March 1, 1927. 1,619,370

C. C. ROBBINS

CYLINDER GAUGE

Filed Dec. 19, 1922

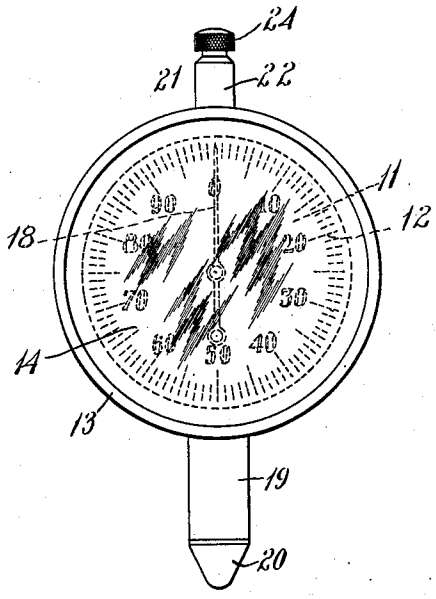


Fig. 1.

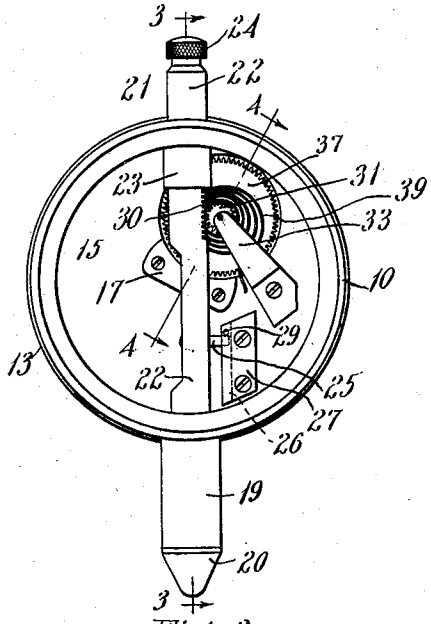


Fig. 2.

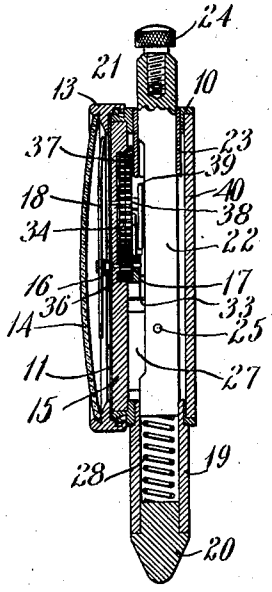


Fig. 3.

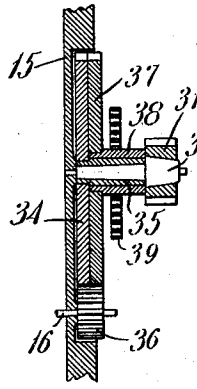


Fig. 4.

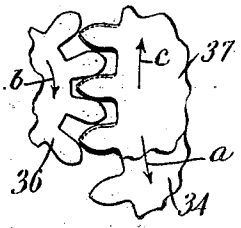


Fig. 5.

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UNITED STATES PATENT OFFICE.

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CYLINDER GAUGE.

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The invention relates to measuring gauges and has among its objects the elimination of back lash and lost motion in the indicating mechanism. The invention will be best understood from the following description when read in the light of the accompanying drawing of a specific embodiment of the invention, while the scope of the invention will be more particularly pointed out in the appended claims.

Referring to the drawings:

Figure 1 represents a front elevation of a cylinder gauge embodying the invention.

Fig. 2 represents a rear elevation of the cylinder gauge, the back plate thereof being removed.

Fig. 3 is a central vertical section taken on the line 3—3 of Fig. 2.

Fig. 4 is a detail section taken on the line 4—4 of Fig. 2.

Fig. 5 is an enlarged detail view illustrating the manner in which the main gear and take-up gear mesh with the center pinion to prevent back-lash therebetween.

Like numerals refer to like parts throughout the several views of the drawings.

