United States Patent [19]

Strybel

[11] **3,849,881**

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[54] **TOOL CONSTRUCTION**

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[73] Assignee: **Imperial-Eastman Corporation,** Chicago, Ill.

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[21] Appl. No.: **372,792**

[52] **U.S. Cl.** ..... **30/102,** 7/1 G, 7/7.1, 7/14.1, 30/94, 30/124, 81/177 E, 145/61 L

[51] **Int. Cl.** **B23d 21/08**

[58] **Field of Search** ..... 7/14.1, 1 G, 7.1; 30/102, 30/101, 96, 97, 98, 124, 92, 93, 94, 95; 81/177 E, 177 D; 145/61 L, 65

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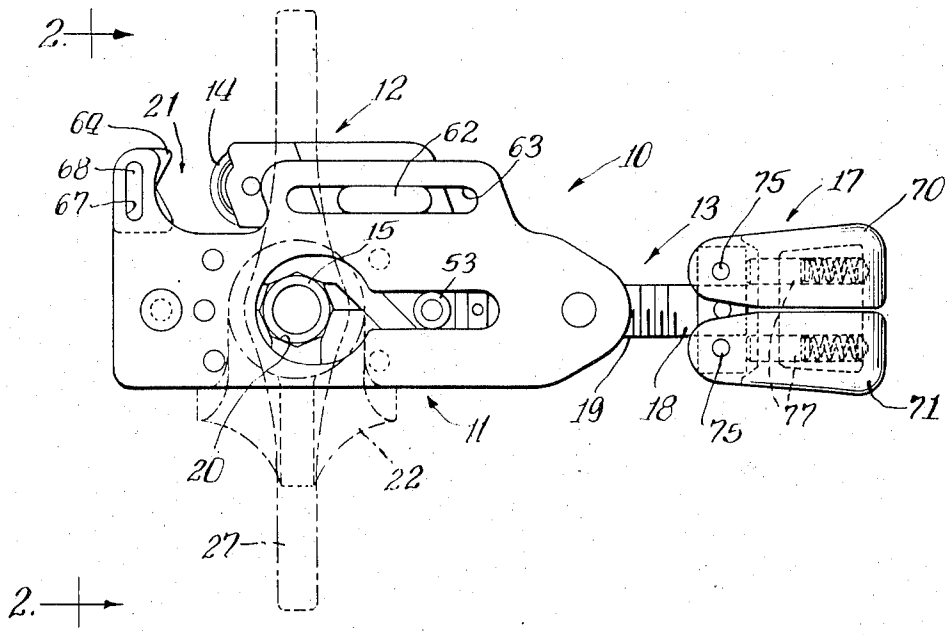
Attorney, Agent, or Firm—Hofgren, Wegner, Allen, Stellman & McCord

[57] **ABSTRACT**

A tool construction for use with workpiece tubes including an adjustable tube holder and an adjustable tube working device integral with the tube holder, and structure for concurrently adjusting the tube holder and tube working device. The exemplary disclosed tube working device comprises a tube cutter. The adjusting structure may be constructed to arrange the tube holder to be properly adjusted to receive the tube at the end of the tube working operation for effectively minimal adjustment to hold the tube for a subsequent operation. The tool includes an improved handle structure selectively disposed in a contracted arrangement or in an extended arrangement. Structure may be provided for biasing the handle to be releasably maintained in each of the selected arrangements.

17 Claims, 9 Drawing Figures



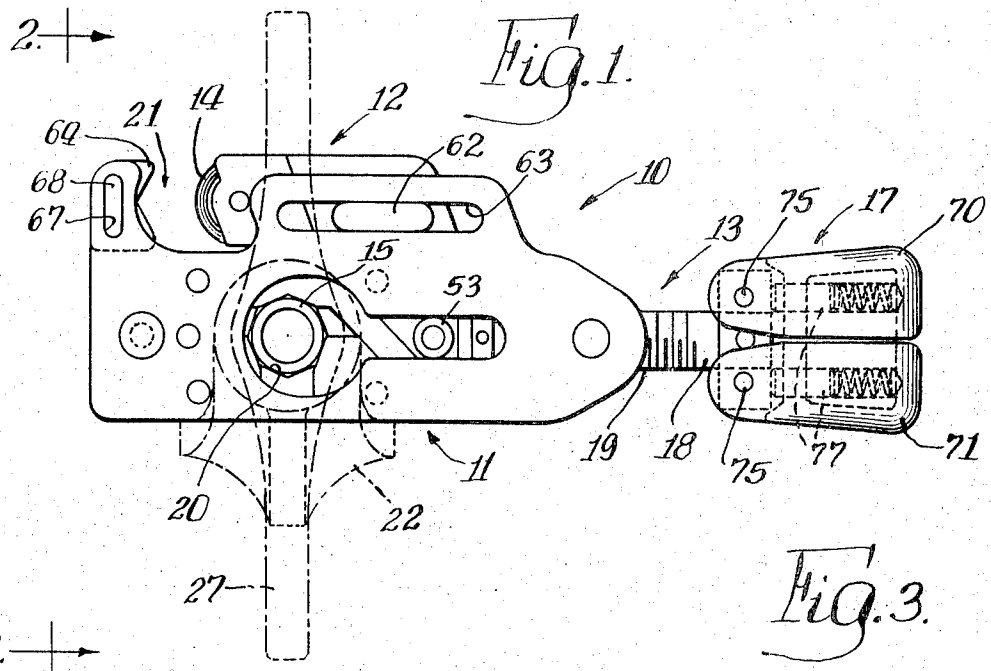


Fig. 1.

