

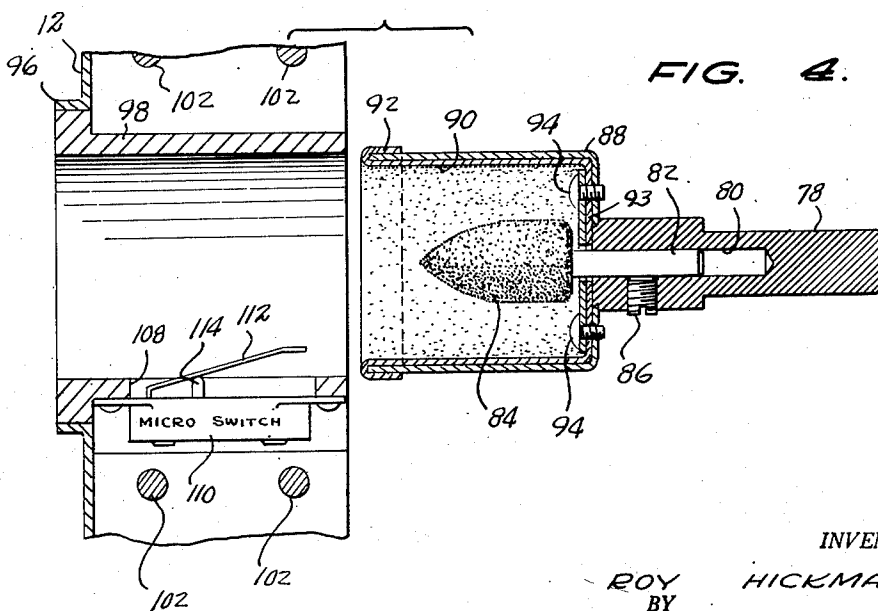
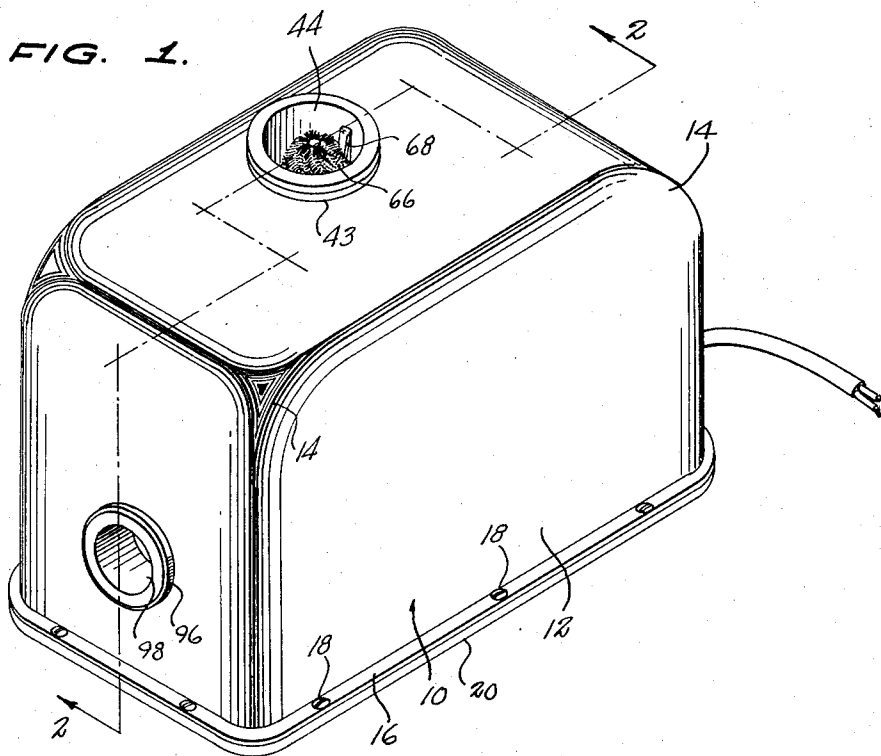
May 28, 1957

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CLEANING AND REAMING DEVICE FOR METALLIC
FITTINGS AND TUBINGS

2,793,473

Filed July 27, 1956

2 Sheets-Sheet 1



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FIG. 3.