In the drawings, 10 represents a casing of a cylinder gauge, 11 is a dial, which herein is movable relative to the casing, provided with graduations 12 preferably indicating thousandths of an inch, 13 is a bezel secured in any suitable manner to the casing 10, and 14 is a crystal mounted in the usual well known manner in the bezel 13. Secured in any suitable manner in the casing 10 adjacent to the rear of the dial 11 is a front plate 15 at the center of which a center staff 16 is located. The center staff 16, which herein rotates the indicating hand, is mounted to rotate in the front plate 15 and also in a bearing member 17 fast to the rear of said center plate, and fast to said staff at the forward end thereof and located adjacent to the front face of the dial 11 is an indicating hand 18.

In the present construction rigidly secured in any desired manner in the casing 10 is a sleeve 19 at the lower end of which a stationary work engaging member 20, preferably constructed of hardened steel, is rigidly secured in any desired manner. Oppositely disposed to the stationary work engaging member 20, and located in longitudinal alignment therewith is a yielding work engaging member 21. The yielding work engaging member 21 as illustrated embodies therein a rod 22 slidably mounted in the sleeve 19 and also in a sleeve 23 fastened in the opposite side of the casing 10 from the sleeve 19. A member 24 preferably constructed of hardened steel is illustrated as detachably secured to the outer extremity of the rod 22 and herein constitutes a part of the yielding work engaging member. As illustrated the rod 22 is prevented from rotating in the sleeves 19 and 23 by a pin 25 fast to said rod and projecting into a groove 26 in a guide member 27 fast to the front plate 15. A spring 28 is located within the sleeve 19, one end of said spring contacting with the inner extremity of the stationary work engaging member 20 and the other end thereof contacting with the inner extremity of the rod 22 and said spring always acts to force the yielding work engaging member 21 outwardly until the pin 25 contacts with a stop pin 29 located within the guide member 27 and extending across the groove 25 at which time said yielding work engaging member is located in its normal position.

In the present embodiment of the invention the motion of the yielding work engaging member 21 is transmitted to the staff 16 carrying the indicating hand 18 by mechanism as follows:—Provided upon the rod 22 and preferably formed integral therewith are rack teeth 30 which mesh with and drive a pinion 31 fast to a staff 32, the latter being rotatably mounted at one end thereof in a bearing bracket 33 and at its other end in the front plate 15, the bearing bracket and front plate constituting spaced bearings for said staff. A gear 34 preferably having a collet 35 rigidly fastened thereto and constituting a hub therefor is rigidly fastened to the staff 32 in any desired manner, and said gear 34 meshes with and drives a center pinion 36 rigidly fastened to the center staff 16. Another gear 37 constituting a take-up gear preferably having a collet 38 rigidly fastened thereto and constituting a hub therefor, is loosely mounted upon the hub of the gear 34 and also meshes with the center pinion 36. A spiral spring 39 surrounds the hub of the take-up gear 37, one extremity of said spring being secured to said hub and the other extremity being secured to the bearing bracket 33 and said spring always acts to force the take-up gear 37 in the direction of the arrow *c* in Fig. 5

and against the opposite sides of the teeth of the center pinion 36 from that to which the power is applied by the gear 34 when the yielding work engaging member 21 is being forced inwardly. This action is illustrated clearly in Fig. 5 and the result is the elimination of any back-lash between the gear 34 and the center pinion 36. A back plate 40 is fastened to the casing 10 and entirely closes said casing at the rear thereof, and said back plate 40 may, if it is so desired, be utilized for fastening the casing 10 to a suitable base which is often employed in connection with devices of this character to facilitate the positioning of the device upon the work. In the present instance, however, it forms no part of the invention.

In the operation of the device illustrated, which is employed in a manner well known to those skilled in the art where very accurate measurements are desired, as the yielding work engaging member 21 is forced inwardly by being brought into contact with the work, the rack 30 meshing with the pinion 31, will cause the staff 32 and gear 34 fast on said staff to be rotated in the direction of the arrow *a*, thereby rotating the center pinion 36 in the direction of the arrow *b* as illustrated in Fig. 5. The take-up gear 37 being loosely mounted upon the gear 34 and also meshing with the center pinion 36 will also be rotated by the latter in the direction of the arrow *a* but at the same time the action of the spring 39 will tend to force the take-up gear 37 in the direction of the arrow *c* and if there happens to be any clearance between the teeth of the gear 34 and the teeth of the center pinion 36, which is generally the case, the back-lash caused by the presence of this clearance will be eliminated.