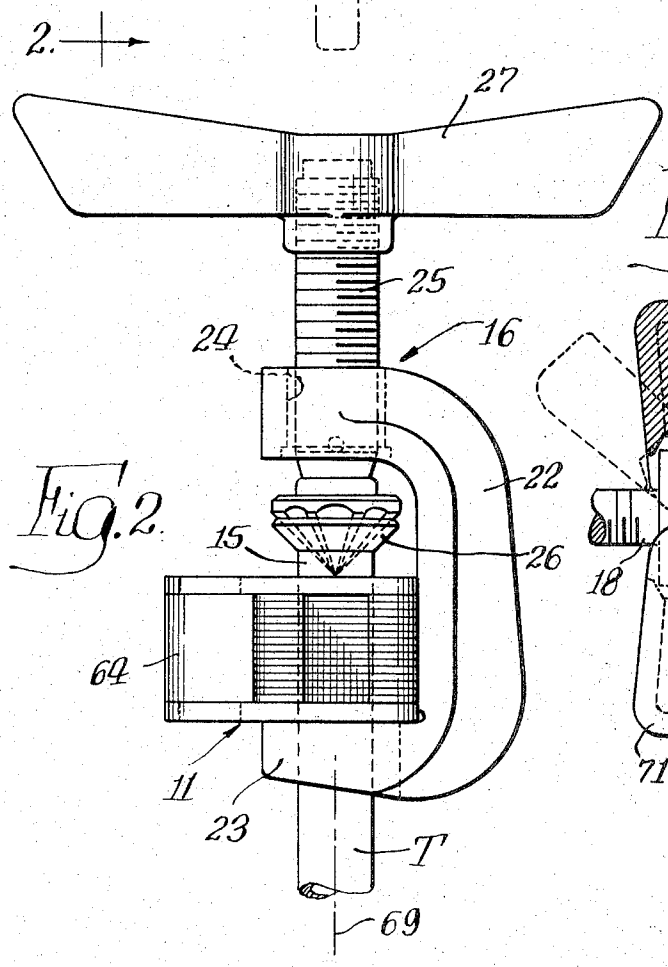


Fig. 2.

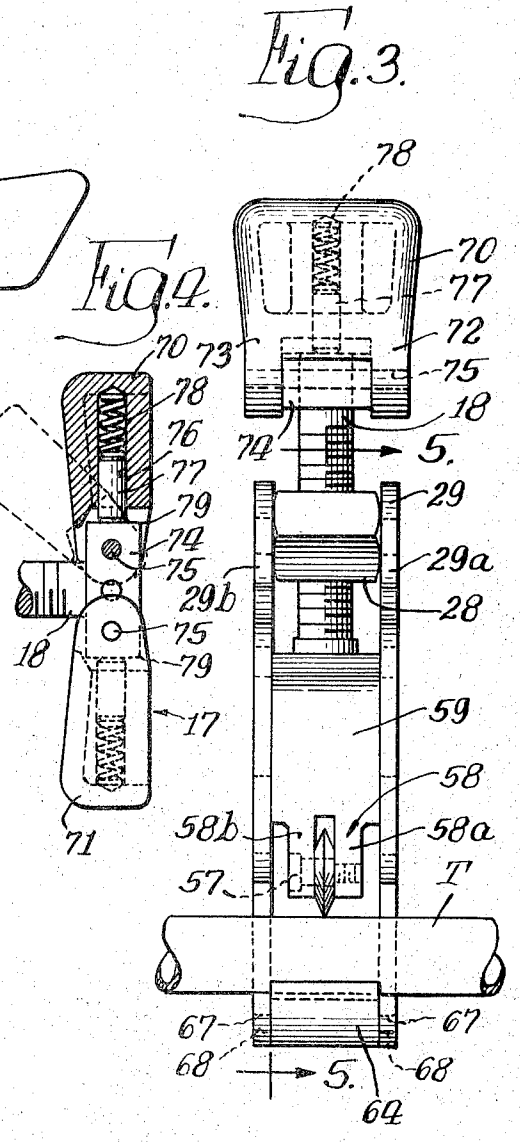


Fig. 3.

Fig. 4.

