F. SPALDING.

MICROMETER CALIPERS.

APPLICATION FILED JUNE 7, 1909.

1,001,471. Patented Aug. 22, 1911.

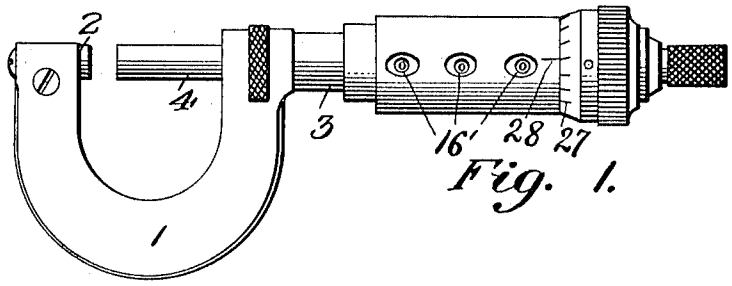


Fig. 1.

Fig. 2

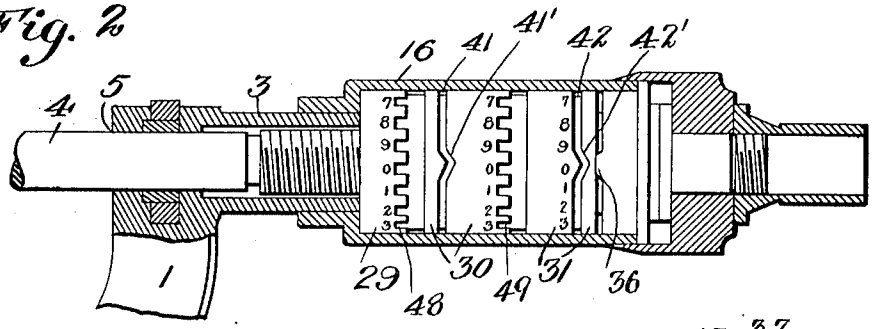


Fig. 3.

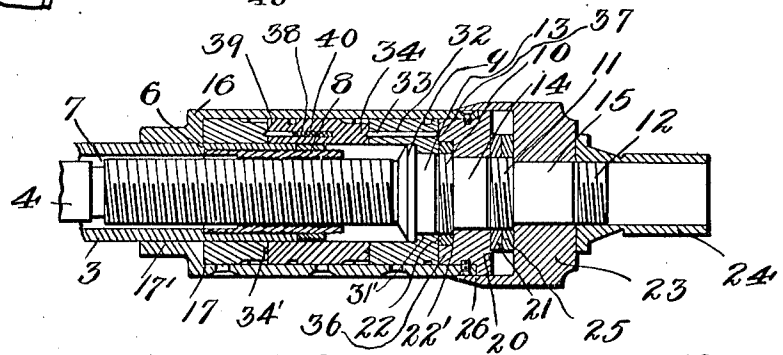


Fig. 4

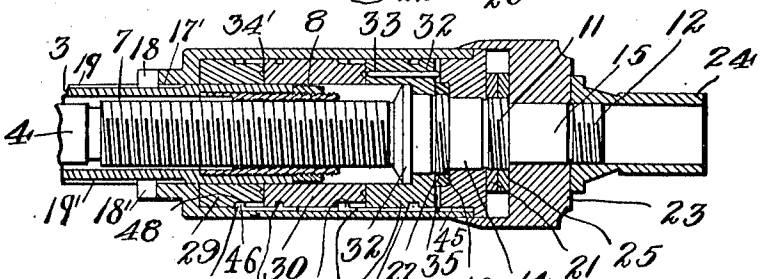


Fig. 5.

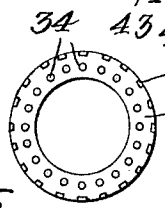
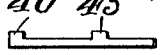


Fig 6.



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MICROMETER-CALIPERS.

1,001,471. Specification of Letters Patent. **Patented Aug. 22, 1911.**

Application filed June 7, 1909. Serial No. 500,590.

To all whom it may concern:

Be it known that I, FRANK SPALDING, a citizen of the United States, residing at Providence, in the county of Providence and State of Rhode Island, have invented a new and useful Improvement in Micrometer-Calipers, of which the following is a specification.

