March 10, 1959 D. D. PETTIGREW 2,876,669

MICROMETER STOPS FOR MACHINE TOOLS

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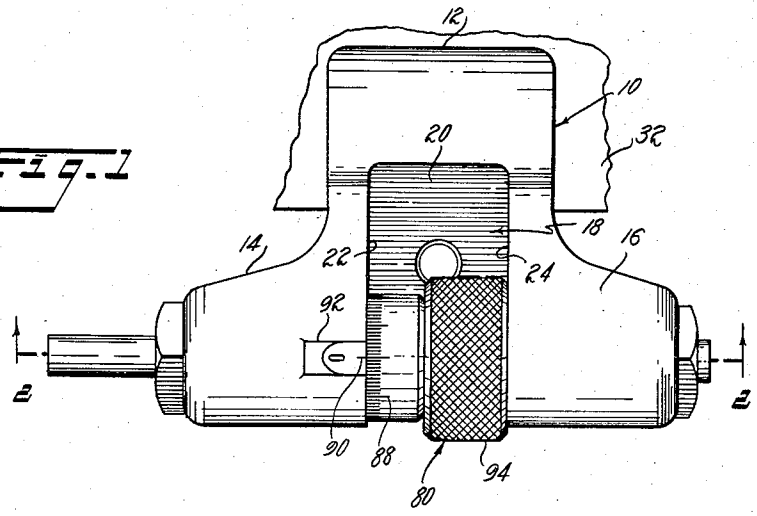
Fig. 1



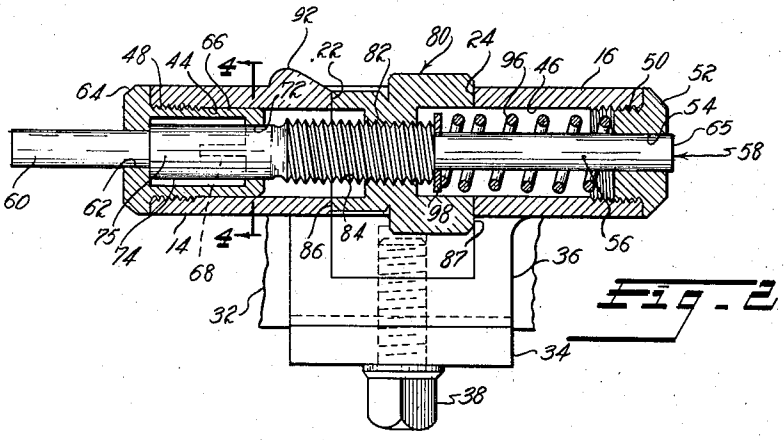


Fig. 2

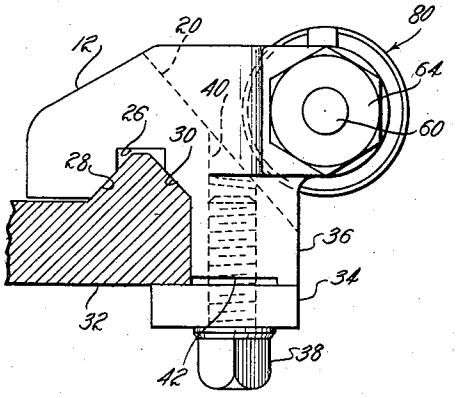


Fig. 3

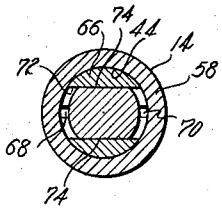


Fig. 4

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MICROMETER STOPS FOR MACHINE TOOLS

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2 Claims. (Cl. 82—21)

This invention relates to stop devices for limiting movement of the tool carriage of a machine tool and more particularly to micrometer stops for use with metal working lathes and the like.

It is the principal purpose and object of the invention to provide improved micrometer stops of simple, rugged construction which maintain a high degree of accuracy under use for extended periods.

It is a further object to provide novel micrometer stops which may be manufactured at a cost well below units of comparable accuracy and durability.

It is also an object of the present invention to provide novel micrometer stops having a micrometer dial for positioning the stop element in which the effects of backlash normally present in such devices are eliminated whereby the dial may be rotated in either direction without loss of accuracy.

