Feb. 2, 1960 H. R. FISCHER ET AL 2,923,491

SPRING BALANCER DRUM

Original Filed April 27, 1954

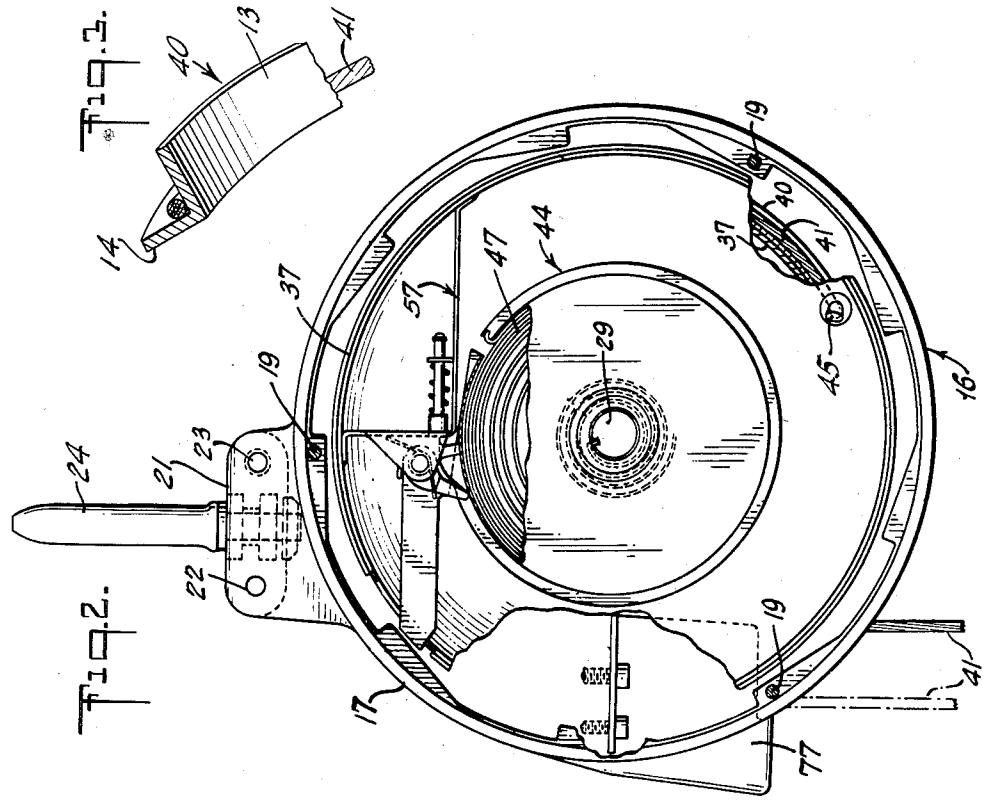


Fig. 2.

Fig. 3.

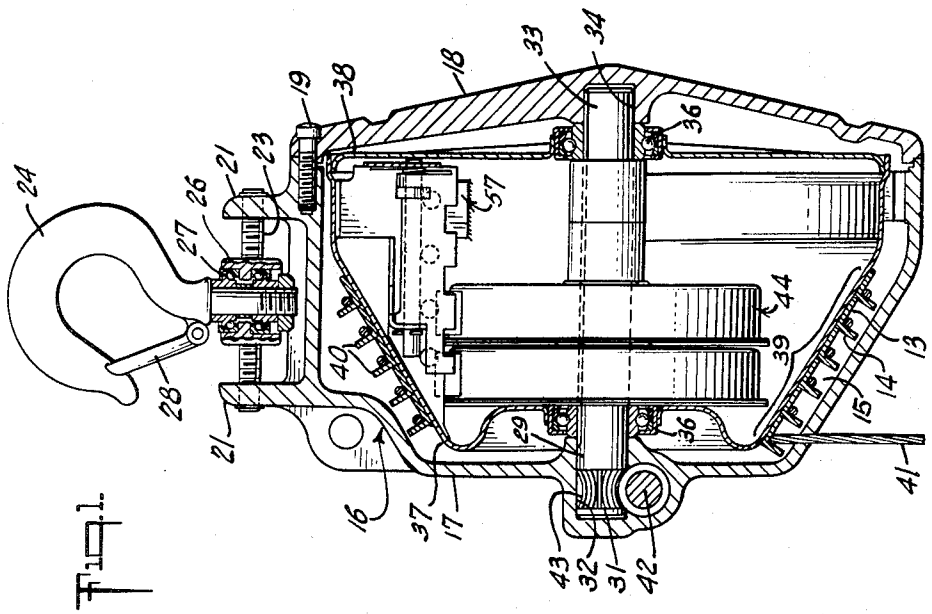


Fig. 1.

