Oct. 11, 1927. 1,645,254

H. G. PEDERSON

COUNTERBALANCING DEVICE

Filed Jan. 26, 1926 2 Sheets-Sheet 1

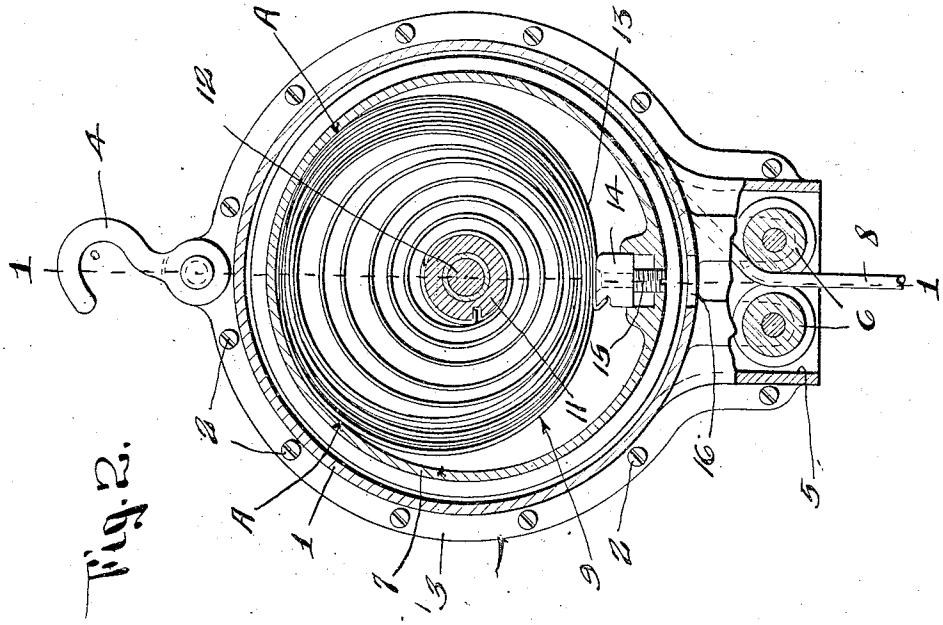


Fig. 2.

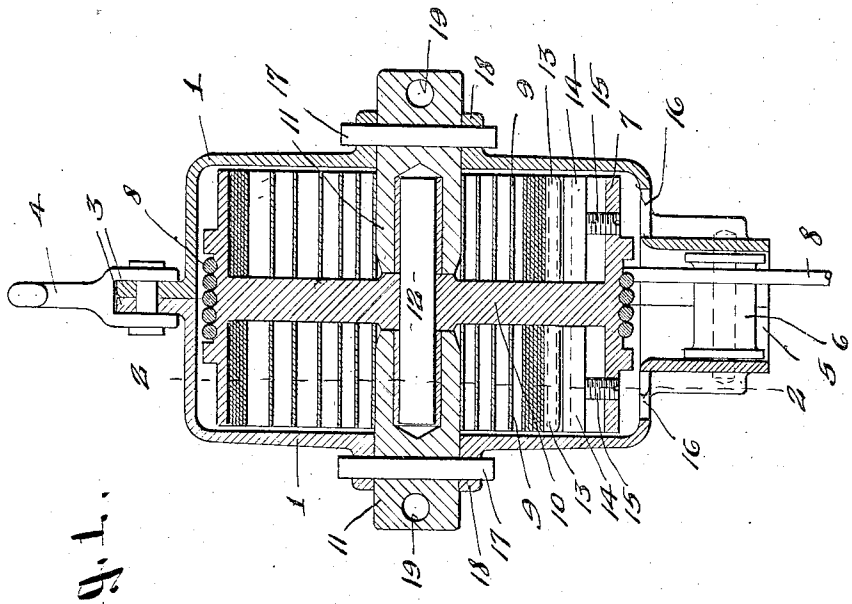


Fig. 1.

