Feb. 11, 1947. C. W. V. DAVIS 2,415,730

MAGNETIC CLEANING DEVICE

Filed Feb. 8, 1943

Fig. 1.

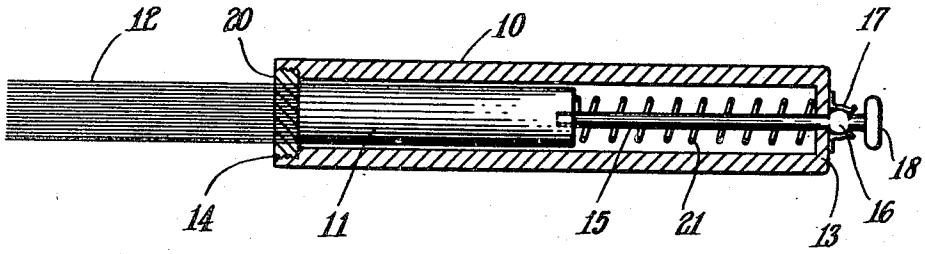


Fig. 2.

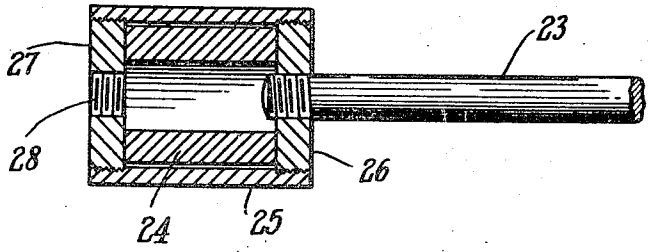


Fig. 3.

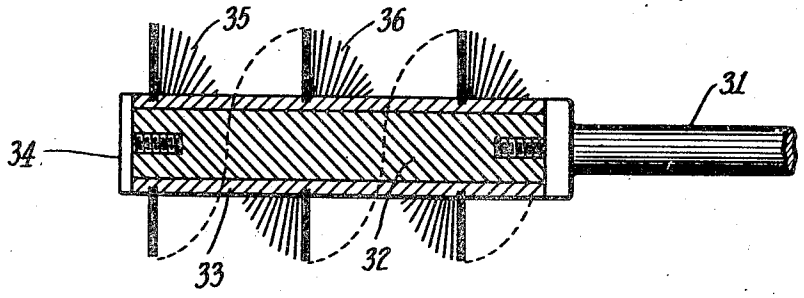
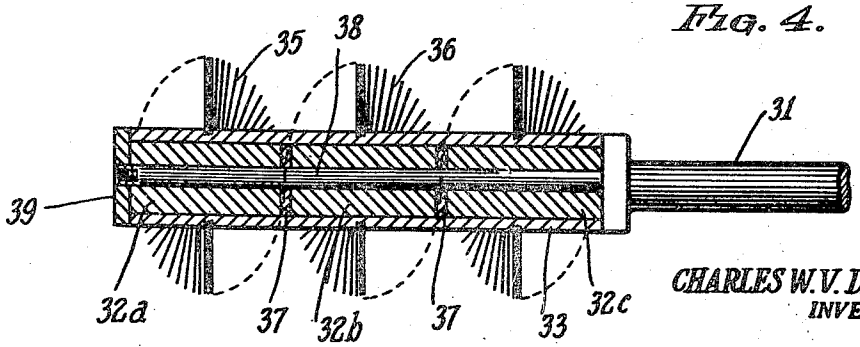


Fig. 4.



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Patented Feb. 11, 1947 2,415,730

UNITED STATES PATENT OFFICE

2,415,730

MAGNETIC CLEANING DEVICE

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Application February 8, 1943, Serial No. 475,227
In Great Britain February 20, 1942

3 Claims. (Cl. 15—104)

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My invention relates to magnetic cleaning devices particularly applicable for cleaning and/or removing magnetic particles from difficultly accessible regions.

It has been proposed to recover articles or fragments of magnetic material from inaccessible regions by the use of magnets. Magnets of conventional construction are however not well adapted for removing magnetic dust, chips, and the like from regions such as internal screw threads or from within cylindrical borings.

The object of the present invention is to provide a magnetic cleaning device which is suitable for such purposes and which is generally useful for cleaning articles made from or superficially contaminated with magnetic material.

According to the invention use is made of a wire brush, the wires being of steel or other magnetic material having stiffness and spring in accordance with the work to be performed by the brush but of low magnetic retentivity in comparison with magnet steel; the wires of this brush are anchored in a mount whereby the brush is secured to a holder accommodating or consisting of a magnet; the ends of the wires may abut directly against one pole face of the magnet. The magnet is preferably a permanent magnet but may be an electro-magnet energized from a suitable source located either externally or positioned within the holder. The holder itself is provided with a grip or a handle of convenient length in accordance with the nature of the work. The device can then be used as a wire brush and in addition to the normal brushing action, magnetic particles even in otherwise inaccessible positions will be picked up by the magnetic attraction of the steel or like wires. Preferably the brush is detachably secured to the holder, so as to enable easy replacement of a worn brush or substitution of a brush of different shape or character. With such a detachable brush, the magnetic particles picked up by the brush can readily be removed when the brush is detached—the magnet remaining in the holder—and the magnetisation being consequently very considerably diminished. Placing the brush in an air stream or shaking it in paraffin oil or other suitable liquid serves to assist such removal.