United States Patent Office 2,923,491 Patented Feb. 2, 1960

2,923,491

SPRING BALANCER DRUM

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Original application April 27, 1954, Serial No. 425,858, now Patent No. 2,801,814, dated August 6, 1957. Divided and this application April 5, 1957, Serial No. 651,062

2 Claims. (Cl. 242—107)

This application is a division of our parent application for a Spring Balancer filed April 27, 1954 and bearing Serial No. 425,858, now Patent No. 2,801,814.

This application relates to weight balancing devices of the spring counterbalancing type. More particularly, it relates to improvements in the drum structure thereof.

Weight balancing devices are commonly used for the support of portable tools; such for example, as riveting tools. By means of this device the tool may be conveniently held and maneuvered about in a work operation. As a rule, a weight balancing device includes a rotatable drum, a load supporting cable wound about the drum, and spring means for counterbalancing the loaded cable as the latter is wound and unwound from the drum. In the use of the device the load, which is usually a tool carried at the end of the cable, normally has an elevated position. When the operator manually pulls down on the tool, the cable unwinds from the drum as the tool load descends, causing the counterbalancing spring means to tighten. When the operator manually releases the tool, the spring means acts to rewind the cable about the drum and to restore the tool to its elevated position. The drum is tapered or conical. This enables the leverage arm of the load to lengthen as the load descends and the counter-pull of the spring means increases; and enables the leverage arm to shorten as the load rises and the counter-pull of the spring means decreases. Accordingly, the drum requires a spiral groove for guiding the winding and unwinding movements of the cable. To accommodate this groove the conventional drum is of heavy cast structure, and the groove is formed when the drum is cast. The drum wall must, therefore, be very thick to permit the groove to be formed therein.

A general object, therefore, of this invention is to provide new and useful improvements in the drum structure of a spring balancer device.

A further object of this invention is to provide in a spring balancer device a drum of lightweight structure.

A more particular object of this invention is to provide a lightweight balancer drum wherein the cable groove is formed by a separate strap of sturdy material spirally wound about the conical surface of the drum and secured thereto in suitable manner.

These and further objects and features of the invention will become more apparent from an understanding of the following description and the accompanying drawings wherein:

Fig. 1 is a longitudinal sectional view of a spring balancer embodying the invention;

Fig. 2 is a side view of Fig. 1, but with the housing cover removed and with certain parts broken away to show structural features of the balancer; and

Fig. 3 is an enlarged detail of a section of the angle iron removed from the drum.

Referring now to the drawings, numeral **16** indicates a spring balancer embodying the structural features of the invention. The balancer includes a cable drum housing **17**, and a housing cover **18** which is affixed to the

housing by a plurality of bolts **19**. The housing **17** has a pair of flanges **21** at its upper end supporting between them a guide rod **22** and an adjusting screw **23** arranged parallel to each other. A swivel hook **24** is arranged for swivel movement in bearings **27** of an adjusting plate **26**. Plate **26** is supported by the guide rod **22** and by the adjusting screw **23**, and can be laterally positioned along these elements by reason of its threaded engagement with the adjusting screw. The swivel hook **24** (Fig. 2) is offset with respect to the vertical center line of the housing so that the balancer will assume the position illustrated when supporting a load. A swivel hook guard piece **28** is pivotally affixed to the hook to prevent accidental removal of the hook from its support.

A cable drum shaft **29** is rotatably supported within the balancer, one end **31** of the shaft being positioned in a bore **32** formed in the housing **17**, while the other end **33** of the shaft is located in a bore **34** formed in the housing cover **18**. Rotatably supported upon the shaft **29** by ball bearings **36** is a cable drum assembly comprising a cable drum **37** and a cover **38**. The latter has a snug fit in the open end of the drum, as shown in Fig. 1. A major portion **39** of the peripheral surface of the drum is tapered to provide a frusto-conical shape. Spirally wound upon the drum surface **39** and welded in position is a length or strap of angle iron **40**. This winding provides a spiral groove **15** for a cable **41**. One end of the cable is disposed in a hole of the drum and is thickened by a leaded slug **45**, whereby the cable end is made secure in the latter hole. The cable is wound in the groove **15** formed about the drum, and the free or loading end of the cable passes through a slot, not shown, in the bottom of a guide shield **77** of the housing **17**.

