Oct. 17, 1950 C. D. JOHNSON 2,526,237

ADJUSTABLE MOUNTING FOR WIRE DRAWING DIES

Filed June 16, 1945

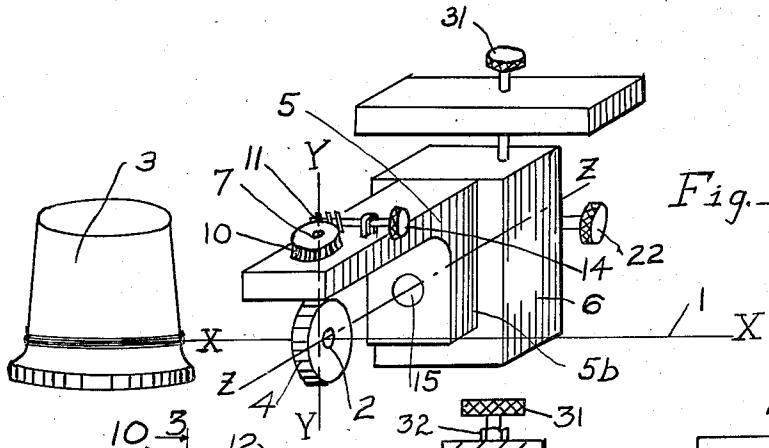


Fig. 1.

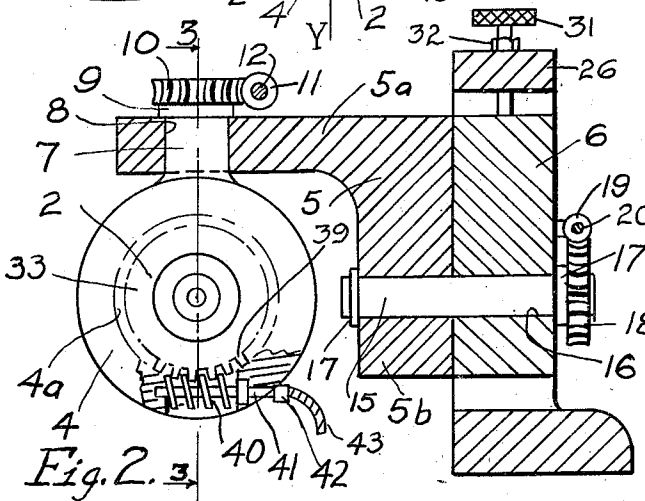


Fig. 2.

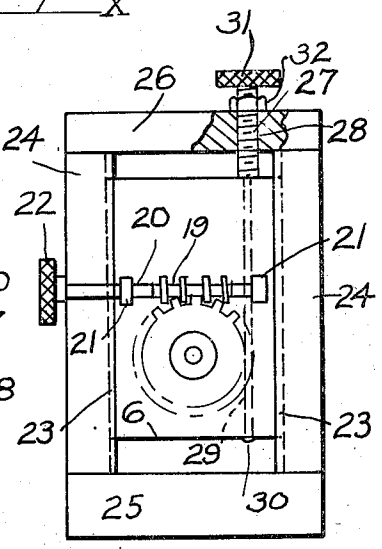


Fig. 4.

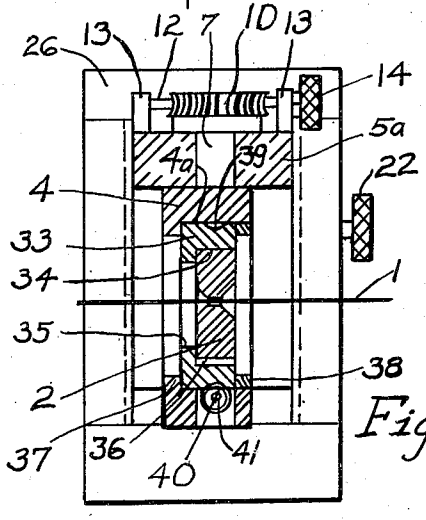


Fig. 3.

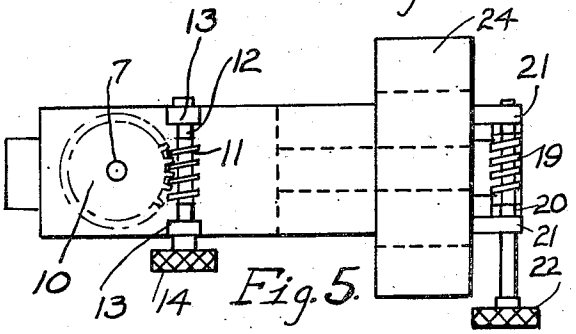


Fig. 5.

