H. KILLICHES.

DYNAMOMETER.

No. 186,010. Patented Jan. 9, 1877.

Fig. 1.

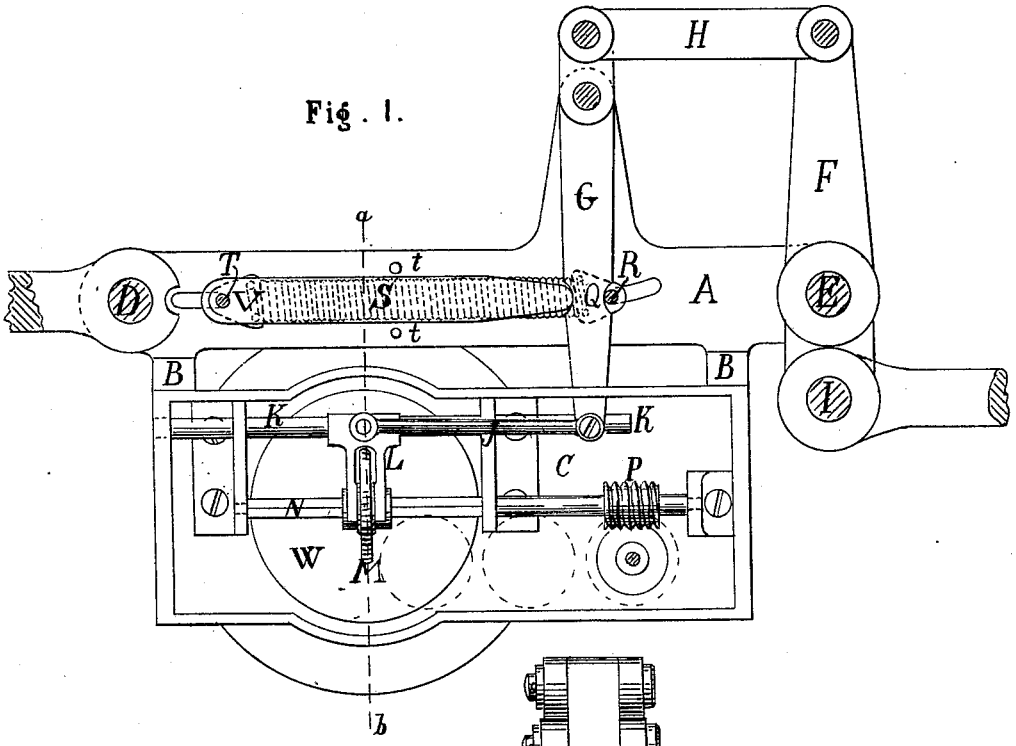
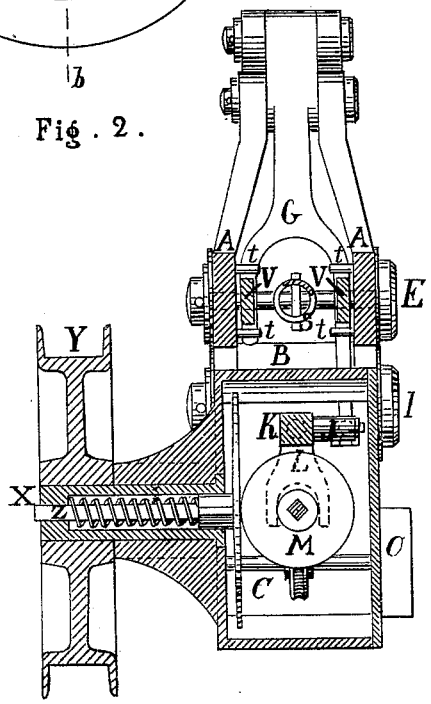


Fig. 2.



Witnesses:

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UNITED STATES PATENT OFFICE.

HERMANN KILLICHES, OF LEMBERG, AUSTRIA-HUNGARY.

IMPROVEMENT IN DYNAMOMETERS.

Specification forming part of Letters Patent No. **186,010**, dated January 9, 1877; application filed August 7, 1876.

To all whom it may concern:

Be it known that I, HERMANN KILLICHES, of the city of Lemberg, Empire of Austria-Hungary, have invented certain new and useful Improvements in Dynamometers; and I do hereby declare that the following is a full and exact description thereof:

My invention is adapted to provide the two main properties of dynamometers, viz: the registration of the power used and of the way made at the same time, and in a manner entirely new and more practicable than has been before known.

In all dynamometers or indicators the strain or power exerted by an engine or a machine was graphically noted, but the way made was in general calculated from the stroke or number of revolutions, very seldom given graphically. Hence in all cases a calculation is necessary to get from the different diagrams the result in figures.

Some of the advantages of my apparatus may be separately enumerated, as follows: First, it gives, without any calculation whatsoever, the actual work on the dial of the counter in foot-pounds or "hundred-yard tons," by figures. Second, the figures expressing the amount of work done can be controlled at any time as the use of gas is controlled, and shown at any time by the figures of the counter of a gas-meter. Third, my apparatus is very simple and easily applied.

