

No. 639,249.

Patented Dec. 19, 1899.

I. R. KERN.

COMBINED CALIPERS AND VALVE SETTING DEVICE.

(Application filed Sept. 12, 1898. Renewed Sept. 22, 1899.)

(No Model.)

Fig. 1

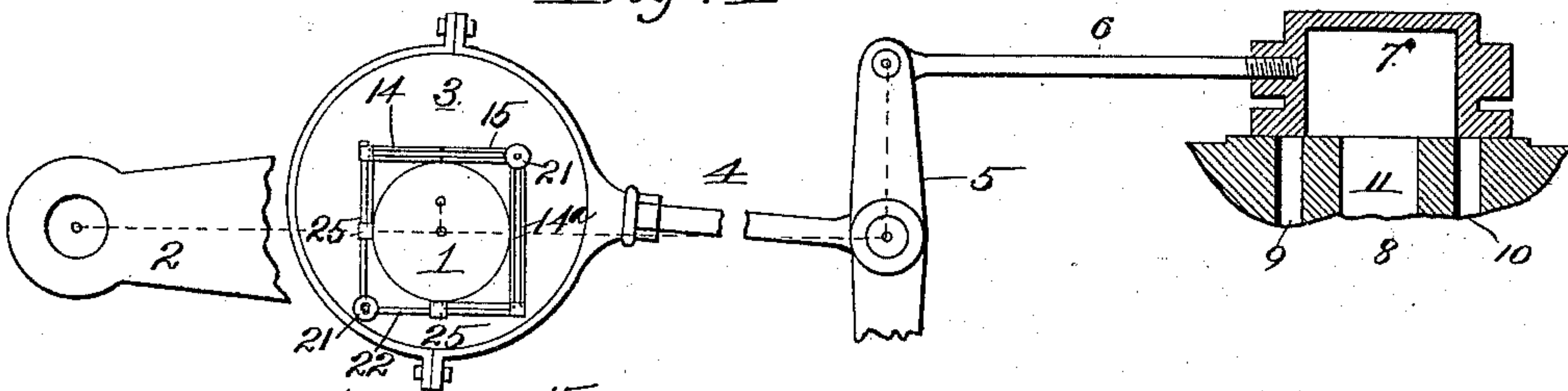


Fig. 2

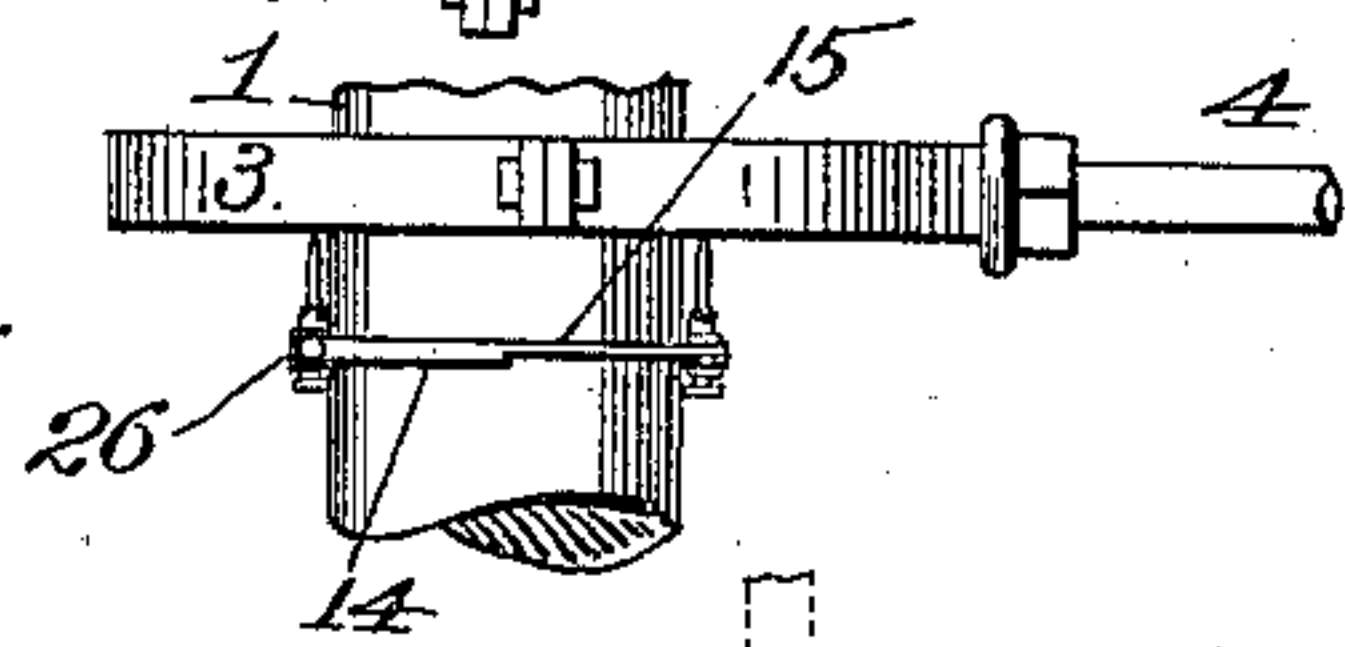


