(No Model.)

J. E. CLOUGH.

BEAM CALIPERS.

No. 492,783. Patented Mar. 7, 1893.

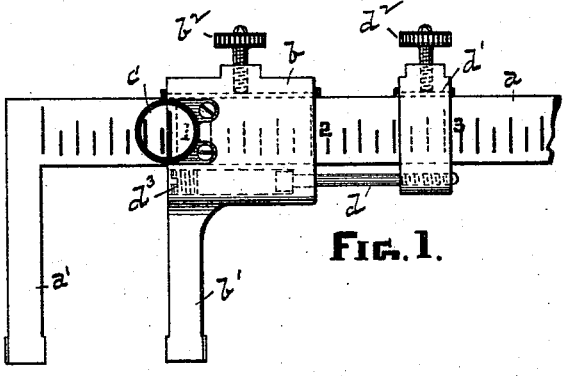

FIG. 1.

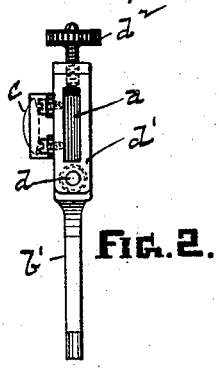

FIG. 2.

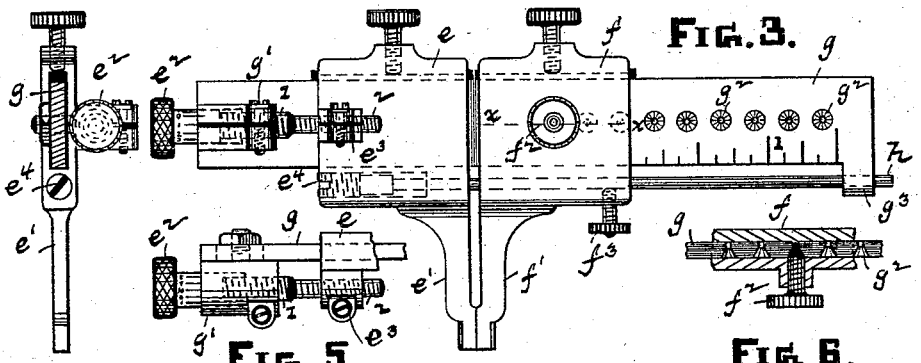

FIG. 3.

FIG. 4.

FIG. 5.

FIG. 6.

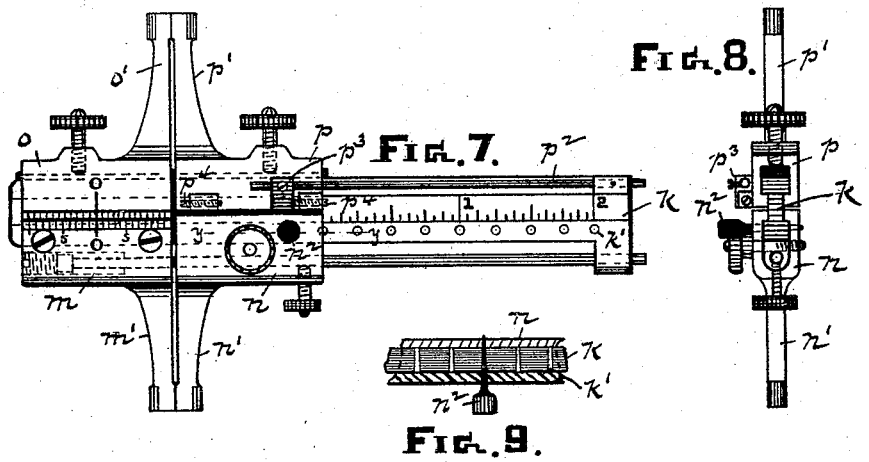

FIG. 7.

FIG. 8.

FIG. 9.

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BEAM-CALIPERS.

SPECIFICATION forming part of Letters Patent No. 492,783, dated March 7, 1893.

Application filed April 2, 1892. Serial No. 427,467. (No model.)

To all whom it may concern:

Be it known that I, JUSTIN E. CLOUGH, of Tolland, county of Tolland, and State of Connecticut, have invented a new and useful Improvement in Caliper-Gages, of which the following is a specification, reference being had to the accompanying drawings, forming part thereof.

My invention relates to caliper gages, sometimes called Vernier calipers, for determining both outside and inside measurements, and has for its objects to provide such instruments with means for securing very fine adjustments with perfect accuracy, and to provide means whereby the shift from an inside to an outside measurement and vice versa, can be effected instantly and without mental calculation.

To these ends my invention consists in the caliper gage constructed and operating as hereinafter fully described and particularly pointed out in the claims.

Referring to the drawings, in which like letters and numerals designate like parts in the several views Figure 1 is a side view of a gage embodying my invention, a portion of the graduated bar being broken away. Fig. 2, is an end view thereof, looking toward the left in Fig. 1. Fig. 3 is a side view of another and in some respects the preferred form of the gage. Fig. 4 is an end view thereof, looking toward the right in Fig. 3. Fig. 5 is a plan view of the micrometer adjusting device used on said gage. Fig. 6 is a horizontal section taken upon line x—x of Fig. 3. Fig. 7 is a side view of still another form of gage embodying the invention. Fig. 8 is an end view thereof, looking toward the left in Fig. 7. Fig. 9 is a horizontal section taken upon line y—y of Fig. 7.