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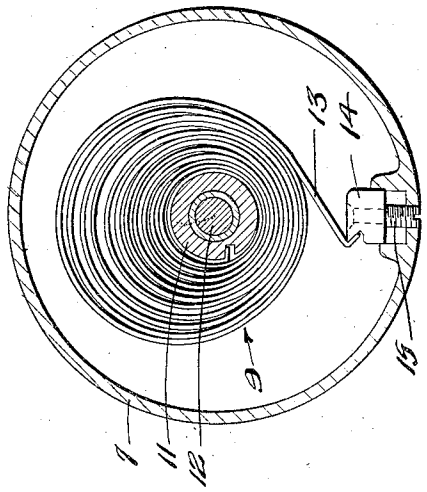


Fig. 4.

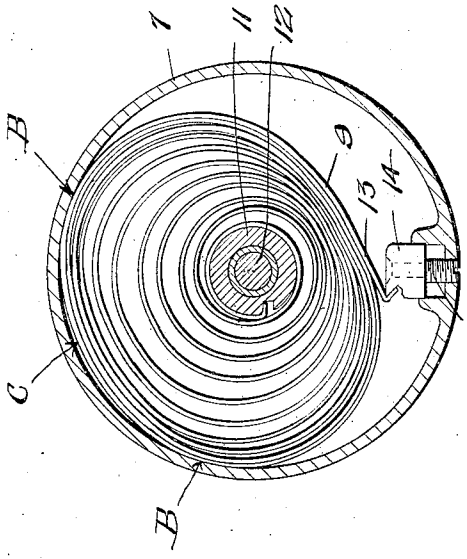


Fig. 5.

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Patented Oct. 11, 1927. 1,645,254

UNITED STATES PATENT OFFICE.

HAROLD G. PEDERSON, OF SYRACUSE, NEW YORK.

COUNTERBALANCING DEVICE.

Application filed January 26, 1926. Serial No. 83,861.

This invention has for its object a counterbalancing device particularly applicable for counterbalancing heavy tools, and for carrying articles from one place to another or rather suspending them from a carrier, and has for its object a particularly simple and efficient construction by which the counterbalancing device can be quickly adjusted to counterbalance the particular load it is to carry, and also by which it can be adjusted to carry a wide range of loads, that is it is adjustable for counterbalancing loads say from 1 to 50 pounds, 50 to 100 pounds, 100 to 150 pounds, etc.

The invention consists in the novel features and in the combinations and constructions hereinafter set forth and claimed.

In describing this invention reference is had to the accompanying drawings in which like characters represent corresponding parts in all the views.

Figure 1 is a sectional view taken on line 1—1, Figure 2.

Figure 2 is a sectional view on line 2—2, Figure 1.

Figures 3 and 4 are detailed views of the reel showing different tensioning of the spring.

The counterbalancing device comprises a casing which is usually cylindrical in general form, it having means as a hook for suspending it from the ceiling or from a travelling carriage, and also having outlet on its lower side, a reel mounted in the casing, a cable winding on the reel and extending through the outlet, a spring anchored at its inner end to a point fixed from rotation, that is a point stationary with the casing, and at its outer end to the reel, the casing being provided with means for distorting the spring out of the form which it would naturally take, to vary the inherent friction in the spring between the coils. Also the counterbalancing device includes a plurality of springs by means of which the range of adjustment of the device to widely varying loads is varied.

1 designates the casing which may be of any suitable form, size and construction, it being here shown as comprising opposing duplicate sections held together by screws 2, extending through peripheral circumferential flanges 3 at the abutting edges of the sections.

The casing is provided with a suitable hook 4 on its upper side by means of which it is suspended from the ceiling or from a carriage that travels along a track or from any other suitable support.

5 is the outlet at the lower side of the casing, this outlet having two guide rollers 6 mounted therein.

7 is the reel mounted in the casing, and 8 the cable winding on the reel and extending through the outlet 5 between the rollers 6. The tool or other article is secured to the lower end of this cable. As before stated there is preferably a plurality of springs to increase the range of adjustability of the device. The reel here shown is provided with two springs.

9 designates the springs which are anchored at their inner ends to a point stationary with the casing and at their outer ends to the reel 7, these springs being located in the reel which is in the form of a cylinder or drum having a central web 10. The springs are anchored in any suitable manner at their inner ends to stationary axles 11 mounted in the casing in axial alinement. The hub of the reel extends between the ends of these axles and is mounted upon a suitable spindle 12 mounted in the axles.

