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SELF-CENTRALIZING AND SYNCHRONIZING DEVICE FOR ARBOR PLUG GAUGES

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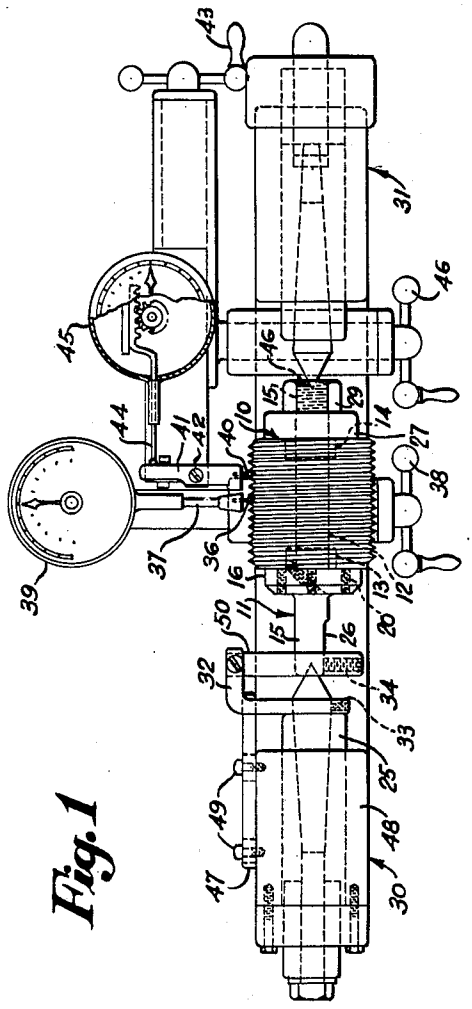

Fig. 1

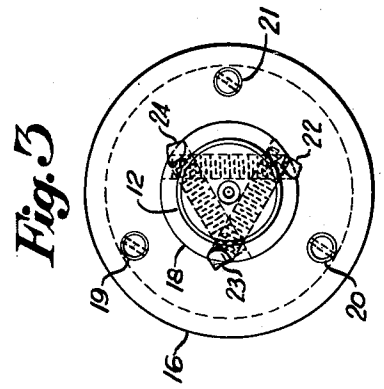

Fig. 3

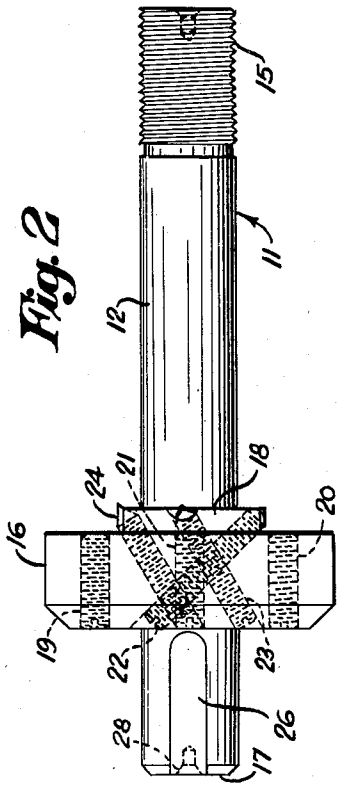

Fig. 2

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SELF-CENTRALIZING AND SYNCHRONIZING DEVICE FOR ARBOR PLUG GAUGES

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1 Claim. (Cl. 82—44)

1

This invention relates to a self-centralizing arbor and synchronizing device for plug gages, either plain or threaded.

At present, personnel engaged in truing plug gages require about five years of training in order to turn out a plug gage of high quality in a reasonable time.

It is an object of the instant invention to provide a device for truing plug gages with which the inexperienced can perform the work now performed by the highly skilled.

A further object is to decrease costs in the manufacture of plug gages.

Other objects of the instant invention will become apparent in the course of the following specification.

