(No Model.)

H. C. HOVEY.

DYNAMOMETER.

No. 243,902. Patented July 5, 1881.

Fig. 2.

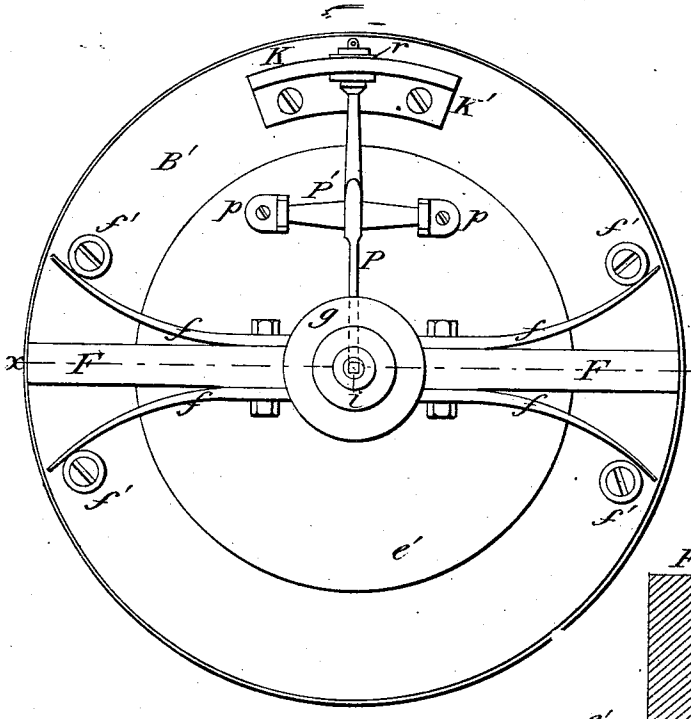

Fig. 4.

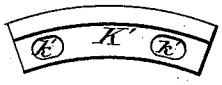

Fig. 3.

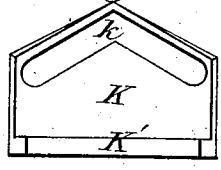

Fig. 1.

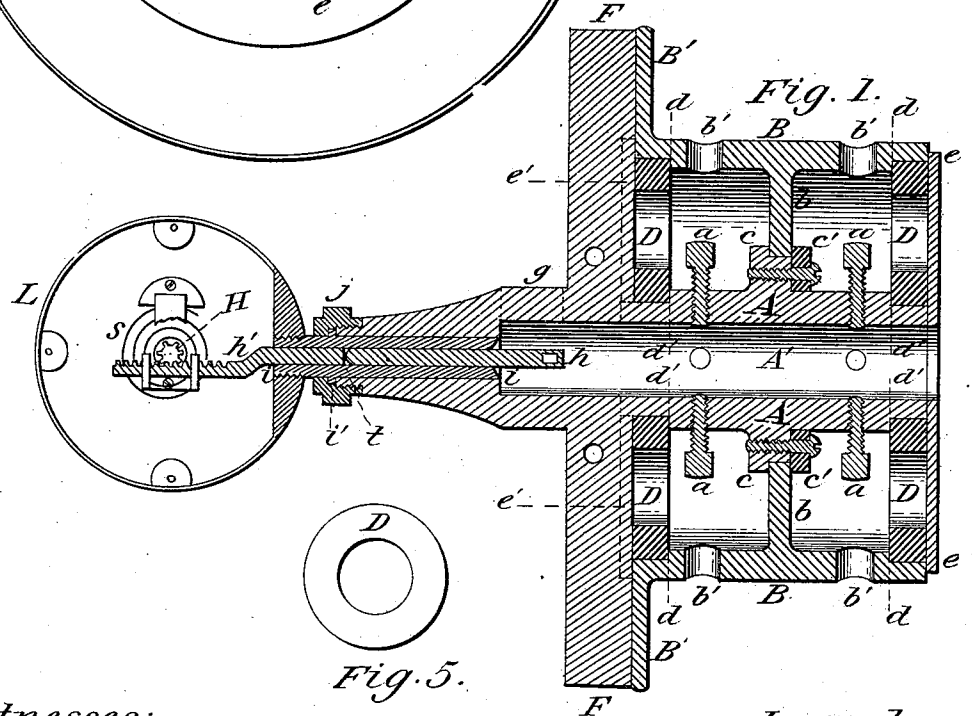

Fig. 5.

