(No Model.)

J. A. MacDONALD.

MICROMETER GAGE.

No. 384,771. Patented June 19, 1888.

Fig. 1.

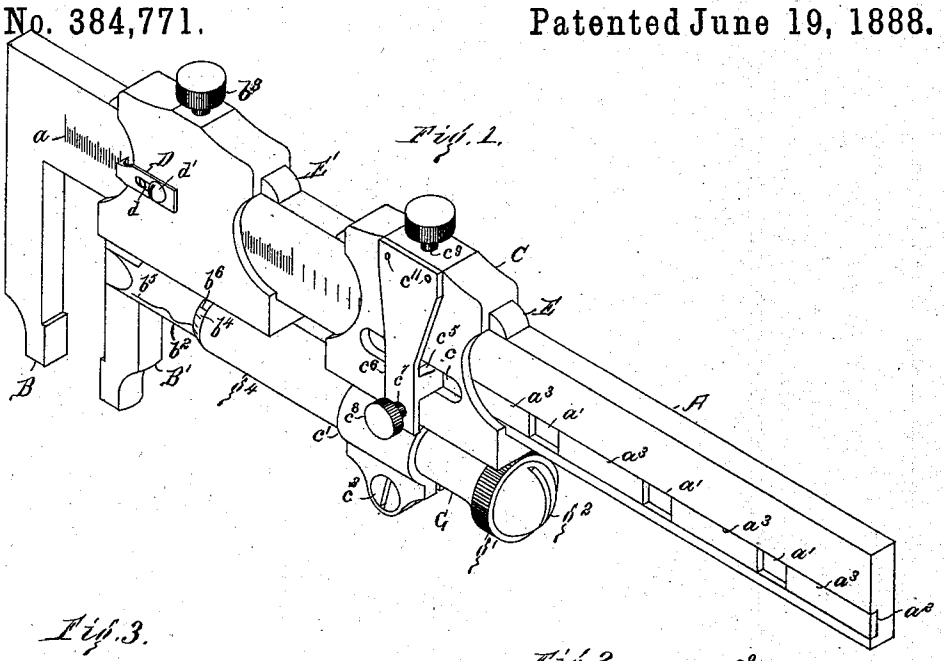


Fig. 3.

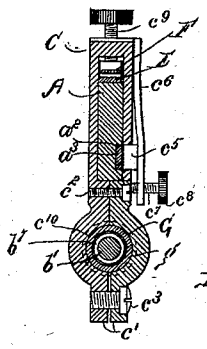


Fig. 2.

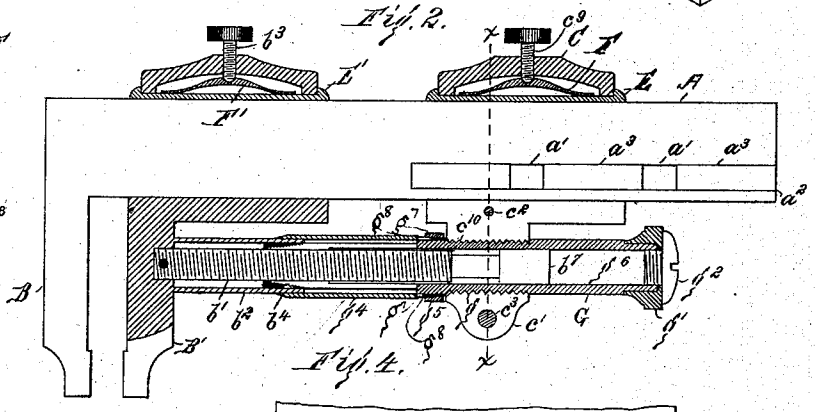


Fig. 4.