This invention relates to micrometer calipers, and deals particularly with direct reading calipers in which a numerical index shows through a fixed outer sleeve, and indicates the fractional parts of the unit of measure.

The object of the invention is to construct a micrometer caliper in which the index barrels are normally locked against accidental rotation, and are only released when the proper progressive rotative step is to be made.

It is also an object to provide a micrometer caliper in which the fine reading head is located at the outer end of the barrel, where it is more readily accessible, and where its position permits a larger construction of the element with relation to the barrel and consequently permits a coarser graduation as compared to the fineness of the reading.

With the above objects and the general improved construction of the micrometer caliper in view, the device will be hereinafter fully described and set forth, reference being had to the accompanying drawings, which form a part of this specification, and in which,

Figure 1 is a plan view of the micrometer caliper. Fig. 2 is an enlarged sectional view showing the index barrel. Fig. 3 is a similar view showing the index barrel rotating means. Fig. 4 is a sectional view showing the barrel locking mechanism. Fig. 5 is an end view of one of the index barrels. Fig. 6 is a view of one of the locking bars.

Referring more particularly to said drawings, 1 is the U-shaped yoke member of the usual caliper, which carries the anvil 2 on one arm, and has the other arm formed with a hollow cylinder 3. Said cylinder 3 carries the longitudinally movable spindle 4, being bored to form a journal for said spindle at 5, and having the remainder of its length bored to a larger caliber. At its outer end said cylinder is fitted with a bushing 6, which is removably fixed in said cylinder by being threaded therein, and is interiorly threaded to receive the micrometrically threaded portion 7 of the spindle 4. A take-up nut 8 is provided to screw on the outside of the bushing 6 for the purpose of taking up any wear incidental to the use of the micrometer. The removability of the bushing 6 from the cylinder 3 renders the pitching of this screw, upon which the accuracy of the instrument largely depends, a matter of much greater convenience and accuracy than when the cylinder portion must be directly threaded. The outer remaining portion of the spindle 4 is provided as indicated with an annular flange 9, screw threaded portions 10, 11 and 12, spaced to leave straight cylindrical portions 13, 14 and 15.

The cylinder 3 carries upon its length a slidable sleeve 16, which has a reduced portion at one end, an interior shoulder 17, and a bearing portion 17′. Said bearing portion 17′ is splined at 18 and 18′ to operate in grooves 19 and 19′ formed in the cylinder 3, to permit the longitudinal movement of said sleeve thereon, but to prevent rotation thereof. The opposite end of said sleeve 16 is supported by an annulus 20 which fits within and is suitably fastened as by screws to the sleeve. Said annulus also forms a bearing for the spindle 4 and incloses the same around the cylindrical portion 14 thereof. A lock-nut, threaded on screw-thread 11, and a lock-nut 22, seated in a recess 22′ on the opposite face of annulus 20, and threaded on screw thread 10, locates said annulus and consequently the sleeve 16 properly with relation to the spindle 4. By this connection said spindle, in its longitudinal movements, carries with it the sleeve 16.

Rigidly secured to the cylindrical portion 15 of the spindle so as to rotate therewith, is a head 23. Said head is seated by a knurled nut 24 threaded on the threaded portion 12 against a shoulder 12′ and is spaced from the annulus 20 and lock-nut 21 by a washer 25. Said head is provided with a longitudinal flange 26 which projects over and closely surrounds the end of the sleeve 16. Said flange is tapered near its edge to form a space for graduations 27. These graduations are the fine readings of the instrument and are adapted to coincide

with a zero or base mark 28 extended longitudinally of the sleeve 16. A set of index openings 16′ are provided through which the numeraled graduations of a series of index barrels, hereinafter described, are shown.