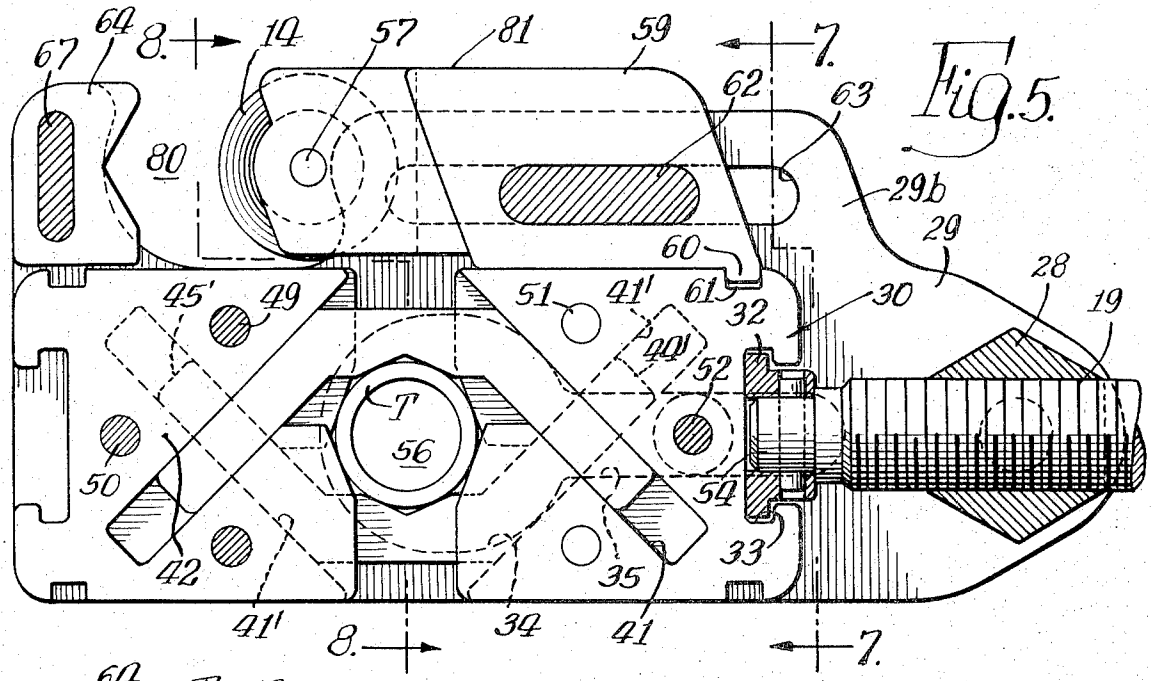


Fig.5.

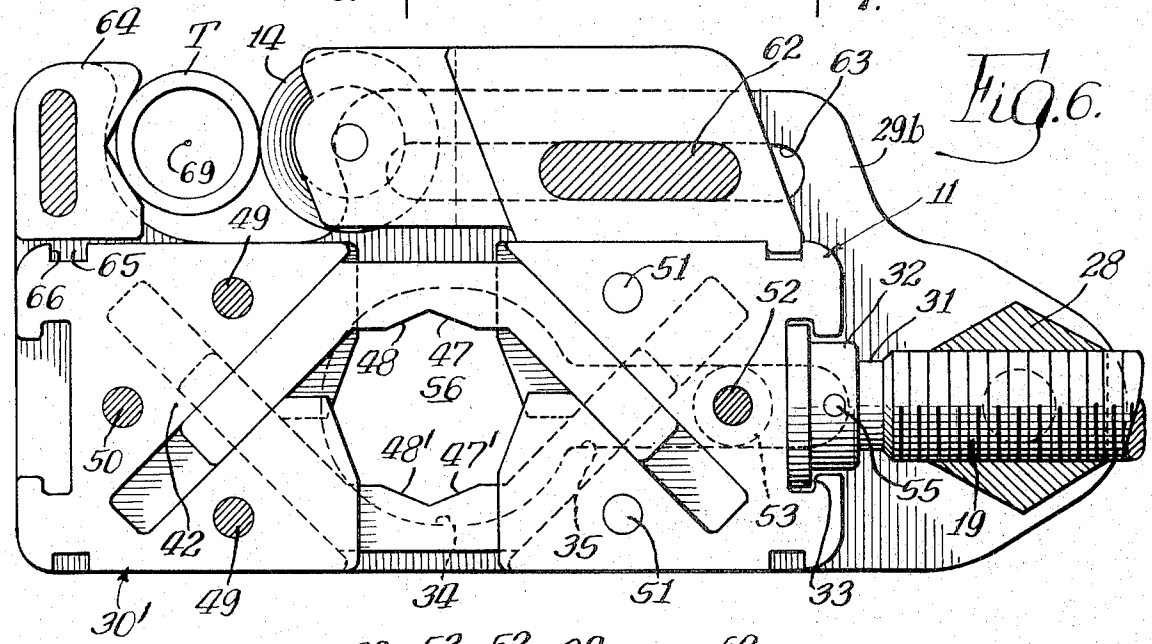


Fig.6.

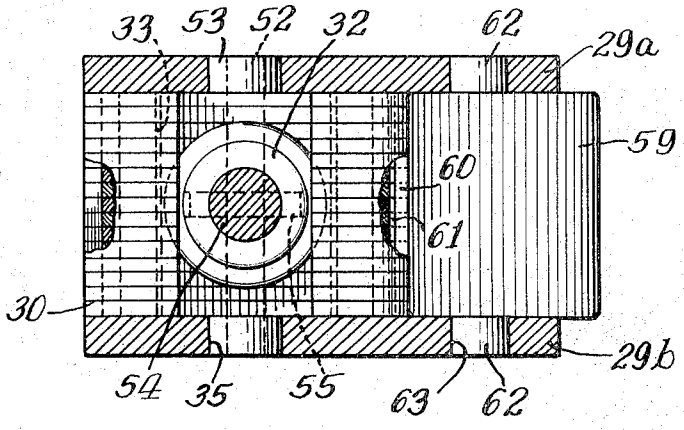


Fig.7.

Fig. 8.