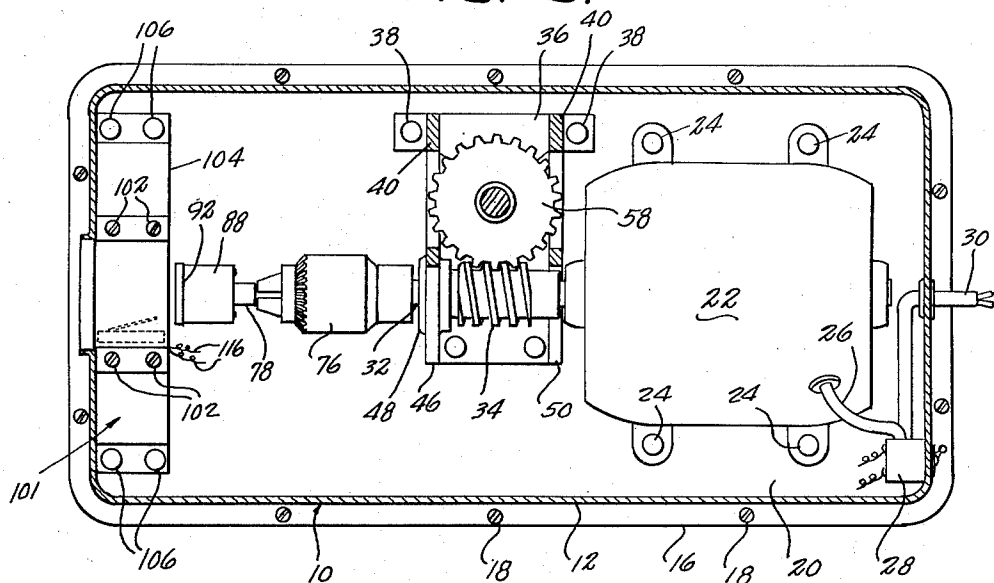
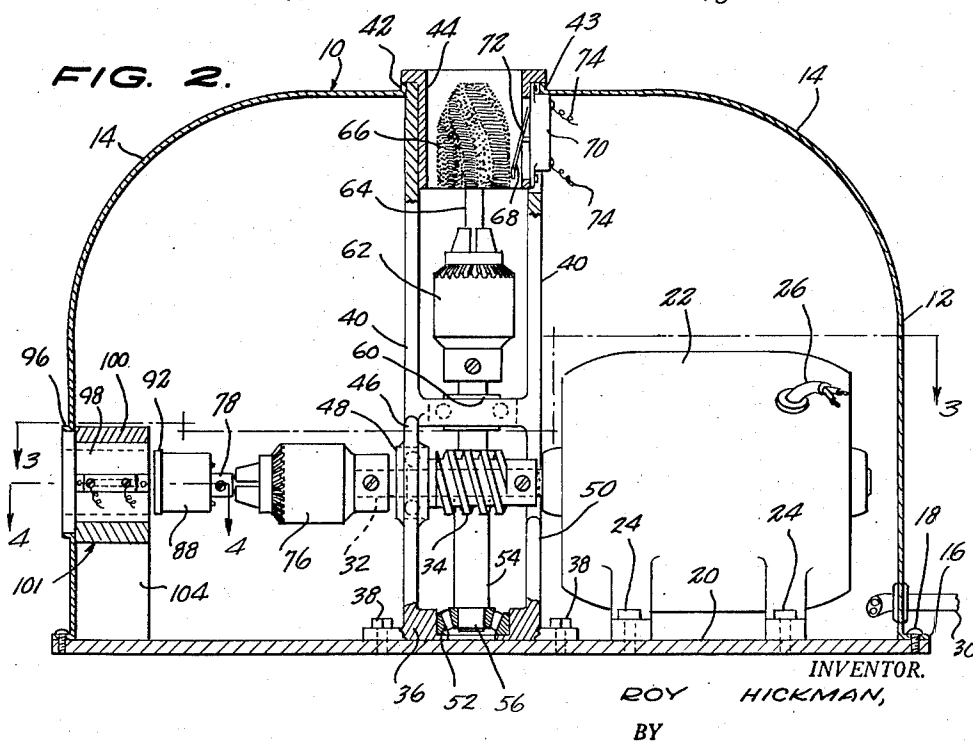


FIG. 2.



