(No Model.)

2 Sheets—Sheet 1.

M. M. BARNES.

MICROMETER CALIPERS.

No. 346,456. Patented Aug. 3, 1886.

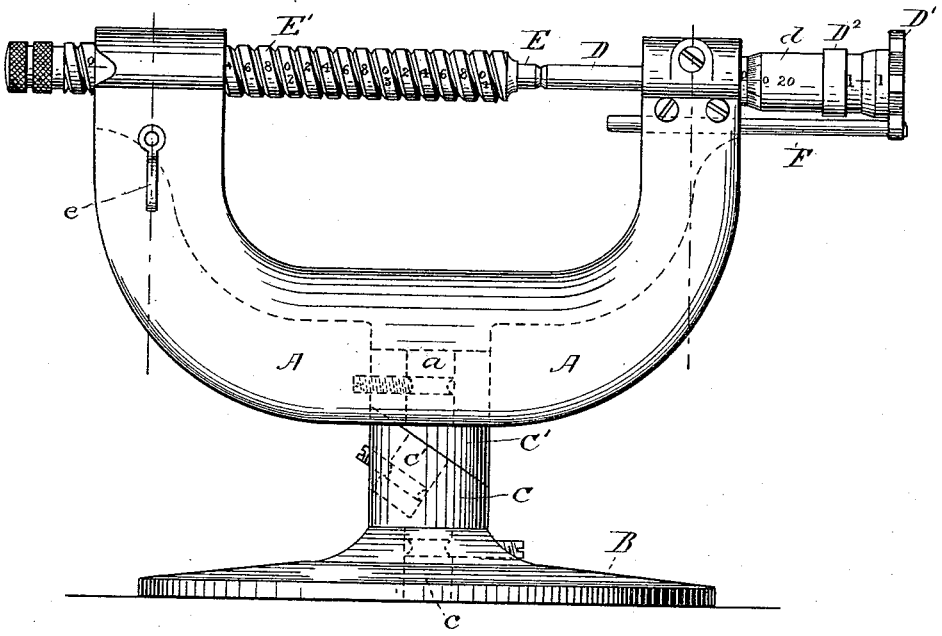

Fig. 1.

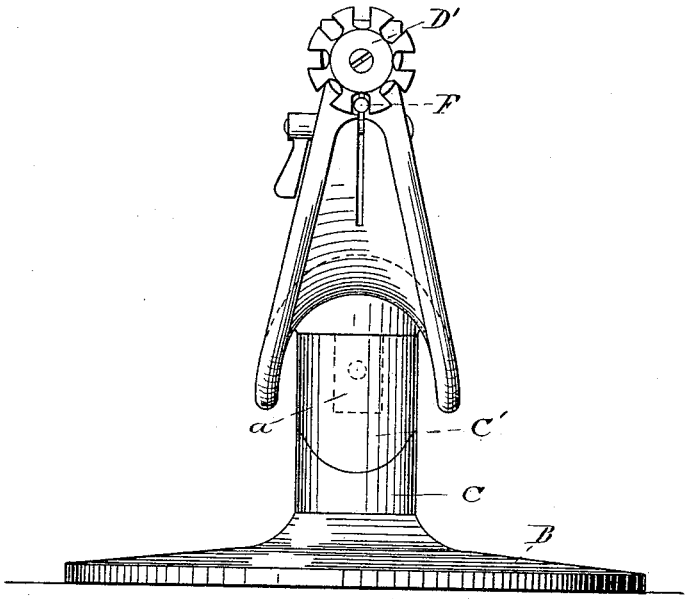

Fig. 2.

WITNESSES

J. Henry Taylor.

James F. Bligh.

INVENTOR

Merrick M. Barnes

by Alex. P. Browne,

his attorney.

(No Model.) 2 Sheets—Sheet 2.