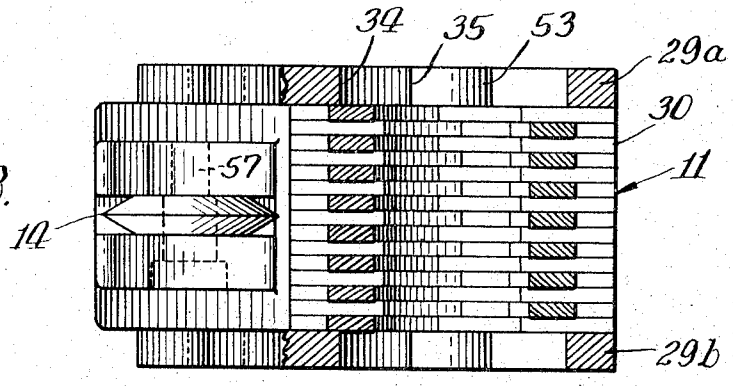
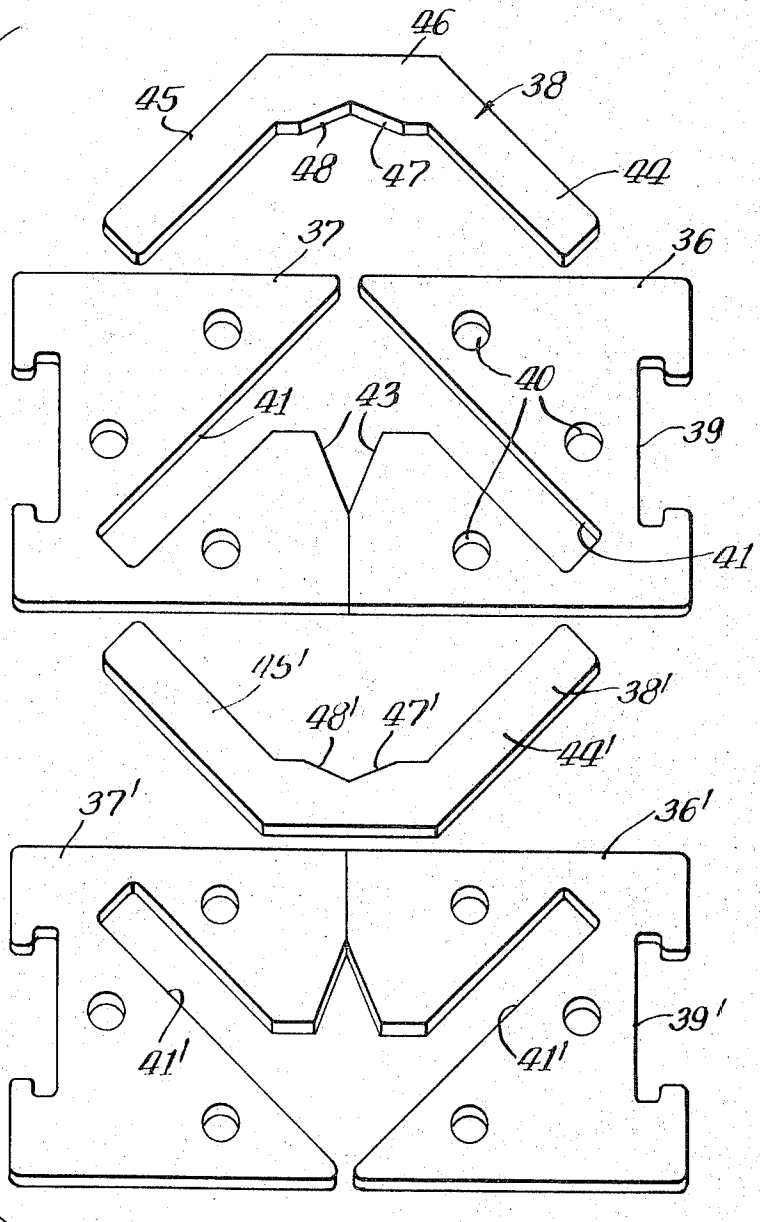

34
35
53
29a
30
11
57
14
29b

Fig. 9.


46
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41'
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TOOL CONSTRUCTION

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to tools, and in particular, to tools for use in working tubes and the like.

2. Description of the Prior Art

In working tubes and the like, different operations may be performed requiring different types of tools. Illustratively, where the tube is to be used in connection with a tube fitting disposed in sealed engagement with one end thereof, the tube end is firstly cut by a suitable tube cutter. The cut end may subsequently be flared for use with a conventional flare-type fitting. In effecting the flare, the tube is held by a suitable tube holder while a flaring cone is forcibly urged into the cut end to provide the desired outwardly widening flare.

A large number of tube working tools, such as such tube cutters, have been developed for use in a tube cutting working operation. Illustrative of such tube cutters is that shown in U.S. Pat. No. 3,665,604 issued to Leonard J. Kowal. Illustrative of flaring tools provided for effecting a flaring of the end of such a cut tube is that shown in U.S. Pat. No. 3,027,931 issued to George A. Franck.

As disclosed in said patents, it is conventional in the tube cutting art to provide a tool having a cutting wheel which is moved coaxially around the outer surface of the tube end while the wheel is slowly advanced into the slit formed by the engagement of the wheel with the tube end as it is swung thereabout. Conventionally in such a tube cutting operation, the tube is held substantially while the tool is swung about the axis of the tube during the advancement of the cutting wheel into the wall thereof.

In the conventional flaring operation, the tube end is held positively by a suitable clamp. The conventional clamping tools utilize semicircular bores in opposed clamp elements which are suitably sized relative to the outer diameter of the tube so as to provide a firm gripping engagement with the outer surface of the tube wall when the clamp elements are urged forcibly together as by suitable manually operable bolt means. In one improved form of clamping means for use in holding such a tube during a flaring operation, clamping elements defining a polygonal tube engaging structure are adjustably mounted to provide a universal tube engaging means. Such a clamping means is disclosed in my copending U.S. Pat. application Ser. No. 238,256, filed Mar. 27, 1972, entitled Adjustable Clamping Means, owned by the assignee hereof, which application is incorporated by reference herein. As disclosed therein, the clamp means includes interleaved, intersliding portions cooperatively defining an array of clamping surfaces adjustably spaced from the axis of an inner clamping space in which the tube is retained. The array is polygonal and manual means are provided for adjusting the size of the array to clamp tubes of different diameters as well as other polygonal, irregular, etc., cross section workpieces.