Located within the sleeve 16 and rotative therein are three index barrels 29, 30 and 31. Said index barrels comprise annular collars fitting closely the interior of sleeve 16 and abutting one another, with means to cause the proper progressive movement as hereinafter set forth. Each barrel is graduated exteriorly into twenty divisions which are numbered in two sets, that is successively from 1 to 0 or 10, and again to complete the circumference of the barrel. Index barrel 31 is provided with an inwardly extending flange 31′ which seats upon the cylindrical portion 13 of spindle 4, and bears against the annular flange 9. Said barrel is locked in this relation by means of lock nut 22, above mentioned. Through the shell of the barrel 31 is formed an opening 32 which carries slidably therein a pin 33. In the end of barrel 30 is formed a series of conical depressions 34, corresponding in position to the graduations on the periphery of the barrel which are adapted to be engaged by a conical point formed on the end of pin 33. The opposite end of pin 33 projects beyond the end of index barrel 31, and into an annular space 35 between annulus 20 and barrel 31. Said annular space however, is interrupted by diametrically disposed cam surfaces 36 and 37 formed on the face of the annulus 20 and in the path of said pin 33. Thus, as the spindle is rotated, and with it the barrel 31, the end of said pin will be brought into contact with said cam surfaces 36 and 37, and caused to move endwise through the barrel. This will bring the end thereof into contact with one of said depressions 34 in the barrel 30, thereby coupling said barrels to rotate together. This coupled relation will be maintained until the cam surface is passed when the pin will be free to ride out of engagement with said barrel 30, and release the same since the end of the pin and the depressions 34 are correspondingly beveled to permit the pin to ride out of the latter, when no resistance is offered to keep the pin and depression in engagement. At the same time that pin 33 engages barrel 30, a barrel locking mechanism, hereinafter described, unlocks barrel 30 from sleeve 16 to permit the rotation thereof. The cam surfaces are formed of sufficient length to cause the barrel 30 to move one step or division.

The coupling arrangement between barrels 30 and 29 is slightly different. Barrel 30 is provided with a longitudinal opening 38 Fig. 3 which extends only partially through the barrel. A pin 39 having a conically pointed end is seated in said opening and bears upon a coil spring 40, by which it is normally pressed outwardly. Thus, the pin normally engages in the openings or depressions 34′ formed in barrel 29, but said barrel is prevented from rotation until properly unlocked or released from the above mentioned locking mechanism, and the pin 39 merely rides in and out of depressions 34′ as barrel 30 rotates.

The locking mechanism above mentioned is provided to prevent the barrels from rotating until the proper instant of progression. Each of barrels 30 and 31 is provided with a peripheral cam groove 41 and 42, which are substantial annuli, except for the offsets 41′ and 42′. 43 and 44 are locking bars which are longitudinally slidable in a groove 45 formed in the sleeve 16, and have protuberances 43′ and 44′ formed to operate in said cam grooves 41 and 42. Upon the ends of said locking bars are the upwardly-projecting protuberances 46 and 47 which normally engage one of a series of notches 48 and 49 formed in the peripheral edges of barrels 29 and 30. Thus, when barrel 31 is rotated, barrel 30 is locked to sleeve 16 until offset 42′ carries the protuberance 44′ and with it the lock bar, rearwardly, thereby disengaging protuberance 47 from notch 49. This occurs at the same instant that pin 33 engages a depression 34 in barrel 30, and said barrel is progressed one step, or as long as offset 42′ maintains locking bar 44 in its retracted position. The coöperative action between barrels 29 and 30 is the same as between barrels 30 and 31 with the exception, as above set forth, that the rotating pin is in constant contact with barrel 29 and rides in and out of depressions 34′ until locking bar 43 releases said barrel 29.

The operation of my device will be evident. The device for instance, is graduated to read to a hundred thousandth part of an inch. The head 23, rotated about sleeve 16, carries with it the spindle 4 and consequently index barrel 31. On the head are read the tenths of inches. The next numeral appearing after the first tenth thus disclosed will show in the opening 16′ over barrel 31, registering the nearest ten thousandth. It is evident that as the barrel 31 progresses and finally carries in its action barrel 30, the said barrel will register the thousandth parts and similarly, barrel 29 will register the hundredth parts of an inch. When the divisions of barrel 31 rest on either side of the zero mark on sleeve 16, as for instance, half way between 0 and 1, it is evident that a half of a ten-thousandth part is being registered, or five one-hundred thousandths of an inch. Thus the device is capable of the finest degree of measurement in a positive and accurate manner.

When it is desired to measure thickness or diameter, the head 23 is rotated to the left until the spindle 4 is retracted a sufficient distance to allow the insertion of the article to be measured, after which the head is rotated in the opposite direction until the spindle bears with proper firmness against the said article. The device is then in position to be read for the thickness of the article, and the various degrees of measurement are read therefrom as above directed.

