

2 Sheets—Sheet 1.

THICKNESS GAGE.

Patented Jan. 20, 1885.



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(No Model.)

2 Sheets—Sheet 2.

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THICKNESS GAGE.

No. 310,908.

Patented Jan. 20, 1885.

Fig. 2.

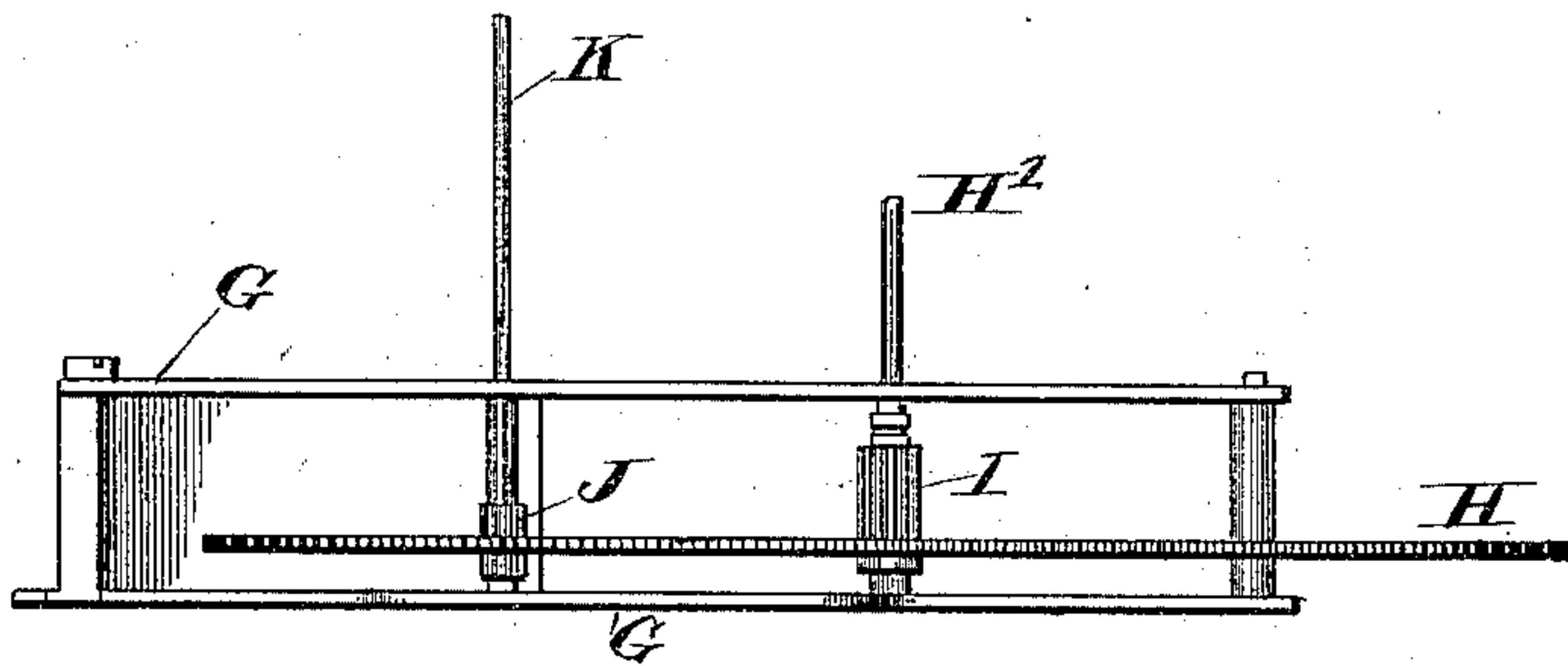
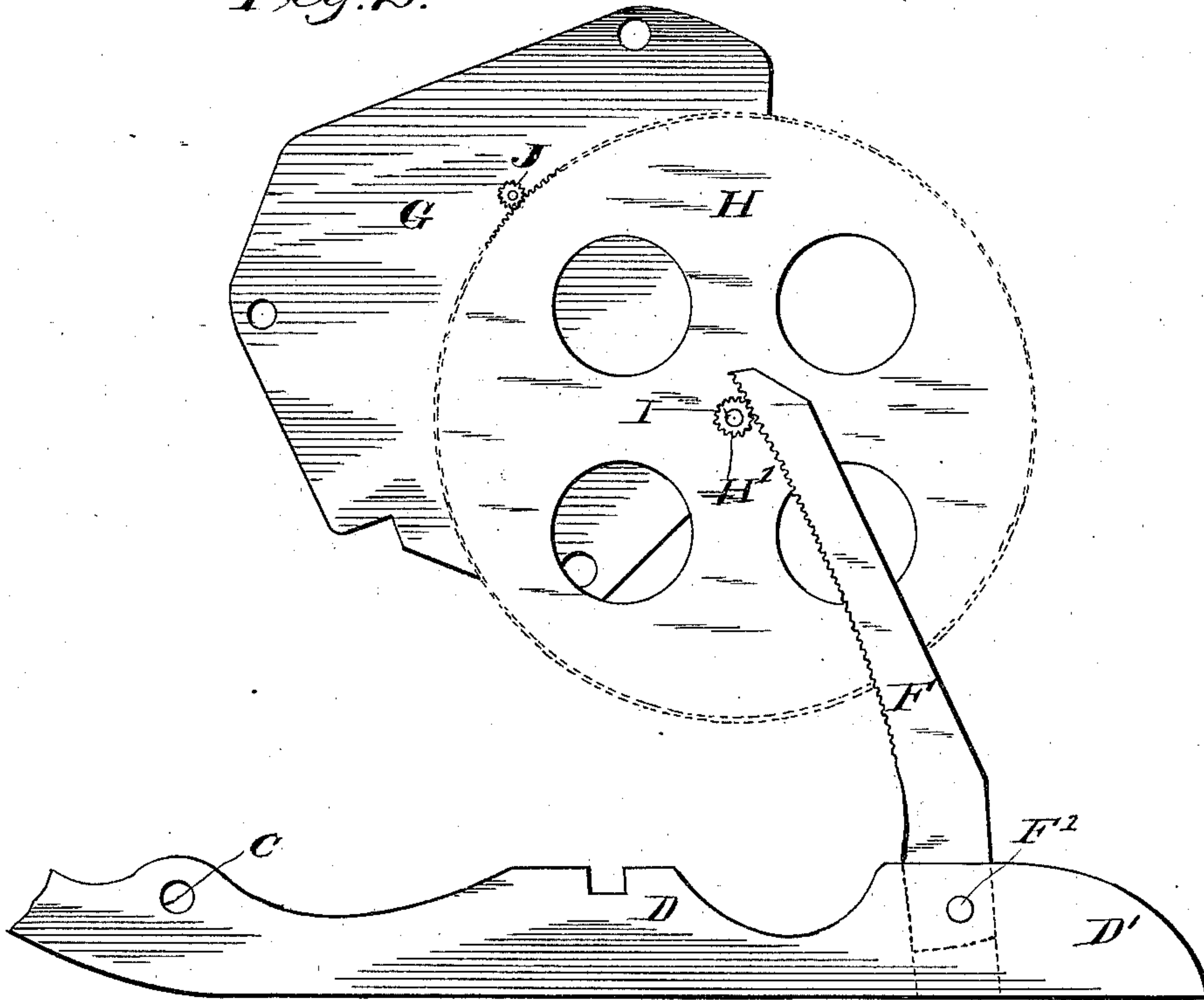