SUMMARY OF THE INVENTION

The present invention comprehends an improved tube working tool construction including an adjustable tube holder having opposed tube engaging elements, an adjustable tube working device integral with the tube holder, and means for concurrently adjusting both the tube holder and tube working device.

The adjusting means may comprise manually operable threaded means including a novel handle construction which is selectively disposable in a contracted arrangement and an extended arrangement. In the illustrated embodiment, the tube working device may comprise a tube cutter. The handle is arranged to be disposed in the contracted arrangement for use in effecting a tube cutting operation with the tube cutter, and in the extended arrangement for use in holding the tube in the tube holder such as during a subsequent flaring operation.

Means may be provided for releasably retaining the handle in either of the contracted or extended arrangements and in the illustrated embodiment, comprises an improved toggle means.

The tube holder may define a polygonal cross section with means for manually adjusting the size thereof to accommodate different diameter tubes.

The tube cutter effectively defines a peripherally open tube receiving space for receiving the tube by lateral insertion thereinto. The tube holder effectively defines a peripherally closed tube receiving space for receiving the tube by axial insertion thereinto.

In the illustrated embodiment, the arrangement of the tube holder is correlated with that of the tube working device such that upon completion of the working of the tube by the tube working device, the tube holder is arranged to receive the worked tube and to clamp the tube therein upon a preselected small adjustment of the tube holder.

The manipulating handle illustratively includes a pair of elements, a base member, means pivotally connecting an inner end of each element to the base member for swinging about juxtaposed, parallel axes, between a side-by-side juxtaposed relationship defining the contracted arrangement and an aligned end-to-end relationship defining the extended arrangement.

The cutting wheel of the tube cutter is peripherally spaced inwardly of the outer edge of the cutting wheel carrier so that the tool may be manually grasped without contact of the user's hand with the cutting wheel.

Thus, the present invention comprehends an improved tube working tool construction which is extremely simple and economical of manufacture while yet providing the substantial improvement over the conventional tools of the prior art.

BRIEF DESCRIPTION OF THE DRAWING

Other features and advantages of the invention will be apparent from the following description taken in connection with the accompanying drawing wherein:

FIG. **1** is a side elevation of a tool embodying the invention showing a flaring means associated therewith for flaring the end of a cut tube;

FIG. **2** is an end elevation thereof;

FIG. **3** is a top plan view thereof with the tube installed in the tube cutting means;

FIG. **4** is a side elevation of the handle with one portion thereof shown in section illustrating the extended arrangement thereof;

FIG. **5** is a fragmentary enlarged longitudinal section of the tool with the tube end being retained in the tube holder;

FIG. 6 is a fragmentary enlarged longitudinal section thereof with the tube being disposed in the tube cutter;

FIG. 7 is a transverse section taken substantially along the line 7—7 of FIG. 5;

FIG. 8 is a transverse section taken substantially along the line 8—8 of FIG. 5; and

FIG. 9 is an exploded view of the tube clamping elements of the tube holder.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In the exemplary embodiment of the invention as disclosed in the drawing, a tool construction generally designated **10** is shown to comprise a tool for use with workpieces such as tubes T. Tool **10** includes an adjustable tube holder generally designated **11** and an adjustable tube working device generally designated **12** integral with the tube holder. Means generally designated **13** are provided for concurrently adjusting both the tube holder and tube working device to provide an improved tool construction.

In the illustrated embodiment, the tube working device **12** comprises a tube cutter having a conventional cutting wheel **14** adapted to cut through the wall of the tube T in a tube cutting operation. As shown in FIG. **2**, the cut end **15** of the tube T may then be flared by means of a conventional flaring cone tool device **16** while the tube T is held in the tube holder **11**. Adjustment of the arrangement of tube holder **11** and tube cutter **12** may be manually effected by means of a handle generally designated **17** connected to the distal end **18** of a threaded rod **19**. Handle **17** is selectively disposable in a contracted arrangement, as seen in FIG. **1**, to define a compact knob for use in providing suitable force in effecting the cutting operation, and in an extended arrangement, as seen in FIG. **4**, to define an elongated handle means for providing an increased force in the tube holding operation.

The invention further comprehends a correlation between the disposition of the cutting tool **12** and the tube holder **11** such that upon completion of the cutting operation, the tube holder is effectively arranged to receive the cut tube end without further adjustment thereof and to effectively clamp the tube end suitably for conducting the subsequent flaring operation by a small further adjustment of the adjusting means. Illustratively, the clamping operation may be effected by approximately one turn of the threaded means after insertion of the tube end thereinto upon completion of the cutting operation.

As best seen in FIG. **1**, tube holder **11** effectively defines a peripherally closed tube holding space **20** for receiving the tube end **15** and the device **12** effectively defines a peripherally open tube receiving space **21**.

The flaring tool **16** may comprise a conventional flaring tool having a C-shaped yoke **22** provided at one end with a support portion **23**, and at its opposite end with a threaded bore **24** threadedly receiving a stem **25** carrying at its lower end a flaring cone **26** adapted to flare the tube end **15** outwardly as the cone is advanced thereinto by rotation of the stem **25** as by manipulation of a handle **27** at the outer end of the stem. During the flaring operation, tube T is positively held against axial displacement by the tube holder **11**.

The construction of tool **10** may best be seen by reference to FIGS. **5–9**. As shown, rod **19** is threaded into a female element **28** carried by a body member **29**. Body member **29** comprises a pair of spaced plates **29***a* and **29***b*, as illustrated in FIG. **3**, with threaded member **28** extending therebetween.