In the attainment of these objectives, the case hardened plug gage, either plain or threaded, is inserted between two shoulders on a rotatably mounted self-centralizing arbor. Screws inserted through one shoulder against the end of the gage permit adjustment thereof in a number of directions. Two indicators are provided, one of which shows the variations in the perpendicular distance from points on the outer surface of the plug or on the thread to the longitudinal center line of the arbor. The other indicator shows the variations of any point on the thread relative to the ends of the plug and is used as a synchronizing device.

The invention will appear more clearly when taken in conjunction with the accompanying drawings showing by way of example a preferred embodiment of the inventive idea.

In the drawings:

Figure 1 is a top plan view of the self-centralizing arbor for plug gages rotatably mounted between head and tail stocks and constructed in accordance with the principles of this invention.

Figure 2 is a top plan view of the self-centralizing arbor shown in Figure 1 but on an enlarged scale; and

Figure 3 is an end view of the self-centralizing arbor shown in Figure 2.

Referring now in greater detail to the drawings where like reference numerals indicate like parts, reference numeral 10 indicates the plug gage to be trued, and 11 the self-centralizing arbor for aiding in the truing of the plug gage.

The plug gage 10 is a cylindrical metallic body having a longitudinal opening 12 of circular cross section through the ends at the center. The opening 12 at both ends terminates in similar openings or recesses 13 and 14 of circular cross

2

section and enlarged diameter relative to the longitudinal opening. The gage 10 is roughly threaded in a known manner and then case hardened. Variations in the internal structure of the crystals forming the metallic gage under the influence of the threading and case hardening operations necessitates that the plug be trued, a task now performed by highly skilled personnel using a rotatable grinding wheel.

The arbor 11 is constituted of a shaft 15 fitted through the previously mentioned opening 12 of the gage. Since some adjustment of the gage 10 on the arbor 11 is imperative, a reasonable tolerance is provided between the outside diameter of the shaft and the inside diameter of the gage.

Adjacent one end 17 (Fig. 2) of the shaft 12 is a cylindrical flange 16, integrally formed with the shaft or otherwise attached thereto. On the inner face of the flange 16, that is the face opposite to the end 17, is a cylindrical shoulder or protrusion 18 of reduced diameter. The diameter of the protrusion 18 is designed for fitting into the circular recess 13 of the plug gage with suitable tolerance between the members to permit adjustment as later shown.

Threaded transversely through the rim of the flange 16 are three adjustment screws 19, 20, and 21, the center lines of the screws being parallel to the center line of the arbor and circumferentially spaced apart in the flange 120°. It will be noted that the ends of the screws when threaded through the flange are in contact with or may be brought in contact with the opposed end of the gage. Also threaded through the flange 16 as well as the sides of the integrally formed protrusion 18 are three more screws 22, 23, and 24 but the center lines of the latter screws are inclined to the center line of the arbor. The inner ends of the screws 22, 23, and 24 have angular inner ends to contact the sides of the recess 13 of the gage 10 at three points spaced also 120° apart.

At the same end 17 of the shaft 15 is a conical recess 28 for mounting the shaft 15 on the shaft 25 of the head stock 30, described infra. In addition, the shaft 15 at the same end has a flattened surface portion 26 which is in a plane parallel to the center line of the shaft 15.

Over the opposite or threaded end of the shaft 15 is a cylindrical washer 27 constituting the other side of the clamp or jaw member holding the gage 10 in coaction with the aforementioned flange 16. Removably holding the washer 27 against the free end of the gage is a nut 29 on

the threaded end of the shaft 15. A conical recess 46 in the center of the threaded end of the arbor at the same end provides the means for supporting that end of the arbor by the tail stock 31.

The head stock 30 and tail stock 31 are known. The arbor 11 is rotated by the head stock in the following manner: A stop 47 is longitudinally attached to the lath head 48 by any suitable screws 49, the stop 47 being extended beyond the end of the lath head. The extended end of the stop 47 serves as a stop for the L-shaped driver 32 removably secured on the end of the shaft 25 of the lath head by a screw 33. The end of the horizontal portion of the L-shaped driver is removably secured through the end of a split dog 50 in turn removably attached to the flattened surface 26 of the shaft 15 by a screw 34.

