

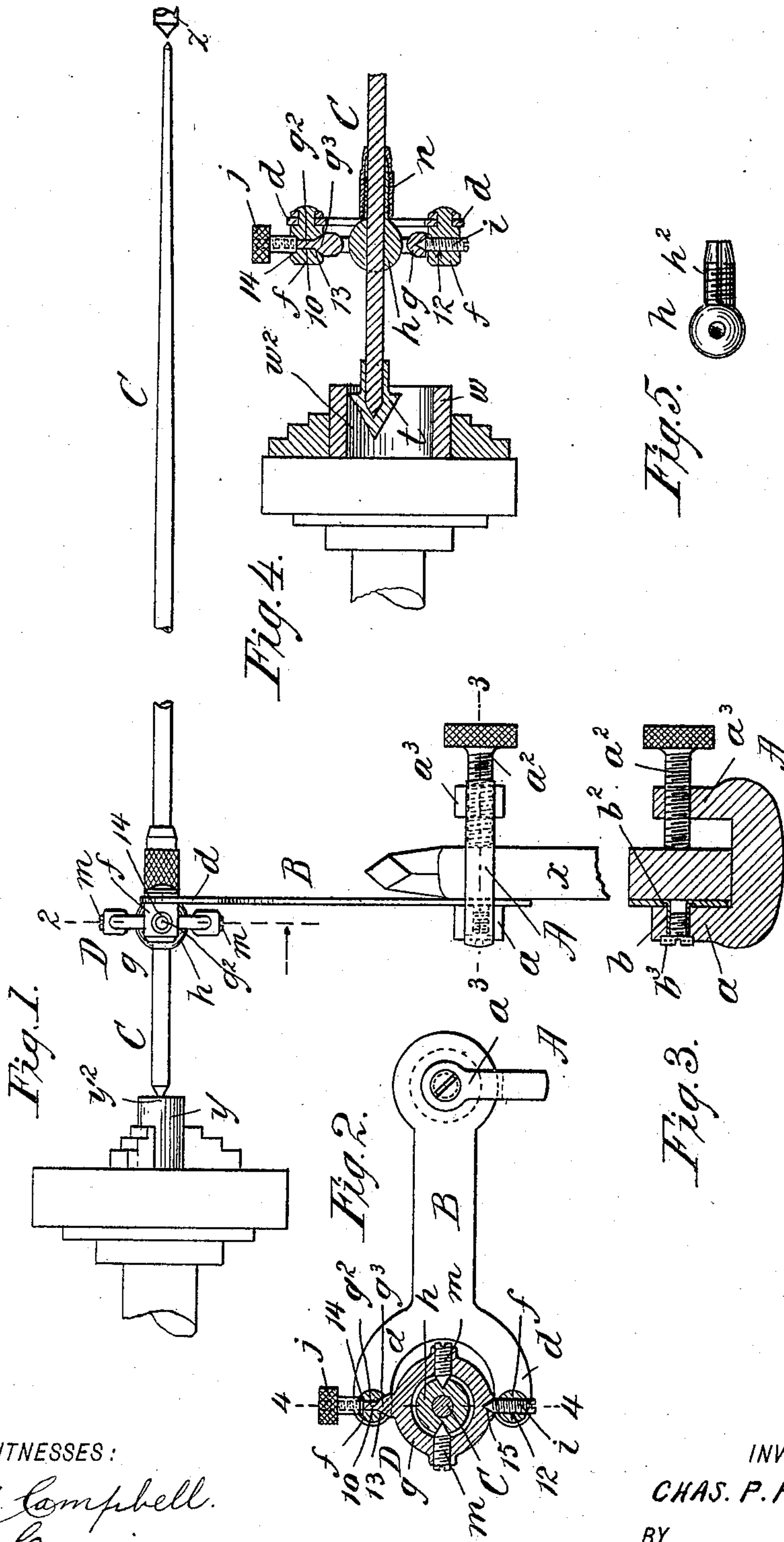
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C. P. FAY.
CENTER INDICATOR.

(Application filed Feb. 16, 1898.)

(No Model.)



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CENTER-INDICATOR.

SPECIFICATION forming part of Letters Patent No. 617,501, dated January 10, 1899.

Application filed February 16, 1898. Serial No. 670,463. (No model.)

