensible means, said support forces being preselected to cumulatively vertically adjustably carry the tool to remain in any one of a plurality of vertically related positions when positioned thereat.

5. The tool balancer of claim 4 wherein said coiled spring means comprises a helically coiled retractable element.

6. The tool balancer of claim 5 wherein said retractable element comprises a tube for conducting fluid to power a fluid operated tool.

7. The tool balancer of claim 1 wherein said constant force spring means comprises a pair of constant force coil springs connected in tandem for jointly carrying the tool.

8. The tool balancer of claim 7 wherein said constant force coil springs are disposed back-to-back.

9. The tool balancer of claim 4 further including means for connecting said support means to an elevated mount.

10. The tool balancer of claim 1 wherein said spring means are constructed to cumulatively support adjustably any one of a plurality of tools having different weights ranging from a preselected minimum to a maximum weight at least approximately 50 percent greater than said minimum weight.

11. The tool balancer of claim 4 wherein said means extending from said support means comprises a fluid flow duct, and said support means comprises a carrier having means for movably mounting said extensible means and means for connecting said duct to a source of pressurized fluid for operating the tool.

12. The tool balancer of claim 1 wherein said support means comprises means for selectively supporting any one of a plurality of different constant force extensible spring means having different strengths thereby to provide selectively different range of weight carrying abilities of said tool balancer.

13. The tool balancer of claim 1 wherein said constant force spring means comprises a plurality of constant force springs.

14. The tool balancer of claim 1 wherein said constant force spring means comprises a pair of constant force coil springs connected in tandem for jointly carrying the tool, said coil springs having different strengths.

15. The tool balancer of claim 4 further including a weight selectively removably carried by the extensible means for extending the range of tool weights to be balanced by said balancer.

16. The tool balancer of claim 1 wherein each of said spring means has an extension of at least approximately 6 feet.

17. The tool balancer of claim 4 wherein said means for powering the tool includes a plurality of power conducting means.

18. The tool balancer of claim 4 wherein said means for powering the tool includes a plurality of power conducting means including conducting means for deliverying and returning powering means for the tool.

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