The outer end of each spring 9 is anchored to the reel in such a manner that the angle of the outer end 13 of the spring can be varied relatively to the coils of the spring to vary the tension of the spring. As here shown the outer end 13 of each spring is secured to an anchor 14 which is adjustable inwardly and outwardly and preferably radially relatively to the reel, this anchor being carried by a threaded stem 15 having its outer end or head opposite a work hole 16 in the casing by means of which the stem is accessible to adjusting by a tool as a screw driver, the stem being formed to receive the screw driver. Obviously by adjusting the anchor 14 inwardly or outwardly the angle of the outer end 13 of the spring will be changed and the force tending to compress the coils of the spring together varied, thus varying the effective strength of the spring.

Another form of means for adjusting the angularity of this arm is shown in my pending application Sr. No. 758,857, filed December 30, 1925.

In addition to the means just described for varying the inherent friction of the spring, additional means is provided for

varying the inherent friction of the spring, and hence the tension thereof, this means operating to distort the spring and create additional friction between the coils thereof. As here illustrated the reel is made comparatively small relatively to the circle of the spring when partly and effectively tensioned to counterbalance a load, so that normally under one tension of the spring as seen in Figure 1 the outer coil of the spring bears continuously between the points, A, on the inner face of the annular wall of the drum or reel, while as seen in Figure 3 under a different tensioning the outer coils bear at the points B on the annular wall in the reel and is spaced apart from the wall at C, thus compressing the coils together opposite the points B and increasing the friction between the coils.

In Figure 4 is shown the spring when tensioned approximately to its maximum extent. In this figure by adjusting the anchor 14 outwardly and thus changing the angle of the arm 13, the maximum pressure would be lessened, the same result would also occur if anchor 14 were moved outwardly in the construction shown in the other figures. In Figure 1 the spring is wound to a quarter of its capacity or one-fourth of its tension, and when so adjusted will counterbalance tools or other articles weighing say from one to 50 pounds.

In Figure 3 the spring is half wound and adjusted to counterbalance heavier loads say from 50 to 100 pounds and in Figure 4 the spring is ¾ tensioned or adjusted to counterbalance loads from 100 to 150 pounds. All these adjustments can be varied or made finer by adjusting the abutment 14 inwardly or outwardly. The initial adjustment of the spring can be varied by turning the axles 11 and they are held in their adjusted position by a pin 17 extending through holes in the hub 18 on the casing and through holes in the axle. Each axle is also formed with holes 19 for receiving a suitable tool and turning the axle to tension the spring. Also the capacity or range of adjustability is further varied by adjusting its springs differently so that the sum of the tension or capacities of both springs is the capacity of the reel.

In manufacturing plants heavy tools are used of varying weights, such as electric or air drills, electric or air screws and nut driving machines, etc. These tools when not in use are pushed upwardly above the head of the operator. By my invention the reel is quickly adjustable to support the particular tool to be used so that it will stay at the elevation it is placed and will not jump up and down.

Heretofore such tools have been counterbalanced by weights which oftentimes come down onto the heads of workmen when the workman using the tool pushes it up out of the way. These counterbalancing devices are also used as carriers to carry articles, for instance crank shafts from one place to another, and at another time the same tool may be used to carry another part of a different weight. Owing to the construction of this counterbalancing device it is apparent that it is readily and quickly adaptable preferably to counterbalance articles of widely different weights.

What I claim is:—

1. A counterbalancing device comprising a casing having on its upper side means by which the casing is supported, and also having outlet passage on its lower side, a reel mounted in the casing, a spring within the reel anchored at its inner end at a point stationary with the casing and at its outer end to the reel, the anchor for the outer end of the spring being adjustable toward and from the center of the reel and a cable winding on the reel and extending through the outlet.

2. A counterbalancing device comprising a casing having means on its upper side for supporting the casing and an an outlet passage on its lower side, an axle mounted in the casing, a reel mounted in the casing to rotate about the axle, the reel being in the form of a drum, a cable winding on the reel and extending through the outlet passage, a spring anchored at the inner end to the axle and at its outer end to the reel, the reel being provided with means for normally distorting the spring and pressing the coils of the spring together to vary the inherent friction between the coils of the spring.

