

E. P. BULLARD, JR.
TURRET HEAD FOR MACHINE TOOLS.
APPLICATION FILED FEB. 25, 1910.

993,290.

Patented May 23, 1911.

2 SHEETS—SHEET 1.

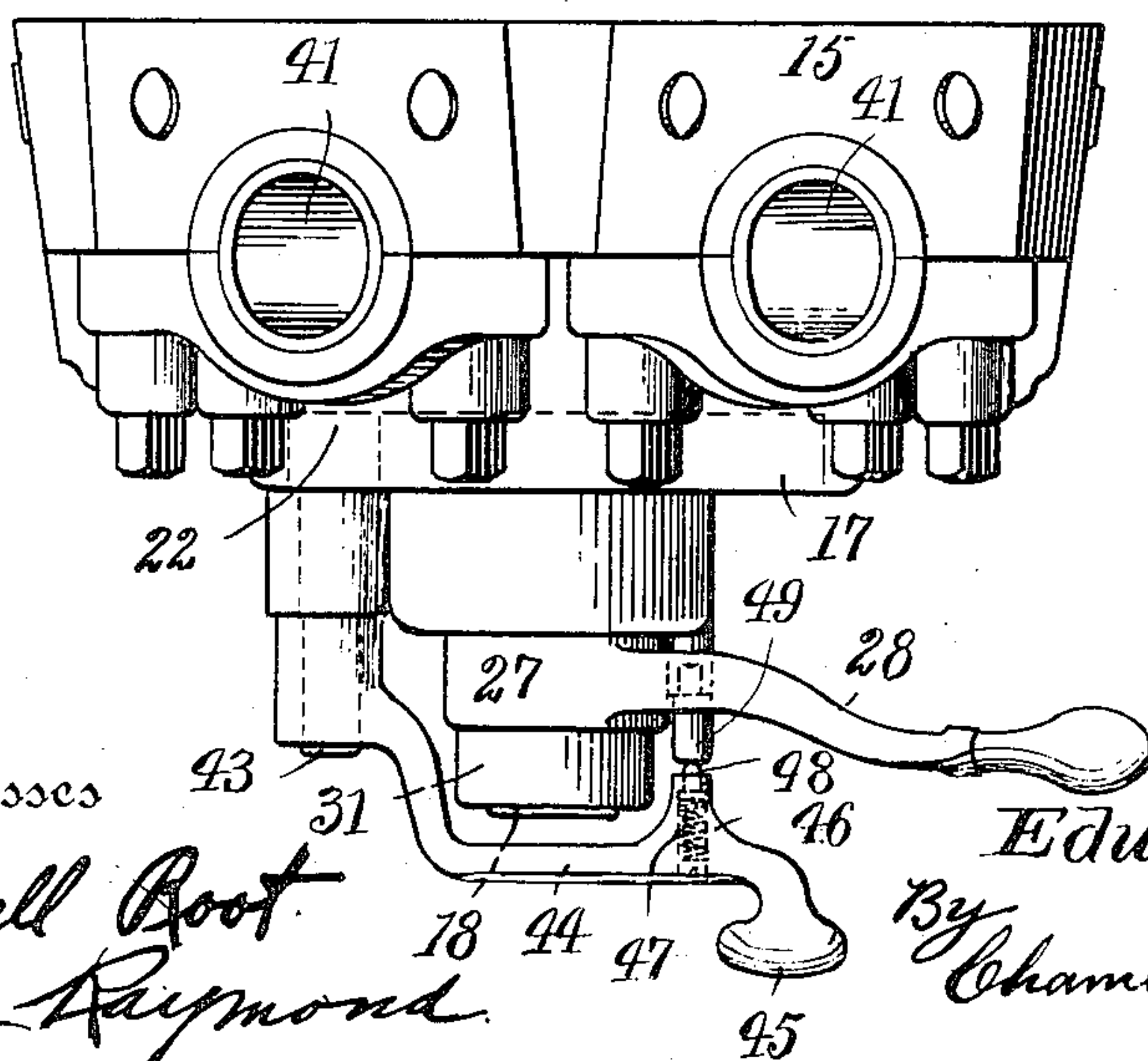
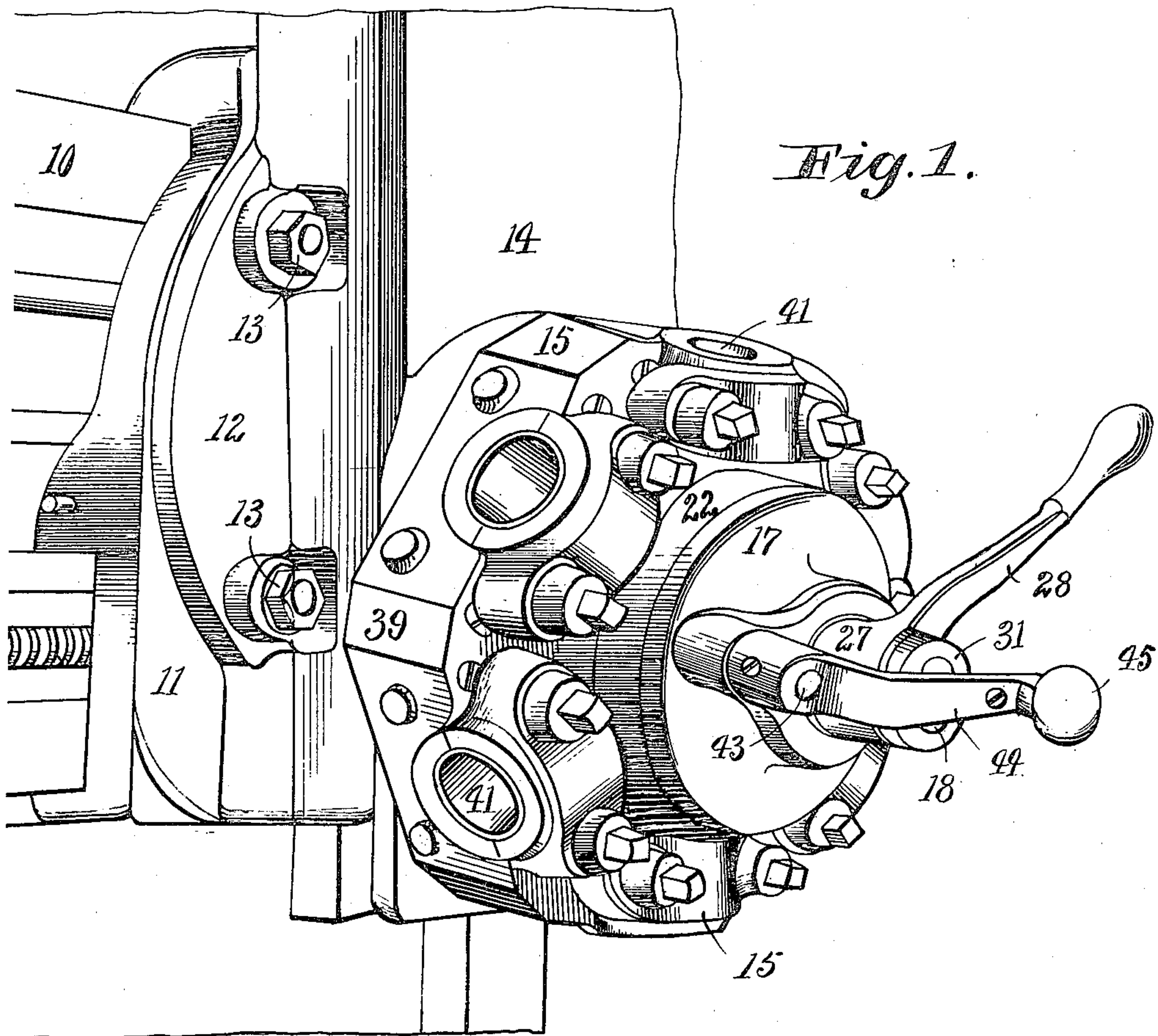


Fig. 2.