Referring to Figs. 1 and 2, the letter a designates the graduated bar forming the body portion of the gage, which bar terminates at one end in the laterally projecting finger a'. Upon said bar is mounted the sliding head b carrying a corresponding finger b', which head can be rigidly secured in position upon the bar by means of a set-screw b^2, bearing against an interposed gib in a well known manner. By adjusting said head to different positions upon the bar the distance between the fingers a' b' can be varied at will, and to facilitate accurate adjustment of the head a magnifying lens c is secured thereto through which the graduations on the bar can be observed.

The main use for which this class of instruments is designed is to secure corresponding inside and outside measurements, and it has been necessary heretofore to first set the fingers a' b' at a proper distance apart to correspond to the desired inside or outside measurement, and then to move the finger b', in one or the other direction, a distance equal to the combined width of the ends of the two fingers, such distance being determined by the graduations on the bar. Such operation besides consuming time, is liable to result in an inaccurate adjustment because of the possibility of an incorrect reading of the graduations, and of an inaccurate setting of the head b at the desired graduation. For the purpose of obviating these objections, I provide rigid stops to limit the movement of head b at the exact point to secure the corresponding inside or outside measurement, after one of such measurements has been determined, thus enabling the shift to be performed instantly and without mental calculation. The form and arrangement of said stops can be greatly varied within the spirit of my invention.

As shown in Figs. 1 and 2, the head b is bored throughout its entire length adjacent to the point where it embraces the bar, and counterbored from its end adjacent to finger a' nearly to its opposite end, as represented by broken lines in Fig. 1. A rod d, passed through the bore in said head, has an enlarged head which occupies the counterbore, and has its opposite end rigidly secured to a sliding head d' adjustably held upon the bar by a set screw d^2. The outer end of the counterbore in the head is closed by a screw d^3, thus confining the head of said pin within said counterbore, and by turning said screw the effective length of the counterbore can be increased or diminished at will. In practice said screw is so set that the length of the counterbore minus the length of the head of pin d will exactly correspond with the combined width of the ends of the fingers a' b', and its position is never changed except for the purpose of compensating for the wear of said fingers. Supposing the first measurement to be

finger b' is set at the desired distance from finger a', as determined by the graduations on the bar, and head d' is moved upon the bar until the head of pin d bears against the end of the counterbore in head b opposite to screw d^3, as represented in Fig. 1. Having thus secured the inside measurement, to determine the corresponding outside measurement it is necessary simply to loosen set-screw b^2 and slide head b toward head d' until the head of pin d is brought into contact with the end of screw d^3, and then tighten said set-screw b^2 again, and the operation is completed. In determining an inside from an outside measurement, the operation is the same except that head d' is moved in the first instance to cause the head of pin d to bear against the end of screw d^3, and head b is moved in the opposite direction in making the shift. No reference is made to the graduations on the bar in such operation, and, consequently, the change can be performed instantly and with perfect accuracy.

In the form of the invention shown in Figs. 3 to 6 inclusive, the fingers e' f' are carried by two sliding heads e f on a graduated bar g, each of which heads is provided with an independent adjusting means to vary its position on the bar relatively to the other. The adjusting device for head e consists of the micrometer mechanism composed of a compound screw e^2 having thereon threads of a different pitch, the threads on the portion 1 thereof being of a twenty-five pitch, for example, and those on the portion 2 being of a twenty pitch. The portion 1 of said screw enters a similarly threaded hub or nut g' on bar g, and the portion 2 enters a similar hub or nut e^3 on head e, said nuts being preferably split longitudinally and provided with set-screws and an interposed gib of absorbent material, for the purpose of taking up wear of the screw-threads and keeping the screw free from grit and dirt, as shown. The hub or nut g' is counterbored as shown to receive the enlarged outer end of screw e^2 upon which are located peripheral graduations in the usual manner, and said screw is provided with the usual milled head to facilitate turning it.

To facilitate accurate adjustment of head f, within certain specified limits, said head is provided with a conically pointed screw f^2, which enters a tapped hole in the head, and the bar g is provided with a series of conical depressions g^2 to receive the end of said screw, said depressions being located at uniformly exact distances apart, for example one-fourth of an inch as shown. By means of said screw and depressions the head f can be accurately set in any desired position, as indicated by the depressions, without the exercise of any particular care, such as would be required to cause it to register with a simple graduation mark. For fractional portions of an inch less than the distance between the depressions g^2, the micrometer screw e^2 is employed, so that by the combined operation of said adjusting devices any degree of separation of the fingers e' f' can be secured quickly and with entire accuracy, the difference in pitch of the threads on said screw e^2 providing for an adjustment of head e corresponding to the smallest subdivision of the graduations indicated at its outer end. The head e is bored and counterbored to receive a rod h and its head, and an adjusting screw e^4, in the same manner as the head b first described, said rod h in this instance passing freely through a bore in head f and through a guiding loop g^3 at the end of bar g, a set-screw f^3 in head f enabling said head to be rigidly connected to the rod. In practice, said set-screw f^3 is loosened, and the heads e and f being adjusted upon the bar to secure the desired inside or outside measurement, the rod h is moved to cause its head to bear against the end of the counterbore in head e or against the end of screw e^4 as the case may be, and said set-screw f^3 is tightened upon the rod. The shift from one measurement to the other can then be made as in the form first described, by simply loosening the set-screw which secures head f to the bar and moving said head in the proper direction as far as it can go. As this form of the gage is adapted to secure finer adjustments than the form shown in Fig. 1 I prefer to use it in all fine work.