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Patented Oct. 17, 1950 2,526,237

UNITED STATES PATENT OFFICE

2,526,237

ADJUSTABLE MOUNTING FOR WIRE DRAWING DIES

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Application June 16, 1945, Serial No. 599,890

5 Claims. (Cl. 205—25)

1

The present invention relates to wire drawing apparatus and has for its object to provide an improved mounting for the dies employed in connection with such apparatus, whereby any such die may be readily adjusted with reference to the line of movement of the wire, as it is drawn through the die on to the surface of a wire drawing block.

Briefly stated, the present invention contemplates an arrangement whereby the position of a die may be adjusted in several different directions with reference to an associated wire drawing block, with the die itself being angularly adjustable about the wire being drawn therethrough. Furthermore, the improved construction is such that any one of the adjustments hereinafter described can be made independently of and without disturbing the other adjustments, so that after the die mounting has been initially set up and wire is being drawn through the die, final minute adjustments can be made without interrupting the wire drawing operation. The above and other advantageous features of the invention will hereinafter more fully appear from the following description considered in connection with the accompanying drawings, in which:

Fig. 1 is a diagrammatic view in perspective illustrating the relation between the several adjustments of my improved die mounting, this view not being to scale.

Fig. 2 is a view, partially in section and partially in side elevation, of a mounting for a wire drawing die embodying the present invention.

Fig. 3 is a vertical sectional view along the line 3—3 of Fig. 2, looking in the direction of the arrows.

Fig. 4 is a rear elevation of the device shown in Fig. 2, as viewed from the right.

Fig. 5 is a plan view of the device shown in Fig. 2.

Referring to the drawings, the general principles involved in the construction are illustrated diagrammatically in Fig. 1, wherein wire 1 is shown as being drawn through a die 2 on to the surface of a wire drawing block 3, with the line of movement of the wire 1 being indicated at X—X, hereafter referred to as the draft line. In order to insure that the wire 1 will properly pass through the die 2 and on to the block 3, the invention contemplates an arrangement whereby a holder 4 for the die 2 may be adjusted about a substantially vertical axis Y—Y intersecting the draft line X—X, and whereby a bracket 5 for the holder 4 may be adjusted about a horizontal

2

axis Z—Z, passing through the intersection of the axis Y—Y with the draft line X—X. The invention further contemplates the provision of means for adjusting a slide 6 carrying both the bracket 5 and die holder 4 up and down, with respect to the wire receiving surface of the block 3, as well as additional means for angularly adjusting the die 2 within its holder 4 about the wire 1.

Referring now to Figs. 2 and 3, it will be seen that the die holder 4 is in the form of a disk providing a central opening 4a for receiving the die 2. The holder 4 also provides an upwardly extending pivot pin 7, freely received in an opening 8 provided in a forwardly extending arm 5a of the bracket 5.

A collar 9 serves to vertically position the pivot pin 7, so that the holder 4 is suspended from the bracket 5, while being free to turn about the pin axis Y—Y of Fig. 1. The pin 7 extends above the collar 9 and carries a worm gear 10 in mesh with a worm 11 turnable on a shaft 12 mounted between ears 13 provided by the bracket arm 5a. As best shown in Fig. 5, one end of the shaft 12 provides a knob 14, whereby the worm 11 may be turned to impart angular movement to the holder 4 about the pivotal axis Y—Y, as the worm gear 10 is turned in one direction, or the other. Obviously, the meshing of the teeth of the worm gear 10 with the worm 11 will cause the die holder 4 to maintain its position after an adjustment on the bracket. While worm gearing is shown for obtaining pivotal movement of the holder 4, spiral or helical gears can be employed for the same purpose.

The bracket 5 also provides a downwardly extending arm 5b carrying a pivot pin 15 extending freely through an opening 16 provided in the slide 6. The pin 15 is fixed with respect to the bracket arm 5b, and carries positioning collars 17 for maintaining the rear face of the bracket 5 in engagement with the front face of the slide 6, with the bracket being capable of pivotal movement on the slide about the pin axis Z—Z of Fig. 1. The pivot pin extends beyond the slide collar 17 and carries a worm gear 18 in mesh with a worm 19.

