Dec. 1, 1931. F. H. WHITMAN 1,834,231

MEASURING DEVICE FOR PRECISION GRINDERS

Filed March 12, 1928

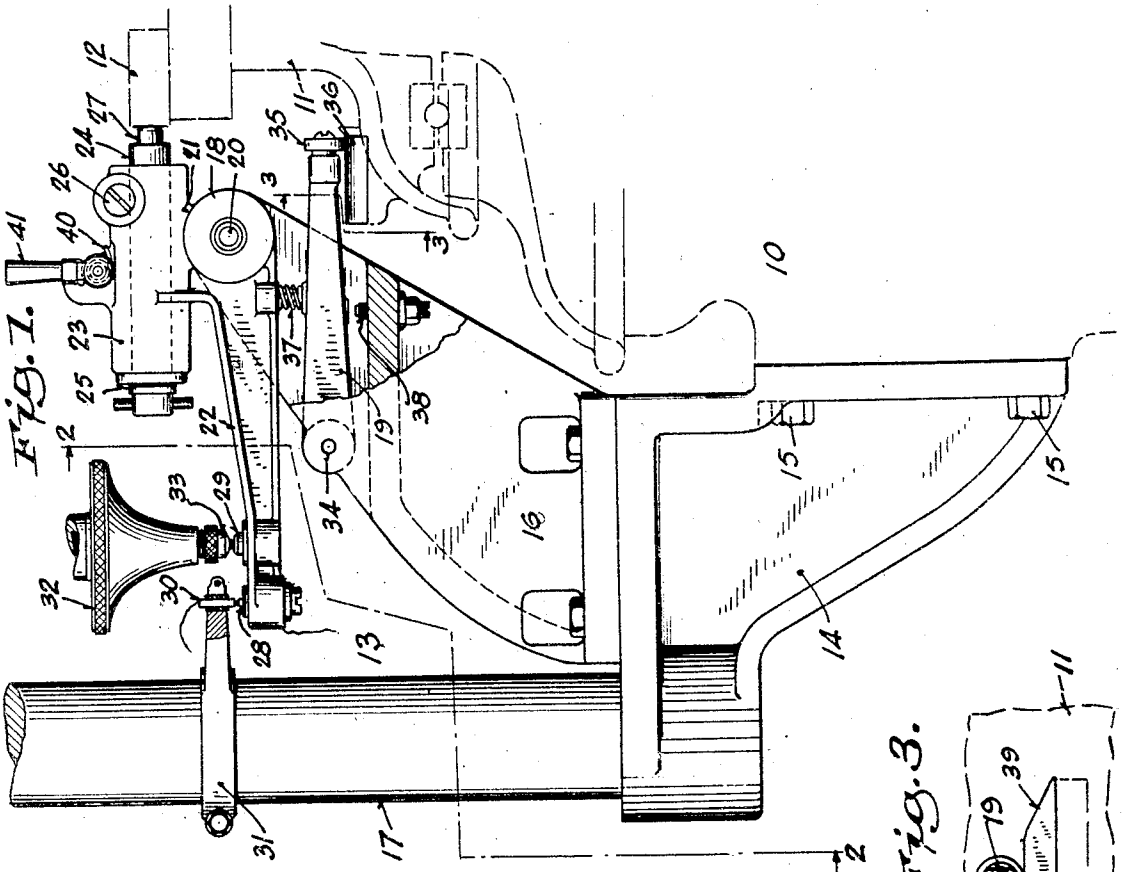


Fig. 1.

Fig. 3.

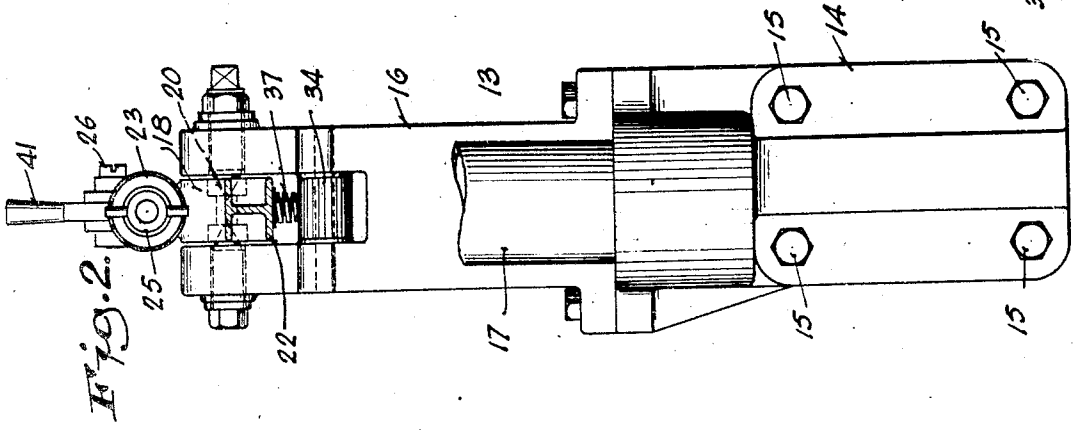


Fig. 2.

