May 4, 1948. E. I. HARRISON 2,440,856

FINISHING DEVICE

Filed Jan. 29, 1945

Fig. 1

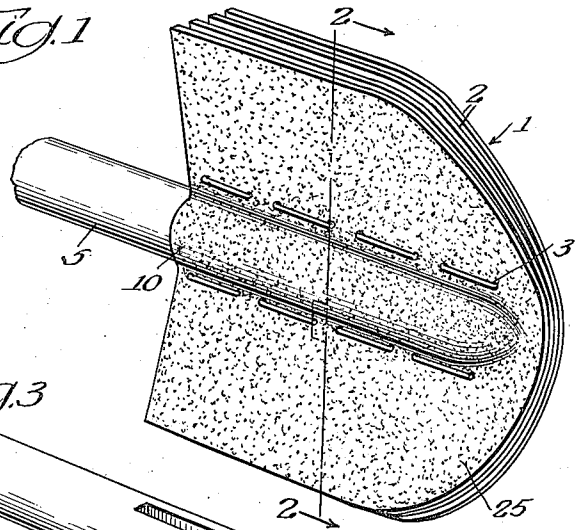


Fig. 2

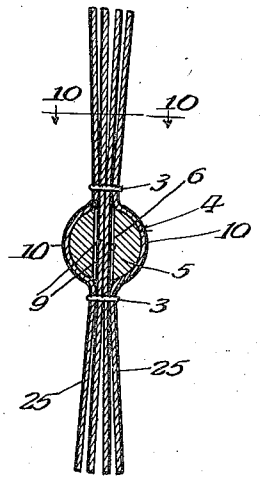


Fig. 3

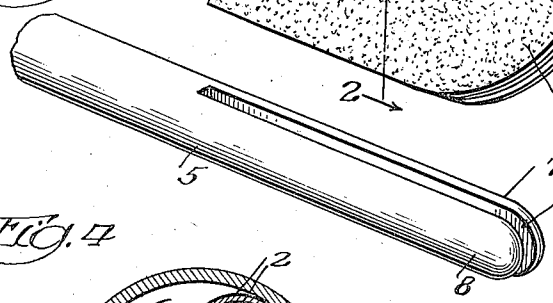


Fig. 4

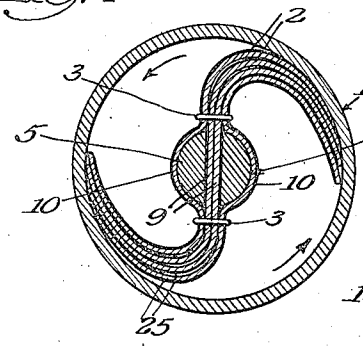


Fig. 5

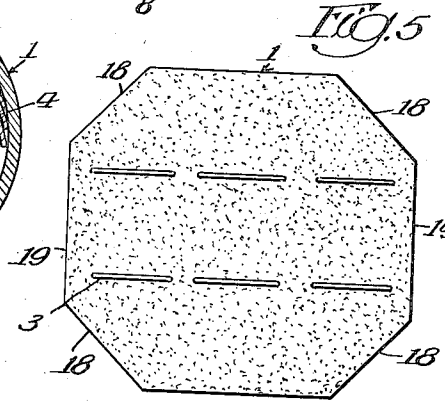


Fig. 8

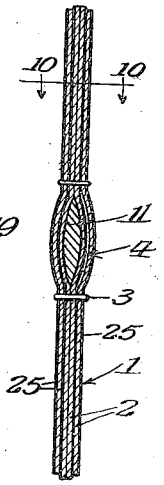


Fig. 6

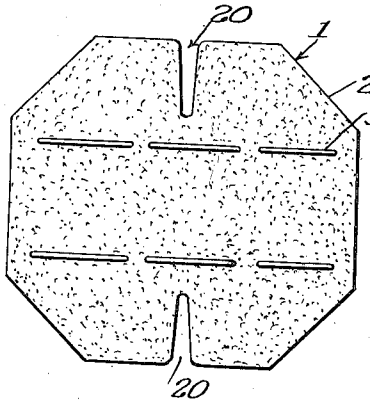


Fig. 10

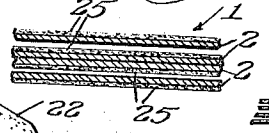


Fig. 9

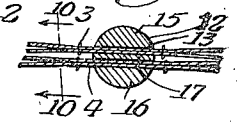
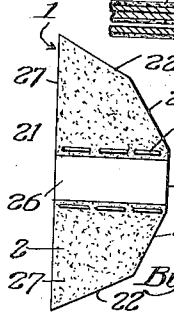


Fig. 7



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Patented May 4, 1948

2,440,856

UNITED STATES PATENT OFFICE

2,440,856

FINISHING DEVICE

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Application January 29, 1945, Serial No. 574,993

8 Claims. (Cl. 51—193)

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This invention relates to a finishing device for grinding, burring and finishing material, such as metal. The device is used particularly in connection with finishing the internal surfaces of tubular articles.

