United States Patent [19]

Jackman

[11] **3,802,244**

[45] **Apr. 9, 1974**

[54] **APPARATUS AND METHOD FOR POINTING WIRE**

[76] Inventor: **Arthur E. Jackman,** 756 W. Main St., New Britain, Conn. 06051

[22] Filed: **Dec. 29, 1972**

[21] Appl. No.: **319,664**

[52] **U.S. Cl.** **72/275,** 72/285, 72/402

[51] **Int. Cl.** **B21c 5/00**

[58] **Field of Search** 72/185, 186, 275, 285, 72/407, 378, 294, 304, 452, 402

[56] **References Cited**

UNITED STATES PATENTS

2,999,405	9/1961	Ewart	72/402
2,728,447	12/1955	Ware	72/285
897,344	9/1908	Bray et al.	83/318

Primary Examiner—Lowell A. Larson
Attorney, Agent, or Firm—McCormick, Paulding & Huber

[57] **ABSTRACT**

Apparatus for use in pointing wire or rod comprising a die holder having a generally wedge shaped upwardly opening die receiving recess containing a pair of split wedge shaped wire forming dies. The dies move in sliding engagement with walls of the die holder toward each other and into working engagement with a wire positioned therebetween when pulling force is applied to the wire in an axial direction and relative to the die holder whereby to reduce the cross sectional area of an elongated portion of the wire spaced from its ends. Reversal of the direction of force applied to the wire causes the dies to separate or move out of engagement with the wire. A point is formed on the wire by cutting it transversely of its axis to expose a free end of the elongated portion.