In contrast with the usual type of cable drum for balancers, which is formed by casting and wherein sufficient metal must be provided in the body of the drum so that a cable groove can be formed therein, the cable drum assembly of the subject invention is of extremely lightweight and simple structure. The drum of the present invention is in the nature of a thin walled shell, and it may be pressed out of sturdy lightweight sheet metal.

Counterbalancing means is provided within the hollow interior of the drum for counterbalancing the cable load as the cable is unwound and wound about the drum. This counterbalancing means comprises one or more coil spring assemblies **44** carried on the shaft **29**. These are cooperable with abutment means, generally indicated at **57** and carried by the interior wall of the drum, for counterbalancing the cable load as the cable is wound and unwound about the drum, all as more particularly detailed in the parent application earlier mentioned. Suitable cranking means, as indicated by a worm gear **43** on the shaft **29** and by a crank worm **42**, is provided to rotate shaft **29** so as to initially wind a coil spring **47** in each assembly **44** to a proper degree. Thereafter, the coil spring is adapted to be further wound and relaxed to counterbalance the cable load, accordingly as the cable is unwound or rewound about the drum.

It is to be noted (Figs. 1 and 3) that the angle iron **40** forming the spiral groove **15** is L-shaped. It has an arm **13** integral with a second arm **14** at right angles thereto.

Arm **13** lies flush upon the tapered smooth outer surface of the drum. The windings of the angle iron about the drum are adjacent to one another so that the forward edge of the arm **13** of each winding abuts the rear of the next adjacent winding, as in Fig. 1. The spiral groove **15** formed between the windings is relatively wider than the diameter of the cable **41** that is movable therein. This allows easy winding and unwinding movement of the cable. The height of the continuous upwardly projecting wall of the groove formed by arm **14** is greater

than the diameter of the cable. This prevents the cable from riding over the top of wall 14 as the cable unwinds from the drum. The latter action might otherwise occur due to the natural tendency of the cable to press downward and towards the taper of the drum as it is unwound.

What is claimed is:

1. In a tool counterbalancing device of the character described, a frusto-conical drum rotatably mounted upon a horizontal shaft and having a counterbalancing coil spring connected with the shaft adapted to wind or unwind inversely to the directional rotation of the drum, the drum being of rigid light gauge sheet metal having a smooth tapered surface; a right-angle iron strap spirally wound about the said surface so that the longitudinal edges of the windings abut one another and define a U-channel having a floor and a pair of opposed walls upstanding at right angles thereto; and a cable received in the channel adapted to ride therein so as to wind about the drum or unwind therefrom accordingly as the drum is rotated in one direction or the other; the floor of the channel being substantially wider than the diameter of the cable, inclined and lying flat upon the tapered surface of the drum whereby the channel has a lower longitudinal vertex and an upper longitudinal vertex.

2. A cable drum for a tool counterbalancing device of the character described, comprising a frusto-conical shell of rigid light gauge sheet metal having its narrow end closed with an integral wall portion and having its opposite wider end closed with a removable cover, having flanged axial openings respectively in the said wall portion and in the cover adapted to fit about bearings on a cable drum shaft, the interior of the shell being adapted to house counterbalancing spring means for the shell, and the shell having a smooth tapered surface; and a cable guide channel defined by the arms of a right-angle iron strap spirally wound about the tapered surface of the shell, wherein the windings are contiguous to one another, a first arm of the strap defining an inclined floor of the channel having its free longitudinal leading edge extending up the said tapered surface, the other arm of the strap extending upward at right angles from the lower longitudinal edge of the first arm and being in abutment at its base with the leading edge of the said first arm of the winding next below, and the floor of the channel being substantially wider than the diameter of a cable received in the channel whereby a broad underlying bearing surface is provided for the cable to ride over, and wherein the floor of the channel is welded to the surface of the shell whereby the shell is relatively thicker and stronger in the area over which the cable is adapted to ride.

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