An important object of the present invention is the provision of a finishing device of new and novel construction including a mandrel or other similar driving element which is adapted to have fastened thereto a finishing element, such as a plurality of layers or plies of material, such as fabric, or of sheet abrasive material, such as sandpaper, the mandrel being adapted to be received in a pocket formed in the sheet material.

Another important object of the invention resides in the provision of a finishing element in the form of a pad, including a plurality of layers of material, the layers of material being suitably stitched together and provided with a pocket therein, into which an element is adapted to be removably inserted for driving the finishing element.

A further object of the invention is the provision of a new and improved mandrel for having locking engagement with a plurality of sheets of material whereby the mandrel may be removably inserted in a pocket formed in the sheets of material.

A still further object of the invention is the provision of sheets of material cut to the proper configuration and stitched longitudinally thereof on both sides of its longitudinal center line to form a pocket for receiving a driving element.

Still another object of the invention resides in a plurality of layers of material to form a finishing device by stitching together a plurality of layers of material, the material having an abrasive surface, the abrasive surface being so arranged so that opposite sides thereof provide the material contacting surfaces adaptable for rotative movement in opposite directions within a tubular object.

Numerous other objects and advantages will be apparent throughout the progress of the following specification.

The accompanying drawing illustrates a selective embodiment of the invention, and the views therein are as follows:

Fig. 1 is a detail perspective view of one form of finishing device and embodying the invention;

Fig. 2 is a detail transverse sectional view on the line 2—2 of Fig. 1;

Fig. 3 is a detail perspective view of one form of mandrel or driving element;

Fig. 4 is a detail transverse sectional view showing the manner in which the finishing element may be used for finishing the inner surfaces of tubes and the like;

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Figs. 5, 6 and 7 are detail plan views showing various forms of finishing elements or pads, each constructed of a plurality of layers of abrasive material and being stitched thereon to provide a central pocket for the reception of a mandrel;

Fig. 8 is a detail transverse sectional view of a modified form of mandrel showing the manner in which the mandrel may be inserted in the pocket of the finishing element;

Fig. 9 is a detail transverse sectional view of another modified form of mandrel showing the manner in which the mandrel may be mounted with respect to the finishing element; and

Fig. 10 is a detail transverse sectional view on the line 10—10 of Figs. 2, 4 and 9.

The particular construction herein shown for the purpose of illustrating the invention comprises a finishing element or pad 1 which may comprise a plurality of layers of material 2. The layers of material 2 are superimposed one upon the other and are stitched along the line 3—3 on opposite sides of the longitudinal axial center line of the element to provide a recess or pocket 4 to receive a driving element such as a mandrel 5. The mandrel 5 may be made of metal and provided with a slot 6, Fig. 3, to provide space legs 7 and 8 as shown in Fig. 3. The mandrel 5 may be inserted within the pocket 4 so that the two center plies 9 of the material 2, Figs. 2 and 4, may be received within the slot 6 of the mandrel. The outer layers 10, 10 of the material may comprise the pocket forming part of the element and extend about the legs 7 and 8 as clearly shown in Figs. 2 and 4.

The mandrel disclosed in Fig. 8 may comprise a flattened mandrel 11, being greater in one cross-sectional dimension than in the other whereby a relatively flat mandrel is provided. This flat mandrel 11 is adapted to be inserted within the pocket 4 as clearly shown in Fig. 8 whereby two plies of material 2 will be on opposite sides as shown in Fig. 8. The use of a flattened mandrel in many instances is desirable in that it may be applied and removed quickly and readily, and, because of its flattened construction, will cause rotation of the element upon rotation of the mandrel without the mandrel rotating with respect to the element itself.

The embodiment shown in Fig. 9 comprises a mandrel 12 provided with slots 13 and 14 forming exterior legs 15 and 16 and a central leg or prong 17. The mandrel 11 is adapted to be in-

serted within the pocket with two layers of the material received in a slot 13 and the two remaining layers received in the other slot 14 whereby the positive driving connection is provided between the element which is made up of the plies of material 2. The central leg or prong 17 is the part which is received within the pocket 4 of the element with the outer legs 15 and 16 arranged exteriorly of the outside of the material. In the embodiment shown in the drawing, four layers or plies of material 2 are used in forming the element or pad 1 but it is obvious that a greater or lesser number of sheets of material or plies may be used if desired.

The material from which the element 1 is constructed is preferably cut from sheets of material, such as fabric, sandpaper or emery cloth, depending upon the type of finishing desired. The configuration of the material may be of any particular shape preferred for performing the metal finishing operation on the inside of cylinders and other tubes. The element 1 may comprise layers or plies of material 2 configurated to best suit the purpose, there being various forms desirable, such as shown in Figs. 1 and 5 to 7, inclusive. The plies of material 2, as shown in Fig. 1, have relatively straight sides converging downwardly toward the outer end in a relatively cone shaped formation. The inner ends of the material may be cut along a relatively straight line, as clearly shown in Fig. 1.