It will be understood that within the scope of my invention wide deviations may be made from the particular embodiment thereof described herein without departing from the spirit of the invention.

I claim:

1. A gauge comprising, in combination, a casing, a dial, an indicating hand or the like, means including a center pinion for producing relative movement between said dial and hand, a yielding work engaging member mounted for reciprocation substantially diametrically of said casing, means operatively to connect said work engaging member and said center pinion and embodying therein a gear meshing with said center pinion, a take-up gear mounted concentric with said first-named gear and meshing with said center pinion, a spring operatively connected to said take-up gear and acting through said center pinion to urge rotation of said first-named gear and take up lost motion in said second mentioned means, a staff acting as a common support for said gear meshing with said center pinion and said take-up gear, said last named gear positioned at one side of said gear meshing with said center pinion and surrounding said staff, and a driving pinion for said staff at the opposite side of said take-up gear for retaining the latter in operative relation to said center pinion.

2. A gauge comprising, in combination, a casing, a dial, an indicating hand or the like, means including a center pinion for producing relative movement between said dial and hand, a yielding work engaging member embodying therein a rod mounted for reciprocation substantially diametrically of said casing and provided with a rack thereon, means operatively to connect said rack and said center pinion and embodying therein a gear meshing with said center pinion, a take-up gear, means for mounting said take-up gear for free rotation relative to said first-named gear, said take-up gear also meshing with said center pinion, and a torsion spring connecting said take-up gear to a fixed part of said gauge.

3. A gauge comprising, in combination, a dial, an indicating hand or the like, means including a center pinion for producing relative movement between said dial and hand, a yielding work engaging member, a rack fast to said member, a staff pivotally carried by said casing at one side of said rack, a pinion fast to said staff and meshing with said rack, a gear also fast to said staff and meshing with said center pinion, a take-up gear and a torsion spring situated between said gear and said pinion fast on said staff and concentrically of said staff, said take-up gear being rotatable relatively to the other gear and meshing with said center pinion, and said torsion spring being fixed to said take-up gear for urging said take-up gear to rotate said center pinion.

4. A gauge having in combination, indicating means, movable work engaging means, mechanism actuated by said work engaging means for operating said indicating means, said mechanism comprising a meshing gear and pinion, said gear having a hub, a second gear mounted on said hub concentrically with and being rotatable relatively to said first named gear, said second gear also meshing with said pinion, and a torsion spring concentric with said gears and connecting said second gear to a fixed part of said gauge.

5. A gauge having in combination, indicating means, movable work engaging means, mechanism actuated by said work engaging means for operating said indicating means, said mechanism comprising a meshing gear and pinion, a supporting staff to which said gear is fixed, a driving pinion fixed to said staff, spaced bearings for said staff, a second gear concentric with

said first named gear and also meshing with said first named pinion, said second gear being positioned between said bearings and being rotatable relatively to said staff, a torsion spring located between said bearings, said spring being concentric with said gears and connecting said second gear to a fixed part of the casing for urging said second gear to rotate said pinion in one direction whereby said pinion urges said first named gear to rotate.

6. A gauge comprising, in combination, an indicating hand, a dial, means including a pinion for producing relative movement between said hand and dial, a yielding work engaging means; means for operatively connecting said pinion and work engaging means comprising a pivotally mounted staff having fast thereon in spaced relation a driving gear and a driven pinion, the former for driving said first mentioned pinion and the latter for driving said staff; a take-up gear of the same pitch and number of teeth as said driving gear rotatably mounted on said staff between said driving gear and driven pinion, said driving gear and driven pinion affording shoulders on said staff for holding said take-up gear on said staff whereby said staff with said driving gear, driven pinion and take-up gear can be assembled and handled as a unit; said take-up gear also meshing with said first mentioned pinion, and a torsion spring surrounding said staff and connecting said take-up gear to a fixed part of said gauge.

In testimony whereof I have hereunto set my hand.

CHESTER C. ROBBINS.