11 Claims, 7 Drawing Figures

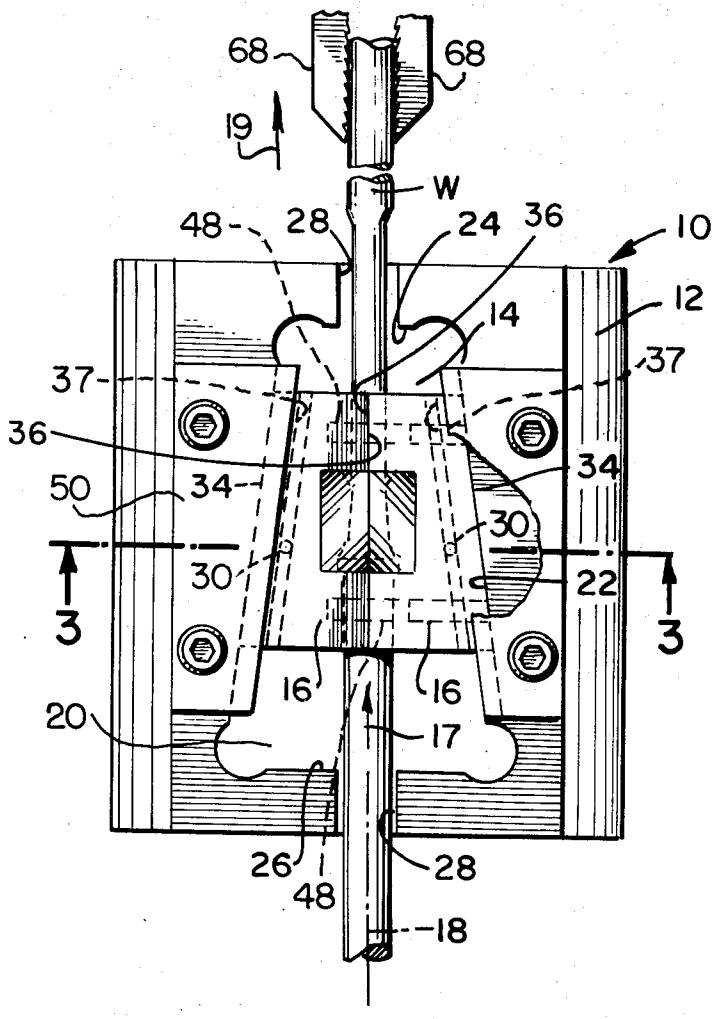


FIG. 1

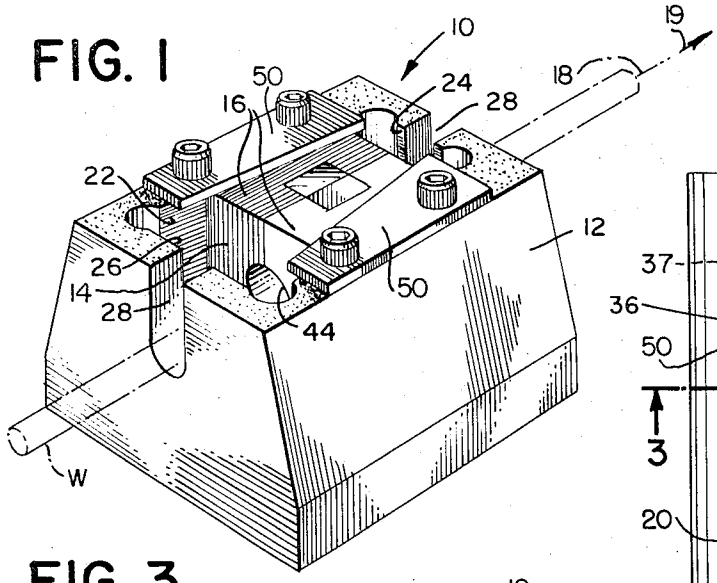


FIG. 2

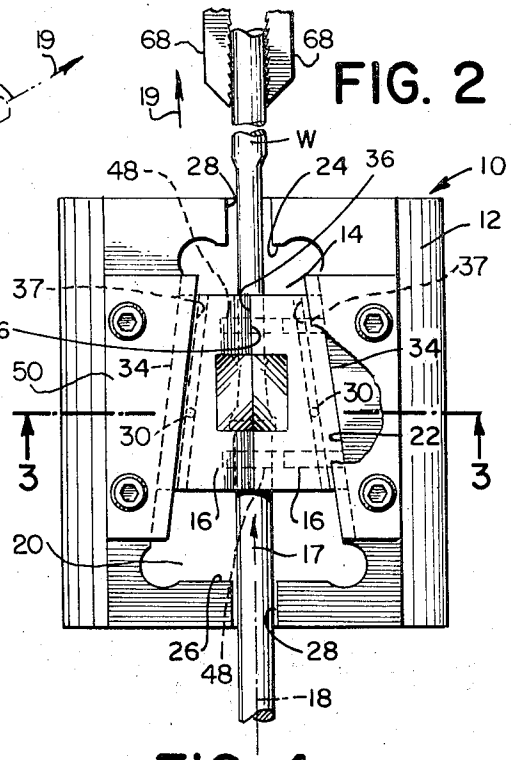


FIG. 3

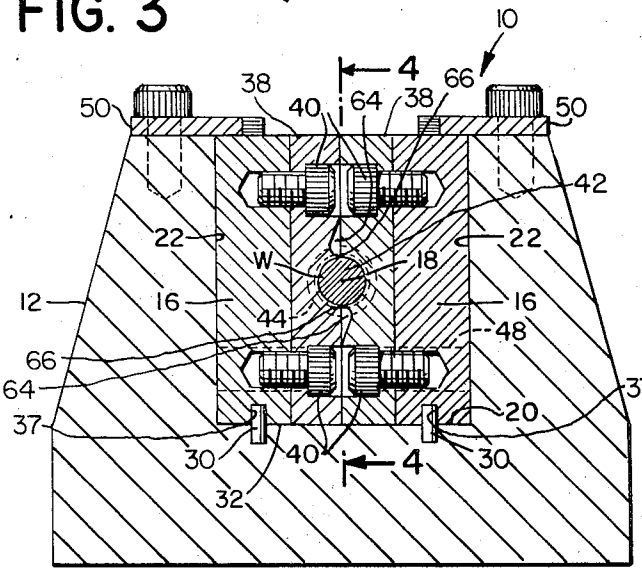


FIG. 4

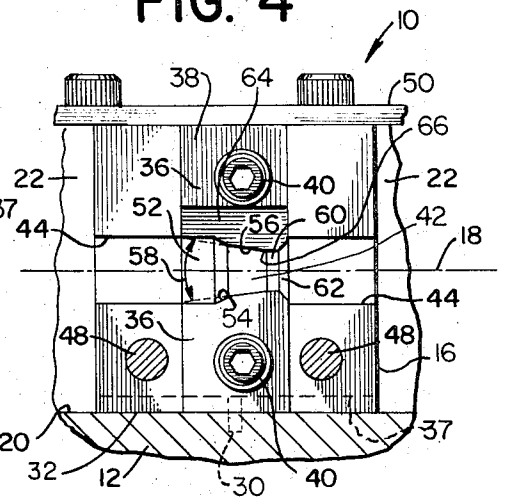


FIG. 5

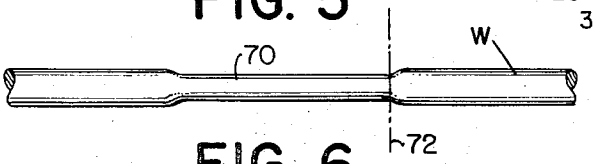


FIG. 6

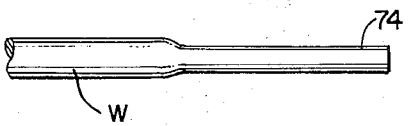
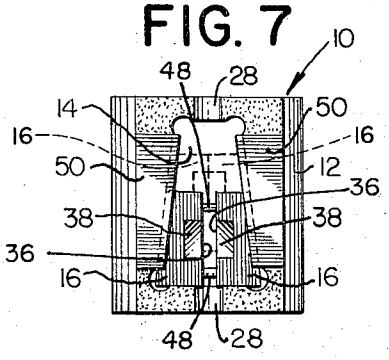


FIG. 7



APPARATUS AND METHOD FOR POINTING WIRE

BACKGROUND OF THE INVENTION

This invention relates in general to methods and apparatus for forming wire, rod and like material and deals more particularly with an improved apparatus and method for use in pointing a wire or rod in preparation for a drawing operation or the like.

Heretofore, various devices and methods have been provided for forming a point or elongated portion of reduced cross-sectional area on a rod or wire to facilitate insertion thereof into a drawing die. If the rod or wire to be pointed has sufficient column strength, a point may be formed thereon by forceably inserting a free end portion thereof into a suitable forming die. However, the aforesaid method cannot be utilized when the wire or rod to be pointed is made from a relatively soft material or otherwise lacks sufficient column strength to resist buckling upon forceable insertion into a die. Various power operated apparatus have been provided for pointing wire or rod by swaging or turning to displace or remove material, however, such apparatus is usually relatively expensive and requires periodic tool maintenance. Accordingly, it is the general aim of this invention to provide a method and apparatus for use in pointing wire, the apparatus being of simple, rugged construction for low-cost manufacture, durability, and relatively maintenance free service.

SUMMARY OF THE INVENTION

In accordance with the present invention, an improved method and apparatus is provided for use in pointing wire wherein a point, or section of reduced cross-sectional area, is formed on a wire by pulling it through a pair of split wire forming dies to reduce the cross-sectional area of an elongated portion of the wire spaced from the ends thereof. A point is formed by cutting the wire through the elongated portion to expose a free end thereof.

BRIEF DESCRIPTION OF THE DRAWING

FIG. **1** is a perspective view of a device embodying the present invention for use in pointing wire in accordance with the method of the present invention.

FIG. **2** is a somewhat enlarged plan view of the device of FIG. **1** shown in working engagement with a wire positioned therein.