Fig. 3.

Witnesses,
Wm J Duwall
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UNITED STATES PATENT OFFICE.

EBENEZER MORRISON AND JAMES P. HERRON, OF WASHINGTON, DISTRICT OF COLUMBIA.

THICKNESS-GAGE.

SPECIFICATION forming part of Letters Patent No. 310,908, dated January 20, 1885.

Application filed May 3, 1884. (No model.)

To all whom it may concern:

Be it known that we, EBENEZER MORRISON and JAMES P. HERRON, citizens of the United States, residing at Washington, District of Columbia, have invented certain new and useful Improvements in Thickness - Gages, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention is an improvement on our Patent No. 292,131, dated January 15, 1884, and the principle object in view is to provide mechanical devices which shall quickly and clearly indicate extremely slight variations in the thickness of any material placed between the measuring points or jaws of the gage. We accomplish this purpose by the peculiar and novel combination of pivoted or oscillatory and of rotary elements of construction, the arrangement of the same being such that there is a positive and direct connection between the rotary and oscillatory, so that lost motion is avoided, and exceedingly slight movements at one point of the combination produces an exceedingly magnified and extended movement in another point, which extended movement is restricted within the limits of a machine of convenient and practicable size by being diverted from an oscillatory to a rotary motion.

Another novel feature of our present invention consists in the novel scales employed for indicating the extent of oscillatory diverted into a rotary movement, the scale of final subdivision having a fixed relation to the scale indicating the extent of the oscillatory movement diverted into rotary.

The invention also consists in certain features hereinafter described, and specifically set forth in the claims.

Referring to the drawings, Figure 1 is a side elevation of a thickness-gage constructed in accordance with our invention. Fig. 2 is a similar view of the main portion of the oscillatory lever and the gearing operated by the same. Fig. 3 is a side elevation of the gearing and the frame-work thereof.

Like letters refer to like parts in all the figures.

A represents a casting which forms a case

for the mechanism shown in Fig. 2, hereinafter described, and also a suitable base for the entire instrument, which by means of the lugs A' may be secured to any suitable table, if desired. The case is provided with a fixed jaw, B, which is finished off squarely on its face B', or may have an independent plate of metal secured to the jaw B, to serve as a finished face thereof. In the lower portion of the case is suspended or pivoted on a rod or pivot screws, C, the oscillatory lever D, the longer arm of which extends through the case, forming a projection or handle, D', and the shorter arm being provided with a jaw, E, having a finished face, E', which, as in the case of the jaw B, may be either integral or an independent plate secured thereto in any suitable, convenient, or well-known manner. The jaw E is secured to the short arm of the lever D by means of a pivotal bolt, rod, or points, E². The lever D is extended beyond the pin-
tiple E², to form a stop, D², to determine or limit the oscillations of the jaw E upon its support, whereby when brought against the face of the jaw B it will always ultimately assume a position parallel therewith. As the jaw E is pivotally supported on the lever D, it (the jaw itself) may be termed a "pivotal jaw;" but whether pivoted or not it is a movable jaw when compared with the jaw B.

We do not limit our invention to a pivoted jaw, as in some cases the area of the jaw E which comes in contact with the jaw B may be slight, and said jaw E may be rigidly connected to the lever D, so that the term "movable," as herein used, means any jaw mounted or formed on the shorter arm of the lever E—that is, any jaw moving with the lever.

Between the pivot C and the projection D' of the lever D is secured a rack-bar, F, the teeth of which are formed in the arc of a circle drawn from the axis of the pivot C as a center. Said bar may be formed integral with the lever D, or may be secured thereon or within a slot formed therein by means of a bolt, rivet, or screws, F'. Within the casing is secured, by any suitable means, the frame-work G, which is adapted to support and provide bearings for a main gear, H, having upon its shaft H' a pinion, I, adapted to mesh in the

rack F and for the second pinion, J, adapted to mesh with the gear H, said pinion being mounted upon the shaft K. In this instance the longer arm of the lever D is made sufficiently heavy to draw the rack-bar from any point of elevation practically required to that position which will bring its free end near the pinion I, and the parts are so proportioned that this occurs when the jaws are close together, or, if desired or necessary, the bar may be lighter or heavier, or additional material may be attached thereto in order to give it such a counterbalancing function. The shaft H' carries a pointer, L, while the shaft K carries a pointer, M.

N is the dial of the instrument secured to the case by any suitable means in such manner that the shafts H' and K pass through openings formed therein. In front of and inclosing the dial is any ordinary suitable frame, O, provided with a glass, P.

Q represents a scale, comprising a series of circles arranged concentrically with the shaft H', each of which is divided into twenty portions, those of the outer circle being numbered consecutively, and those of the inner circles being numbered midway and at the termination thereof, for a purpose hereinafter described.

R represents what may be designated as the "ultimate measurement scale," subdivided into twenty portions, each of which is again subdivided into five portions, so that the entire circle comprises one hundred points. The gear H and pinion J are relatively proportioned to each other in the number of their teeth, so that the latter revolves twenty times to one revolution of the former. The pinion I being fixed with the gear H upon the shaft H', rotates in unison with the gear. In this instance the relative length of the longer and shorter arms of the lever D, and the relative diameter of the pinions and gear, and the relative proportion of the rack F as to length with the pinions and the long and short arms of the lever, are such that when the jaws are separated one-eighth of an inch the pointer L makes one revolution, covering the figures from 1 to 20; but as the pinion J rotates twenty times to one rotation of the pinion I, the pointer M will have made twenty revolutions while the pointer L has made one, so that by glancing at the outer circle of the scale Q the location of the pointer L thereon will indicate the number of revolutions made by the pointer M. For instance, if the pointer L be at 3 on the scale Q, the pointer M will be at 100 on the scale R, and therefore the two scales together indicate three hundred units of the instrument as the measurement of any fabric between the jaws which would bring the pointers into the said positions. The parts being in the described relative proportions, if any fabric be placed between the jaws after the lever has been raised by means of the projection D', and said lever is permitted by reason of the counterbalancing-weight of its longer arm to re-