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CLEANING AND REAMING DEVICE FOR METALLIC FITTINGS AND TUBINGS

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5 Claims. (Cl. 51—5)

This invention relates to a device which can be used to clean the inner surfaces of fittings of copper or other metal, and which can further be used for cleaning or reaming the ends of copper tubing, preparatory to soldering or other operations formed upon the same.

Heretofore, the general practice in cleaning, reaming, and otherwise surface-conditioning objects of the type described has been to perform the task by hand. This results in a considerable loss of time, and further, is highly inconvenient so far as the worker is concerned. It is necessary, in this regard, to perform these operations for the purpose of assuring a uniformly clean joint when the fitting or tubing is to be connected to an associated work piece. When the article is cleaned by hand, it is often difficult to assure a uniformly clean surface, properly conditioned for making the necessary joint.

In view of the above, the main object of the present invention is to provide an electrically operated device, which will be energized responsive to insertion of the workpiece, and will perform a selected surface-conditioning operation on the work piece. The device, in this regard, is automatically deenergized when the work piece is removed.

Among more specific objects of the invention are the following:

To provide a cleaning and reaming device that will operate efficiently and swiftly to perform the necessary surface-conditioning of the work;

To permit the manufacture of the device at relatively low cost;

To provide a readily portable device as described, capable of being carried in one's tool kit, or alternatively capable of being temporarily or fixedly mounted upon a bench or other support;

To facilitate the interchange of the various work-engaging components of the device, thereby to increase distinctly the versatility of the invention; and

To provide a device for cleaning or reaming purposes that can be easily cleaned, will be rugged, and capable of trouble-free operation over a long period of time.

Other objects will appear from the following description, the claims appended thereto, and from the annexed drawing, in which like reference characters designate like parts throughout the several views, and wherein:

Figure 1 is a perspective view of a surface-conditioning device formed according to the present invention;

Figure 2 is a longitudinal sectional view therethrough substantially on line 2—2 of Figure 1;

Figure 3 is a plan sectional view on line 3—3 of Figure 2; and

Figure 4 is an enlarged, detail section on line 4—4 of Figure 2.

A casing generally designated 10 may be of various shapes, but in the preferred embodiment has vertical side walls 12 and vertical end walls 14, said side and end walls merging into a top wall with the junctures of the several walls being rounded off as at 14 to eliminate sharp corners on the casing.

The one-piece portion of the casing so far described constitutes a removable cover formed throughout its periphery with an outwardly directed, relatively narrow flange 16 apertured at substantially uniformly spaced intervals to receive screws 18 connecting the cover removably but fixedly to the marginal part of a flat base 20. The flanging of the casing in this manner permits one to use C clamps, not shown, to temporarily connect the device to a bench or other support, but obviously, a permanent connection can be made by extending into said support elongated screws passing through selected openings of the base and flange.

Within the casing there is provided an electric motor 22 of fractional horsepower, having a shaft rotating at a high speed, preferably at approximately 3600 R. P. M. Obviously, the rating of the motor can be according to the wishes of the particular manufacturer. The motor 22 is anchored to the base by bolts 24, and extending from the motor is an electrical conductor 26, connected in circuit with a main control switch 28 and with a source of electric power, through the medium of an extension 30 projecting exteriorly of the casing and provided with the usual electric plug, not shown.