FIG. **3** is a somewhat further enlarged sectional view taken along the line **3—3** of FIG. **2.**

FIG. **4** is a fragmentary sectional view taken along the line **4—4** of FIG. **3.**

FIG. **5** is a fragmentary side elevational view of a wire which has been formed by the device of FIGS. **1–4.**

FIG. **6** is a fragmentary side elevational view of the wire of FIG. **5** after it has been pointed in accordance with the present invention.

FIG. **7** is similar to FIG. **2** but of somewhat reduced size and shows the dies in an open position, the closed position of the dies being shown by broken lines.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT AND METHOD

In accordance with the present invention, a wire or rod is pointed by positioning an axially extending portion thereof spaced from its ends between a pair of split wire forming dies. The dies are brought into forming engagement with the wire to reduce the cross-sectional area of an elongated portion thereof. After forming, the wire is removed from the dies and cut transversely of its elongated portion to expose at least one free end of the elongated portion.

Turning now to the drawing, a device embodying the present invention and illustrating the method thereof is indicated generally by the reference numeral **10** and comprises a die case or die holder **12** which has an upwardly opening generally wedge-shaped recess **14** formed therein. A die set which comprises a pair of split wedged-shaped forming dies generally indicated at **16, 16** is received within the recess **14.** The forming dies **16, 16** are constructed and arranged to move transversely toward and away from each other in response to respective forward and rearward movement longitudinally of the die holder **12.** The dies **16, 16** move toward each other to a closed position in forming engagement with an associated portion of a wire W, positioned therebetween with its axis **18** in general alignment with the longitudinal axis of the device **10,** when axial pulling force is applied to the wire W in a forward direction, as indicated by the arrow **19** in FIGS. **1** and **2.** Application of reverse or pushing force to the wire in an axial direction causes the forming dies **16, 16,** to move out of working engagement with the wire or toward an open position to effect release of the wire W as will be hereinafter further discussed. In FIGS. **1** and **2,** the dies **16, 16** are shown in closed or working position. The open position of the dies is shown in FIG. **7.**

Considering the device in further detail, the die holder **12** may take various forms, but preferably, and as shown it is machined from a generally rectangular metal block. The die recess **14** is defined by a generally horizontally disposed bottom wall **20,** a pair of generally vertically disposed and inwardly facing side walls **22, 22,** a front wall **24** and a rear wall **26.** The side walls **22, 22** converge toward the forward end of the holder **12.** Preferably, each side wall **22** forms an angle of at least 7° with the axis **18.** Upwardly opening slots **28, 28** formed in opposite ends of the die holder **12** communicate with the recess **14** to facilitate positioning of the wire W therein. A pair of pins **30, 30** spaced inwardly from the side walls **22, 22** project upwardly from the bottom wall **20** for a purpose to be hereinafter discussed.

The dies **16, 16** are substantially identical and each has a lower surface **32** for sliding engagement with the bottom surface **20** and a generally vertically disposed and outwardly facing bearing surface **34** for complementary sliding engagement with an associated side wall **22.** Each die **16** also includes a generally vertically disposed and inwardly facing abutment surface **36** for mating engagement in an axial plane with a corresponding abutment surface on the other of the dies when the dies are in closed position. Each die **16** has a groove **37** which opens downwardly through the lower surface **32** thereof. The groove **37** is spaced inwardly from and generally parallel to an associated bearing surface **34.** The pins **30, 30** cooperate with the grooves **37, 37** to retain the bearing surfaces **34, 34** in engagement with the side walls **22, 22.**

Each die carries a die insert **38** which is received in a vertically extending notch, substantially as shown. The insert is retained in the notch by a pair of threaded fasteners **40, 40.** The inserts are made from material harder than the material from which the dies **16, 16** are

made and may, for example, be made from tungsten carbide or like material. Each insert **38** defines one half of a longitudinally extending die cavity **42**, best shown in FIG. **4**, which is generally coaxially aligned with the axis **18** when the dies **16, 16** are in closed position and which will be hereinafter further described. Generally semi-cylindrical inwardly opening recesses **44, 44** formed in each die **16** open through opposite ends thereof and communicate with the die cavity **42**, as shown in FIG. **4**.