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Patented Dec. 1, 1931

1,834,231

UNITED STATES PATENT OFFICE

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MEASURING DEVICE FOR PRECISION GRINDERS

Application filed March 12, 1928. Serial No. 260,874.

The invention relates to a measuring device adapted for use in connection with apparatus for accomplishing precision grinding.

The purpose of my invention is to produce a device for the automatic gaging to close limits of finished metal parts which will be provided with means whereby cessation of the grinding operation upon a metal part can be effected immediately when said part has obtained a predetermined degree of precision.

The novel device consists of a primary mechanism including a gaging element adapted to directly contact with the face of a metal part being ground and means set up to function in conjunction with said gaging element to cause cessation of the grinding operation when the metal part has the desired gage, and a secondary or measuring mechanism, also set up to function in conjunction with the gaging element, to indicate the gage of said metal part.

Having briefly stated the general nature of the invention, I shall now particularly describe the features thereof, and later specifically point out the novelty of said features in the claims hereto appended.

Fig. 1 is a side elevational view of a measuring device made in accordance with the invention and as applied to use, disclosing, in dotted lines, so much of a precision grinding machine as is necessary to illustrate the principles of the invention.

Fig. 2 is a sectional view of the measuring device, on line 2—2 in Fig. 1.

Fig. 3 is a sectional view on line 3—3 in Fig. 1, detailing the shoe cam for the cam roller.

With respect to the drawings, 10 and 11 indicate the stationary and reciprocable members, respectively, of a precision grinder, 12 designates a piece of work fixed upon said reciprocable member to be operated upon by a grinding element (not shown), and 13 represents, generally, the measuring device of the present invention.

Of said measuring device, 14 is a main bracket secured, as at 15, upon the stationary member 10 of the grinder, and suitably supporting a smaller bracket 16 adjacent the work 12 and a column 17 at farther distance from said work. The smaller bracket 16 supports a gaging lever 18 and a cam roller lever 19.

As disclosed, the gaging lever 18 is pivotally attached, as at 20, to the upper portion of the smaller bracket 16 between spaced ears thereof, and is constituted by two arms, designated 21 and 22, the former extending vertically upward from the pivot 20, and the latter extending horizontally from said pivot in direction toward the column 17.

An integral sleeve 23 upon the arm 21 of the gaging lever houses a post 24 adapted to be longitudinally adjusted in said sleeve, as by a screw 25, and locked in adjusted position therein, as by a clamp screw 26. A steel gaging pin 27 carried by said post has a preferably slightly spherical head adapted to directly contact with the face of the work being ground. See Fig. 1.

The arm 22 of the gaging lever is desirably several times as long as the arm 21 thereof. At its extremity spaced from the pivot 20, said arm 22 is provided with an upstanding properly insulated contactor 28, and adjacent said extremity said arm has an upstanding steel pin 29 the head of which is preferably slightly spherical.

The contactor 28 is in a relay (not shown), for actuating a stop motion, or other suitable mechanism for discontinuing the grinding operation upon a metal part, as will be understood, and said contactor 28 is adapted to engage a mating properly insulated contactor 30, suitably carried by a clamp arm 31 on the column 17, and also in the relay.

A gage or other suitable measuring device 32 supported upon the column 17 in any convenient manner (not shown), has its gaging pin 33 situated to be engaged by the steel pin 29.

The cam roller lever 19 is situated directly below the gaging lever 18, between the ears of the bracket 16, and is arranged parallel with the arm 22 thereof. One end of said cam roller lever is pivoted, as at 34, upon the ears of said smaller bracket, and the other end thereof carries a steel roller 35 adapted to engage a shoe cam 36 located upon the re-

ciprocable member 11 of the grinder in any convenient way.

A sensitive compression spring 37 interposed between the lower face of the arm 22 of the gaging lever and the upper face of the cam roller lever provides means for resiliently supporting the gaging lever upon said cam roller lever.

An upstanding stop 38 upon the smaller bracket 16, between its ears, and beneath the cam roller lever is adapted to limit the extent of downward movement of said cam roller lever.

The shoe cam 36 is situated at one end portion of the reciprocable member 11, so that during the major portion of the stroke of said member, the cam roller lever 19 is resting upon the stop 38. At such time, both the cam roller 35 and the gaging pin 27 are unengaged. When, however, the shoe cam 36 reaches the location of the cam roller 35 the oblique surface 39 of said shoe cam rides under the roller 35 and elevates the roller lever and swings the arm 22 of the gaging lever upward to an extent bringing the gaging pin 27 into engagement with the face of the work being ground.

Upon the movement of the shoe cam in reverse direction, the cam roller rides off of said shoe cam and the cam roller lever falls to the stop 38. The arm 22 of the gaging lever is constructed to overbalance the arm 21 and its sleeve, so that said arm 22 follows the cam roller lever in its downward movement and thus removes the gaging pin from the work.