Fig. 3

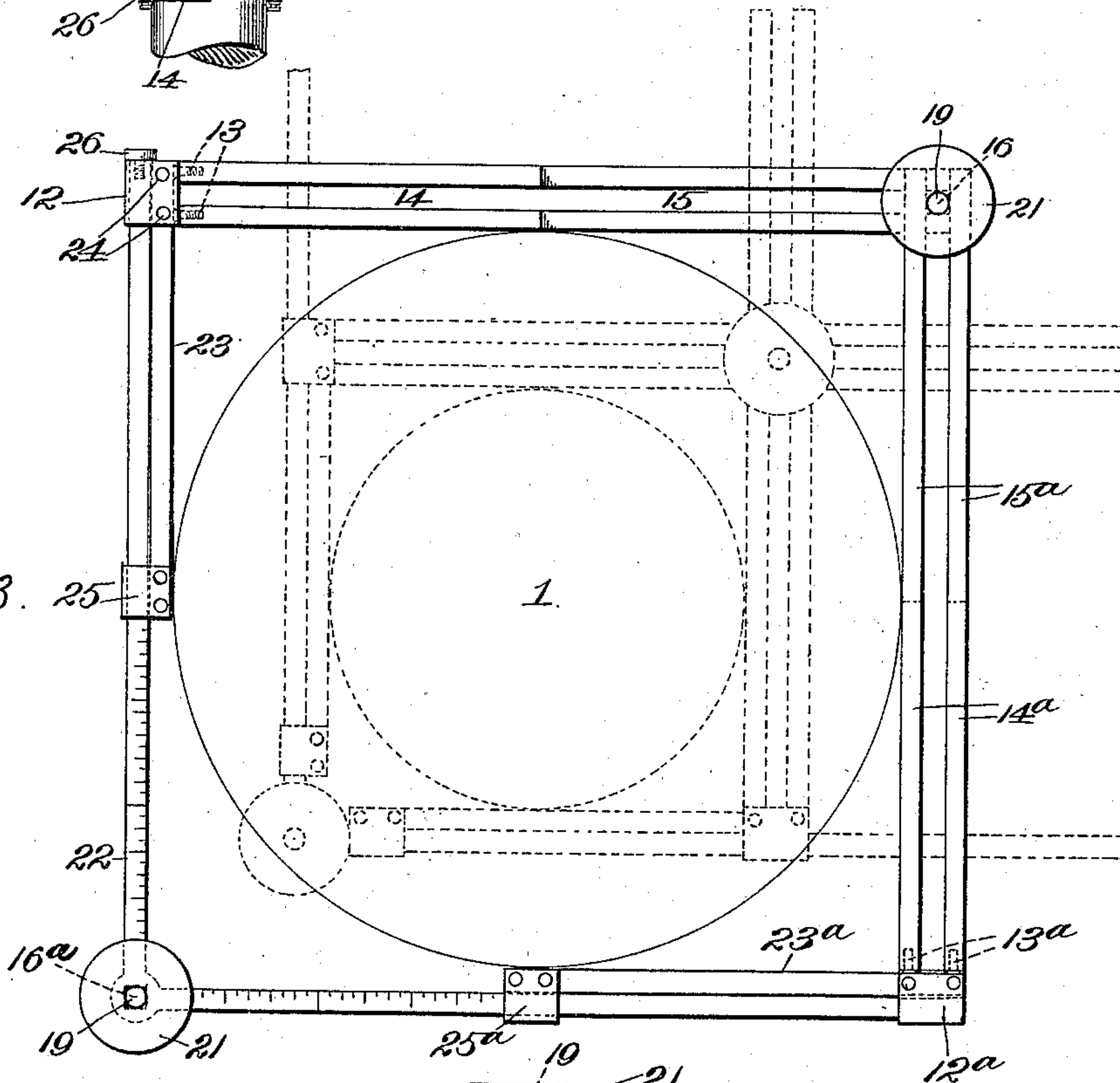


Fig. 4

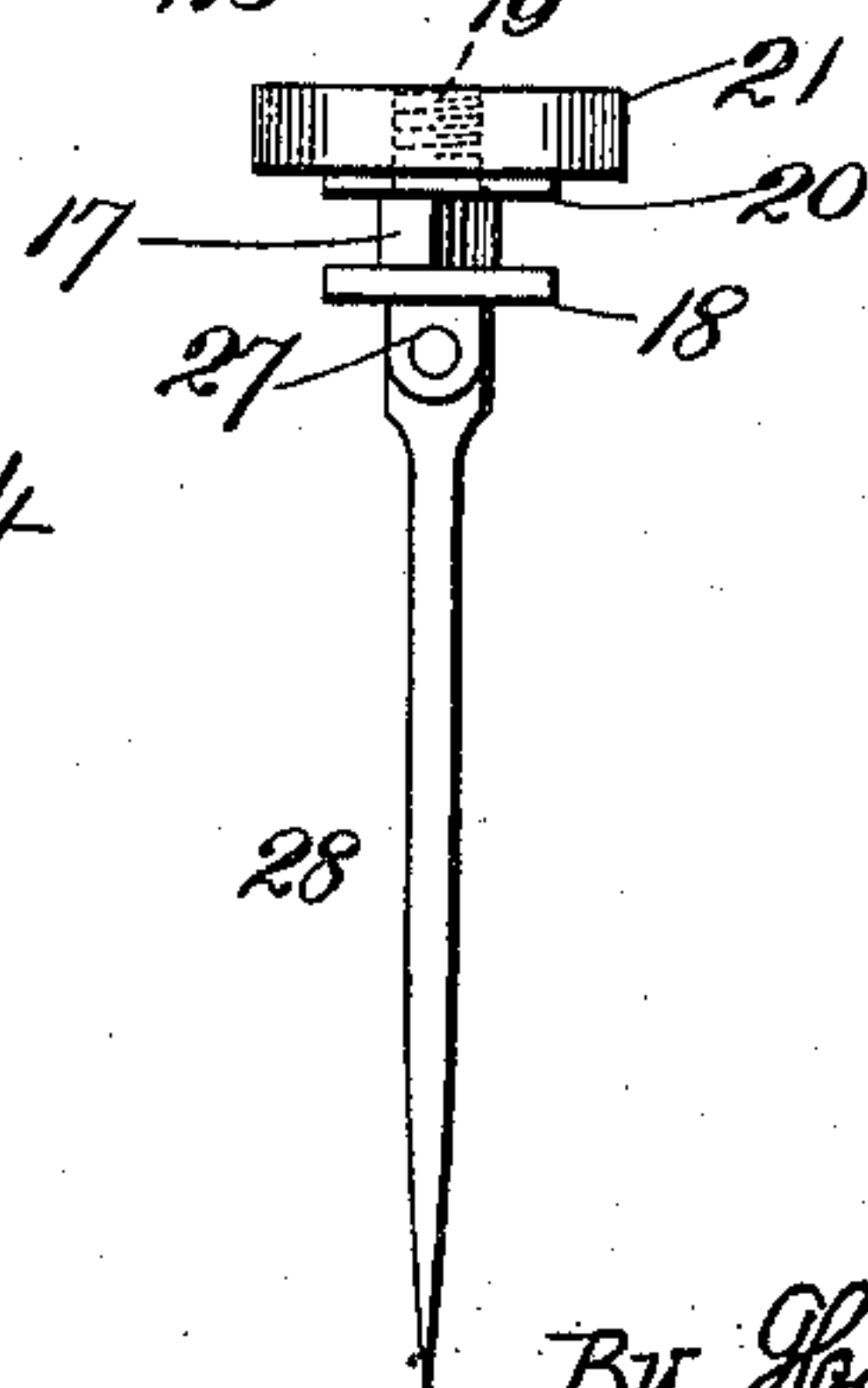
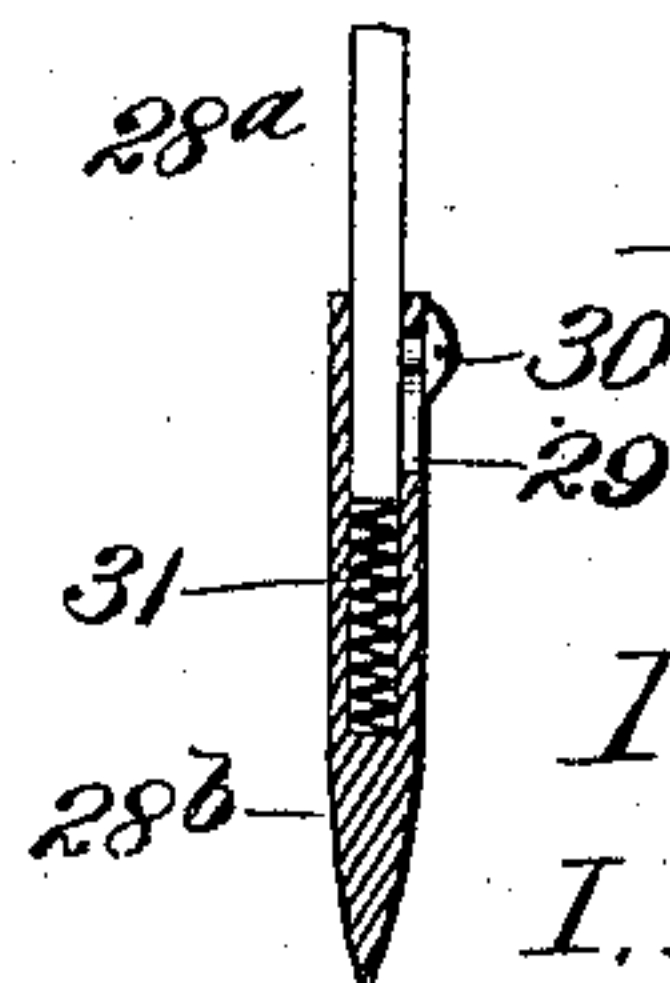