The dies **16, 16** are arranged for movement in unison within the recess **14** by a pair of dowel pins **48, 48** which are carried by one forming die and which project therefrom and into pin receiving openings formed in the other forming die **16**. The forming dies **16, 16** are retained in the recess **14** by a pair of retaining plates **50, 50** secured to the upper surface of the die holder **12**. Each plate **50** has an elongated marginal portion or lip which extends inwardly beyond an associated side wall **22**.

Considering now the preferred configuration of the die cavity **42** and referring particularly to FIG. **4**, wherein one half section of the die cavity defined by one of the dies is illustrated. The cavity includes a generally cylindrical portion **52** which opens through the rear end thereof and communicates at its inner end with a bell mouth portion **54**. The bell mouth portion blends smoothly into a generally conical portion **56** which forms an approach angle of approximately 14°, the latter angle being designated by the numeral **58**. The inner end of the conical portion **56** communicates with a generally cylindrical bearing portion **60** which has a cross-sectional area throughout the axial length thereof smaller than the cross-sectional area of the wire W. Each insert **38** has a relieved or cut away area immediately adjacent one side of the die cavity section formed therein, the relief areas of the dies **16, 16** being designated by the numerals **64, 64** in FIG. **3**. Each relief area **64** cooperates with the die cavity section in an associated die **16** to define a relatively sharp shearing edge **66** which defines one side edge of the cavity section. Thus, as best shown in FIG. **3**, each insert **38** has one shearing edge **66** which cooperates in shearing relation with an associated abutment surface **36** on the other of the dies when the dies **16, 16** move to closed position.

A wire W to be pointed is positioned between the open dies **16, 16** with its axis generally aligned with the longitudinal axis of the device **10** so that an elongated portion of the wire spaced from the ends thereof is positioned is generally coaxial alignment with the two half sections of the die cavity **42**. Slight forward movement of the dies **16, 16** within the recess **14** causes the dies to move into frictional engagement and toward working relation with opposite sides of the wire W. Thereafter, pulling force is applied to the free end of the wire in the direction of the arrow **19** by jaws **68, 68** or some other suitable means, which may, for example, comprise a chain and dog mechanism on an associated wire drawing machine (not shown). The initially applied force causes the dies **16, 16** to move forwardly in the holder **12** and into tight gripping engagement with the wire W. As additional force is applied to the wire W in the direction of the arrow **19**, the dies **16, 16** continue to move forwardly with the wire and radially inwardly in working engagement with the wire and toward mating engagement with each other. As the dies approach their closed or mating position, the portion of the wire received within the cavity **42**, formed therebetween, will be reduced in cross-sectional area. Some slight flash may be produced on the wire as the dies approach their fully closed or mating position, however, this flash will be trimmed from the wire by the shearing action of the edges **66** when the dies move to fully closed position. Force is continually applied to the wire in the direction of the arrow to draw an elongated portion of the wire through the bearing portion **60** of the die cavity so that an elongated portion of substantially uniform diameter and reduced cross section is formed on the wire W, as indicated at **70** in FIG. **5**. Thereafter, the dies **16, 16** are opened by reversing the direction of force on the wire W. Since a portion of the wire forward of the die cavity **42** has a cross-sectional area greater than the cross-sectional area of the die cavity at its forward end, continued application of force to the wire W in a reverse direction causes the dies **16, 16** to move rearwardly within the recess **14**. The pins **30, 30** cooperate with the grooves **37, 37** to cause the dies to separate or move transversely outwardly and away from each other as they move toward the rear of the recess **14**. Ultimately, a release position is attained wherein the wire W may be lifted vertically out of the device. Suitable means (not shown) will, of course, be provided for removing any flash or trimmed material from the die recess **14** when the dies attain an open position. The pointing operation is completed by cutting the wire W through the elongated portion thereof as indicated at **72** in FIG. **5**, to expose a free end **74** of the elongated portion, as shown in FIG. **6**.