Fig. 5 discloses a finishing element or pad 1 constructed of a plurality of layers of material 2, the opposite side walls being relatively straight and then converging inwardly at opposite ends along the lines 18 terminating into relatively straight ends 19, Fig. 5. The element 1 disclosed in Fig. 6 also comprises a plurality of sheets of material having an outer configuration similar to that disclosed in Fig. 5 but having side slots 20, 20 formed therein whereby the element may be used to perform a certain particular type of finish.

The finishing element 1 disclosed in Fig. 5 may have a relatively straight outer end 21 with inclined side edges 22, the inclined side edges 22 inclining sharply as at 23 and terminating into a blunt end 24.

Regardless of the shape of the sheets of material from which the element 1 is made, or the kind of material which is used, the sheets are all stitched together, as indicated at 3. The stitching may be conventional fabric stitches or the stitches may comprise metal staples if desired.

In some instances it is desirable that a relatively smooth finish or lapping be had whereby the element 1 may comprise layers of soft fabric stitched together as indicated at 3 to provide the pocket 4. Abrasive material may be applied to the fabric pads or elements if and when desired.

In cases where it is desired to have the sheet material 2 made of abrasive material, such as sandpaper or emery cloth, it is desirable that the abrasive be applied to the exterior surfaces as indicated at 25, Fig. 10, whereby there will be an abrasive surface adapted for contact with the inside of the tube regardless of whether the mandrel is rotated in the manner indicated by the direction of arrows in Fig. 4 or whether the material is rotated in a direction opposite to that shown in Fig. 4.

The broad aspect of the invention resides in the provision of a finishing element which is preferably composed of a plurality of superimposed layers of material. The material from

which the element is made may be fabric or it may be an abrasive material, such as sandpaper or emery cloth. It is desirable that the element 1 be composed of a plurality of layers of material stitched together as indicated at 3 to provide the pocket 4 into which the mandrel may be inserted. The mandrel may be of any desired shape or construction, such as the mandrels 5, 11 or 12, or the mandrels may be of any other desired shape or configuration capable of performing the function intended. The mandrel, whether it be the mandrel 5, 11 or 12, may be a separate element adapted to be mounted in a chuck of a revolving machine part or it may be a tool of a machine. Regardless of the shape, size or construction of the mandrel, its only purpose is to provide a drive for the element 1.

In cases where the sheet material 2 of the element 1 is abrasive material, it may be desirable to have the central part 26, Fig. 7, smooth with the abrasive on opposite sides as indicated at 27, Fig. 7.

While the device herein shown and described is particularly adapted for the interior finishing of cylinders and other tubes, it may, of course, be used for such other purposes as conditions require.

Changes may be made in the form, construction and arrangement of the parts without departing from the spirit of the invention or sacrificing any of its advantages, and the right is hereby reserved to make all such changes as fairly fall within the scope of the following claims.

The invention is hereby claimed as follows:

1. A finishing device embodying a finishing element, a pocket formed in said element, and a driving member receivable in said pocket for rotating said element, and a pair of outer prongs integral with and spaced from the member, and between which member and said prongs portions of said element are disposed.

2. A finishing device embodying a finishing element made up of a plurality of layers of abrasive material, said material being stitched longitudinally on both sides of its longitudinal axial center line so as to provide a pocket therein, a mandrel having a plurality of slots formed therein and extending lengthwise thereof to provide a central prong and outer spaced legs, said central prong being receivable in said pocket, and said slots receiving layers of material.

3. In a finishing device, a finishing element embodying a plurality of layers of material stitched together, said layers of material being provided with an abrasive surface on their exterior sides only, a prong insertable between said layers, and exterior prongs engageable with the outside of some of said layers.

4. An abrading device embodying an abrading pad, said pad embodying a plurality of plies assembled together and secured at spaced points adjacent and along an axis extending lengthwise of the pad, to provide a pocket, a driving element received in said pocket and a finger on said driving element engaging an outer face of said abrading pad operating to maintain the element against slipping in the pocket and with respect to said pad.

5. A device for finishing the insides of tubular members embodying a relatively flexible finishing element having an interior pocket therein, adapted to receive a driving element, a driving element including a finger receivable in said pocket, and other finger means associated with said finger and engageable with the outside face of

portions of the finishing element, to thereby prevent relative rotation of the finishing element with respect to the driving element.

6. A device for finishing the insides of tubular members embodying a relatively flexible finishing element, stitching through said element and forming a pocket adapted to receive a driving element, a driving element embodying a plurality of prongs, one of said prongs being receivable in the pocket, and portions of said finishing element being disposed between said prongs.

7. A finishing device embodying a finishing element made up of a plurality of layers of material, the layers of material being stitched together to form a pocket therein adapted to receive a driving member, a driving member including a pair of outer prongs engageable with the outside of the finishing element, and a central prong receivable in said pocket, and portions of the element being also disposed between the outer and central prongs.

8. A finishing device embodying a finishing element made up of a plurality of layers of material, the layers of material being flexible, means for securing said layers together, said means and the layers of material defining a pocket for receiving a driving element, and a driving element including a central prong receivable in said pocket and a pair of outer prongs engageable with the exterior of the outermost layers of material.

EUGENE I. HARRISON.

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