Fig. 5



Witnesses:

C. J. Bartholomew  
M. R. Rumbley

Inventor:  
I. R. Kern

By Higdon, Fischer & Thorpe Attys



# UNITED STATES PATENT OFFICE.

ISAAC R. KERN, OF KANSAS CITY, MISSOURI, ASSIGNOR OF THREE-FOURTHS TO L. C. STUART AND WILLIAM WEST, OF SAME PLACE, AND SUSAN LINDSEY, OF PARSONS, KANSAS.

## COMBINED CALIPERS AND VALVE-SETTING DEVICE.

SPECIFICATION forming part of Letters Patent No. 639,249, dated December 19, 1899.

Application filed September 12, 1898. Renewed September 22, 1899. Serial No. 731,354. (No model.)

*To all whom it may concern:*

Be it known that I, ISAAC R. KERN, of Kansas City, Jackson county, Missouri, have invented certain new and useful Improvements in a Combined Caliper and Valve-Setting Device, of which the following is a specification.

My invention relates to a measuring device for use in "setting" valves or as a caliper-square; and my object is to produce a structure whereby the accurate setting of valves may be facilitated or the diameter of a shaft or other cylindrical object reliably measured, and, furthermore, to produce a device of this character which is of simple, cheap, and durable construction.

With these objects in view the invention consists in certain novel and peculiar features of construction and combinations of parts, as will be hereinafter described and claimed, and in order that it may be fully understood I will proceed to describe it with reference to the accompanying drawings, in which—

Figure 1 represents in side elevation and section a part of a steam-engine provided with a device embodying my invention. Fig. 2 is a top plan view of the crank-shaft, the eccentric and said device being arranged in their proper relative positions. Fig. 3 is an enlarged side elevation of the device as employed in measuring the diameter of the shaft. Figs. 4 and 5 are detail views, to be hereinafter described.

In said drawings, 1 designates the shaft; 2, the crank thereof; 3, an eccentric; 4, a link connecting the eccentric to the rock-arm 5, and 6 a rod connecting said rock-arm with the slide-valve 7.

8 designates a part of the cylinder provided with the inlet-ports 9 and 10 and the exhaust-port 11 between said inlet-ports.

All of the parts above described are of the ordinary construction and arrangement.

The device for facilitating the setting or adjustment of the valve or for use as a caliper-square is constructed as follows:

12 designates a short rectangular tube, and 13 screw-bolts extending through one side of said tube and securing to the latter the parallel bars 14, which for about half their length are of reduced thickness, as shown at 15.