Indicating whether any point on the outer surface of the threaded plug gage 10 is high or low relative to the center line of the arbor is a standard indicator 39 which may be in the form of a dial having a rotatably mounted pointer over any arbitrarily chosen scale, as shown. Actuating the pointer is an arm 37 reciprocally mounted by any suitable means in a plane perpendicular to the center line of the arbor, the arm being reciprocally actuated by the handle member 38 interconnected in a known manner with any suitable mechanism. In the end of the arm 37 adjacent the plug gage 10 is a ball point 36 along the center line of the arm extended. The ball point may be attached to the arm in any desired manner. Of course, the indicator 39 is independently mounted from the arm and the means revolving the pointer of the indicator may be the well known rack and pinion combination, not shown.

Indicating whether any point on the outer surface of the threaded plug gage 10 is high or low relative to the ends of the arbor is another indicator 45 similar to the previously mentioned indicator 39. The indicator 45 is actuated by a lever 41 pivotally mounted by any suitable means 42 in a plane through the center line of the arbor. In the weight arm of the lever 41 is a ball point 40, protruding from the end thereof and coacting with the threads of the plug. The lever arm is moved longitudinally by the handle 43 interconnected with the lever through any known slide and slideway combination. Coacting with the power arm of the lever, is a slidably disposed member 44 under outwardly directed tension, the opposite end of which may have a rack in operable engagement with the pointer on the dial as in the first embodiment. Moving the lever transversely relative to the gage is a handle member 46 through any suitable means at the end of which the slideway for the longitudinal movement of the lever 41 is mounted. The indicator 45 and associated mechanisms previously described is also essentially a synchronizing device for a number of gages to be trued at one time. While the nut 29 is only finger tight and the driver 32 rests against the stop 47, by turning the gage 10 until the indicator 45 reads zero the V of the thread at the ball point will be synchronized with the flat surface 26 so that the position of the grinding wheel relative to the thread of each successive plug will be the same.

In operation:

The gage 10, roughly threaded and case hardened, is inserted over the shaft 15 of the arbor 10 and against the flange 16 with the shoulder 18 in the recess of the gage. The washer 27 is then inserted over the threaded end of the shaft 15 and the nut 29 threaded on the shaft against the outer end of the washer 27 to securely hold the gage. The arbor is then inserted between the pointed ends of the shafts of the head and tail stocks with the end of the shaft 15 having the flattened surface 26 through the split dog 32 and the screw 34 tightened, assuming, of course, that the dog has already been attached to the driver and the driver to the shaft 25 of the head stock in the manner previously described. By rotating the handle 38, the ball point 36 of the indicator 39 can be tested against the threads until an approximate low point is found and to which the remainder of the surface must be ground down. By manipulating the handles 43 and 46 of the indicator 45 along various points of the gage another point may be found that appears low relative to the end of the gage. By manipulation of the angularly disposed screws 22, 23, and 24 of the dial 39, the pointer at the selected point can be brought back to zero on the scale, even though the selected low point reads 2 points off at zero. To the adjusted position of the dial all other points must be made to conform by grinding. In a similar manner the arrow of dial 45 is brought back to zero but by the manipulation of the screws 19, 20, and 21. With the predetermined knowledge of the high and low spots on the gage, the grinding operations are greatly facilitated.

It will be understood that the invention is not limited to the exact disclosure herein described but may lend itself to a variety of expressions within the scope of the appended claim.

What is claimed is:

A self-centralizing arbor for a plug a gage having a cylindrical opening terminating at each end in recesses of greater diameter, said arbor comprising a shaft adapted to be inserted into the opening of the gage, a cylindrical flange mounted on said shaft adapted to engage one end of the gage, a cylindrical shoulder connected with said flange and adapted to fit into one of said recesses, a plurality of screws threaded through said flange above said shoulder and extending parallel to the longitudinal axis of the arbor, said screws being adapted to engage said one end of the gage, and other screws threaded through said flange and said shoulder at an acute angle to said axis and adapted to engage the inner surface of said one recess.

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