Sept. 26, 1967 L. D. MERSEK 3,343,574

WIRE STRAIGHTENING UNIT

Filed April 22, 1965 2 Sheets-Sheet 1

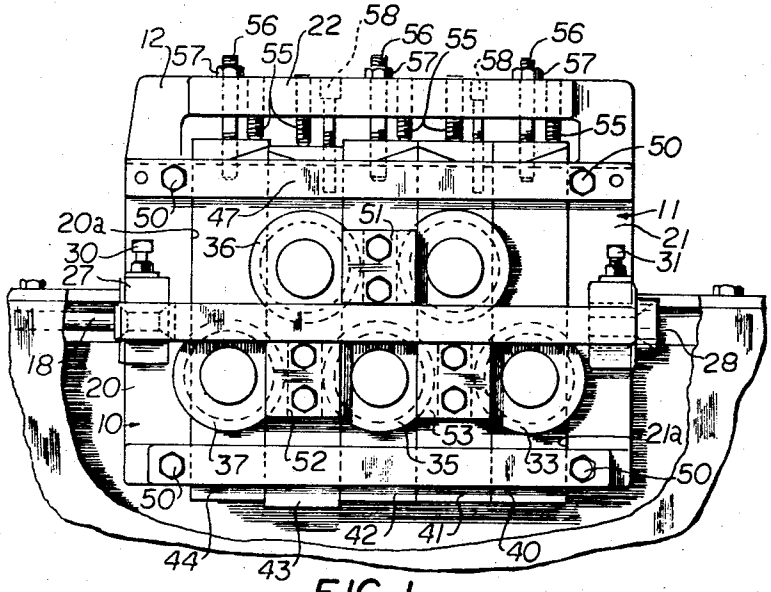


FIG. 1

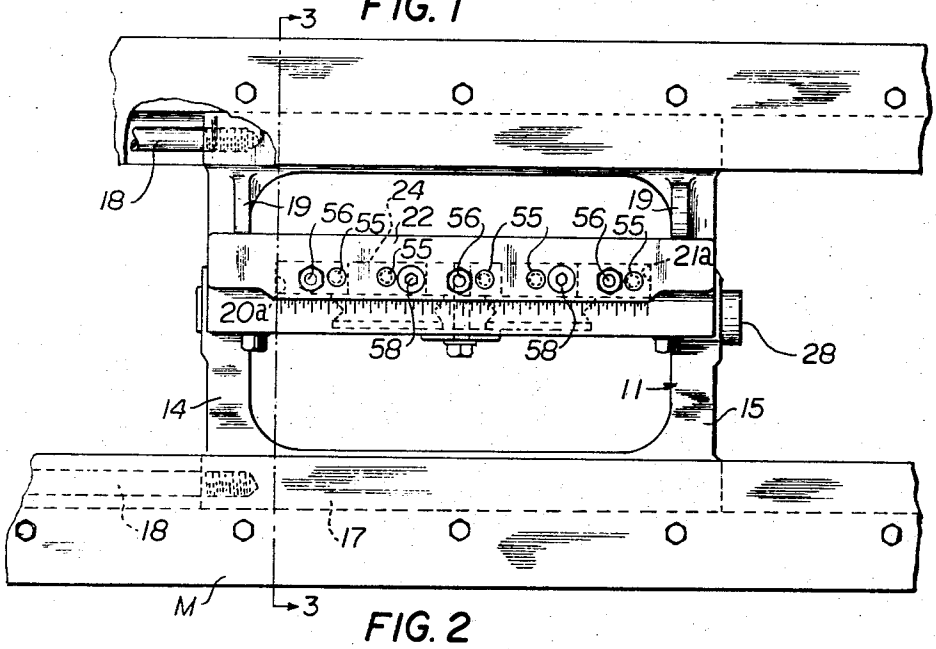


FIG. 2

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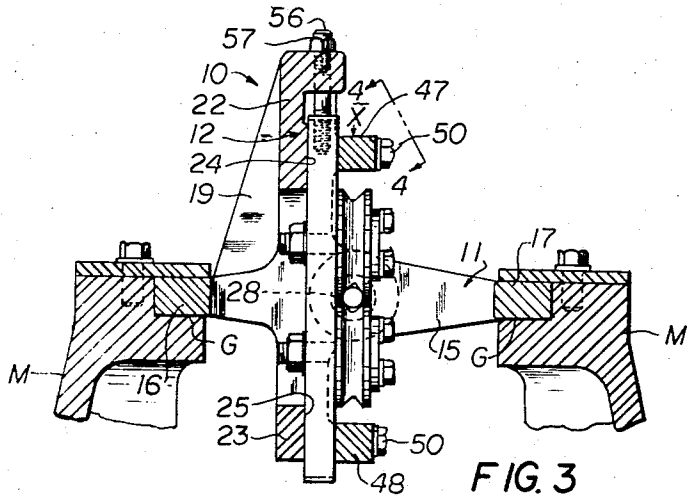