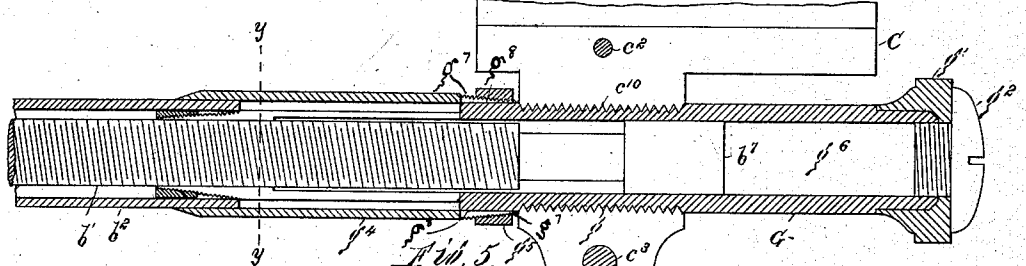
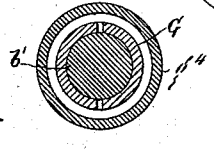


Fig. 5.



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UNITED STATES PATENT OFFICE.

JOHN A. MACDONALD, OF LOWELL, MASSACHUSETTS.

MICROMETER-GAGE.

SPECIFICATION forming part of Letters Patent No. 384,771, dated June 19, 1888.

Application filed March 21, 1887. Serial No. 231,674. (No model.)

To all whom it may concern:

Be it known that I, JOHN A. MACDONALD, a citizen of the United States, residing at Lowell, in the county of Middlesex and Commonwealth of Massachusetts, have invented a certain new and useful Improvement in Micrometer-Gages, of which the following is a specification.

My invention relates to micrometer-gages, and has for its object to attain greater ease of adjustment and greater accuracy of measurement.

In the accompanying drawings, Figure 1 is an isometric view of a micrometer-gage provided with my improvement; Fig. 2, a side elevation of the same, the movable jaw, slide, and operating parts being in central vertical section, the scale being omitted from the beam of the instrument; Fig. 3, a section on line $x\,x$ in Fig. 2 to show the means of holding the slide immovably upon the beam; Fig. 4, an enlarged central vertical longitudinal section of the slide, the micrometer-screw, and the sleeves; Fig. 5, a section on the line $y\ y$ in Fig. 4.

A is the beam of the instrument, and carries a fixed jaw, B, at one end of the same in the usual manner, and is also provided with a scale, a, also in the usual manner.

The beam A is provided on its face, near its lower edge, with a series of rectangular holes, a', which are most conveniently arranged at intervals of one inch from center to center of said holes. The most convenient way of making the holes a' is to groove the beam, as indicated at a^2, and then to insert in this groove small blocks a^3, of steel, of a size to fill said groove, each of said blocks being of a length less than an inch by the width of a hole a'. The blocks a^3 are secured in the groove a^2 by any well-known means.

The slide C has an opening to receive and fit the beam A, and carries below said beam a clamp, c', one half of which is formed in one piece with said slide, and the other half of which is secured to the slide by screws $c^2\ c^3$. The slide C is provided with a slot, c, immediately in front of the groove a^2, as shown in Figs. 1 and 3, through which slot reaches a projection, c^5, of a width equal to the width of one of the holes a', said projection being secured to or being a part of a spring, c^6, the upper end of which is secured by rivets c^{11}, or otherwise, to the slide C, which spring presses said projection c^5 against the beam and forces it to enter any one of the holes a' over which it may be placed. The free end of the spring c^6 below said stud supports a screw, c^7, provided with a milled head, c^8, which screw turns in a threaded hole in the free end of said spring and thrusts against said slide and draws the projection c^5 away from the beam A and allows the slide to be moved over said beam without said projection catching in the holes a'. In the top of the slide turns a set-screw, c^9, in the usual manner, which does not, however, press against the gib E, but against a semi-elliptic spring, F, the ends of which bear upon the gib. The notch of the gib E is just wide enough to receive and fit the upper part of the slide to prevent the slide and gib from moving on each other, and thus preventing, when the screw c^9 is turned down against the spring F, the slide from moving on the beam.

The inside of the clamp c' is provided with a series of annular grooves, c^{10}, and the sleeve G is provided externally with an equal number of similar grooves, g, of equal size and depth, so that the notches in the clamp receive and fit the annular projections between the grooves of the sleeve G, and vice versa, a number of such grooves being used in order that they may offset the errors of each other, and that the sleeve may be turned in the clamp, but be incapable of longitudinal motion therein. The free end (the end at the right in Figs. 1, 2, and 4) of the sleeve E is provided with a milled head, g', to enable the sleeve to be turned in the clamp, and, as a matter of convenience, the head g' may be formed in a separate piece and secured to the sleeve by the screw g^2, as shown in Figs. 2 and 4.