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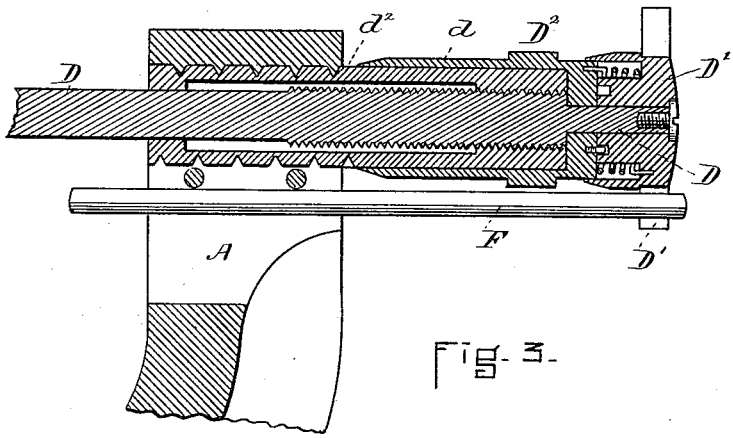

Fig. 3.

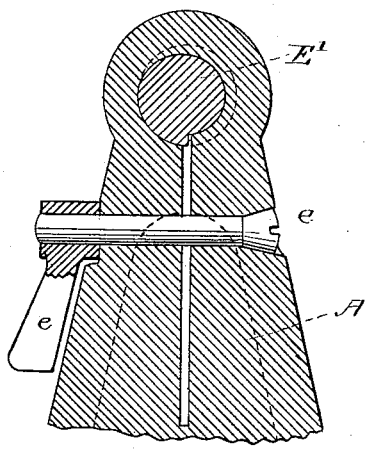

Fig. 4.

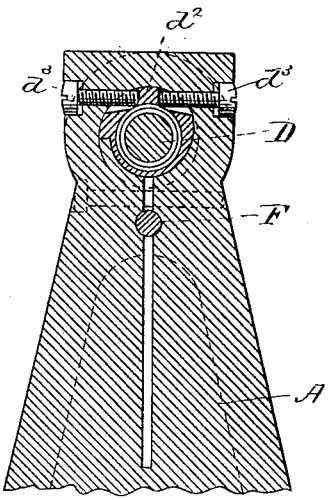

Fig. 5.

WITNESSES

J. Henry Taylor.

James F. Bligh.

INVENTOR

Merrick M. Barnes

by Alex P. Browne

his attorney

UNITED STATES PATENT OFFICE.

MERRICK M. BARNES, OF BOSTON, MASSACHUSETTS.

MICROMETER-CALIPERS.

SPECIFICATION forming part of Letters Patent No. 346,456, dated August 3, 1886.

Application filed August 21, 1885. Serial No. 174,956. (No model.)

To all whom it may concern:

Be it known that I, MERRICK M. BARNES, of Boston, in the county of Suffolk and State of Massachusetts, a citizen of the United States, have invented certain new and useful Improvements in Micrometer-Calipers, of which the following is a specification.

My invention relates to that class of measuring-instruments known as "micrometer-calipers," and has for its object to produce improved accuracy, effectiveness, and convenience therein.

In the accompanying drawings, Figures 1 and 2 represent in side and end elevation a device embodying my present invention. Fig. 3 represents in section the screw D, with its connecting parts; and Figs. 4 and 5 are sections showing, respectively, the method of clamping the screw E and of adjusting the screw D, in the manner hereinafter described.

My improved micrometer-calipers consist of the usual U-shaped standard, A, the extremities of its arms carrying the calipering devices, as will be hereinafter more particularly described. As it is often desirable that the calipers should be used as a bench-tool, I have devised a universal joint or attachment between the calipers and the bench-plate B, which is to be screwed into the bench, as shown. This attachment I will now proceed to describe.