FIG. 3

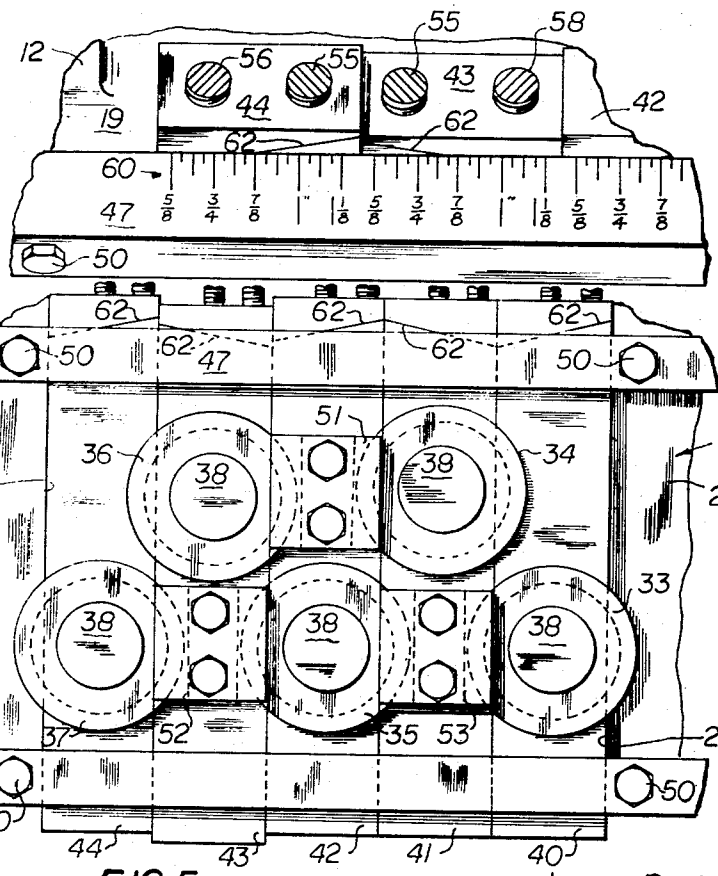


FIG. 4

FIG. 5

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WIRE STRAIGHTENING UNIT

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The present invention relates to wire straightening units of the type comprising a series of rollers carried on a frame so as to engage opposite sides of a wire passing therebetween and flex and straighten the wire and to remove any tendency of the wire to kink.

Wire straightening units of the type mentioned generally comprise a frame having a wire guide bushing serving to guide a wire to be straightened between a series of straightening rollers supported on the frame, and a second wire guide bushing coaxial with the first bushing for guiding the wire passing from the straightening rollers into a succeeding wire working unit. It is convenient to employ rollers having grooves in the peripheries thereof V-shaped in cross section as distinguished from grooves semicircular in cross section so that by properly adjusting the axial positions of the rollers toward or away from the center line of the guide bushings, wires of different diameters, within limits, may be passed between the same rollers for straightening etc. thereof. It is, however, important that the axes of the rollers be accurately positioned with respect to the guide bushings.

A principal object of the present invention is the provision of a new and improved wire straightening unit having indicating means which clearly and accurately indicates the positions of the roller axes relative to the center line or axis of the wire guides and which permits the rollers to be quickly and accurately positioned for any given size wire within the range of the capacity of the rollers.

More specifically, it is the object of the present invention to provide a new and improved wire straightening unit comprising a frame having two spaced, axially aligned wire guide bushings and a series of grooved straightening rollers between the guides, the rollers each being supported on a member shiftable in a direction transversely of the axis of the wire guide bushings, and indicating means for registering the position of each member comprising two adjacent linear indicia means which converge so that one intersects the plane of the other at an acute angle and one being shiftable toward and away from the other in accordance with the shift in position of the roller supporting member relative to the center line of the guide bushings whereby the distance of shift in position of the apparent point of intersection of the linear indicia is a substantial magnification of the distance of the shift of the member.

