

UNITED STATES PATENT OFFICE

2,276,941

STRAIGHTENING MACHINE

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Application October 2, 1940, Serial No. 359,395

2 Claims. (Cl. 153—48)

My invention relates to improvements in machine tools and is directed more particularly to improvements in apparatus for straightening objects.

The principal objects of the invention are directed to the provision of apparatus for straightening work of all kinds such as shafts, worms, and the like.

It has been customary in straightening work to place the same between centers and, while slowly rotating or oscillating the work, to determine by means of various gauges or instruments contacting the work the amount or degree which the work is out. The procedure is then to remove the work from the centers and to straighten it by various means. After the straightening operation, the work is again placed between the centers and by means of instruments or gauges it is determined whether the work has been straightened to the desired degree. Oftentimes the work is tested or measured and straightened a number of times.

Such practice is not only tedious and costly but has among other objections the disadvantage that when the work is straightened the operation may be carried too far and in any event it requires several trials.

According to my invention, the apparatus in a general way includes means for supporting a piece of work so that it may be oscillated or rotated to facilitate measurements to be taken by means of gauges or instruments to determine whether and where it requires straightening and means for applying pressure to the work for straightening the same.

As special features of the invention, the work is held between centers for both the measuring and straightening operations and is made possible by the provision of a center or centers that are yieldable and retractable while the work may be moved axially for the measuring and straightening operations.

With the foregoing and various other novel features and advantages and other objects of my invention as will become more apparent as the description proceeds, the invention consists in certain novel features of construction and in the combination and arrangement of parts as will be hereinafter more particularly pointed out in the claims hereunto annexed and more fully described and referred to in connection with the accompanying drawing, wherein:

Fig. 1 is a side elevational view of a straightening apparatus embodying the novel features of the invention;

Fig. 2 is a front elevational view of the machine shown in Fig. 1; and

Fig. 3 is an enlarged view of one of the centers and mounting therefor.

The novel features of the invention may be used in connection with various forms of presses or the like having a movable member or members adapted to exert pressure.

Referring now to the drawing more in detail, wherein similar reference figures refer to like parts, and referring more particularly to the preferred form of my invention which has been selected for illustrative purposes, I have shown in the form of the apparatus shown in Figs. 1 and 2, a frame or support 2 having a ram 4 reciprocable therein which is operable by a lever 6 that is pivoted by links 8 to the frame.

The said lever 6 is actuated by a piston rod 10 that has a piston, not shown, reciprocable in a cylinder 12 pivoted at 14 to the frame. Fluid may be admitted to the cylinder to move the piston upwardly and cause the ram to move downwardly for applying pressure.

Other means may be employed for actuating a ram or rams so that pressure may be applied to the work.

A base is shown at 20 which is secured in some suitable manner relative to the support and ram and a slide 22 on the upper side thereof is guided for sliding movements on the base, as by plates 24 engaging the sides of the base. Any other form of guiding means may be employed.

The slide is formed on its upper side with a slideway 26 for blocks or center carriers 28 so that the same may be moved relative to one another and relative to the slide. Binding screws 30 of any well known form are associated with the carriers which engage the slide for locking the carriers in adjusted positions.

Anvils 32, and there may be as many as desired, are slidable along the slide 22 and are adapted to underlie an object or the work W which is rotatably supported between centers 34 associated with the carriers 28. The centers 34 are arranged for retraction relative to the carriers and also are yieldable.

The retractability and yieldability of the centers 34 may be accomplished in various ways but as shown, the said centers extend into openings of the carriers and are provided with slots 36 that receive pins 38 carried by the carriers. Bores 40 in the centers have compression springs therein that bear on the pins and tend to urge the centers inwardly while allowing the said centers to be retracted.

Adjusting means which may be in the form of screws 42 are associated with the blocks or carriers 28 and springs 44 disposed below the centers urge them upwardly against the screws 42. The centers may move downwardly against the springs 44 which urge them upwardly. Other means than shown may be employed for urging the centers upwardly.

In operation the carriers are moved apart a distance to facilitate a piece of work being supported by the centers and locked to the slide in this desired relation.

A piece of work W is placed between the centers with an anvil or anvils 32 below the work.

Instruments or gauges of various kinds associated with the ram, slide, or any suitable part of the machine, may be employed for measuring or indicating while the work is rotated or oscillated between the centers, the amount or degree of correction the work requires, and the point or points along the work requiring pressure for the correction.

The slide 22 is moved along the base to bring that part of the work requiring pressure beneath the ram with the anvils below the work at opposite sides of the ram. The ram is lowered to press on the work to the required degree and the centers yield and retract if necessary to accommodate any displacement of the work there may be. When pressure is removed from the work the springs 44 act on the centers to urge them upwardly against members 42.

Thus the work may be tested and straightened without removal from between the centers since the centers are yieldable and the slide may be moved along the base to position that portion of the work requiring pressure beneath the ram.

Work is readily inserted between and removed from the centers since they are retractable or depressible axially.

The invention may be embodied in other specific forms without departing from the essential characteristics thereof. Hence, the present embodiments are therefore to be considered in all respects merely as being illustrative and not as being restrictive, the scope of the invention being indicated by the appended claims rather than by

the foregoing description, and all modifications and variations as fall within the meaning and purview and range of equivalency of the appended claims are therefore intended to be embraced therein.

What it is desired to claim and secure by Letters Patent of the United States is:

1. Apparatus of the class described comprising in combination, a support having a ram vertically reciprocable therein, a slide member guided on said support for horizontal movements therebelow, a pair of spaced blocks guided on said slide member for relative sliding movements having cavities in adjacent sides, centering devices having rear ends disposed in said cavities and forward work supporting ends, pivotal connections associated with the rear ends of the centering devices and blocks whereby the forward ends thereof may swing up and down, spring means acting on said devices urging them upwardly, and adjustable means limiting upward movements of said devices, the said pivotal connections including pivot pins in the said blocks receivable in longitudinally extending closed slots in said centering devices.

2. Apparatus of the class described comprising in combination, a support having a ram vertically reciprocable therein, a slide member guided on said support for horizontal movements therebelow, a pair of spaced blocks guided on said slide member for relative sliding movements having cavities in adjacent sides, centering devices having rear ends disposed in said cavities and forward work supporting ends, pivotal connections associated with the rear ends of the centering devices and blocks whereby the forward ends thereof may swing up and down, spring means acting on said devices urging them upwardly, adjustable means limiting upward movements of said devices, the said pivotal connections including pivot pins in the said blocks receivable in longitudinally extending closed slots in said centering devices, and spring means acting on said centering devices to urge them forwardly relative to said pivot pins.

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