12<sup>a</sup> designates a rectangular tube similar to tube 12 and arranged diagonally opposite the same and parallel with the bars 14, and 13<sup>a</sup> screw-bolts which secure to said tube 12<sup>a</sup> the bars 14<sup>a</sup>, extending at right angles to the bars 14 and provided likewise with reduced extensions 15<sup>a</sup>, which intersect the reduced extensions 15, so as to provide at the intersection-point a square hole or opening 16. The bars 14 and 14<sup>a</sup> are cut away at opposite sides, so that at their intersection-points their aggregate thickness will no more than equal the thickness of bar 14 or bar 14<sup>a</sup>. Said bars 14 and 14<sup>a</sup> are secured at right angles to each other by means of the rectangular pin 17, extending through the opening 16, and said pin is provided with a collar or enlargement 18 to bear against, in this case, the extensions 15, and with a threaded extension 19, of smaller diameter than the pin, by preference. A washer 20, slipped upon said pin, bears against the shoulder formed at the junction of the pin and its threaded extension 19 and also against the opposite sides of extensions 15<sup>a</sup>, and said washer is held in place by the nut 21, screwed upon said extension. It is apparent from this construction that it will be impossible for the bars 14 14<sup>a</sup> to become disconnected, but that they may be adjusted longitudinally in order to measure cylindrical objects of varying diameters.

22 designates a right-angled bracket with its arms preferably the same length as bars 14 and of the same size and configuration in cross-section, and at least one of said arms is divided into inches and fractions thereof.

23 23<sup>a</sup> designate a pair of short bars, which are riveted, as at 24, to and within the guide-tubes 12 12<sup>a</sup> and extend at right angles to each other, and 25 25<sup>a</sup> guide-loops riveted to the opposite ends of said bars. The arms of the bracket 22 extend slidingly through said guide-loops and the guide-tubes, and one of them is provided at its end with a head or enlargement 26 in the form of a screw-bolt, which is adapted by striking against the outer end of the corresponding guide-tube to limit the expansion of the frame and prevent the dislocation of its parts. To measure the diameter of the shaft, for instance, as shown



in Fig. 1, it may be adjusted to proper size to loop over the end of the shaft and then contracted until it touches the same at four points, or if it is not practicable to loop it over the end of the shaft the screw-bolt 26 may be removed to permit a dislocation of the parts, which are then fitted around the shaft with the arm of bracket 22 extending through the guide loops and tubes and the screw reengaging one end of said bracket, as shown. By simply pressing the four sides of the device toward each other the size of the rectangular frame will be reduced by the relative inward sliding movement of the bar extensions 15 15<sup>a</sup> upon each other and the corresponding movements of the sleeve 12 12<sup>a</sup> upon the arms of bracket 22, it being possible to continue this reduction until the guide-loops 25 25<sup>a</sup> meet at the junction-point of the bracket-arms, as will be readily seen.

In order that the device may be used to facilitate the setting or adjustment of a valve, the bracket 22 should be provided at a point diagonally opposite opening 16 and a similar distance from the center of the frame with a like opening 16<sup>a</sup>, and in said opening should be mounted a duplicate of pin 17. In this case also both pins should be provided with lugs or ears 27 and pointers 28, the latter being pivoted to said lugs, so that they may swing in a single plane—viz., in the plane which intersects the center of the bracket. The pins are, however, secured to the lugs sufficiently tight to prevent their accidental movement, as it is desired that they shall normally extend in parallel lines and at right angles to the face of the frame, so that when the latter is fitted upon a shaft the pins shall extend parallel with the latter.

In setting a valve the arm 2 is arranged horizontally, as usual, and the eccentric 3 is adjusted until its center is in the same horizontal plane as the center of the shaft and at the side of the latter corresponding to the direction in which the arm 2 projects. The eccentric and valve are then linked to the rock-arm 5, the latter, therefore, occupying a position at one extreme of its stroke, and such position is marked in any suitable manner. The frame being placed upon the shaft, as explained, and adjusted properly, one or the other of the pointers 28 is caused to make a slight mark or radial scratch upon the eccentric. The shaft and eccentric are then rotated until the mark or scratch upon the latter registers with the companion pointer 28, the shaft turning through exactly one hundred and eighty degrees of space to accomplish this purpose, and consequently to adjust the valve to the other extreme of its stroke. The engineer by measuring the excess of distance and dividing it by two between the mark first made and the adjacent side margin of the nearest port and between the mark last made and the adjacent margin of the nearest port can determine the proper and exact adjustment of the valve, to the end

that its stroke both ways from the center will be equal. This adjustment being obtained, it is only necessary then to adjust the eccentric in one direction or the other, accordingly as the engine is to operate, in order to expose slightly one of the inlet-ports of the cylinder to obtain what is generally called a "lead," but what I prefer to term the "on-time" position of the valve.