Upon the bench-plate I form a horizontal face to receive a cylindrical block, C, the lower face of which is also horizontal, and which is provided with a dowel, *c*, entering a suitable recess in the bench-plate. The upper end of this block C is cut off at an angle of about thirty degrees to the horizon, and upon it is fitted by a similar dowel and recess a second piece, C′, the lower face of which is cut off at an angle matching that of the upper face of the block C. The dowel of this piece C′ is shown in the drawings at *c*′. The standard A is made at its lower part in the form of a yoke or saddle, for convenient attachment to the block C′, with which it is connected in a similar manner by a dowel, *a*. Each of the dowels *c*, *c*′, and *a* is provided with a suitable locking-screw, as shown, whereby it may be held at any desired position.

The connection between the standard A and the block C enables the former to be turned entirely around upon the latter, and the same is true of the connection between the blocks C′ and C, and the block C and the bed-plate B. By the combined use of these various adjustments, the calipers can be adjusted to a large number of different positions, as may be most convenient in use, the arrangement of blocks and dowels being substantially equivalent to the well-known ball-and-socket or so-called "universal" joint.

The two arms of the standard A carry, respectively, a pair of calipering-screws, D and E, the screw E serving the purpose of the anvil commonly used in instruments of this class. As shown in the drawings, this screw or anvil E may be moved backward or forward within the standard A by means of the graduated shifting-screw E′. This screw, being of large diameter and quick pitch, and being graduated, as shown, enables the anvil E to be quickly and readily shifted toward or away from the opposite end of the standard which carries the calipering-screw D, as may be required, for readily calipering the different sizes of work. The screw E′ may be locked at any desired position by means of the lock or clamp *e*. This detail of construction is illustrated on an enlarged scale at Fig. 4, and is a well-known device in instruments of this character.

The calipering-screw D, which is mounted in the opposite end of the standard A, is of ordinary construction, except that instead of attaching the thumb-piece directly to the graduated shell *d*, which is connected with the screw D, I interpose a coiled spring between the thumb-piece D′ and the shell *d*′, attached to the arm D. This construction is illustrated in section and on an enlarged scale at Fig. 3. The thumb-piece is loosely mounted upon an extension of the screw D, and a coiled spring, as stated, is interposed between the thumb-piece and the shell *d*, which is rigidly attached to the screw D, as stated. The object of interposing this spring is as follows: In instruments of this character, intended to measure distances or thicknesses of material with great minuteness and accuracy, it has been found that when the calipering-arm is directly or rigidly connected with the thumb-piece by

which it is turned there is liability of inaccuracy of measurement, growing out of the difference of degree of delicacy of touch in the hands of the various workmen using the calipers. It frequently happens from this that different workmen, when calipering a piece of metal of the same thickness by means of the same calipers, will obtain different readings of the instrument. This, as has been said, is due to the difference in their delicacy of touch; and it is consequently important to remove this factor of uncertainty in the operation of the machine. When a spring or similar yielding connection is inserted, it is obvious that after the calipering-screw D has been brought up against the work any excess of force will cause the spring to be compressed and the thumb-piece D′ to be turned without further turning the screw D or the shell *d*. As this shell is graduated in the customary way with reference to a scale upon the arm of the standard A, which graduation gives a micrometer measurement of the advance or withdrawal of the calipering-screw D, it is manifestly desirable to have a spring or cushion interposed between the collar *d* and the thumb-piece D′, so that the screw D shall always be brought up to the work with the same force—viz., the tension of the spring.

As the face of the calipering-screw D is apt to become worn, and its measuring length thereby slightly shortened, it is desirable to provide an adjustment for this, which may be done by forming the nut d^2, in which the calipering-screw D turns, separate from the standard A and screw-threaded therein. This nut may be cut away on either side at the top, as shown on an enlarged scale and in section in Fig. 5, so as to leave a rib, against which adjusting-screws d^3 bear. By turning these the nut d^2 can be turned in either direction, and thus slightly advance or withdraw the calipering-screw D and the graduated shell *d* together to compensate for wear, and also to insure an accurate adjustment of the machine when first put together.