The inner surface of the sleeve G is provided with a screw-thread, which engages the thread of the screw b', secured to the movable jaw B′ of the gage. The jaw B′ is of the usual construction, except that it is provided with said screw b' and with a sleeve, b^2, which surrounds said screw b' concentrically therewith, but out of contact therewith.

The movable jaw B′ is prevented, when de-

sired, from moving on the beam A by a set-screw, b^3, gib E', and spring F', these parts being precisely like the corresponding parts marked c^9 E F, above described.

It is evident that when the jaw B' is free to move on the beam, turning the sleeve G will cause said jaw to approach or recede from the fixed jaw B. Suppose the screw b' to have forty threads to the inch, it is evident that a complete revolution of the sleeve G will move the jaw B' one-fortieth of an inch. The sleeve b^2 enters a larger sleeve, g^4, secured to the sleeve G, so that turning the sleeve G causes the sleeve g^4 to move over the sleeve b^2 toward or away from the movable jaw. The end of the sleeve g^4 nearest the fixed jaw is beveled, as shown at b^4 in Figs. 1, 2, and 4, and on this beveled end are marked twenty-five graduation-lines, b^6, at, as nearly as possible, equal intervals, which lines b^6 are numbered from 0 to 24, and on the sleeve b^2 is marked a line, b^5, (shown in Fig. 1,) which serves as an index to which the graduation-lines on the sleeve g^4 are to be turned, and with which they are to be compared. The screw b', having forty threads to the inch, turning the sleeve G one twenty-fifth of a revolution, will cause the movable jaw to advance toward or recede from the fixed jaw one-thousandth of an inch. Inasmuch as it is impossible to make an absolutely-perfect screw, the index-line b^5 (shown in Fig. 1) is not a straight line, as it would be if the screw were perfect and the graduation-lines on the sleeve g^4 were at perfectly equal intervals from each other. The index-line b^5 is drawn by marking the places on the sleeve g^4 where the ends of the graduation-lines b^6 successively stop when a number of pieces, known to vary from each other in thickness by successive thousandths of an inch, are successively held between the jaws of the gage and in contact with both of said jaws, and by connecting the points or places so marked by drawing the line b^5 through them all.

The deviations of the line b^5 are exaggerated in Fig. 1 beyond what would occur in practice, for the purpose of illustration.

It will be seen that the indicating-sleeve consists substantially of two overlapping parts or sleeves, G and g^4, the overlapping end of the larger sleeve, g^4, being externally screw-threaded and tapering, as shown in Fig. 4 at g^7, and slotted at g^8. A nut, g^5, tapering internally, engages the screw g^7 and contracts the overlapping end of the sleeve or part g^4 and prevents said sleeve g^4 from turning or slipping on the sleeve G. By loosening the nut g^5 the parts g^4 G may be moved endwise and turned on each other to bring the zero-mark or starting graduating-mark of the sleeve g^4 into correspondence with the index-line b^5 of the gage.

The movable jaw B' carries an adjustable pointer, D, the same being a strip of sheet metal provided with a slot, d, through which is passed a set-screw, d', which turns in a threaded hole in said movable jaw and holds the pointer in the desired position, the free end of the pointer being bent down nearly into contact with the beam A, where the scale a is marked thereon.

When the screw d' is loosened, the pointer may be adjusted lengthwise of the beam to bring the indicating end of the pointer to the 0 of the scale a, when the jaws are in contact with each other, thus correcting any error in the original placing of the 0 on said scale a, or any inaccuracy subsequently caused by the gradual wearing of the inner faces of the jaws.

The free ends of the jaws are hardened to prevent them from wearing, and the ends of the blocks a^3 are also hardened to prevent them from wearing, and are ground to give them a better finish and to enable the holes or spaces a' to fit the projections c^5 with the greatest possible accuracy.