Having thus described my invention, I claim as new and desire to secure by Letters Patent;—

1. A micrometer caliper, comprising, in combination with a cylinder, a spindle threaded in said cylinder, a sleeve surrounding said cylinder, indicating means housed in said sleeve, to register the micrometer measurements, means for locking said indicating means to said sleeve, cams for actuating said locking means and means for causing said indicating means to register said micrometer measurements.

2. A micrometer caliper, in combination with a cylinder, a spindle threaded in said cylinder, a sleeve surrounding said cylinder, indicating means housed in said sleeve to register the micrometer measurements, locking bars slidable in said sleeve, cams for controlling the rotation of said indicating means, and means for causing said indicating means to register said micrometer measurements.

3. A micrometer caliper comprising in combination with a cylinder, a spindle threaded in said cylinder, a sleeve slidable on said cylinder and movable with said spindle, indicating means in operative connection with said spindle for registering the micrometer measurements, means for locking said indicating means and cams for actuating said locking means.

4. A micrometer caliper comprising in combination with a cylinder, a spindle threaded in said cylinder, a sleeve slidable on said cylinder and movable with said spindle, indicating means in operative connection with said spindle for registering the micrometer measurements, means for automatically locking said indicating means and coöperating means for releasing said indicating means, said automatic locking means comprising slide bars and cams for actuating said slide bars.

5. A micrometer caliper comprising in combination with a cylinder, a spindle threaded in said cylinder, a sleeve slidable on said cylinder, indicating means in said sleeve, a head for operating said spindle and indicating means, means for normally locking said indicating means, and means for actuating said indicating means and coöperating means for unlocking said indicating mechanism.

6. A micrometer caliper comprising in combination with a cylinder, a spindle threaded in said cylinder, a sleeve slidable on said cylinder, a head carried by said spindle for indicating micrometer measurements, a series of graduated barrels adapted to register sub-divisions of measurements and contained in said sleeve, means for normally locking said barrels, and means coöperating with said locking means to release and progressively move said barrels.

7. A micrometer caliper comprising in combination with a cylinder, a spindle threaded in said cylinder, a sleeve slidable on said cylinder, a head for indicating micrometer measurements, a series of barrels carried within said sleeve and bearing on said cylinder, said barrels having graduations thereon, means for rotatively progressing said barrels, said head also being constructed for operating said barrels and spindle, means for normally locking said barrels against rotation, means for releasing said barrels at intervals, and means for progressing said barrels at corresponding intervals.

8. A micrometer caliper comprising in combination with a cylinder, a spindle threaded in said cylinder, a sleeve slidable on said cylinder, a plurality of barrels inclosed in said sleeve, pins carried by some of said barrels, means to cause said pins to couple said barrels together, locking bars normally locking some of said barrels against rotation, and means to unlock said barrels at periods.

9. A micrometer caliper comprising in combination with a cylinder, a spindle threaded in said cylinder, a sleeve slidable on said cylinder, a plurality of barrels inclosed in said sleeve, pins carried by some of said barrels, means to cause said pins to couple said barrels together, locking bars normally locking some of said barrels against rotation, and means formed on one barrel to unlock an adjacent barrel at predetermined intervals.

10. A micrometer caliper comprising in combination with a cylinder, a spindle threaded in said cylinder, a sleeve slidable on said cylinder, a plurality of barrels inclosed in said sleeve, pins carried by all but one of said barrels, means to cause said pins to couple said barrels together, a locking bar locking said one barrel, and means rendering said locking bar operative by the operation of the next preceding barrel.

11. A micrometer caliper comprising in combination with a cylinder, a spindle threaded in said cylinder, a sleeve slidable on said cylinder, a plurality of barrels inclosed in said sleeve, pins carried by a part of said barrels, means to cause said pins to couple said barrels together, locking bars normally locking a part of said barrels

against rotation, and means to unlock said barrels at predetermined periods, said locking bars having lugs engaging notches in the locked barrels and having lugs operating in cam grooves formed in the operating barrels.

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

FRANK SPALDING.

Witnesses:
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J. A. MILLER.