Tube holder **11** comprises a plurality of interfitted slide members **30** retained between the plates **29***a* and **29***b*. Inner end **31** of rod **19** carries a rotatable connector **32** received in an undercut slot **33** of the interfitted slide members **30**. Each of plates **29***a* and **29***b* further defines a through opening **34** and a slot **35** extending away from opening **34** toward element **28**.

Interfitted slide members **30** define a plurality of layers of first slide members **36**, second slide members **37** and third slide members **38**. The succeeding layers of associated slide members **36, 37** and **38** are reversed, as shown in FIG. **9**, wherein a first set of slide members **36, 37** and **38** is shown in combination with an adjacent set of slide members identified as slide members **36′**, **37′** and **38′**, it being understood that the respective slide members are identical in the two layers except for the reversal in the positioning thereof. Each of the first and second slide members defines an undercut slot **39** at one end thereof and is provided with three through holes **40**. Each of the first and second slide members is further provided with a substantially rectilinear slot **41** which extends at an angle to the longitudinal axis **42** of the clamp, and more specifically, to the slot **35** which defines a line of movement of the slide members **30**. In the illustrated embodiment, the respective slots **41** extend at opposite 45° angles to this longitudinal axis line of movement. The confronting portions of the paired first and second slide members define clamping surfaces **43** which, in tube holder **11**, extend at an angle of approximately 67-½° to the longitudinal line of movement. Thus, as shown in FIGS. **5** and **6**, the clamping surfaces **43** comprise two portions of an octangular array.

Third slide member **38** comprises a slide bar having opposed legs **44** and **45** extending outwardly at an angle of 45° to a bight portion **46** of the slide bar defining on its inner surface a pair of planar intersecting surfaces **47** and **48** intersecting at an angle of 135° and defining additional clamping surfaces of the octangular array defined by the clamping surfaces **43**. The legs **44** and **45** slidably fit in the slots **41** of the confronting first and second slide members **36** and **37**, and thus, upon relative displacement between the first and second slide members, the bight portion **46** of the slide member **38** is caused to move perpendicularly to the line of movement between the first and second slide members. As the legs **44** and **45** extend at **45°** angles, the movement of bight portion **46**, and therefore clamp surfaces **47** and **48**, correspond exactly to the movement of the clamping surfaces **43** relative to each other so as to maintain an octangular array of the clamping surfaces while permitting an infinite adjustment of the cross-sectional size thereof.

To effect such relative movemtne between the slide members **36** and **37**, the slide members **37** are fixedly secured between the plates **29***a* and **29***b* by a plurality of roll pins **49** which are press-fitted into the plates and a rivet **50**. Thus, rivet **50** cooperates with element **28** in locking the plates **29***a* and **29***b* with the interfitted slide members **30** therebetween.

The slide members **36** are movable longitudinally of the clamp by the engagement of connector **32** with the slide members **36** in the undercut slot **33** as a result of

the threaded movement of the rod **19.** The slide members **36** are secured together as a unit by roll pins **51** and an elongated roll pin **52** provided at its opposite ends with guide caps **53** slidably received in slots **35** of the side plates. Rod **19** is provided at its inner end with a reduced diameter portion **54.** Connector **32** is pinned to rod portion **54** by a suitable roll pin **55** and, thus, force is transmitted from the threaded rod **19** through the connector **32** to the stack of slide members **36** to move the stack of slide members alternatively toward or away from the fixed slide members **37** as desired. As discussed above, such movement changes the size of the octangular array of clamping surfaces **43, 47,** and **48** so as to cause the clamping surfaces to engage a workpiece such as tube T at four spaced points, as illustrated in FIG. **5** for an infinite range of tube sizes.

The adjacent set of slide members **36'**, **37'**, and **38'** is, as indicated above, identical to the set **36, 37** and **38** but is reversed so that the legs **44'** and **45'** of the third slide member **38'** extend oppositely to legs **44** and **45** of the first set. This reversed arrangement is alternatively effected throughout the stack of slide members defining the interfitted slide members assembly **30** and, thus, the tube T is alternatively engaged at four spaced points by adjacent sets of slide members intermediate the location of the spaced points engaged by the first set **36, 37** and **38,** i.e., the engagement points of the second set are offset by an angle of 360° divided by the number of sides of the polygonal array. Therefore, the engagement of the interfitted slide member assembly **30** with the tube T is effectively at eight points around the circumference of the tube while at each layer, or level, defined by a set of first, second and third slide members, the tube is engaged at only four points.

Thus, to clamp a tube T in association with the tool **10,** the tube need merely be inserted into the clamping space **56** about which the clamping surfaces **43, 47,** and **48** are arranged in the octangular array and the handle **17** suitably manipulated to thread rod **19** through the element **28** to urge the movable set of first slide members **36** toward the fixed set of slide members **37.** The legs **44** and **45** of the third slide members **38** are caused to slide further into the slots **41** of the first and second slide members as a result of the movement of the first slide members **36** along the longitudinal axis line of movement thereof, thereby maintaining the octangular array of clamping surfaces while reducing the cross-sectional size thereof until each of the clamping surfaces **43, 47** and **48** engages the outer circumference of the tube. Further turning of the handle forcibly tightens the clamp to hold the tube firmly against the flaring action of the cone **26.** As the clamp is infinitely adjustable, any diameter tube may be so clamped therein to be flared by the flaring cone, thereby permitting the flaring of an infinite range of sizes of tubes including both English size tubes, metric size tubes, etc.