Witnesses:

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UNITED STATES PATENT OFFICE.

HORACE C. HOVEY, OF AYER, MASSACHUSETTS, ASSIGNOR TO JAMES R. GRAY, OF SAME PLACE.

DYNAMOMETER.

SPECIFICATION forming part of Letters Patent No. 243,902, dated July 5, 1881.

Application filed January 14, 1881. (No model.)

To all whom it may concern:

Be it known that I, HORACE C. HOVEY, of Ayer, State of Massachusetts, have invented a new and useful machine of the class known as "Dynamometers," which invention is fully set forth and described in the following specification.

This invention has for its object to furnish a machine which can be directly and easily applied to a revolving shaft or arbor for the purpose of indicating the exact resistance of such shaft or arbor to the belt which drives it. I attain these results by the mechanism as shown in the accompanying drawings, which constitute a part of this specification.

In the drawings, Figure 1 is a longitudinal central section on line *x x* of Fig. 2; Fig. 2, an end view; Fig. 3, a side elevation of cam; Fig. 4, a top view of cam; Fig. 5, an end view of anti-friction rollers.

A is a hollow hub having a longitudinal bore, A′, which receives the end of a revolving shaft or arbor, and is secured to and made concentric with the same by means of the set-screws *a* placed in pairs at quarter-turns around the hub A, thereby making it adjustable to shafts of different diameters.

B is a movable rim, which incloses the main part of the hub A and receives the driving-belt. This rim moves around the hub A independently of the same, being kept in a fixed longitudinal position by the flange *b* projecting from its inner surface and engaging the shoulder *c* and collar *c′* projecting from the hub A. Holes *b′* are drilled through the rim B to admit a socket-wrench to the set-screws *a*. In order that the rim B may move around the hub A with the least amount of frictional resistance under all variations of belt-tension, the rim B is supported by twelve anti-friction rollers, D, placed six at either end. These rollers are kept in place by means of the shoulders at *d d′*, and also by the circular end plates, *e e′*, the plate *e′* being preferably cast with the hub A and arms F, while the plate *e* is made of wrought-iron or brass, having a diameter a little less than the diameter of the rim B, and provided with a circular hole at its center to admit the end of a shaft or arbor to the bore A′. It is attached to the hub A by means of screws entering the end of the hub just outside of the bore A′.

I am aware that the rim B might be made as a loose pulley, running directly on the shaft or arbor, but this form of construction has the great advantage that there is no sliding friction between the hub A and rim B, and the friction of the rolls D is not materially increased by the tension of the belt. Consequently the reading on the dial is not varied by the variations of different belt-tension. The rim B does not move entirely around the hub A, however, but is provided with four stop-pins, *f′*, attached to an outward extension, B′, of the rim B and placed one on each side of and about one inch from the arms F, which arms are attached to the hub A and extend at right angles from opposite sides of the same.

Between the stop-pins *f′* and the arms F are interposed the springs *f*, attached to the arms at their base and bent so as to engage the stop-pins *f′* and poise the arms F equidistant between the pins *f′*. These springs may be coiled or elliptical, but I prefer the latter. By the use of four springs, arranged as shown, I am able to apply the dynamometer to belts running in either direction. The pins *f′* are incased in rollers to lessen any friction between themselves and the springs *f*. When the belt pulls on the rim B the rim moves around the hub A, compressing the springs *f* until their resistance overcomes the resistance of the shaft or arbor, to which the hub A may be attached. When that point is reached the shaft or arbor turns and the rim and hub move together, the rim B being poised against the compressed springs and moving forward or back in relation to the hub as the resistance of the shaft or arbor increases or diminishes.