Other objects and advantages of the invention will be apparent from the following description of a wire straightening unit embodying a preferred form of the invention, reference being made to the accompanying drawings wherein:

FIG. 1 is a fragmentary view of a wire drawing machine having a wire straightening unit attached thereto, certain parts of the machine being broken away and the wire straightening unit being shown in elevation;

FIG. 2 is a fragmentary plan view of the wire drawing machine and wire straightener unit;

FIG. 3 is a sectional view taken substantially along line 3—3 of FIG. 2;

FIG. 4 is a fragmentary perspective view taken along line 4—4 of FIG. 3, but on a larger scale; and

FIG. 5 is a fragmentary view of the wire straightening unit showing FIG. 1 having certain parts omitted and being shown on a larger scale.

Referring to the drawings, a wire straightener unit **10** is shown supported in guideways G of a wire drawing machine M which is of the reciprocating type in which a reciprocating die box, not shown, is supported on the frame for performing successive drawing operations on the wire as it passes through the unit. The wire straightener unit **10** is reciprocated to move relative to the wire during one stroke of the die box and straightens the wire before it enters the die box. The machine M is like the Ajax-Hogue Wire Drawer No. 6 manufactured by the assignee of this invention. The straightener unit also has utility in conjunction with many other wire processing machines, such as a wire straightener and cut-off machines and in some cases the wire straightener unit will remain fixed.

Wire straightener unit **10** shown is operatively connected to the die slide and moves therewith and comprises a unitary frame **11**, which may be a die casting having a generally rectangular base plate **12** supported on end cross members **14, 15**, the outer ends of which are interconnected by slides **16, 17** which slide in guideway G of machine M. For the purpose of reciprocating the unit with the die slide rods **18**, actuated by suitable mechanism not shown, are attached to the unit by threading into openings in the cross members **14, 15**. Gussets **19** lend rigidity to the base plate **12** and its supporting cross members.

The base plate **12** includes end parts **20, 21** in the form of bars providing inwardly facing plane abutment surfaces **20*a*, 21*a*** and upper and lower parts **22, 23** interconnect the end parts and provide transverse plane bearing surfaces **24, 25** which are inset from the plane of the front surfaces of the end parts as seen in FIG. 3.

Cross members **14, 15** have openings for receiving wire guide bushings **27, 28** therein, respectively, which bushings can be replaced by sets of bushings of different diameters and are secured in position by set screws **30, 31**. The bushing openings are axially aligned so that wire fed into bushing **28** is directed out from the unit through guide **27**.

Wire fed into bushing **28** passes through a series of five straightener rollers **33, 34, 35, 36, 37** which are rotatably journaled on stub bearings **38** attached to slide bars **40, 41, 42, 43, 44** respectively. A large number of similar rollers could be employed if desired. The rollers **34, 36** are retained on their bearings **38** by a flanged plate **51** bolted to bar **42**, and rollers **33, 35, 37** are retained on their bearings **38** by similar retaining plates **52, 53** bolted to plates **41, 43**. The slide bars rest against the transverse surfaces **24, 25** and are dimensioned to snugly fit between the inside surfaces **20*a*, 21*a*** of end members **20, 21** and are held to these surfaces by upper and lower retaining bars **47, 48** which are bolted to the end parts of the frame by bolts **50**. The rollers **33–37** are the same diameter and each has a peripheral groove **51** therein which is V-shaped in cross section, the grooves having straight sides. The straight sides of the grooves permit the same rollers to accept wires therebetween of different diameters, within a limited range, provided the axes of the rollers are properly spaced from the common axis of the wire guides. The included angle between the sides of the grooves **51** shown in 70°; other angles, however, may be employed.

In order to accurately locate bars **40–44** and position the rollers to accept wires of a given diameter, set screws **55** are threaded through openings in an overhanging portion of transverse part **22** to engage and locate the upper ends of the respective bars **40–44**, as viewed in FIGS. 1, 3, and 4, and threaded rods **56** which extend through openings in member **22** are threaded into openings in the top ends of the respective bars **40, 42, 44**. In locating bars **40–44**, screws **55** are rotated to properly position the lower ends thereof, the nuts **57** threaded on the rods

56 are drawn tight to firmly draw the bars 40, 42, 44 against their respective locating screws, and the bars 41, 43 are drawn to their locating screws 55 by countersunk Allen head bolts 58 threaded therein.

