May 26, 1931. J. FIEUX 1,806,992

DEVICE FOR BRINGING A MOVING BODY TO REST

Filed Nov. 9, 1928

Fig. 2a

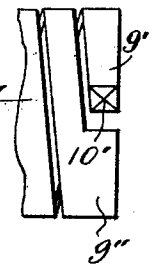


Fig. 1.

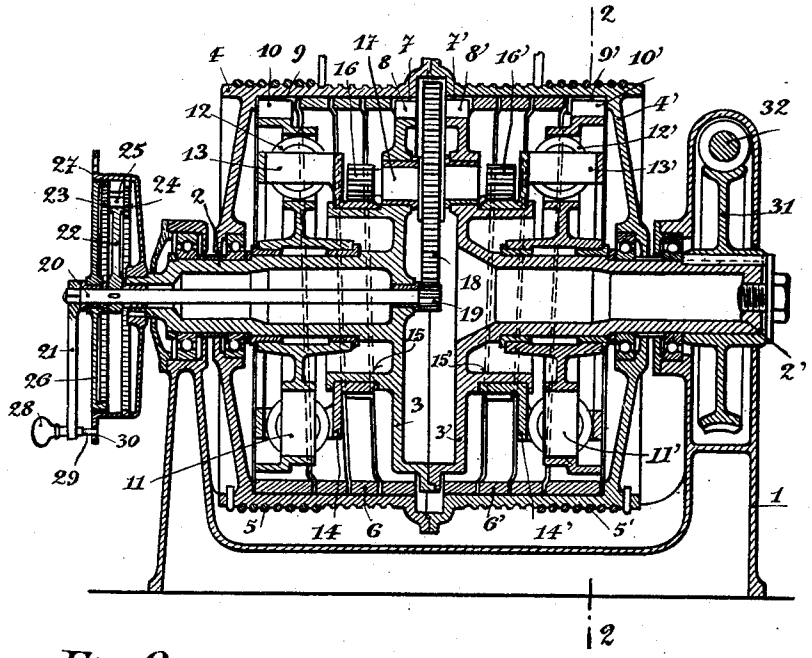


Fig. 2.

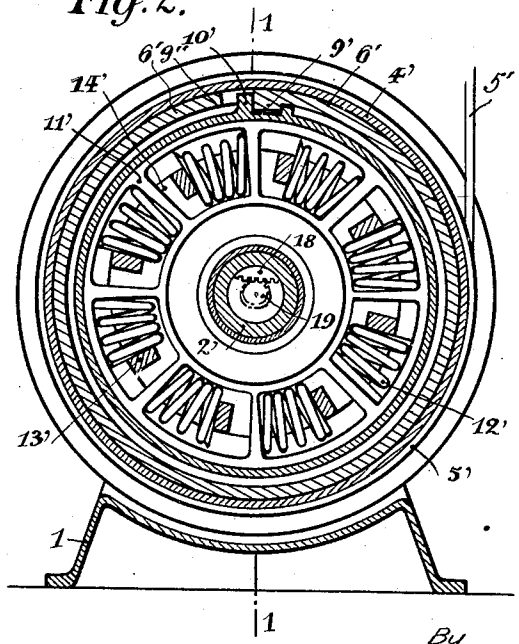
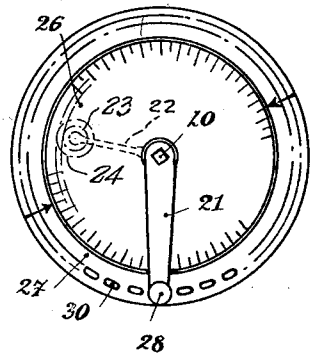


Fig. 3.



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UNITED STATES PATENT OFFICE

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DEVICE FOR BRINGING A MOVING BODY TO REST

Application filed November 9, 1928, Serial No. 318,203, and in France January 25, 1928.

It has already been proposed to bring an aeroplane to rest gradually in a short distance when it is coming to ground, by arresting the travel of the aeroplane by means of a cable unwinding from a drum subjected to a braking action, the drum being mounted in a fixed position (on the landing ground, deck of a ship, etc.) or upon the moving body itself.

With these devices it is necessary each time the moving body has been brought to rest, to release the brake in order to permit the cable to be rewound and then to tighten up the brake again for subsequently stopping another moving body. Two operations are therefore necessary which take up a certain amount of time and an omission to tighten up the brake after the cable has been rewound on the drum may also have serious consequences.

The present invention relates to a device of the known type described above, that is to say comprising the use of a cable unwinding from a winch drum subjected to a braking action, but characterized by means which obviate the disadvantages inherent to the said arrangement, these means further comprising advantages of economy which will be described hereinafter.

The device according to the invention is characterized by the feature that the brake acting upon the drum from which the cable unwinds is connected to a non-reversible control which, when actuated in the suitable direction, permits the drum and the braking members tightly applied upon it to be driven as an integral unit in order to rewind the cable.

As the drum thus remains in permanent frictional connection with the winch shaft the work of slackening and tightening the brake between two operations is therefore obviated.

A practical embodiment of the invention presenting very special advantages with regard to the accuracy and the ease in regulating the friction is shown by way of example in the accompanying drawings.

Fig. 1 is an axial section taken along the line 1—1 in Fig. 2.

Fig. 2 is a cross section taken along the line 2—2 in Fig. 1, these two figures showing a winch mounted in a fixed position and a drum upon which the restraining cable winds and unwinds.

Fig. 2*a* is a side view of one of the helical springs shown in section in Figs. 1 and 2.