My improved calipers are frequently used in calipering a large number of pieces of metal—as, for example, duplicate parts of machinery varying only slightly in thickness. It is desirable under these circumstances, after setting the screws D and E at the distance apart which represents the standard thickness of the parts to be calipered, to give to one of them the capacity of slightly yielding, to admit of the easy introduction of the part to be calipered. For this purpose I provide an attachment whereby one end of the coiled spring interposed between the thumb-piece D′ and the screw D, by which the latter is moved, may be held fixed. As this spring is attached to the screw D, it is obvious that the latter may still be turned backward slightly against the tension of the coiled spring, which at one end is held fast.

I have found that a convenient way of securing one end of the coiled spring is to form the thumb-piece D′ with a series of notches in its edge, (see Fig. 2,) and to provide a sliding catch-pin, F, (best shown at Fig. 1,) working in and out of a suitable slot in the arm of the standard A. It is obvious that when this catch-pin F enters one of the notches in the thumb-piece D′ the latter is held fast, and as one end of the coiled spring is attached thereto, it in turn is held fast. Now, if a supplemental thumb-piece, D^2, be for convenience placed upon the shell *d*, which, as has been said, is connected with the screw D, and also with the loose end of the coiled spring, it is obvious that if the screws D and E be set at the right distance the shell *d* may be turned back two or three turns by means of the supplemental thumb-piece D^2, thereby increasing the distance between the screws D and E, so as to allow the easy introduction of the piece to be calipered. At the same time the coiled spring will be made tense, and as soon as the piece to be calipered is in place, if the operator simply releases his hold of the thumb-piece D^2, the tension of the spring will automatically bring up the screw D against the work to be measured, while at the same time its dimensions can be read by the graduation upon the shell *d*. In this way I obtain the advantages, first, of rapid work, and, second, of the automatic tension upon the screw D, with its benefits, as previously described.

As the work to be measured is often quite as likely to run below the standard as above it, it is desirable, after setting the shell *d* at the point representing standard thickness, to turn the thumb-piece D′ one or two notches farther in the direction of the inward movement of the screw D before securing it by means of the catch-pin F. When so adjusted, the calipers will show whether the work measured is standard or whether it exceeds or falls below it, and how much.

I claim—

1. In micrometer-calipers, the combination of the calipering-screw, its thumb-piece, and an interposed spring attached to the calipering-screw and also to the thumb-piece, by means of which spring and thumb-piece the screw is moved up against the work under a constant tension—viz., the tension of the spring—all substantially as set forth.

2. In micrometer-calipers, the combination, with the calipering-screw and its thumb-piece, of a spring-connection between the thumb-piece and screw, and a device, substantially as herein described, whereby one end of the spring may be held fast or prevented from moving, all substantially as set forth.

3. In micrometer-calipers, the combination of the calipering-screw D and the notched thumb-piece D′, connected by an interposed spring, as described, and of the catch-pin F, arranged to slide in the arm of the calipers and to engage with the notches in the thumb-piece D′, all substantially as set forth.

4. In micrometer-calipers, the combination of the calipering-screw D with its measuring-

shell *d*, carrying a supplemental thumb-piece, D^2, of the thumb-piece D′, an interposed spring, as described, and a sliding catch-pin, F, for securing or holding fast the end of the spring, all substantially as set forth.

5. In micrometer-calipers, the combination, with the calipering-screw D and the standard A, of a sleeve, d^2, screw-threaded in one extremity of said standard, and opposed adjusting-screws bearing against the said sleeve, whereby it may be turned in either direction within the standard to regulate the position of the calipering-screw.

In testimony whereof I have hereunto subscribed my name this 14th day of August, A. D. 1885.

MERRICK M. BARNES.

Witnesses:

J. HENRY TAYLOR,

E. B. TOMLINSON.