While the invention has been described in connection with the holding of a tubular workpiece T, as will be obvious to those skilled in the art, any suitable workpiece may be held by the clamp where the cross-sectional configuration thereof may be suitably engaged by the effectively octangular array of clamping surfaces.

As discussed above, the illustrated tube working device comprises a tube cutter having a cutting wheel **14** adapted to cut through the wall of the tube T. To effect such a cutting operation with tool **10,** cutting wheel **14** is rotatably carried on a shaft **57** which is secured between legs **58a** and **58b** of a bifurcated end **58** of a carrier **59.** As shown in FIG. **5,** carrier **59** includes a lug **60** received in a groove **61** of slide member set **30** for movement parallel to axis **42** together with slide member set **30.** Carrier **59** is guided for movement parallel to axis **42** by means of a pair of slide projections **62** received in slots **63** of plates **29***a* and **29***b*. A backup tube support **64** is secured between the side plates **29***a* and **29***b* by projecting portions **67** received in openings **68** of the slide plates **29***a* and **29***b*. Thus, as illustrated in FIGS. **5** and **6,** cutting wheel **14** is movable toward and from tube carrier **64** for selective advancement of the wheel **14** into the wall of a tube in a conventional manner as by a slow advancement of the cutting wheel into the tube wall as the cutting wheel is swung around the longitudinal axis **69** of the tube T until the wheel has cut fully through the wall.

The invention comprehends relating the disposition of cutting wheel **14** on carrier **59** to the disposition of the slide member sets **30** and **30'** so that the space **56** is slightly larger than the outer diameter of the tube T when the tool is disposed as at the end of the cutting operation. Thus, the user need merely reposition the now cut tube in the space **56** and with a small further manipulation of handle **17** to effect approximately one turn of threaded member **19,** effect a positive clamping of the cut tube in the tube holder **11.** As discussed above, during the tube cutting operation, the handle **17** is retracted to the position of FIG. **1** for facilitated swinging of the tool about the axis of the tube. To effect a more forceful clamping action for positively holding the tube in the flaring operation, the handle **17** is swung to the extended position of FIG. **4** to adjust the disposition of slide member sets **30** and **30'**. As shown in FIGS. **1, 3** and **4,** handle **17** includes a pair of holder elements **70** and **71,** each having a bifurcated end defined by a pair of legs **72** and **73** straddling a base member **74** fixed to the end **18** of threaded rod **19.** Legs **72** and **73** are pivotally mounted to base member **74** by means of a pin **75.**

Each handle element defines a hollow bore **76** opening inwardly toward base member **74** and provided with a plunger **77** biased outwardly against base member **74** by a coil spring **78.** As best seen in FIG. **4,** base member **74** defines right angle corner projecting portions **79.** Thus, plunger **77** and coil spring **78** cooperate with the corner portions **79** to define a toggle structure selectively releasably retaining the handle elements in either the side-by-side knob-forming contracted arrangement of FIG. **1,** or the end-to-end extended handle arrangement of FIG. **4.** This arrangement of the toggle structure causes maximum retaining force to occur halfway between the two operating positions of FIG. **1** and FIG. **4** so that the handle members are effectively retained in the desired selected positions while yet they may be readily swung to the other position when desired. Further as shown in the drawing, a substantial movement of the handle members may occur before accidental flipover of the handle members from one position to the other occurs. As a minimal toggle force is provided in the selected disposition, movement of the handles to the other disposition may be readily effected, and in particular, ready separation of the two handle members in the contracted knob-forming arrangement may be readily effected.

As further shown in dotted lines in FIG. **4**, if the tool is accidentally dropped, the handle members may merely swing beyond the other corners of the base member to prevent excessive stresses from being developed in the handle connections. As discussed above, the handle is normally disposed in the contracted arrangement of FIG. **1** during the tube cutting operation for improved force generation correlation with the requirements of the tube cutting operation, and in the extended arrangement of FIG. **4**, to effect the more forceful tube holding operation.

As illustrated in FIG. **5**, the space **80** between the cutting wheel **14** and tube support **64** is laterally open to receive the tube to be cut by a lateral movement downwardly thereinto. The space **56** is peripherally closed so that the cut tube may be inserted by axial movement thereinto. The movable cutter wheel carrier **59** is effectively integrally associated with the movable slide member means **30** to provide the desired positional relationship discussed above. By utilizing a single threaded means **19** for effecting operation of the tube cutter and tube holding means, the tool may be extremely simple and economical of construction while synergistically providing the improved positional relationships discussed above.

The pitch of the thread of members **19** and **28** is preselected to be suitable to effect the desired forceful advance of the slide members **30** as well as the cutting wheel **14** for use in the two different operations. A variation in the mechanical advantage is obtained by the selected disposition of the handle as discussed above. The improved clamping means permits a lower clamping force to provide a substantially positive retention of the tube as compared to the clamping forces required in conventional tube holders utilizing segmentally cylindrical clamping elements and, thus, the tube cutting and tube clamping forces are more closely related for facilitated effecting of each.

As the cutting wheel **14** is recessed in space **80** below the top edge **81** of carrier **59**, injury to the user by inadvertent engagement of his fingers with the cutting wheel, as during a flaring operation, is effectively minimized.

In removing the flared tube from the tool, the user need merely retrogradely rotate threaded rod **19** to enlarge clamping space **56** sufficiently to pass the flared end of the tube axially therefrom. Again, such enlargement of space **56** provides a corresponding enlargement of space **80** to automatically redispose cutting wheel **14** suitably for initiating a subsequent tube cutting operation. Thus, the tool operates synergistically not only in correlating the position of the holding means with that of the cutting means at the end of the cutting operation, but also in correlating the relationship at the end of the flaring operation.