Fig. 3 is an external end view of the regulating handle and dial.

Upon the frame 1 is journalled a hollow shaft 2—2′ the diameter of which is increased at its centre to form a casing 3—3′. On this shaft may rotate the drum 4—4′ provided with grooves in which are wound the ends 5—5′ of a cable which, in a well known manner, after passage over guide pulleys, forms a hollow, wide-mouth loop, one element of which is arranged transversely to the travel of the vehicle to be stopped and is adapted to be grasped by a suitable receiving member, as for example, an arresting hook integral with said vehicle. The result thereof is that the ends 5—5′ of the cable unwind and consequently that the brake which opposes this unwinding enters into action thereby gradually bringing the vehicle to rest. The inner surface of this drum is subjected to the friction of brake members 6—6′ in the form of helical springs which are known generally under the name of spiral brakes. The ends 7—7′ of these spiral brake members press upon pins 8—8′ rigid with the casing 3—3′ while the ends 9—9′ press upon pins 10—10′ rigid with plates 11—11′ adapted to oscillate upon the shaft 2—2′ and having cavities in which are housed coil springs 12—12′. An adjustable tension is given to these springs by projections 13—13′ which act as seatings for the latter and form part of the toothed crowns 14—14′ carried by the hollow trunnions 15—15′ rigid with the casing 3—3′.

Pinions 16—16′ engaging with the teeth of the crowns 14—14′ are keyed upon a shaft journalled in the casing 3—3′ and serving as a shaft for the toothed wheel 18 rigid with this shaft. This wheel 18 engages with a pinion 19 rigid with a shaft 20 journalled in the shaft 2 and upon which are keyed a hand lever 21 and an arm 22 which carries unequal planet wheels 23, 24 rigid with one and the

same shaft 25. The pinion 23 engages with the internal teeth of a disc shaped dial 26 loosely mounted upon the shaft 20 while the pinion 24 engages with the internal teeth of an indicator carrying member 27 keyed upon the shaft 2. Dial 26 is graduated in tension values so as to cooperate with indicator carrying member 27 to indicate the amount of tension in springs 12—12′. The handle 28 of the hand lever 21 is rigid with a pin 29 slidable through lever 21 and adapted to engage in the holes 30 formed in the indicator carrying member 27. Upon the end of the shaft 2′ is keyed a wheel 31 engaging with a worm 32 adapted to be actuated in order to cause the cables 5—5′ to be wound upon the drum 4—4′ when the friction between the latter and the spiral brake members 6—6′ is sufficient.

The system of worm wheels 31, 32 is non-reversible so as to be capable of preventing any movement of rotation of the whole arrangement of the members contained in the drum 4—4′ when the worm 32 is allowed to remain at rest.

The directions in which the spiral brake members 6—6′ are wound are such that the tension of the springs 12—12′, tending to displace the plates 11—11′ angularly with respect to the crowns 14—14′, has the effect of developing compressive forces at the end of the terminal turns and consequently of pressing the said spiral brake members against the drum 4—4′.

During the unwinding of the cable 5—5′ receiving the pull from the moving body upon the speed of which the braking action is to be exerted, the direction of rotation of the drum 4—4′ must be such that the friction developed acts upon the spiral brake members 6—6′ in the same direction as the pressure of the pins 8—8′.

The pull upon the cables 5—5′ is limited by this friction, which itself depends upon the tension of the springs 12—12′ and consequently of the number of turns through which the shaft 20 has been made to turn relatively to the shaft 2.

The engagement of the pin 29 in one of the holes 30 permits the tension of the springs 12—12′ to be set at the desired value according to the indications given by the rotation counter formed by the members 22, 23, 24, 25, 26 and 27.

When, as result of a pull, exerted upon the cable 5—5′ by the vehicle which is coming to rest (aeroplane or other) slip tends to be produced between the two members 4—4′ of the drum and the brake members 6—6′, the friction thus developed has the effect of relieving the pins 8—8′. Consequently the force exerted on the free end (7—7′) of the spiral springs tends to be annulled to the extent which is necessary for generating the desired braking force.

The rewinding of the cable, after it has been unwound with a view to stopping the vehicle or the aeroplane, may be effected immediately without requiring any action upon the brakes, by simply actuating the screw 32 by a motor or by hand, this actuation causing the drum, the brakes and the regulating system to be driven as an integral unit.

A suitable adjustment will naturally have to be made according to the speeds and masses of the movable bodies to be brought to rest.

Claims:

1. In a device for gradually bringing a moving body to rest, the combination of a cable, a drum upon which said cable is wound, a brake acting to check the unwinding action of said drum, and a non-reversible control connected to said brake and moving as an integral unit with the brake during the winding action of the drum.

2. In a device for gradually bringing a moving body to rest, the combination of a cable, a drum upon which said cable is wound, a shaft upon which said drum turns, helical spring brake members in constant frictional relation with the interior of the drum, adjustable tension members governing the friction between said drum and brake members, and a non-reversible control connected with said brake members and moving as a unit therewith during the winding action of the drum.

3. In a device for gradually bringing a moving body to rest, the combination of a cable, a drum upon which said cable is wound, a shaft upon which said drum turns, helical spring brake members in constant frictional relation with the interior of said drum, a set of plates rigid with said shaft and supporting the least loaded ends of the said brake members during the unwinding of the cable, a second set of plates oscillating on said shaft and supporting the more heavily loaded ends of said brake members during the unwinding of the cable, and a non-reversible control actuating said shaft in one direction only.

In testimony whereof I have signed this specification.

JEAN FIEUX.