Projecting horizontally within the casing, longitudinally and centrally thereof, is the shaft 32 of the motor and adjacent its inner end, the shaft is provided with a worm 34, said worm being disposed above a bearing retainer 36 secured by bolts 38 to the base plate 20. Integral with retainer 36 and projecting upwardly therefrom are vertical arms 40, formed at their upper ends with a support ring or sleeve 42 the upper end of which engage in an opening formed in the top wall of the casing cover, said opening being bounded by an upwardly extending flange 43. Supported upon flange 43 and ring 42 is the outwardly directed upper end flange of a vertically disposed guide sleeve 44 into which a work piece can be inserted in a manner to be presently apparent.

At their lower ends, the arms 40 are respectively formed with vertically disposed walls 46, 50, the wall 50 being substantially lower than wall 46 so as to extend below shaft 42. In wall 46 there is mounted a bearing 48 for a shaft 32.

Supported within the cupped bearing retainer 36 is a roller bearing 52 in which journaled the reduced lower end of a vertical shaft 54 to the lower end portion of which is secured a gear 58 meshing with worm 34. A bearing 60 is mounted in a retainer carried by arms 40 above gear 58, and receives shaft 54. Connected to the upper end of shaft 54 is a geared chuck 62 conventional per se, and removably engaged in the chuck is the shank 64 of a cleaning brush 66 extending axially within guide sleeve 44 adjacent the arm 68 of a microswitch 70, mounted in an opening of the guide sleeve and having a plunger 72 depressible by arm 68 to close the switch. Leads 74 extend from the terminals of the switch, and are connected in circuit with the motor 22 so as to cause the motor to operate whenever arm 68 is depressed with the main switch 28 in "on" position.

A second geared chuck 76 is secured to motor shaft 32, and is adapted to receive a shank 78 (Figure 4) having an axial recess 80 in which is receivable the stem 82 of a tapered abrasive stone 84. Stem 82 is removably secured to the shank 78 by a screw 86 or equivalent means.

The stone 84 extends axially within a cylindrical, cup-shaped receptacle 88, and lining said receptacle is a moulded abrasive cloth 90 the outer end of which is turned outwardly and rearwardly as at 92 to engage the liner with the outer end of the receptacle. A clamping plate 93 overlies the inner end wall of the receptacle, and receives screws 94 passing through the liner and said inner end wall for the purpose of removably but fixedly engaging the liner in the receptacle.

The end of the casing cover adjacent receptacle 88 is formed with an opening bounded by an outwardly directed flange 96 in which is snugly engaged the outwardly flanged outer end of a horizontally extending guide sleeve 98. The guide sleeve 98 is supported in the cylindrical seat 100 of a guide sleeve support bracket generally designated 101. Said bracket includes an arcuate cover plate providing the top portion of the guide sleeve seat, said cover plate being secured to the body of the bracket at opposite sides of the seat by screws 102. The bracket is formed with downwardly diverging legs 104 secured by rivets or equivalent fastening elements 106 to the base plate 20.

Formed in the guide sleeve 98 at one side thereof is an opening 108, and secured to the bracket in position across said opening is a micro switch 110 the arm 112 of which extends into the guide sleeve through opening 98 so as to be depressible by a work piece inserted in guide sleeve 98. This causes depression of the switch plunger 114 to close the switch, thus to energize the motor through the medium of leads 116 extending from the switch terminals and connected in circuit with the motor.

The particular wiring connections between the micro switches and the electric motor have not been detailed, but it will be understood that the motor is so wired with the several switches that, first of all, it will not operate at all unless the main switch is on. Further, the motor will still not operate unless one or the other of the micro switch arms is depressed. The circuit employed is such that the depression of either micro switch arm will energize the motor. The provision of such a circuit is believed to be so easily achieved by one working in the art as not to require special illustration herein.

In any event, one would first, ordinarily, clean the outer surface of a length of tubing, while also reaming or cleaning the inner surface thereof. To accomplish this, one merely inserts the tubing into the guide sleeve 98. The receptacle 90 is disposed inwardly from the guide sleeve, within the casing, and the tubing moves into the receptacle.