In the form shown in Figs. 7 8 and 9, four heads are utilized upon a single bar k, two upon each side thereof, as follows:—A head m carrying a finger m', which head is rigidly secured to the bar by screws as shown, a head n carrying a finger n', adjustably secured to the bar adjacent to said head m, and two heads o and p, carrying fingers o' p', adjustably secured to the bar upon its opposite side. The heads m and o are provided with Vernier graduations as shown to enable a very fine adjustment of the latter head to be made in the usual manner. The head n has an adjusting device similar to the tapered screw f^2 previously described with reference to the form shown in Fig. 3, except that in this case a tapered pin n^2 to enter tapered holes k' in the bar, is employed. The heads m and n are provided with stops for the shifting movement in changing from an outside to an inside measurement and vice versa, identical with those shown in Fig. 3, while the head p has a slightly different form of stop for the same purpose, the same comprising a rod p^2 rigidly secured at one end to the bar k, and having adjustably secured thereon a lug p^3 which projects between two screws p^4 on said head, said screws being held within tapped hubs on the head as shown. The operation of this form of stop is substantially the same as that first described, the lug p^3 being set at a position on rod p^2 to correspond with the adjusted position of head p, and said head being then moved in either direction as far as it can go, to secure the corresponding out-

side or inside measurement, the screws p^4 serving to compensate for wear of the fingers o' p'. Two sets of independently adjustable fingers, located upon opposite sides of the bar, are thus provided, which can be used for securing two separate outer and inner measurements, or those upon one side can be set to indicate the outer measurement and the other the inner measurement, so that no shift of either of the fingers will be required to change from one to the other, the mere reversal of the instrument being sufficient. The capacity of the gage is thus doubled, but I regard that of the form shown in Fig. 3 as being sufficient for all ordinary work.

It will be observed that the improvements devised by me not only effect a great saving in time and trouble to a person using the gage, but enable the finest adjustments to be made with perfect accuracy by even an unskilled workman.

Having thus fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a caliper gage, a graduated bar, two fingers projecting laterally therefrom, means substantially as described for securing any desired degree of separation between said fingers, a stop device substantially as described adjustably secured upon said bar, and stop devices upon one of said fingers adapted to engage the device on the bar to limit the amount of movement of said finger from an adjusted position to a distance corresponding to the combined width of said fingers at their outer end, combined and operating substantially as described.

2. In a caliper gage, a graduated bar, two sliding heads mounted upon said bar each of which heads carries a calipering finger, means substantially as described for securing each of said heads in any desired position upon the bar, and stop devices substantially as described for positively limiting the movement of one of said heads from any position of adjustment, to a distance corresponding to the combined width of said fingers at their outer end, combined and operating substantially as set forth.

3. In a caliper gage, a graduated bar, two heads adjustably mounted upon said bar each of which carries a calipering finger, a rod adapted to be rigidly secured to one of said heads, said rod passing loosely through a bore in the other of said heads and having an enlarged end located within a counterbore in the latter head, said counterbore being of such length that the limit of movement of the end of the rod therein will correspond with the combined width of said fingers at their outer end, combined and operating substantially as set forth.

4. In a caliper gage, graduated bar g, heads e and f adjustably secured upon said bar and carrying the fingers e' f' respectively, micrometer screw e^2 engaging threaded hubs on the bar and head e respectively, rod h passing through said heads and having its enlarged end retained within a counterbored recess in head e, and set-screw f^3 for rigidly connecting head f to said rod, combined and operating substantially as set forth.

5. In a caliper gage, the combination with graduated bar g of heads e f adjustably secured to said bar and carrying the fingers e' f', and micrometer screw e^2 having the threaded portion 1 engaging threaded hub g' on the bar, and threaded portion 2 of a different pitch engaging threaded hub e^3 on head e, said screw having its head provided with peripheral graduations, substantially as set forth.

6. In a caliper gage, the combination with graduated bar g, of the heads e f adjustably secured upon said bar and carrying the fingers e' f', said head e being bored longitudinally and having a counterbore the outer end of which is closed by screw e^4, and rod h passing through the bore in said head and having an enlarged end which is confined within said counterbore, and means for rigidly connecting said rod to head f, substantially as and for the purpose set forth.

JUSTIN E. CLOUGH.

Witnesses:
W. H. CHAPMAN,
F. W. CLOUGH.