It is a further object to provide micrometer stops of novel construction which are held in adjusted position without the use of the usual separate locking mechanisms.

It is an additional object of the present invention to provide micrometer stops of novel construction which are reversible to permit their installation to control the movement of the tool carriage at either end of its stroke.

It is a further object to provide novel micrometer stops in which a spring is utilized in a unique manner to perform the dual functions of eliminating backlash and locking the unit in adjusted position.

It is an additional object to provide novel micrometer stop units having an elongated stop member threaded into a rotatable micrometer dial in which a relatively inexpensive construction including easily fabricated cooperating flats on the stop rod and a bushing prevent rotation of the stop whereby rotation of said dial produces axial movement of the stop rod.

Additional objects and advantages will become apparent as the description proceeds in connection with the drawings in which:

Figure 1 is a top plan view of a micrometer stop assembly constructed in accordance with the present invention;

Figure 2 is a vertical section taken along line 2—2 of Figure 1;

Figure 3 is an end view looking from the left in Figure 1; and

Figure 4 is a fragmentary section taken along line 4—4 of Figure 2 and showing details of construction.

Referring now more particularly to the drawing, **10** indicates generally a relatively heavy body member, preferably of cast iron. The body member has a central section **12** integrally joined to a pair of aligned arms **14** and **16** formed at the opposite sides of a central recess **18** having a sloping bottom wall **20** and vertical side walls **22** and **24**. The under surface of the central section **12** is provided with a downwardly opening groove **26** having inclined side wall portions **28** and **30** adapted to receive the mating surfaces of the front prismatic way **32** of a standard lathe bed. The body **10** is adjustably

clamped to the prismatic way **32** by a plate **34** which engages a portion of the undersurface of the way **32** and is secured to a downwardly projecting portion **36** of the body by a square head collar screw **38** threaded into a tapped opening **40** in the body section **36**. The lower surface of the body section **36** is cut away as at **42** to permit the desired clamping action.

The arms **14** and **16** are provided with aligned bores **44** and **46** which are of the same diameter and substantially the same length. The bores terminate at their inner ends in the recess **18** and are provided at their outer ends with identical tapped portions **48** and **50**, respectively. Threaded into the tapped portion **50** of the arm **16** is a nut bushing **52** having a central reamed bore **54** which slidably receives the cylindrical end portion **56** of the stop rod indicated generally at **58**. A cylindrical portion **60** formed at the opposite end of the stop rod **58** is received in a reamed central bore **62** formed in a nut bushing **64** threaded into the tapped portion **48** of the arm **14**. The end **65** of the rod **58** is carefully finished to provide a precision stop surface.

The nut bushing **64** is provided with a smooth cylindrical shank **66** which is split by the opposed slots **68** and **70** and received within bore **44**. A relatively shallow slot **72** is formed across the inner end of the nut bushing **64**, the opposite parallel sides of which slidably engage flats **74** formed in an enlarged section **75** of the stop rod **58**. The central portion of the nut bushing **64** is undercut to a diameter substantially larger than the diameter of the section **75** of the stop rod. Accordingly, only the relatively short bore **62** and the relatively shallow slot **72** need be carefully machined to achieve the desired support of the stop rod **58**. By virtue of this construction the respective bores **62** and **54** in the nut bushings **64** and **52** support the stop rod **58** for axial movement in exact parallelism with the prismatic way **32** and the cooperating surfaces of the slot **72** and the flats **74** fix the stop rod **58** against rotation. The cylindrical shank portion **66** of the nut bushing **64** fits within the bore **44** of the arm **14** with a relatively large clearance to obviate the necessity for close tolerances in the manufacture of the slot **72** and the flats **74**. If the dimension between the latter is slightly oversize the slots **68** and **70** will permit limited expansion of the shank of the nut to accommodate the flats **74** with a free sliding fit.