As the tubing passes through the guide sleeve, it engages the switch arm 112 and shifts it toward the wall of the guide sleeve. This causes the micro switch to be closed, energizing the motor to rotate the receptacle 90 and the abrasive stone 84. The stone extends into the tubing, and serves to remove the ridge which will be found upon the extremity of the tubing, extending inwardly thereof, caused by the cutting wheel of the conventional tubing cutter, not shown. In this connection, in a commercial embodiment the stone would have ridges or grooves filed into its surface in a direction longitudinally thereof, said grooves being spaced circumferentially of the stone to prevent its being loaded with soft metal removed as the stone cuts away the ridge from the extremity of the tube.

Simultaneously with surface-conditioning of the inner surface of the tubular work piece, the outer surface thereof is also conditioned, by contact with the liner 90.

As soon as the tubing is removed, the motor will be de-energized because the switch arm 112 would no longer be depressed.

Brush 66, when operated responsive to depression of switch arm 68 resulting from insertion of an article through the opening at the top of the casing, is used to clean the inside of fittings such as L's, T's couplings, caps, etc.

It will be noted that the receptacle shown in Figure 4 is designed to receive any of various tool elements. One need merely back off the set screw 86, to insert the stem of the different tool element. Three-cornered reamers, burring tools, etc. can thus be accommodated within the receptacle.

Still further, the receptacle itself can be readily disengaged from a driving-driven relationship to the motor

shaft, through the medium of the gear chuck 76. The same is true of the brush 64, 66.

With further reference to the receptacle 88, it is intended that this will be so constructed as to enable the operator to insert a piece of abrasive cloth, from the conventional roll carried by all craftsmen for manual cleaning operations. In such an instance, the cloth would be secured in the manner presently used to fasten sandpaper on various conventional sanders, namely a V-groove, with the ends of the cloth being held down by a steel strip in the groove below the surface level. The molded liner shown in the drawing will be constructed so that either can be used.

Still further, the switch arms of the micro switches will be so designed as to have overtravel sufficient to accommodate tubing within a wide range of diameters. The guide sleeve 98 would be sufficient diameter to accommodate the larger size tubing, and it will be understood that bushings, not shown, would be inserted therein to accommodate smaller sizes. The bushings would have slots in their sides coinciding with the switch arm-receiving opening of the guide sleeve 98, to permit operation of the switch. One setting of the switch would be adapted to handle all sizes of tubing, as for example from $\frac{3}{8}$ inch to $1\frac{1}{2}$ inch. This would be accomplished by disposing the switch arm at a predetermined angle relative to the axis of the guide sleeve, so that the free end of the switch arm would be disposed a sufficient distance inwardly from the wall of the guide sleeve to be engaged by the smallest diameter tubing.

It is believed apparent that the invention is not necessarily confined to the specific use or uses thereof described above, since it may be utilized for any purpose to which it may be suited. Nor is the invention to be necessarily limited to the specific construction illustrated and described, since such construction is only intended to be illustrative of the principles, it being considered that the invention comprehends any minor change in construction that may be permitted within the scope of the appended claims.

What is claimed is:

1. A surface-conditioning tool comprising a casing having an opening; an electric motor mounted in the casing and including a shaft coaxially aligned with the opening; an abrasive-lined receptacle connected to the shaft inwardly from the opening for conditioning the surface of a work piece when inserted through the opening; normally open switch means mounted in said opening for controlling the operation of the motor, said switch means including a switch arm positioned to be deflected by the inserted work to a switch-closing position; and a tool element carried by and extending axially of and within the receptacle for conditioning the inner surface of a tubular work piece the outer surface of which is in contact with the abrasive wall of the receptacle.