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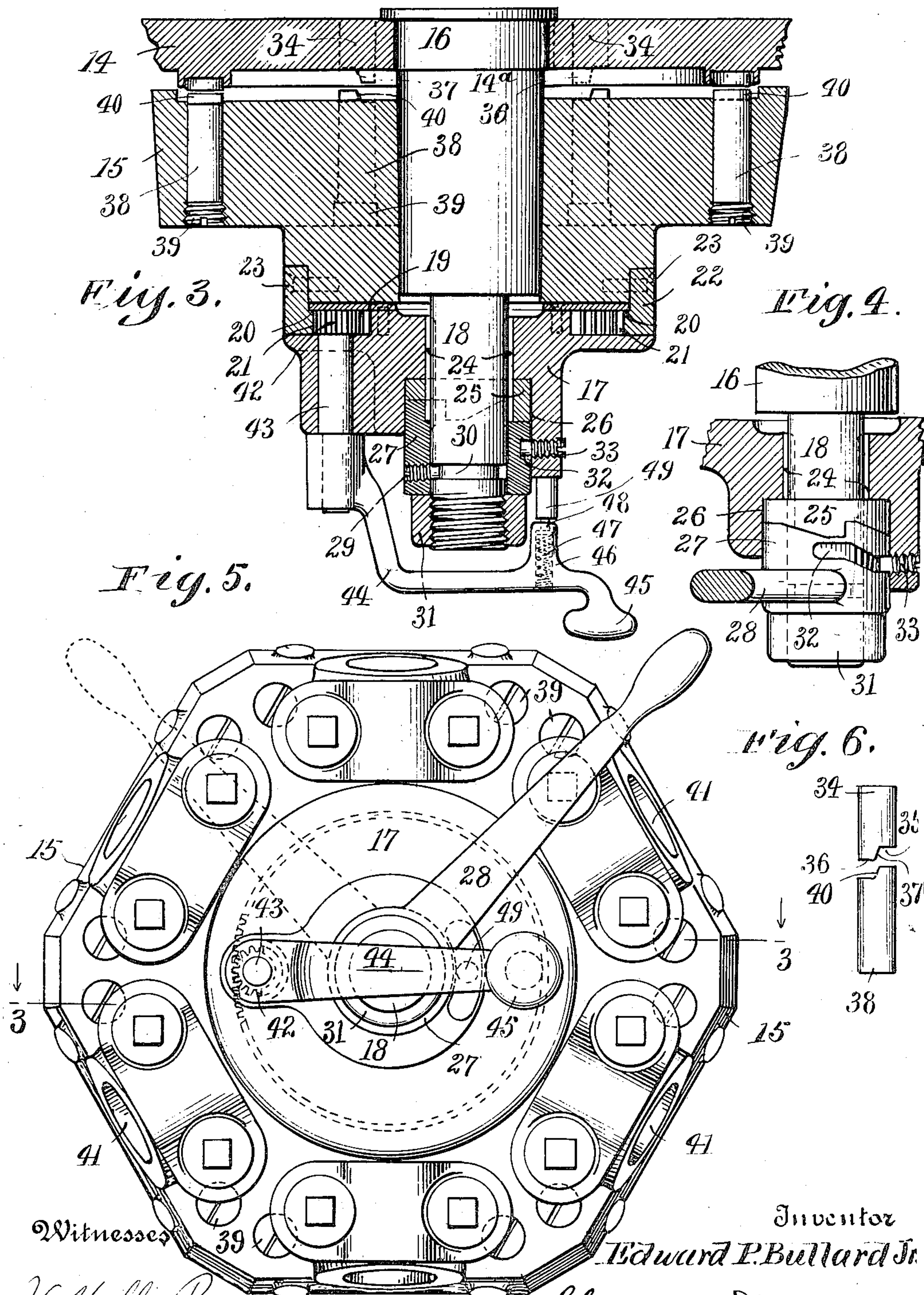
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UNITED STATES PATENT OFFICE.