I claim:

1. Apparatus for reducing the cross-sectional area of a portion of an axially elongated wire and comprising a die set including a pair of opposing mating dies, each of said dies having a radially inwardly opening recess therein extending axially therethrough and defining a portion of a die cavity, each recess cooperating with the other when the dies are in mating relation to define said die cavity, said die cavity including an axially elongated portion having a cross-sectional area throughout the length thereof smaller than the cross-section of the wire, means restraining said die sections for radial movement toward and away from each other respectively into and out of mating relation and for axial directional movement in unison, means supporting said die sections for radial and axial movement, and means for moving said dies radially inwardly toward each other into mating relation and working engagement with associated opposite side portions of a wire positioned therebetween with the axis thereof coaxially aligned with the axis of said die cavity in response to movement of said dies in one axial direction relative to said supporting means.

2. Apparatus as set forth in claim **1** including means for moving said dies away from each other and out of working engagement with a wire positioned therebetween in response to movement of said dies in a direction opposite said one axial direction and relative to said supporting means.

3. Apparatus as set forth in claim **1** wherein said supporting means comprises said means for moving said dies toward each other.

4. Apparatus as set forth in claim **1** wherein said supporting means comprises a die holder having a generally wedge-shaped upwardly opening die receiving re-

cess partially defined by a pair of vertically disposed and inwardly facing side walls converging in said one axial direction, said dies received in said recess, each of said dies having a generally vertically disposed outwardly facing bearing surface for complementary sliding engagement with an associated one of said side walls, said side walls and said associated bearing surfaces comprising said means for moving said dies toward each other.

5. Apparatus as set forth in claim **4** including means for moving said dies away from each other in response to movement of said dies in a direction opposite said one axial direction and relative to said supporting means.

6. Apparatus as set forth in claim **5** wherein said recess includes a bottom surface, said die holder has a pair of pins projecting upwardly from said bottom surface, each of said dies has a lower surface in sliding engagement with said bottom surface and a groove opening downwardly through said lower surface and receiving an associated one of said pins therein, said groove being parallel to an associated one of said side walls, each of said pins cooperating with an associated one of the grooves to maintain one of said dies with the bearing surface thereof in sliding engagement with an associated side surface.

7. Apparatus as set forth in claim **4** including means for retaining said dies in said recess.

8. Apparatus as set forth in claim **1** wherein said restraining means comprises a dowel pin carried by one of said dies and slidably received in the other of said dies.

9. Apparatus as set forth in claim **1** wherein each of said dies includes an insert, said insert defining said axially elongated portion.

10. Apparatus as set forth in claim **1** wherein each of said dies has a radially inwardly facing abutment surface thereon engageable with said abutment surface on the other of said dies when said dies are in mating relation, said die cavity defining portion of each of said dies opens through an associated one of said abutment surfaces, and each of said dies has a relief area therein generally adjacent one side of said die cavity defining portion and opening through said abutment surface thereof, said relief area cooperating with said die cavity defining portion to form a shearing edge which defines one edge of said die cavity defining portion, each said shearing edge cooperating in shearing engagement with said abutment surface on the other of said dies when said dies are in mating relation.

11. A method for pointing a wire having a substantially uniform cross-sectional area throughout its length comprising the steps of positioning an axially elongated portion of the wire spaced from the ends thereof between a set of wire forming dies, moving said dies into forming engagement with said elongated portion to reduce the cross-sectional area of said elongated portion throughout its length, removing said wire from said dies, and cutting said wire at said elongated portion after the cross-sectional area thereof has been reduced to form at least one free end on said elongated portion.

* * * * *