The end portion of the arm 22 of the gaging lever which contains the contactor 28 and the steel pin 29 can move upwardly only to the extent permitted by the condition of the face of the work being ground. The engagement of said steel pin 29 with the gaging pin 33 affords an arrangement for indicating the gage of said face of the work from time to time, as will be obvious. The contactor 30 is set at elevation relatively to the gaging lever and its arm 22 to permit engagement of the contactor 28 with said contactor 30 upon the engagement of the gaging pin 27 with a face of the work which has become ground to a degree of precision already predetermined. Immediately upon engagement of the contactors with each other, the relay having said contactors is brought into play to actuate any suitable type of mechanism, as, for example, a stop motion device, adapted to terminate the grinding operation.

Manual means including a sensitive compression spring 40 resting against a finger lever 41 accessibly situated upon the sleeve 23 can be utilized to manually measure the gage of the work without interruption of the mechanical gaging.

The lever 41 may be operated to bring the gage element into contact with the workpiece irrespective of the cam operating mechanism so that the piece may be gaged at any desired time.

Having thus described the invention, what I claim and desire to secure by Letters Patent of the United States, is:

1. A measuring device for precision grinders comprising a gaging element, means for periodically causing said gaging element to contact with the piece being worked, measuring mechanism functioning in conjunction with said gaging element for indicating the gage of said workpiece, and additional means functioning in conjunction with said gaging element and adapted to cause the termination of the working operation when the piece being worked has attained a predetermined degree of precision.

2. A measuring device for precision grinders comprising a support, a bell crank pivoted to said support, a gaging element associated with one arm of said bell crank, indicating means associated with the other arm of said bell crank and functioning in conjunction with said gaging element, and means for periodically causing said gaging element to contact with the piece being worked to indicate the gage of said work piece.

3. A measuring device for precision grinders comprising a support, a bell crank pivotally mounted on said support, a gaging element adjustably connected to one arm of said bell crank, indicating means associated with the other arm of said bell crank and operating in conjunction with said gaging element, means for normally maintaining said gaging element out of contact with the workpiece, means for periodically causing said gaging element to contact with the workpiece to indicate the gage of said work, and means adapted to cause the cessation of the working operation when the workpiece has attained a predetermined degree of precision.

4. A measuring device for precision grinders comprising a support, a bell crank pivotally mounted on said support, a gaging element connected to one arm of said bell crank, indicating means associated with the other arm of said bell crank, means for normally maintaining said gaging element out of contact with the piece being worked, and cam means for periodically causing said gaging element to contact with the work and to indicate the gage thereof.

5. A measuring device for precision grinders comprising a support, a bell crank pivotally connected to said support, a gaging element connected to one arm of said bell crank, indicating means associated with the other arm of said bell crank and operating in conjunction with said gaging element, a lever pivotally connected to said support, resilient means between said lever and said bell crank, and a roller mounted on one end of said lever for engaging a cam surface on the oscil-

lating portion of the grinder, said cam causing a pivotal movement of said bell crank at periodic intervals to cause the gaging element to contact with the piece being worked and to indicate the gage thereof.

6. A measuring device for precision grinders comprising a support, a bell crank mounted on said support, a gaging element connected to one arm of said bell crank, indicating means associated with the other arm of said bell crank and operating in conjunction with said gaging element, and means for periodically imparting a pivotal movement of said bell crank to cause said gaging element to contact with said workpiece to thereby indicate the gage thereof.

7. A measuring device for precision grinders, comprising a gaging element including a movable electrical contactor and means for actuating a measuring unit, a fixed electrical contactor normally in spaced relation to said movable contactor, a measuring unit adjacent said means, and mechanism resiliently urging said gaging element into engagement with the face of a metal part being ground, the movable contactor thereof in direction toward the fixed contactor, and the means into operative engagement with the measuring unit to indicate the gage of said face as the grinding operation progresses, said fixed contactor being situated to be engaged by said movable contactor when said engaged face of the metal part being ground has obtained a predetermined degree of precision.

8. In a measuring device for precision grinders, a pivoted gaging element having an overbalancing arm, a pivoted lever below said arm, a compression spring for supporting said arm upon said lever, said lever being normally positioned to cause said overbalancing arm to position said gaging element in spaced relation to the face of a metal part being ground, and a shoe cam adapted to ride under said lever and elevate the same to yieldingly urge said gaging element against said face.

9. A measuring device for precision grinders comprising a gaging element, a movable electrical contactor operated by said gaging element, a measuring unit, means operated by said gaging element for operating said measuring unit, a fixed electrical contactor normally in spaced relation to said movable contactor, and means operable at periodic intervals for resiliently urging said gaging element into contact with the metal part being ground, the movable contactor in the direction of the fixed contactor and the measuring unit actuating means into operative engagement with the measuring unit.

10. A measuring device for precision grinders comprising a gaging element, an oscillating carriage adapted to support the work to be ground, means operable on each oscillation of the carriage to cause the gaging element to temporarily contact with the work, and means functioning in conjunction with said gaging element adapted to cause a termination of the working operation when the work piece has attained a predetermined degree of precision.

In testimony whereof, I have signed my name at Milwaukee, this 28th day of February, 1928.

FRED H. WHITMAN.