EDWARD P. BULLARD, JR., OF STRATFORD, CONNECTICUT, ASSIGNOR TO THE BULLARD MACHINE TOOL CO., OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF CONNECTICUT.

TURRET-HEAD FOR MACHINE-TOOLS.

993,290.

Specification of Letters Patent.

Patented May 23, 1911.

Application filed February 25, 1910. Serial No. 545,887.

To all whom it may concern:

Be it known that I, EDWARD P. BULLARD, Jr., a citizen of the United States, and resident of Stratford, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Turret-Heads for Machine-Tools, of which the following is a specification.

This invention relates to turret heads for machine tools, such for instance as vertical turret lathes, boring mills and the like, and it refers particularly to the revolving, indexing and locking mechanism for the head whereby it is rotated on its bearing and secured in desired positions.

The object of the invention is to generally improve upon devices of this class and particularly to provide novel mechanism for rotating the head upon its saddle so as to bring the respective tools in position to be used; to provide improved means for insuring the proper indexing of the head when so adjusted, and to cause the proper locking of the head in such adjusted positions; to so construct the several parts as to prevent any back swing of the head and its tools when being adjusted; and finally to arrange the whole so as to insure ease of operation, accuracy and permanency of adjustment.

On the accompanying two sheets of drawings forming a part of this specification similar characters of reference denote like or corresponding parts throughout the several figures and of which,

Figure 1, shows a front perspective view of a turret head embodying my improvements and mounted upon a slide, swivel-plate, saddle, and cross rail. Fig. 2, is a detached top plan view of the head shown in Fig. 1. Fig. 3, is a longitudinal cross section through the head as seen from line 3—3 of Fig. 5, but with hub of lever in the position indicated by dotted lines in Fig. 5. Fig. 4, is a detail sectional plan of outer end portion of pivotal stud, cap and hub mounted thereon as shown in section in Fig. 3. Fig. 5, is a separate front elevation of the head shown in the preceding figures, and Fig. 6, shows a side view of a pair of the interlocking pins detached.

Referring to Fig. 1, of the drawings and the characters of reference marked thereon, 10 indicates a part of a common form of cross rail as employed on machine tools. 11 is a saddle slidably mounted upon the rail

and 12 a swivel-plate secured to the saddle by means of bolts 13. A vertically adjustable slide 14 is mounted in ways of the swivel-plate 12 and serves to support the turret head 15 through my novel form of connections which I will next describe.

Referring to Fig. 3 it will be seen that the inner end of a stud 16 is keyed to the said vertically movable slide 14 to form a pivot and upon the large part 14^a of which the before mentioned head is rotatably mounted. This larger part is slightly tapered as shown being bigger at the inner end than the outer thereby insuring a tight fit of the head on the stud when in its locked position and a loose or operative fit when drawn outward upon the stud for the purpose of being rotated. A cap 17 keyed to the reduced portion 18 of this stud is operatively connected to the head by means of a plate 19 that is screwed to the inside of the cap and extended out to engage the underside of shoulder 20 formed on the rear side of internal gear 21. This gear is cut on inside of a ring 22 that is secured to the reduced front part of head by means of screws 23. This cap, ring and plate serve to cover the outer end portion of the head and together with the head are free to move longitudinally upon the stud but are held against rotary movement by means of the keys 24 fitted between the cap and stud. A hardened cam faced bushing 25 is set into an enlarged hole 26 of the cap to form a bearing against which the cam shaped hub 27 of a lever 28 operates. This hub is free to turn upon the outer reduced end portion of the stud but is held against longitudinal movement thereon by means of a screw 29 secured in the said hub and having its inner end engaging an annular groove 30 in the end portion of the stud. A nut 31 is attached to the outer threaded end of this stud to better support the hub of lever when the same is being turned upon the stud. The hub of the lever is provided with a cam groove 32 in its peripheral surface for the engagement of a screw 33 fixed in the hub of the cap 17 and whereby the cap and head are made to positively slide in or out according to the movement of the lever. The hub is in part mounted within the hole 26 of the cap and its inner edge portion is of an irregular shape to fit into the cam surface of the bushing 25 and is inclined in one