In the accompanying drawing, Figure 1 represents a vertical front elevation of my improved dynamometer with the front parts removed. Fig. 2 represents a vertical cross-section on the line *a b*, in Fig. 1.

A A are two frames, kept in position to each other by means of two lugs, B B, on the casing C, and of different bolts. One end of the frames A A is attached to suitable parts of an engine or a machine by means of the bolt D, the other end by means of the bolt I of the lever F, swinging round the bolt E. The motion of the shorter part of the lever F is enlarged by means of the lever G, to which the former is connected by the links H H, and this larger motion is communicated by means of the connecting-rod J on the end of the longer arm of G, the guide-bar K, and the forked guide L, to the smaller wheel M of a pair of brush-wheels. The wheel M slides longitudinally on a four-square part, or on a feather of the shaft N and causes, revolving in the forked guide L, the shaft N to revolve as well. The revolutions of this shaft N are registered on the dial of the counter O, a screw, P, on the shaft N working, by means of a worm-wheel, the first shaft of the counter O. The lever G is at the place Q forked, and both its branches are provided with indentations to meet on the right side the cross-pin R and on the left side the ends of the two stays, V V, which are connected on their other ends by the cross-pin T, and kept in position by guide-pins *t t*, with play enough to slide between them. A coiled spring, S, has one end attached to the cross-pin R and the other end to the cross-pin T. Both pins reach through the side frames A A and work in slots of the latter, but in such a manner that in the position represented in the drawing the pin R and the free ends of the stays V V are held in contact with the indentations of the lever G by means of the spring S. The brush-wheel M gears with the larger wheel W, which united to the hollow shaft X by means of a feather, on which it slides, is set in motion by the pulley or gear-wheel Y, fastened to the shaft X.

To secure the necessary friction between the two brush-wheels M and W, the latter is pressed against the former by means of a spring, incased in the hollow shaft X, and coiled round the shaft Z, fixed to the hub of the wheel W. The shaft X turns in a long hub or socket on the casing C, and is prevented from slipping by means of a collar.

When a pull is exerted on the apparatus by means of the pins I and D, the lever G is forced to the right side, carrying with it the pin R along the slots in the frames A A and the wheel M along the shaft N, returning to its original position when the pull ceases. When a push is exerted on the apparatus by means of the pins I and D, the lever G is forced to the left side, carrying with it the stays V V, and by them the pin T along the slots in A A, and the wheel M along the shaft N, returning also to its original position, when the push ceases.

As the apparatus is intended to measure

not the power alone, but the product of power and way, therefore the way traveled is transferred to the pulley Y by a belt or chain, and by means of the pulley Y to the wheel W, causing the wheel M to revolve as soon as the latter is shifted to the right or left side of the center of W. The product or effect of these two motions is shown in figures on the dial of the counter O.

In place of the pulley Y may be used a toothed wheel or a chain-drum, or any other suitable device.

For the explanation of the use of my dynamometer, it may be interposed between the locomotive of a railroad-train and the tender by means of links or loops attached to the bolt D and to the bolt I. On the axle of the driving-wheel of the locomotive, which may have a diameter of one yard, a pulley is fastened of the same diameter as the pulley Y, so that each revolution of the driver corresponds with one revolution of the wheel W. Then for each hundred yards of the way of the train the wheel W will make thirty-one thousand eight hundred and thirty-two revolutions. If a drawing power of two thousand pounds is acting at the point I, then the power exerted on the spring S at the point Q will be two thousand eighths, equaling two hundred and fifty pounds. This force of two hundred and fifty pounds exerted at the point Q will extend the spring S five-sixteenths of one inch, and the wheel M will be shifted half an inch from the center of W. Sixteen revolutions of the shaft N produce one revolution of the first axle of the counter. The diameter of M is two inches, and consequently when it is shifted to a distance of one-half inch from the center of W, M will make one-half revolution for every one revolution of W. Consequently thirty-one thousand eight hundred and thirty-two revolutions of W will approximately produce one revolution of the unit-wheel of the counter, indicating hundred yards, tons, as thirty-one thousand eight hundred and thirty-two revolutions of W show one hundred yards of traveled way. At a glance on the dial at the end of the trip the product of drawing-power and velocity—that is, the amount of work of the locomotive—is ascertained in figures, with due consideration of wind, different levels of the road, and other incidents which have any influence on the work of the locomotive. By this example it can be easily understood how to use my dynamometer in other cases to ascertain the work of stationary engines, turbines, shaftings, &c.

For reciprocating motions the lever Q is forced alternately to the right and to the left; and as the wheel Y turns also to the right and to the left, the shaft N will keep on to turn in its original direction, the counter O showing always the amount of work done.

What I claim as new, and want to secure by Letters Patent, is—

1. The levers F and G, the spring S, the stays V V, in combination with the wheel or pulley Y and the intermediate working mechanism, all substantially as herein described, when used for a dynamometer in the manner and for the purpose specified.

2. The spring S, with its two pins R and T, in combination with the stays V V, when arranged relatively to the lever G at the place Q, as and for the purpose specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HERMANN KILLICHES.

Witnesses:

GERARD WENZESLAUS NAWROCKI,
EDWARD P. MACLEAN.