When it is desired to use the device as the means for determining the diameter of a cylindrical body, the pointers 28 are functionless, but need not be removed. The nut 21 of pin 17, extending through opening 16, is loosened in order to permit the rectangular frame to be expanded or contracted, as illustrated clearly in Fig. 3, and when said frame contacts with the cylinder at four points an inspection of the graduated bracket 22 reveals the true diameter of the shaft or body, as will be readily understood.

In Fig. 5 a pointer of expansive-retractive type is shown, consisting of the member 28<sup>a</sup>, adapted to be pivoted to the lug 27, and member 28<sup>b</sup>, preferably tipped with chalk or other material by which a legible mark will be easily made, and fitting telescopically upon member 28<sup>a</sup>. The outer member 28<sup>b</sup> is provided with a longitudinal slot 29, engaging a headed pin or screw 30 of the inner member, and the spring 31 within the outer member tends to advance the same at all times. By means of this pin it is obvious that not only a clearer but a longer mark may be made on the eccentric.

From the above description it will be apparent that I have produced a device with which may be accomplished the objects enumerated as desirable in the statement of invention, and it is to be understood that I reserve the right to make all changes which do not involve a departure from its spirit and scope.

Having thus described the invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A device of the character described, comprising a right-angle bracket, a pair of parallel arms extending parallel with one of the bracket-arms, a pair of similar arms extending parallel with the other bracket-arm and intersecting the first-named parallel arms; said parallel arms being slidably connected to the bracket-arms, and means to clamp said arms at any desired point of adjustment, substantially as described.

2. A device of the character described, comprising a right-angle bracket having one of its arms graduated, a pair of parallel arms extending parallel with one of the bracket-arms, a pair of similar arms extending parallel with the other bracket-arm and intersecting the first-named parallel arms; said parallel arms being slidably connected to the bracket-arms, a rectangular pin extending through the opening formed by the said parallel arms at their point of intersection, and



a clamping-nut engaging said pin to secure said arms at any desired point of adjustment, substantially as described.

3. A device of the character described, comprising a right-angle bracket having one or both of its arms graduated, a pair of parallel arms extending parallel with one of the bracket-arms, a pair of similar arms extending parallel with the other bracket-arm and intersecting the first-named parallel arms; said parallel arms being slidingly connected to the bracket-arms, a rectangular pin extending through the said parallel arms at their point of intersection, a clamping-nut engaging said pin to secure said arms at any desired point of adjustment, and a head or enlargement at one end of a bracket-arm to limit the expansive adjustment of the frame, substantially as described.

4. A device of the character described, comprising a pair of rectangular guide-tubes, a pair of parallel arms secured to each tube and extending at right angles to and intersecting each other, a rectangular pin extending through the opening formed by their intersection, short arms secured to said guide-tubes and extending in the same direction as said tubes, guide-clips secured to said arms, and a right-angle bracket extending through said guide tubes and clips and having telescopic action therein, substantially as described.

5. A device of the character described, comprising a rectangular frame having a right-angle bracket provided with a hole at the junction of its arms, a pair of parallel arms extending parallel with one of the bracket-arms, a pair of parallel arms extending parallel to the other bracket-arm and intersecting the first-named parallel arms and connected to the angle-bracket, and pointer carrying pins mounted in openings formed in the angle-bracket and by the intersection of said parallel arms, substantially as described.

6. A device of the character described, comprising a rectangular frame, having a right-angle bracket provided with a hole at the junction of its arms, a pair of parallel arms extending parallel with one of the bracket-arms, a pair of parallel arms extending parallel to the other bracket-arm and intersecting the first-named parallel arms and connected to the angle-bracket, pins mounted in the openings formed in the angle-bracket and by the intersection of said parallel arms, and expansive-retractive pointers pivoted to said pins and arranged to swing in the same plane, substantially as described.

In testimony whereof I affix my signature in the presence of two witnesses.

ISAAC R. KERN.

Witnesses:

M. R. REMLEY,

C. F. BARTHOLOMEES.