2. A multi-tool surface-conditioning device comprising a casing including angularly related guide sleeves opening upon the wall of the casing at different locations thereupon, for insertion of a work piece in a selected one of said guide sleeves; an electric motor mounted in the casing and including a shaft aligned coaxially with one of said openings; an abrasive-lined receptacle connected to the shaft inwardly from said one opening for conditioning the surface of a work piece inserted through said one opening; a tool element carried by and extending axially of and within the receptacle for conditioning the inner surface of a tubular work piece the outer surface of which is in contact with the abrasive wall of the receptacle; a second shaft aligned coaxially with the other guide sleeve and rotatably mounted within the casing; a driving connection between the first and second shafts for effecting simultaneous rotation of the shafts during operation of the motor; and switches mounted in the respective guide sleeves each including a switch arm extending obliquely within its associated guide sleeve for deflection of the

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switch arm by insertion of the work piece through a selected guide sleeve, each of said switches being adapted when closed to effect operation of said motor.

3. A multi-tool surface-conditioning device comprising a casing including angularly related guide sleeves opening upon the wall of the casing at different locations thereupon, for insertion of a work piece in a selected one of said guide sleeves; an electric motor mounted in the casing and including a shaft aligned coaxially with one of said openings; an abrasive-lined receptacle connected to the shaft inwardly from said one opening for conditioning the surface of a work piece inserted through said one opening; a tool element carried by and extending axially of and within the receptacle for conditioning the inner surface of a tubular work piece the outer surface of which is in contact with the abrasive wall of the receptacle; a second shaft aligned coaxially with the other guide sleeve and rotatably mounted within the casing; a driving connection between the first and second shafts for effecting simultaneous rotation of the shafts during operation of the motor; and switches mounted in the respective guide sleeves each including a switch arm extending obliquely within its associated guide sleeve for deflection of the switch arm by insertion of the work piece through a selected guide sleeve, each of said switches being adapted when closed to effect operation of said motor, said receptacle including a stem and the respective shafts including chuck means, said stem being removably insertable in the chuck means of said one shaft.

4. A multi-tool surface-conditioning device comprising a casing including angularly related guide sleeves opening upon the wall of the casing at different locations thereupon, for insertion of a work piece in a selected one of said guide sleeves; an electric motor mounted in the casing and including a shaft aligned coaxially with one of said openings; an abrasive-lined receptacle connected to the shaft inwardly from said one opening for conditioning the surface of a work piece inserted through said one opening; a tool element carried by and extending axially of and within the receptacle for conditioning the inner surface of a tubular work piece the outer surface of which is in contact with the abrasive wall of the receptacle; a second shaft aligned coaxially with the other guide sleeve and rotatably mounted within the casing; a driving connection between the first and second shafts for effecting simultaneous rotation of the shafts during operation of the motor; and switches mounted in the respective guide sleeves each including a switch arm extending obliquely within its associated guide sleeve for deflection of the switch arm by insertion of the work piece through a selected guide sleeve, each of said switches being adapted

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when closed to effect operation of said motor, said receptacle including a stem and the respective shafts including chuck means, said stem being removably insertable in the chuck means of said one shaft, said brush including a shank removably engaged in the chuck means of the other shaft.

5. A multi-tool surface-conditioning device comprising a casing including angularly related guide sleeves opening upon the wall of the casing at different locations thereupon, for insertion of a work piece in a selected one of said guide sleeves; an electric motor mounted in the casing and including a shaft aligned coaxially with one of said openings; an abrasive-lined receptacle connected to the shaft inwardly from said one opening for conditioning the surface of a work piece inserted through said one opening; a tool element carried by and extending axially of and within the receptacle for conditioning the inner surface of a tubular work piece the outer surface of which is in contact with the abrasive wall of the receptacle; a second shaft aligned coaxially with the other guide sleeve and rotatably mounted within the casing; a driving connection between the first and second shafts for effecting simultaneous rotation of the shafts during operation of the motor; and switches mounted in the respective guide sleeves each including a switch arm extending obliquely within its associated guide sleeve for deflection of the switch arm by insertion of the work piece through a selected guide sleeve, each of said switches being adapted when closed to effect operation of said motor, said receptacle including a stem and the respective shafts including chuck means, said stem being removably insertable in the chuck means of said one shaft, the stem of said receptacle having an axial recess and said tool element including a shank fixedly and removably engageable in said recess.

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