Thus, as discussed above, tool **10** is extremely simple and economical of construction while yet providing the improved functioning discussed above.

The foregoing disclosure of specific embodiments is illustrative of the broad inventive concepts comprehended by the invention.

I claim:

1. A tool construction for use with workpiece tubes comprising: means for holding a tube against axial displacement having adjustably spaced tube engaging elements defining a peripherally closed tube receiving space of polygonal shape and arranged to engage a tube to be held at at least **6** circumferentially spaced positions; a tube cutter having adjustably spaced tube supporting and tube cutting means integral with said tube holding means; and means for adjusting the spacing of the tube holding means and the tube cutter including manually operable means for providing a low torque adjustment of said cutter to advance the cutting means into a tube held by said supporting means while the tool is swung about the tube and selectively rearranged to provide a high torque adjustment of said holder means to effectively prevent axial displacement of the cut tube in said holding means.

2. The tool construction of claim **1** wherein said adjusting means comprises threaded means.

3. The tool construction of claim **1** wherein said adjusting means comprises threaded means having a manipulating handle selectively disposable in a contracted arrangement for use in the tube cutting operation and an extended arrangement for use in the tube holding operation.

4. The tool construction of claim **1** wherein said adjusting means comprises threaded means having a manipulating handle selectively disposable in a contracted arrangement for use in the tube cutting operation and an extended arrangement for use in the tube holding operation, and having toggle means for releasably retaining the handle in either of said arrangements.

5. The tool construction of claim **1** having a body member, at least one of said tool holding elements and said tube cutting means being movably mounted on said body member.

6. The tool construction of claim **1** wherein said tube holding means defines a peripherally closed tube receiving space, and said tube cutter defines a peripherally open tube receiving space.

7. The tool construction of claim **1** wherein the arrangement of said tube holding means is correlated with that of said tube cutter such that upon completion of the adjustment of the tube cutter to complete the cutting of the tube, the tube holding means is arranged to receive the cut tube and to clamp the tube therein upon a preselected small adjustment of the tube holding means.

8. The tool construction of claim **1** wherein said adjusting means comprises manually operable threaded means, and the arrangement of said tube holding means is correlated with that of said tube cutter such that upon completion of the adjustment of the tube cutter to complete the cutting of the tube, the tube holding means is arranged to received the cut tube and to clamp the tube therein upon approximately a single turn of the threaded means.

9. The tool construction of claim **1** wherein said adjusting means comprises threaded means having a manipulating handle selectively disposable in a contracted arrangement for use in the tube cutting operation and an extended arrangement for use in the tube holding operation, said handle comprising a pair of elements, a base member, means pivotally connecting an inner end of each element to the base member for swinging about juxtaposed, parallel axes, between a side-by-side juxtaposed relationship defining said contracted arrangement and an aligned end-to-end relationship defining said extended arrangement.

10. The tool construction of claim **1** wherein said adjusting means comprises threaded means having a manipulating handle selectively disposable in a contracted

arrangement for use in the tube cutting operation and an extended arrangement for use in the tube holding operation, said handle comprising a pair of elements, a base member, means pivotally connecting an inner end of each element to the base member for swinging about juxtaposed, parallel axes, between a side-by-side juxtaposed relationship defining said contracted arrangement and an aligned end-to-end relationship defining said extended arrangement, and means for releasably retaining said elements in either of said arrangements.

11. The tool construction of claim **1** wherein said adjusting means comprises threaded means having a manipulating handle selectively disposable in a contracted arrangement for use in the tube cutting operation and an extended arrangement for use in the tube holding operation, said handle comprising a pair of elements, a base member, means pivotally connecting an inner end of each element to the base member for swinging about juxtaposed, parallel axes, between a side-by-side juxtaposed relationship defining said contracted arrangement and an aligned end-to-end relationship defining said extended arrangement, and toggle means for releasably retaining said elements in either of said arrangements.

12. The tool construction of claim **1** wherein said tube cutter includes a carrier defining an outer edge portion and said cutting means comprises a cutting wheel carried on said carrier with all exposed portions of the cutting wheel being spaced inwardly of said outer edge portion.

13. A tool construction for use with workpiece tubes comprising:

means for holding a tube against axial displacement having adjustably spaced tube engaging elements defining a peripherally closed tube receiving space of polygonal shape and arranged to engage a tube to be held at at least **6** circumferentially spaced positions; a tube cutter having adjustably spaced tube supporting and tube cutting means integral with said tube holding means;

means for adjusting the spacing of the tube holding means and the tube cutter including manually operable means for providing a low torque adjustment of said cutter to advance the cutting means into a tube held by said supporting means while the tool is swung about the tube and selectively rearranged to provide a high torque adjustment of said holder means to effectively prevent axial displacement of the cut tube in said holding means; and

means for flaring the cut end of the tube with said tube being held by said holding means.

14. The tool construction of claim **13** wherein said manually operable means defines a knob for providing said low torque adjustment.

15. The tool construction of claim **13** wherein said tube holding means defines means for engaging the tube at at least **6** circumferentially equally spaced points.

16. The tool construction of claim **13** wherein said tube holding means defines means for engaging the tube at **8** circumferentially equally spaced points.

17. The tool construction of claim **13** wherein said flaring means defines a support portion, said cutter being disposed outwardly beyond said support portion with said holding means being supported on said support portion during a tube flaring operation.

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