The stop rod is moved axially with respect to the body **10** by means of a collar indicated generally at **80** provided with an internally threaded central section **82** threaded onto a central section **84** of the stop rod **58**. The collar **80** is received between the opposite faces **22** and **24** of the recess **18** and the end faces **86** and **87** of the collar and the adjacent faces of the recess are accurately ground or otherwise finished to provide full surface contact therebetween. Suitable indicia **88** are provided around the end of the collar **80** adjacent the face **22** which cooperate with a scribe line **90** formed on a boss **92** on the arm **14** to determine the rotative position of the collar **80**. To facilitate manual adjustment of the collar **80** the collar is provided with an enlarged knurled section **94** which may be readily grasped by the operator's thumb and forefinger.

A coil spring **96** is compressed between the inner end surface of the nut bushing **52** and a washer **98** positioned at the shoulder formed between the end of the threaded section **84** and the cylindrical section **56** of the stop rod **58**. The spring **96** has two important functions. First it takes up all backlash in the stop assembly, for example, between the threads on the stop rod **58** and the threads on the collar **80** and between the adjacent faces **86** and **22** of the collar and body assembly, respectively. Secondly, it provides a frictional

lock to retain the collar in adjusted position. The locking effect is sufficient to prevent inadvertent movement of the collar and yet permit easy rotation when desired. It will be understood that the end surface **65** of the stop rod **58** is the operating stop surface.

It is a feature of the invention that the stop rod may be reversed end for end with respect to the body **10** to permit the use of the device to control the travel of the carriage at either end of its stroke. Specifically the reversal is accomplished by removing the nut bushings **52** and **64** and the spring **96** and threading the stop rod out of the collar **80**. The stop rod **58** is then reversed end for end and threaded into collar **80**, the spring **96** is positioned around the cylindrical portion **56** of the stop rod and the reversed nut bushings **52** and **64** are threaded into the respective arms **14** and **16**. Again the spring **96** will effectively remove the backlash from the system urging the end surface **87** of the collar **80** against the adjacent surface **24** of the recess **18**. The surface **65** remains the effective stop surface.

The micrometer stop assembly of the present invention is normally used to facilitate finishing operations. After the rough cut is completed and it has been determined the amount of additional movement of the tool carriage required to complete the finish cut the nut **38** is loosened and the entire stop assembly is moved along the way to dispose the stop surface **65** in contact with the tool carriage. After the nut **38** is tightened the collar **80** is rotated to move the stop surface **65** away from the tool carriage the exact amount required to perform the finishing operation as indicated by the scale **88** and the scribe line **90**. As indicated above, the stop surface will be retained in this position because of the frictional lock established by the coil spring **96**.

From the foregoing it will be seen that the above stated advantages of the invention have been attained by the provision of a novel micrometer stop assembly of simplified, rugged, construction and high accuracy.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiment is therefore to be considered in all forms as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

What is claimed and desired to be secured by United States Letters Patent is:

1. An adjustable stop assembly comprising a body member adapted to be secured to a fixed support; a stop rod mounted for longitudinal movement in said body member and fixed against rotation, said rod having a central threaded portion and having a stop surface disposed externally of said body; an adjustment nut having threads engaging the threads of said stop rod, said adjustment nut being fixed against axial movement in said body member, and a spring surrounding a portion of said stop rod within said body member and compressed between surfaces rigid with said body member and said stop rod, respectively, to urge said rod in the direction to move said stop surface inwardly of said body to thereby eliminate backlash.

2. An adjustable stop assembly comprising a body member adapted to be secured to a fixed support, said body member having spaced aligned bores provided with threaded end portions; a pair of bushings having aligned central bores mounted respectively in said threaded portions; a stop rod having relatively reduced cylindrical end sections mounted in said bores for sliding movement longitudinally of said body, and having a stop surface disposed externally of said body, said stop rod having an intermediate portion provided with opposed plane surfaces, one of said bushings having plane surfaces adapted to slidably engage the plane surfaces on said stop rod to prevent rotation of said stop rod with respect to said body, said stop rod also having a relatively enlarged threaded central section, a collar having internal threads engaging said threaded central section of said stop rod; means fixing said collar against longitudinal movement in said body whereby rotation of said collar moves said rod axially of said body; and a coil spring surrounding a portion of said stop rod within said body member and compressed between the inner end surface of one of said bushings and a shoulder on said stop rod and adapted to urge said rod in a direction to move said stop surface inwardly of said body to thereby eliminate backlash between said stop rod and said collar and between said collar and said body.

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