Instead of completely detaching the brush, it may be spaced from the magnet by movement of brush and/or magnet in the holder, with resultant substantial demagnetisation of the brush. With such movement relative to the holder detents such as a ball and socket arrangement may be provided for retaining the components in the

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operative and inoperative positions as required. Similarly, when using an electro-magnet demagnetisation of the brush may be obtained by opening the energizing circuit of the electro-magnet.

The holder for the magnet may be made of brass, hard rubber or other non-magnetic material, and may be provided at one end with an internal screw thread or other means for the attachment of a handle. At the other end, the brush is attached in a convenient manner. Thus, for example, the bristle mount (similarly of brass, hard rubber, or other non-magnetic material) may be provided with an external screw thread for engagement with an internal screw thread in the holder; alternatively a bayonet type joint can be used.

The ends of the wire bristles which abut against the magnet are ground or otherwise machined to lie in a flat surface, and the end of the magnet is correspondingly flat so as to ensure good magnetic contact. The pressure between the abutting surfaces can be maintained by means of a spring operating on the magnet and tending to urge it towards the brush.

The wires of the brush are anchored in their mount preferably by soldering or brazing when a metal mount is used, but any suitable cement can be employed and in some cases use can be made of welding.

The invention will be further described with reference to the appended drawing showing some constructional forms of magnetic brushes in accordance with the invention. The brush shown in Fig. 1 comprises a handle-holder 10, a magnetic actuating element 11, and cleaning bristles 12. Holder 10 consists of a hollow brass tube closed at one end by means of an integral apertured wall portion 13, and internally threaded at its other end as shown at 14.

The magnetic actuating element 11 consists of a rod-shaped permanent magnet loosely positioned within the holder 10 and retained therein by means of a pin member 15 which is secured to one end of the magnet and extends through and has for a bearing the aperture of the wall portion 13. At its protruding end the pin 15 is formed with an integral ball-shaped collar 16 adapted to engage a socket consisting of two resilient metal clips 17—17 fixedly secured to the outer surface of the wall 13. For facilitating axial movement of the pin 15 its protruding end is formed into an integral collar 18 which serves as a handle for grasping the pin.

The bristles 12 consist of a plurality of wire elements of steel having their ends embedded in

a mounting disc **20** of brass. Disc **20** is provided with external screw threads for engagement with the internal screw threads of the holder **10**. As shown, the bristles **12** extend to the inner surface of the disc **20** so as to abut against the adjacent pole face of the magnet, a pressure contact between the pole face and the ends of the bristles being provided by a compression spring **21**.

In the brush shown in Fig. 2, the handle **23** is attached to a separate magnet housing consisting of a brass tube **25** internally threaded to receive iron pole pieces **26, 27** which are screwed into the tube **23** and clamp between them the hollow cylindrical permanent magnet **24**. The pole piece **26** has a tapped hole to receive the handle 23 while the pole piece **27** has a tapped hole **28** to receive the brush proper, which may be of the same form as the unit **12, 20** of Fig. 1.

In the construction of Fig. 2, however, the bristle mount **20** (see Fig. 1) should be of magnetic material.

In Fig. 3, the magnetic bristles **35, 36** are set on the peripheral surface of a brass sleeve **33** within which the cylindrical magnet **32** is housed. The handle **31** screws into the magnet **32**, has a shoulder forming an abutment for one end of the sleeve **32**. The other end of the sleeve is held by a retaining bolt **34** screwing into the end of the magnet **32** remote from the handle. The bristles are conveniently set in helical rows and in the drawing two helical rows **35, 36** are shown. Naturally any desired number of helical rows can be provided. The magnet **32** may with advantage be magnetised with consecutive poles arranged along the longitudinal axis of the magnet so as to form in effect a plurality of individual magnets placed end to end with like poles adjacent to each other.

Fig. 4 shows a brush similar to Fig. 3 but in which the magnet is replaced by a plurality of magnets placed end to end with like poles adjacent. The brass sleeve **33** is provided with radially extending bristles **35, 36** arranged in helical rows as in Fig. 3. The handle **31** has a threaded extension **38** which passes through the sleeve **33**. The magnets **32a, 32b, 32c** are in the

form of hollow cylinders. Interposed between adjacent magnets are spacing washers **37** of fibre or other suitable non-magnetic material. The magnets and the sleeve are held in position by a nut **39**, screwing on the threaded end of the rod-like extension **38**.

While I have described my invention in specific embodiments and by means of specific examples I do not wish to be limited thereto for obvious modifications will occur to those skilled in the art without departing from the spirit and scope of the invention.

I claim:

1. A magnetic cleaning device comprising a hollow tubular bristle mount having a wall, bristles of magnetic material of low magnetic retentivity anchored at one end in the wall said bristles projecting radially outwardly, and a permanent magnet positioned within said bristle mount.

2. A magnetic cleaning device as claimed in claim 1, in which the permanent magnet exhibits poles lengthwise of the tubular mount.

3. A magnetic cleaning device as claimed in claim 1, in which the tubular mount accommodates a plurality of permanent magnets arranged end to end with like poles adjacent.

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