To all whom it may concern:

Be it known that I, CHARLES P. FAY, a citizen of the United States, and a resident of Chicopee, in the county of Hampden and State of Massachusetts, have invented certain new and useful Improvements in Center-Indicators, of which the following is a specification.

This invention relates to improvements in center-indicators—that is, devices for employment when work is being chucked up in a lathe for ascertaining whether a given indicated line or point thereon or surface thereof is coincident with or concentric with the center of rotation, which is the axis of the head-stock spindle.

The objects of this invention are to improve the device especially with respect to the means for allowing for any end thrust which the work may have as it rotates, to the means comprised as a permanent part of the device for mounting it on any available side support of the lathe, and to means for locking or setting at pleasure certain of the pivotal connections in the universal joint which is comprised in the device, whereby in the indication of the eccentricity, if any there be, in the wall of an annular chucked piece of work relative to the center of rotation the indicator-rod of the device can have no tendency to revolve around its axis, but can only oscillate on one plane across its axis, whereby the determination of the true or untrue chucking up of the work is accurately made; and the invention consists in the construction and combination of parts, all substantially as will hereinafter fully appear, and be set forth in the claims.

Reference is to be had to the accompanying drawings, in which the present improvements are illustrated.

Figure 1 is a plan view of the center-indicator shown as mounted on a diamond-point tool, which is understood as supported at the side of the lathe, the end of the indicator-rod being engaged in a prick-point in the end of a chucked bar or piece of work, the chuck and head-stock spindle being shown. Fig. 2 is a cross-sectional view as taken on the line 2 2, Fig. 1, with parts beyond the plane of section seen in elevation. Fig. 3 is a sec-

tional view through the clamping portion of the device as taken on the line 3 3, Fig. 1. In this view the clamp is shown as inverted from the position in Fig. 1 in order the better to show its capability for application as well from the under side as over the top of the tool. Fig. 4 is a sectional view designed to illustrate the employment of the indicator in properly chucking an annular piece of work or an object having a hole within its end. The vertical plane on which the parts of the device are shown in section is indicated by the line 4 4, Fig. 2. Fig. 5 is a side view of the ball member comprised in the joint of the instrument.

The device comprises the clamp A, yoke B, indicator-rod C, and a universal joint, which is in a general way indicated at D, for peculiarly supporting the rod on the yoke.

The yoke B is in the form of a thin flat bar of stirrup form at one end, its other being pivotally hung to one jaw a of the clamp A, the clamp-screw a^2 threading through the opposite jaw a^3 , with its end directed toward the clamp-jaw a . The pivotal connection between the yoke and clamp-jaw is made by the tubular bushing b , which is flanged at one end b^2 , being passed through a perforation in the yoke and through the clamp-jaw, the flanged end thereof lying in a countersunk seat therefor in the yoke, while a screw b^3 by its threads engages in the said bushing, the screw-head being disposed in a countersink in the outer face of the clamp-jaw.

In mounting the indicator by fastening the clamp on a tool x , as shown, or post or other side-supported part or fixture of the lathe the yoke may be extended level or inclined either upwardly or downwardly to bring the center of the universal joint, which is also in the axis of the rod C, coincident with or in proximity to the center of rotation of the head-stock spindle, and the yoke is held in the level or inclined extension from its place of support by the binding pressure of the clamp-screw a^2 . The end of the yoke which comprises the bifurcated members $d d$ has the parallel right-angularly-arranged studs $f f$, formed thereon or attached thereto, both being transversely drilled in a common line, as seen at 10 and 12, the hole 10 having at its

inner end an inwardly-tapering orifice 13, while at its other end it has a countersunk seat 14. The other hole 12 is screw-tapped. The universal joint mounted on the yoke consists of the ring *g*, swiveling on the yoke, and the ball *h* or a center piece swiveling upon and within the ring on an axis at right angles to that of the movement of the ring. The swiveling connection of the ring upon the yoke-studs *f f* is constituted by the provision of a trunnion-like member *g*², radially extended from the edge of the ring at one side and passed through the hole 10 in the one stud, and the taper-pointed screw *i*, which passes through the tapped hole in the other stud and enters a conical socket 15 within the edge of the ring. The said trunnion-like member *g*², which is comparatively long, has a screw-threaded shank and a base portion *g*³ of the form of a frustum of a cone, which seats itself within the said tapering orifice 13 of the hole in the stud through which said member is passed. The outer screw-threaded portion of the said member *g*² receives thereon the thumb-nut *j*, (shown in Figs. 2 and 4, but purposely omitted in Fig. 1,) the inner circular end of which may seat itself in the aforesaid countersink 14. The ball *h* is hung within the ring by the trunnion-like connections constituted by the taper ends of the screws or pins *m m*, which pass through the opposite parts of the ring in a common line and which ends enter diametrically opposite sockets therefor in the ball. The ball has the elongated split and tapered hub *h*², through which and the ball proper the rod passes. The nut *n* screwing about the split hub and having an internal portion to impinge against the tapered part of the hub constricts the latter about the rod. By loosening the thumb-screw *j* the ring is free to have a partial rotary movement on a vertical axis on the yoke, while the ball is always free to have a slight rotary vibratory movement within the ring on an axis at right angles, and thus the indicator-rod *m*, which is passed through and supported by the ball, may have oscillatory movements, both end portions when the rod oscillates generating cones, the apexes of which converge in the center of the ball.