As best shown in Fig. 4, the worm 19 is mounted on a shaft 20 turnable in lugs 21 projecting from the back of the slide 6, and the shaft 20 extends laterally from the slide, with its outer end carrying an operating knob 22. The knob 22 provides means for readily turning the shaft 20 and through it the worm wheel 18, thereby imparting angular movement to the bracket

about the axis Z—Z of its pivot pin 15. The engagement between the worm wheel 18 and the worm 19, or any equivalent gearing, maintains any desired adjustment of the bracket 5 and, obviously, such adjustment can be made independently of any previous adjustment of the holder 4, as described above.

As best shown in Figs. 4 and 5, the slide 6 is mounted between vertical guideways 23 provided by the side members 24 of a suitable frame, which also comprises a base 25 and top member 26. It is to be noted that the distance between the base 25 and top member 26 is greater than the length of the slide 6, as measured vertically, and while the slide 6 is frictionally held between the guideways 23, means are provided for closely adjusting the position of the slide 6 within the frame. To this end, a screw 27 is in threaded engagement with an opening 28 in the top frame member 26, with an unthreaded portion 29 of the shaft 27 passing through the slide and secured against longitudinal movement by means of a head 30.

The upper end of the shaft 27 provides an operating knob 31, so that turning of the knob 31 will cause the threaded portion of the shaft 27 to move either up or down with respect to the top frame member 26. Therefore the slide 6 can be moved vertically between the guideways 23 within a very close range of adjustment, without disturbing any previous adjustments of the die holder 4 or bracket 5, and any desired adjustment of the slide 6 can be maintained by locking the shaft 27 against turning by means of a nut 32.

As previously pointed out, the invention also contemplates the provision of means for angularly adjusting the die itself about the wire being drawn therethrough, so as to insure that the die will wear evenly. As best shown in Figs. 2 and 3, such adjustment of the die 2 is obtained by mounting the die on an adjusting ring 33 that is rotatable within the holder 4. To this end, the ring 33 provides an opening 34 for receiving the die 2, with a shoulder 35 preventing sidewise movement of the die in the direction of the draft on the wire 1. Suitable means are provided for preventing turning of the die 2 within the ring 33, as by means of a key 36.

The ring 33 is freely received within the opening 4a of the die holder 4, and the ring is held against sidewise movement by means of a collar 37 and a retainer 38 threaded within the opening 4a. In order to impart turning movement to the ring 33 and the die 2 held thereby, the outer periphery of the ring 33 provides worm gear teeth 39 in mesh with a worm 40 rotatably mounted in the holder 4.

As best shown in Fig. 2, the worm 40 provides a shaft extension 41 terminating in a socket 42 for receiving a suitable tool for turning the worm 40, and thereby imparting rotative movement to the ring 33 and the die 2 about the draft line X—X. Should it be desired to impart continuous rotative movement to the ring 33 while wire is being drawn through the die, the socket 42 provides means for conveniently coupling the worm 40 to the end of a flexible shaft 43 continuously driven from a source of power, as indicated in dotted lines in Fig. 2.

In the utilization of a die 2 mounted in accordance with the disclosure of the present invention, the several adjustments that have been described are employed in order to insure that the best results are obtained when drawing wire through the die on to the block 3. For example, the up and down adjustment of the slide 6, carrying both the bracket 5 and the die holder 4, is employed to regulate the height of the draft line X—X with reference to the wire drawing block 3 to insure that the wire will be drawn on to the block at just the right point. On the other hand, adjustment of the holder 4 about the pivotal axis Y—Y by means of the knob 14, and adjustment of the bracket 5 about the pivotal axis Z—Z by means of the knob 22, will impart exactly the desired degree of tilting to the die in different planes to cause the wire to lay properly as it coils on the block 3.

Such tilting or "casting" of the die is a delicate problem in wire drawing, and it has been found that minute adjustments of the tilt of the die, obtainable by turning the knobs 14 and 22, respectively, permits laying the wire as it is drawn in a coil of given diameter, generally corresponding to the diameter of the drawing block or drum. That is to say, by the above described adjustment of the die, successive coils of wire drawn on the block can be caused to lay dead, i. e., without exhibiting any tendency to spring apart and cause snarling.

As previously described, the die itself can be angularly adjusted about the wire being drawn therethrough, and this adjustment is useful in preventing undue wear of the die opening. With a die fixed in its holder, the continuous drawing of wire therethrough will in time result in wear on the die opening, which wear will likely to be at one side of the die, especially when a cast is imparted to the wire being drawn. By being able to angularly adjust the die 2 about the wire, through turning of the ring 33, such wear of the die can be equalized and be made entirely uniform, by imparting a slow rotative movement to the worm 40.