direction so that by turning the lever and hub to the right as shown in full lines Fig. 5, it will force the bushing, its cap and head inward upon the stud to secure the latter to the slide 14. The groove 32 in the hub, which is engaged by a screw 33, is cut to agree with the cam surfaces of bushing and hub, to insure a uniform action of the parts when the lever is operated to move the head in or out upon the stud.

A pair of pins 34 are seated in the lower central part of slide 14, see Figs. 3 and 6, and are cut away to form a recess 35 on the outer side, a projection 36 upon the inner side and a slightly beveled wall 37 to coact with similar faced pins 38 secured in suitable sockets of the head 15. These pins are set in from the front and covered over by a screw plug 39 that also serves as a means for adjusting the said pins longitudinally to take up the wear and lost motion. The inner ends of these pins like those in the slide are provided with projecting portions, a recess and beveled sides 40. These beveled surfaces obviously serve to engage the bevel surfaces of the pins in the slide when the turret head 15 is shoved back, thus causing a positive registration and interlocking of the head and slide to bring the respective tools of the head in proper position when swung around to the underside for use. There are two of these oppositely beveled pins in the head for each face of turret and their bevels are so located with relation to bevels of pins in the slide that the wedged action when head is shoved back is opposed to that of the slide thus to better center and rigidly hold the parts in position. In addition to the foregoing means for moving the said head backward and forward upon the stud to engage with and disengage from the slide, I have provided mechanism for rotating the head upon the stud, which serves to bring the several tools, (not shown) when mounted in the sockets 41 of the head, into proper position for operation upon stock carried by the table of the machine (not shown) but of which the head forms a part. The several sockets 41 referred to are adapted to accommodate tools of various kinds and forms as employed in turret heads of this class. There are six of these sockets shown in the head thus providing for the use of six different styles of tools any one of which may be readily swung to the bottom in proper position for operation and then secured in such position by means of the before mentioned lever 28.

The means for rotating the head upon the stud comprises a gear, pinion and operating arm as is clearly shown in Figs. 3, 4 and 5, and comprising in detail the internal gear 21, formed in the side walls of the before mentioned ring 22 secured to the head, and which is engaged by a pinion 42 mounted

upon the inner end of a shaft 43 journaled in the before mentioned cap 17. To the outer end of this shaft is secured an arm 44 bearing a handle 45 upon its outer end and by means of which the said arm is swung around to turn the shaft, pinion and head. The relation of the teeth of pinion and gear is such as to insure the turning of the head the required fractional part of a rotation with each complete turn of the arm thereby insuring the positioning of a different tool when supported in the head, with each complete rotary movement of the arm.

From the above it will be seen that the head may be rotated and its pins made to register with the pins of the slide without having the same strike thus materially lessening the liability of injuring and wearing the pins which wear in time would mean a looseness of the head and thus an inaccurate registration.

Upon the rear side of the arm is formed a boss 46 that is chambered to receive a spring 47 which bears against a projecting yieldable pin 48 that in turn engages a stud 49 secured to an extension of the head. A recess is formed in the end of the stud 49 to receive the end of the pin to retard the movement of and yieldably support the arm in the position indicated in Figs. 3 and 5 when brought to that position.