As an exemplification of the use of the instrument for center-indicating a chucked-up bar *y*, as seen in Fig. 1, it will be understood that the bar has in its end a prick-point at *y*², which is to be brought to coincide with the axis of the head-stock spindle. The indicator is clamped onto a tool as its support, as seen, the thumb-nut *j* being loosened to leave the ring free in its journal-supports, and the taper end of rod *C* is set in the prick-point. It will also be assumed, for instance, that the machinist is able to determine that the center of the ball is in the axial line of the head-stock spindle. Now as the chucked piece rotates the eccentricity of the prick-point will cause the proximate end of the rod

to revolve, the opposite longer end of the rod revolving in a path of magnified extent. So soon as the machinist by manipulating the chuck brings the center of the work truly axial the rod will, as the work rotates, have no movement, but will remain in the axis of rotation; but, again, assuming, as is more often the case, that no pains is taken to mount the indicator with the ball centrally coincident with the axis of rotation of the spindle, now when the work is mounted true the rod will have its one end located eccentric to the axis of the spindle, and as the work rotates the rod will have no movement; but if the work is set untrue there will be a revoluble movement of the outer end of the rod eccentric to the axis of the head and tail stock spindles.

If, as indicated in Fig. 4, the piece of work *w* has a circular hole *w*² to be brought concentric to the spindle, the thumb-nut *j* is set down to prevent the ring from vibrating on the yoke, when the only motion the rod may have is a swinging motion in a vertical plane. A "pump-center" or flanged and conical-headed thimble *t* is pressed friction-tight on the end of the rod and permitted to rest against the upper peripheral wall of the hole in the work being trued. The counterpoising-weight of the long free end portion of the rod keeps the pump-center up to its bearing at the top of the hole, so while the work remains untrue the eccentricity of the inner peripheral wall thereof will cause the rod to vibrate in a vertical plane, the vibrations being magnified in extent at the long free end; but of course as soon as such wall becomes concentric the vibration will cease.

It is especially to be understood and appreciated that the yoke is produced from steel or other suitable metal, which while rigid in degree and sufficiently stable to support the joint and rod of the device is susceptible of being sprung slightly across the line of its extension from its clamp-support and to retract to its normal position, thus allowing for any slight end thrust which the work has, especially while in the unfinished state and before it is centrally trued.

The yoke provided with a clamp upon its forward end renders the device most easily and conveniently available and adaptable in and under a wide variety of situations and conditions.

Now, having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a center-indicator, the indicator-rod and a yoke or bar, and universal-joint connections between the rod and yoke the yoke-bar consisting of a flat spring-metal piece and means for mounting the instrument on an available support therefor, substantially as described.

2. In a center-indicator, the indicator-rod, a yoke-bar, a connecting universal joint and a clamp to one jaw of which the end of the yoke-bar opposite from the rod is pivotally

connected and means, as the clamp-screw for causing the bar to be bound against the clamp-jaw, substantially as described.

3. In a center-indicator, the yoke having
5 opposite members, as the studs *f f*, perforated in a common line, one of the perforations having at its end the tapering seat 13 the ring having the radial projection *g*² with the tapering base, and the screw or pin *i* the
10 thumb-nut threading on the said projection and adapted, when turned, by abutment

against the stud to draw said tapering base into the conical seat, to lock the ring against oscillatory movement, the ball or center member journaled in the ring to rock on an axis at 15 right angles to said projection and pin, and the rod supported by the center member, substantially as described.

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