turn to its normal or lowest position, said fabric will be held squarely and flatly between the faces of the jaws with a uniform pressure, and the pointers will assume a position dependent upon the thickness of the fabric. Now, it will be noticed that each subdivision of the scale Q is the distance which pointer L travels when fabric one-twentieth of one-eighth of one inch, that is one one hundred and sixtieth of one inch in thickness, is placed between the jaws, and as the scale R contains one hundred points, each of them will represent one one-hundredth of one one hundred and sixtieth of an inch—that is, one sixteen-thousandths of an inch.

By the construction described, and the operation of the parts as set forth, it will be seen that instead of extending the longer arm of the lever D to a distance necessary to indicate exceedingly slight separation of the jaws, which construction is altogether impracticable, because the longer arm would be several feet in length, we in effect absorb or divert the excessive movement of a longer arm so extended into a continuous or repeated rotation of the gear pinions and pointers, whereby we secure an indication of the movement of an arm equivalent to one so extended upon a dial, and thus provide an instrument which is of size and proportion adapted to daily practicable use, and we secure these advantages by the direct connection of the gearing to the longer arm of the oscillating lever, the shorter arm of which carries the movable jaw of the gage.

We do not limit ourselves to the specific construction of the case and its contained mechanism as herein shown, but may alter the same in minor respects and otherwise to any extent and in any manner within the skill of persons conversant in the manufacture of similar instruments.

We do not herein claim the case provided with a fixed jaw, combined with a lever pivoted to an extension of the case and carrying the movable jaw, as that is included as a part of the subject-matter of our hereinbefore-mentioned patent.

It is apparent that the scales Q and pointer L may be dispensed with, and we do not limit our invention in other respects to a use thereof.

Having described our invention and its operation, what we claim is—

1. The combination of the fixed jaw, a pivoted lever carrying a jaw, and provided with a rack adapted to mesh directly with and operate a system of gear-wheels one of which carries a pointer over a suitable scale, substantially as specified.

2. In a thickness-gage, the combination of a pivoted lever carrying one of the jaws of the gage, a system of gearing carrying a pointer over a suitable scale, and a connecting rack-bar secured directly to the lever, and having teeth formed in a circle described from an axial line of the pivot of said lever, substantially as specified.

3. In a thickness-gage, the combination of a

fixed jaw, a pivoted lever carrying a movable jaw, a rack secured to the lever and adapted to operate a gear-wheel meshing with a pinion carrying a pointer over a scale, substantially as specified.

4. In a thickness-gage, the combination of a fixed jaw, a pivoted lever carrying a jaw, a system of gearing carrying a pointer over a scale, and a rack-bar secured to the longer arm of said lever, the latter being extended to form a handle, and weighted to operate the gearing by its gravity, substantially as specified.

5. In a thickness-gage, the combination of a fixed jaw, a pivoted lever carrying a pivoted jaw, and having a projection, as D², for limiting the movement of the movable jaw, substantially as specified.

6. In a thickness-gage, the combination of a fixed jaw, a pivoted lever carrying a movable jaw and connected directly by means of a rack secured to its lower arm, with a system of gearing, comprising a pinion and gear, upon a shaft carrying a pointer over a concentric

scale, and a pinion meshing with said gear and mounted upon a shaft carrying a pointer over a second scale, the scales and gearing and pivoted lever being proportioned relatively to each other, substantially as specified.

7. The combination of the case A, adapted to sustain the pivoted lever D, and the system of gearing H I J, and the rack F, and provided with the fixed jaw B, forming a part thereof, with the dial N, provided with the scales Q and R, substantially as shown and described.

8. The combination of the case A, having the fixed jaw, with the pivoted lever D, carrying the movable jaw at one end of the case and projecting from the other end of the case, as at D', substantially as shown and described.

In testimony whereof we affix our signatures in presence of two witnesses.

EBENEZER MORRISON.
JAMES P. HERRON.

Witnesses:

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WM. S. DUVALL.