From the foregoing, it is apparent that by the present invention there is provided an improved mounting for wire drawing dies, whereby a die so mounted may be readily adjusted with reference to the draft line as well as the drawing block, so as to obtain extremely favorable results. As pointed out above, the various adjustments can be made independently of each other, with the assurance that when an adjustment is once made, it will be maintained during the wire drawing operation. Furthermore, the various adjusting mechanisms are so arranged as to be conveniently operated while the wire drawing operation is in progress, so that final minute adjustments can be made to obtain the desired results, while actually observing passage of the wire through the die and on to the drawing block.

I claim:

1. An adjustable mounting for wire drawing dies comprising in combination, a fixed frame, a slide vertically movable with respect to said frame, a bracket mounted on said slide and turnable about a horizontal pivot extending through the slide, with said bracket providing a portion projecting beyond and parallel to the axis of its pivot, and a die holder mounted on the projecting portion of said bracket and turnable about a pivot extending vertically through said bracket portion and intersecting the pivotal axis of said bracket, with said die holder providing a circular opening for receiving and supporting a die, and with the central axis of said die-receiving opening passing through the intersection of the pivotal axes of said bracket and said holder.

2. An adjustable mounting for wire drawing dies comprising in combination, a fixed frame, a

slide vertically movable with respect to said frame, a bracket mounted on said slide and turnable about a horizontal pivot extending through the slide, with said bracket providing a portion projecting beyond and parallel to the axis of its pivot, a die holder mounted on the projecting portion of said bracket and turnable about a pivot extending vertically through said bracket portion and intersecting the pivotal axis of said bracket, with said die holder providing an opening for receiving and supporting a die, and with the central axis of said die-receiving opening passing through the intersection of the pivotal axes of said bracket and said holder, and interlocking gearing for causing pivotal movements of said holder and said bracket independently of each other, while maintaining the intersecting relation between said pivotal axes and the axis of the holder opening.

3. An adjustable mounting for wire drawing dies comprising in combination, a fixed frame providing spaced vertically extending guideways, a slide movable between said guideways, a bracket mounted on said slide and turnable about a horizontal pivot extending through the slide, with said bracket providing a portion projecting beyond and parallel to the axis of its pivot, a die holder mounted on the projecting portion of said bracket and turnable about a pivot extending vertically through said bracket portion and intersecting the pivotal axis of said bracket, with said die holder providing an opening for receiving and supporting a die, and with the central axis of said die-receiving opening passing through the intersection of the pivotal axes of said bracket and said holder, and means for moving said slide vertically within said frame to determine the position of the die-receiving opening of said holder with respect to said frame, while maintaining the intersecting relation between the pivotal axes of said bracket and said holder.

4. An adjustable mounting for wire drawing dies comprising in combination, a fixed frame, a slide movable with respect to said frame, a bracket mounted on said slide and turnable about a horizontal pivot extending through the slide, with said bracket providing a portion projecting beyond and parallel to the axis of its pivot, a die holder mounted on the projecting portion of said bracket and turnable about a pivot extending vertically through said bracket portion and intersecting the pivotal axis of said bracket, with said die holder providing an opening for receiving and supporting a die, and with the central axis of said die-receiving opening passing through the intersection of the pivotal axes of said bracket and said holder, worm gears mounted on the pivots of said bracket and said holder, respectively, and worms mounted on said slide and on said bracket, respectively, in mesh with said worm gears, with turning of said worms serving to cause pivotal movements of said holder and bracket independently of each other, while maintaining the intersecting relation between said pivotal axes and the axis of the holder opening.

5. An adjustable mounting for wire drawing dies comprising in combination, a fixed frame providing spaced vertically extending guideways, a slide movable between said guideways, a bracket mounted on said slide and turnable about a horizontal pivot extending through the slide, with said bracket providing a portion projecting beyond and parallel to the axis of its pivot, a die holder mounted on the projecting portion of said bracket and turnable about a pivot extending vertically through said bracket portion and intersecting the pivotal axis of said bracket, with said die holder providing an opening for receiving and supporting a die, and with the central axis of said die-receiving opening passing through the intersection of the pivotal axes of said bracket and said holder, worm gears mounted on the pivots of said bracket and said holder, respectively, and worms mounted on said slide and on said bracket, respectively, in mesh with said worm gears, with turning of said worms serving to cause pivotal movements of said holder and bracket independently of each other, while maintaining the intersecting relation between said pivotal axes and the axis of the holder opening, and means for moving said slide on said frame to determine the position of the axis of said holder opening with respect to said frame, while maintaining the pivotal adjustment of said bracket and holder, as determined by said worm gears and worms.

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