In order to register the compression of the springs *f*, which is exactly coincident with and equal to the movement of the rim B around the hub A, a cam, K, is attached to the upward extension B′ of the rim B. This cam is made concave to conform to the curve of the extension B at the point of attachment, and projects at right angles from the same. It is provided with a slot, *k*, dipping each side from a

central point toward its base K′. This base is constructed at right angles to the face of the cam, and is provided with oblong screw-holes *k′* to adjust it in proper position.

On the circular plate *e′*, which is attached to the hub A and arms F, the lever P is supported, one end of which enters and moves in the slot *k* in the cam K. This end of the lever is provided with a roller, *r*, which may be cylindrical or spherical, and revolves on the lever as the cam K moves over it. The other end of the lever P passes through the slot *g* to the center of the hub A, where it engages the spindle *h*.

The dial-box L is attached to a tube, *i*, having a shoulder, *i′*. This tube enters the hub A, and is secured to it by means of the nut *j*, which engages the shoulder *i′* and allows the hub to revolve around the tube, and also allows the dial-box to be easily detached. The tube *i* receives the end of the rack-bar *h′*, which is adapted to move freely in the tube and to actuate the pinion H, carrying an indicator in the usual manner. The spindle *h* extends into the tube *i* until it meets the end of the rack-bar *h′* at *t*, the rack-bar being kept in contact with the spindle by the pressure of the spring *s* attached to the pinion H. This arrangement allows the spindle *h* to revolve with the hub A and lever P, while the dial-box and tube are at rest, and at the same time to communicate to the rack-bar any longitudinal movement which the spindle may receive from the lever P. In actual operation the tube *i* and dial-box L will revolve with the hub A unless held by the hand, which can easily be done, as the tendency to revolve caused by the friction between the tube and hub is very slight. When the springs *f* are at rest the end of the lever P rests at the highest point of the cam K, and is then at its greatest elevation, while the opposite end is at its greatest depression. The spindle *h* is then drawn back to its extreme limits, and the indicator should point to 0 on the dial. As the springs *f* are compressed the point of the cam K is moved away from the line of the lever P, depressing that end and causing a corresponding elevation of the end engaged to the spindle *h*, moving the spindle toward the dial-box and rotating the pinion H, carrying an indicator around the dial in the usual manner.

What I claim is—

1. The hollow hub A, supporting the rollers D, and provided with the set-screws *a*, shoulders *d′*, flange *c*, collar *c′* circular plates *e e′*, arms F, springs *f*, slot *g*, nut *j*, tube *i*, spindle *h h′*, and lever P, substantially as shown and described.

2. The movable rim B, supported on the rollers D, and provided with the wrench-holes *b′*, flange *b*, shoulders *d*, upward extension B′, stop-pins *f′*, and cam K, substantially as set forth.

3. The lever P, provided with the roller *r*, arm P′, and supports *p*, substantially as set forth.

4. The spindle *h*, secured in the hub of a rotary shaft and actuated as shown, in combination with the indicator L, adapted to be swiveled to the end of the hub, and having a rack-bar *h′*, which transmits the longitudinal movement of the spindle to the indicator, substantially as set forth.

5. The dial-box L, having the tubular attachment *i*, provided with a shoulder, *i′*, the rack-bar *h′*, spring *s*, and pinion H, carrying an indicator in the usual manner, as set forth.

6. The cam K, having the double slot *k* dipping from a central point toward its base, the base K′, provided with oblong screw-holes *k′*, substantially as set forth.

7. That improvement in dynamometers which consists in the combination, with a revolving shaft or arbor, of the hollow hub A, movable rim B, and rollers D, arranged substantially as set forth.

HORACE C. HOVEY.

Witnesses:
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