The present invention provides means for clearly indicating the positions of the slide bars 40–44 or more particularly the straightening rollers carried thereby relative to the axis of the wire guides 27, 28, and thereby facilitate the speedy and accurate setting of all rollers the correct equidistance from the center line of the guide bushings for any particular wire passing through the unit. According to the present invention a scale 60 is provided along the top surface of retaining bar 47 opposite each adjacent slide bar 40–44, respectively, and each scale comprises a series of etched or stamped lines extending normal to the inner edge of the retainer bar and terminating according to a pattern convenient for reading. The lines comprising the scales 60 may be appropriately marked.

Each of the slide bars 40–44 has a sloping indicia line 62 scribed transversely of the outer face thereof, which line slopes so as to converge with the plane of the top surface of retainer bar 47 between the ends of the adjacent scale 60, as seen in FIG. 4, when the axis of the roller supported by the slide bar is within the range of its wire working positions. It will be apparent that slight longitudinal movement of any of the slide bars 40–44 in either direction will result in an appreciable shifting of the point of intersection of slope lines 62 with the plane of the top surface of retainer bar 47 which is along the inner edge of the adjacent scale 60. As an example of the magnification of the bar movements appearing along the scales 60, by scribing lines 62 at angles of 8° to 12° to the plane of the scales 60 on retainer bar 47, the intersection of the slope lines with the scale edges shifts a distance which is from four to six times the movement of the respective slide bars. It will be apparent that a high degree of accuracy and ease of effecting proper settings of the slide bars is achieved by my invention.

In the form shown, the slope lines 62 on the bars 40, 42, 44 slope in one direction and lines 62 on bars 41, 43 slope in the opposite directions so that the scale readings will be the same for all of the bars although the rollers on each set of bars are on opposite sides of the center line of the wire guides.

The spacing of the marks comprising the scales 60 and the angle of slope of lines 62 relative to the plane of the scale surface can be calculated so that when the slope lines and scale edges intersect at a mark having a given indicia, such as a numerical fraction indicating wire diameters in inches, the roller axis will be properly centered for the wire diameter indicated. Alternatively, any suitable indicia could be employed to indicate the settings for different diameter wires to be passed through the unit.

In the various figures of the drawings with the exception of FIG. 3 the roller supporting member or slide bar 43 is shown in a different position relative to the guide bushings than the other slide bars merely to better illustrate that the slide bars are adjustable.

Although one form of the invention has been described, it is to be understood that other forms, modifications and adaptations could be made all falling within the scope of the claims which follow.

I claim:

1. A wire straightener unit or the like comprising a frame, guide means for guiding wire transversely of said frame, two contiguous bars supported on said frame for sliding movement in parallel paths, a wire straightener roller on each of said bars for engaging opposite sides of a wire passing therebetween, a scale member extending

adjacent to said bars and having a surface lying in a plane intersecting the adjacent faces of said bars, said member having linear indicia means along one edge thereof adjacent said faces of said bars, linear indicia means extending across said face of one of said bars and converging with the plane of said one surface toward the edge of said one bar remote from the other bar, linear indicia means extending across said face of said other bar and converging with the plane of said surface toward the edge of said other bar remote from the adjacent edges of said bars, and means to position said bars relative to said frame.

2. A wire straightening unit or the like comprising a frame, a first means for guiding a wire transversely of said frame, a straightening roller supporting member supported on said frame for movement transversely of said first means, a straightening roller carried by said straightening roller supporting means, second means forming a first linear indicator means on said frame, third means forming a second linear indicating means on said straightening roller supporting member and converging with respect to said first linear indicator means, said second linear indicator means extending transversely of the direction of movement of said straightening roller supporting member whereby said linear indicator means are shifted relative to one another in accordance with movement of said straightening roller supporting member, and indicia adjacent to said first linear indicator means indicating the relative position of said roller to said first means.

3. A wire straightening unit or the like comprising a frame, first means for guiding a wire transversely of said frame, a plurality of straightening roller supporting members supported on said frame for movement transversely of said first means, a straightening roller carried by each of said straightening roller supporting means with alternate rollers located on opposite sides of said first means, second means forming first linear indicator means on said frame, third means forming a second linear indicating means on said straightening roller supporting members, said second linear indicating means converging with respect to said first linear indicator means and extending transversely of the direction of movement of said straightening roller supporting members whereby said second linear indicator means are moved relative to said first indicator means upon movement of said straightening roller supporting members, and an indicia scale for each of said straightening roller supporting members adjacent to said first linear indicator means indicating the relative position of said straightening rollers carried thereby to said first means, said second linear indicator means associated with the respective straightening roller supporting members, the rollers of which are on opposite sides of said first means being inclined with respect to said first linear indicator means in opposite directions and said scale associated with said first linear indicator means reading in the same direction.

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