To keep the jaws parallel with each other, the free end of the screw b' is lengthened out, as shown in Figs. 2 and 4, and provided with a cylindrical head, b^7, which enters and fits the enlarged cylindrical chamber g^6 in the sleeve G, and holds the movable jaw B' at right angles to the beam A, and also prevents the screws b' G from wearing on each other.

The instrument above described is a convenient form of micrometer-gage, operated by a measuring-screw and having the portability and adaptability of an ordinary slide-gage.

I claim as my invention—

1. In a micrometer-gage, the combination of the beam provided with a jaw rigidly secured thereto, a slide provided with a clamp and adapted to be moved on said beam, or to be immovably secured thereon, a jaw sliding on said beam and provided with a screw, a sleeve turning without advancing in said clamp, and being internally threaded, and said screw being externally threaded and entering and engaging said sleeve, as and for the purpose specified.

2. In a micrometer-gage, the combination of the beam provided with a jaw rigidly secured thereto, a slide provided with a clamp and adapted to be secured on said beam, a jaw sliding on said beam and provided with a screw, a sleeve provided with external annular grooves and projections to receive and fit corresponding annular projections and grooves within said clamp and being internally threaded, and said screw being externally threaded and entering and engaging said sleeve, as and for the purpose specified.

3. The combination of two sleeves, one arranged around the other and adapted to slide the one upon the other, one of said sleeves being provided with a micrometer-screw and the other of said sleeves being internally threaded to engage said screw, the outer one of said sleeves being provided with graduation-marks which extend to its central opening, and the other of said sleeves being provided with an index-line, substantially as described, so that turning said sleeves the one upon the other

until the same graduation-mark comes a second time over said index-line will cause said sleeves to advance relatively to each other an amount equal to the pitch of said screw, said index-line being determined by experiment and varying from a straight line more or less, according to the errors of said screw, as and for the purpose specified.

4. In a micrometer-gage, the combination of the beam having a jaw rigidly secured thereto, a slide provided with a clamp and adapted to be secured to said beam, a jaw sliding on said beam and provided with a screw, a sleeve turning without advancing in said clamp, and provided with an internal screw-thread and surrounding and engaging said screw, another sleeve surrounding said first-named sleeve and moving with said screw and having an index-line thereon, and a third sleeve secured to said first-named sleeve and moving therewith and surrounding said second-named sleeve, and having its end beveled and marked with graduation-lines, as and for the purpose specified.

5. The combination of the beam, blocks of steel having their ends hardened and ground secured to said beam at equal intervals from each other, a slide movable on said beam, and a projection carried by said slide and adapted to enter the spaces between said blocks and to reach across said intervals, as and for the purpose specified.

6. The combination of the beam provided in its face with a groove, blocks of steel having their ends hardened, ground and fixed in said groove at equal intervals from each other, and a slide movable on said beam, and a projection carried by said slide adapted to enter the spaces between said blocks and to reach across said intervals, as and for the purpose specified.

7. In a micrometer-gage, the combination of the slide movable on the beam of said gage, a gib interposed between said beam and said slide and having a notch adapted to receive and fit said slide, a semi-elliptic spring arranged between said gib and said slide, and a set-screw turning in said slide and thrusting against said spring to crowd said spring upon said gib and to hold said gib in contact with said beam, as and for the purpose specified.

8. In a micrometer-gage, a graduated indicating-sleeve formed in two overlapping parts, an end of the larger part being tapering, slotted, and externally screw-threaded, in combination with a nut internally tapering and adapted to engage said screw-threaded end of said larger part, and by contracting the same to prevent said parts by friction on each other from slipping or turning on each other, and when loosened to allow said parts to be moved endwise and turned on each other to bring the starting graduating-mark of said sleeve to correspond with the index-line of said gage, as and for the purpose specified.

In witness whereof I have signed this specification, in the presence of two attesting witnesses, this 18th day of March, A. D. 1887.

JOHN A. MACDONALD.

Witnesses:

ALBERT M. MOORE,

GERTRUDE M. DAY.