From the foregoing description and construction it will be noted that in order to operate the device it would first be necessary to move the lever to the left, see dotted lines Fig. 5, from the position shown in full lines of same figure, which would serve to draw the head with its pins 38 forward upon the stud away from the pins 34 of the slide thereby freeing the head. A turning movement of the arm 46 would follow the unlocking of the head to turn the same around to either of its several positions, which is determined primarily by the registration of the pin 48 with the recess in stud 49 and finally by the locking of it in its fixed and correct position by a throw to the right of the said lever which serves to force the head back against the slide and the pins of the head in registration with the pins of the slide.

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

1. The combination of a head supporting member bearing a stud, bevel faced pins mounted in said member, a head pivotally mounted upon the stud, adjustable pins carried by the head to register with and engage the pins of the supporting member and means for moving the head longitudinally upon the stud to engage and disengage the said pins.

2. The combination of a head supporting member bearing a stud, a pair of bevel faced

pins mounted in said member, a head pivotally connected to the stud, bevel faced pins carried by the head to register with the pins in the supporting member, means for adjusting the pins in the head longitudinally and means for moving the head longitudinally upon the stud to engage and disengage the said pins.

3. The combination of a head supporting member bearing a stud, a head pivoted on the stud, means carried by the head to engage and interlock with the supporting member to center and hold the head in position, mechanism for drawing the head forward and backward upon the stud to engage and disengage said centering means, an operating arm, a gear and rack connection for rotating the said head upon the stud preparatory to locking the same.

4. The combination of a head supporting member bearing a stud, a head pivotally connected to the stud, means carried by the head to engage with the supporting member, an arm and gear connection for rotating the head upon the stud to bring the respective tools carried by the head into alinement for engagement with the supporting member.

5. In a device of the class described, the combination of a head supporting member bearing a stud, a head rotatably mounted upon the stud, interlocking pins carried by the head to engage the supporting member to center and hold the head, a lever and connections for positively moving the head upon the stud to engage and disengage the said pins.

6. In a device of the class described, the combination of a head supporting member bearing a stud, a head rotatably mounted upon said stud, interlocking pins carried by the head to engage the supporting member to center and hold the same, a cap mounted to slide longitudinally upon the stud and swivelly connected to the head, a lever connected intermediate of the cap and stud to positively move the latter and head longitudinally upon said stud to engage and disengage the interlocking pins.

7. In a device of the class described, the combination of a head supporting member bearing a stud, a head rotatably mounted upon the stud, means for engaging the head with the supporting member to center and hold said head, a cap slidably attached to

the stud and swivelly connected with the head, a rack and gear connection for positively rotating the head with respect to the cap and stud, a lever rotatably mounted upon the stud for engaging the cap in a manner to positively move the same longitudinally upon the stud and with respect to the lever.

8. In a device of the class described, the combination of a head supporting member bearing a stud, a head rotatably mounted upon the stud, pins carried on the head to engage the supporting member to center and hold the head, a cap mounted upon the stud and swivelly connected to the head, a shaft and pinion mounted in the cap and adapted to engage and rotate the head, an arm for turning the pinion to effect said operation of the head, means for engaging and supporting the arm to hold the head in certain positions.

9. In a device of the class described, the combination with a head supporting member bearing a stud, a turret head rotatably mounted upon the stud, a cap secured to said stud and swivelly connected with the head, a lever mounted to turn upon the stud but held against longitudinal movement, the hub of said arm being provided with an irregular shaped peripheral groove, and a pin secured to the cap to engage the said groove, whereby a rotary movement of the hub of the lever upon the stud will cause the cap and head to move longitudinally upon the stud for the purposes of engaging and disengaging the supporting member.

10. The combination of a head supporting member, a tapered stud secured thereto, a head slidably and pivotally mounted upon the stud, pins carried by the head to engage the supporting member, means for moving the head longitudinally upon the stud to engage and disengage the supporting member, and means for rotating the head upon the stud to effect different registrations of the head with relation to said supporting member.

Signed at Bridgeport, in the county of Fairfield, and State of Connecticut, this 18th day of December, A. D. 1909.

EDWARD P. BULLARD, JR.

Witnesses:

F. J. LYNCH,
D. B. YOUNG.