3. A counterbalancing device comprising a casing having means on its upper side for supporting the casing and an outlet passage in its lower side, a stationary axle mounted in the casing, a reel mounted in the casing to rotate about the axle, the reel being in the form of a drum, a cable winding on the reel and extending through the outlet passage, a spring anchored at the inner end to the axle and at its outer end to the reel, the reel being provided with means for pressing the coils of the spring together to vary the inherent friction between the coils of the spring, and the outer end of the spring being adjustable to change the angular relation thereof to the outer coil of the spring and thereby vary the inherent friction between the coils of the spring.

4. A counterbalancing device comprising a casing having means by which it is supported and also having outlet passage on its lower side, a reel mounted in the casing, a spring within the reel anchored at its inner end at a point stationary with the casing and at its outer end to the reel, the anchor for the outer end of the spring being adjustable toward and from the center of the reel and

having an operating member accessible from the outside of the casing.

5. The counterbalancing device comprising a casing, a reel mounted in the casing, a plurality of coil springs anchored at their inner ends to a fixed point, and at their outer ends to the reel, means for adjusting the tension of the springs independently of each other and a cable winding on the reel.

6. A counterbalancing device comprising a casing, a pair of axles mounted in axial alinement in the casing, a reel mounted in the casing, to rotate about the axles, coil springs anchored at their inner ends respectively to the axles and at their outer ends to the reel, the axles being rotatable independently of each other to tension the springs and a cable winding on the reel.

7. A counterbalancing device comprising a casing, a pair of axles mounted in axial alinement in the casing, a reel mounted in the casing to rotate about the axles, coil springs anchored at their inner ends respectively to the axles and at their outer ends to the reel, the axles being rotatable independently of each other to tension the springs, a cable winding on the reel and means for varying the inherent friction between the coils of the springs.

8. A counterbalancing device comprising a casing, a pair of axles mounted in axial alinement in the casing, a reel mounted in the casing to rotate about the axles, coil springs anchored at their inner ends respectively to the axles, and at their outer ends to the reels, the axles being rotatable independently of each other to tension the spring, a cable winding on the reel and means for changing the angle of the outer arms of the springs which arms are anchored to the reel.

9. A counterbalancing device comprising a carriage, a pair of axles mounted in axial alinement in the casing, a reel mounted in the casing to rotate about the axles, coil springs anchored at their inner ends respectively to the axles and at their outer end to the reel, the axles being rotatable independently of each other to tension the spring, a cable winding on the reel, and means for varying the inherent friction between the coils of the springs, and means to change the angles of the outer ends of the spring which ends are anchored to the reel.

10. A counterbalancing device comprising a casing, a pair of axles mounted in axial alinement in the casing, a reel mounted in the casing, to rotate about the axles, coil springs anchored at their inner end respectively to the axles and at their outer ends to the reels, the axles being rotatable independently of each other to tension the springs, a cable winding on the reel, the reel being constructed to distort the spring to vary the inherent friction between the coils of the springs when the spring is tensioned to actuate the reel.

11. A counterbalancing device comprising a casing, a pair of axles mounted in axial alinement in the casing, a reel mounted in the casing to rotate about the axles, coil springs anchored at their inner ends respectively to the axles and at their outer ends to the reels, the axles being rotatable independently of each other to tension the spring, a cable winding on the reel, the reel being constructed to distort the springs to vary the inherent friction between the coils of the springs when the spring is tensioned to actuate the reel and means for changing the angle of the outer arm of each spring which arm is anchored to the reel.

12. A counterbalancing device comprising a casing having means on its upper side for supporting it and an outlet passage on its lower side, a pair of axles mounted in axial alinement in the casing, a reel mounted in the casing and having a hub portion located between the ends of axles and a spindle on which the hub is mounted, the spindle being mounted in the axles, coil springs within the reel and anchored at their inner ends respectively to the axles, and at their outer ends to the reel, the axles being rotatable for tensioning the springs independently of each other and a cable winding on the drum and extending through the outlet.

In testimony whereof, I have hereunto signed my name, at Syracuse, in the county of Onondaga, and State of New York, this 21st day of December, 1925.

HAROLD G. PEDERSON.