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2,820,281

ABRASIVE ARTICLE

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Fig. 1.

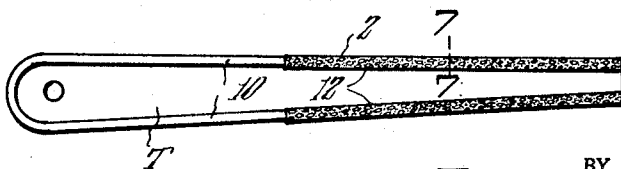
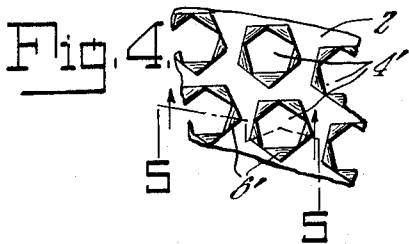
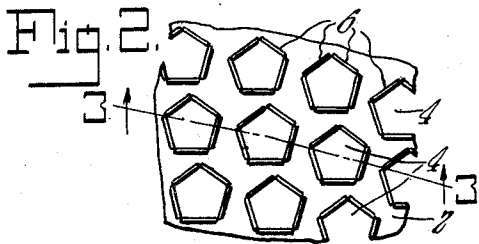
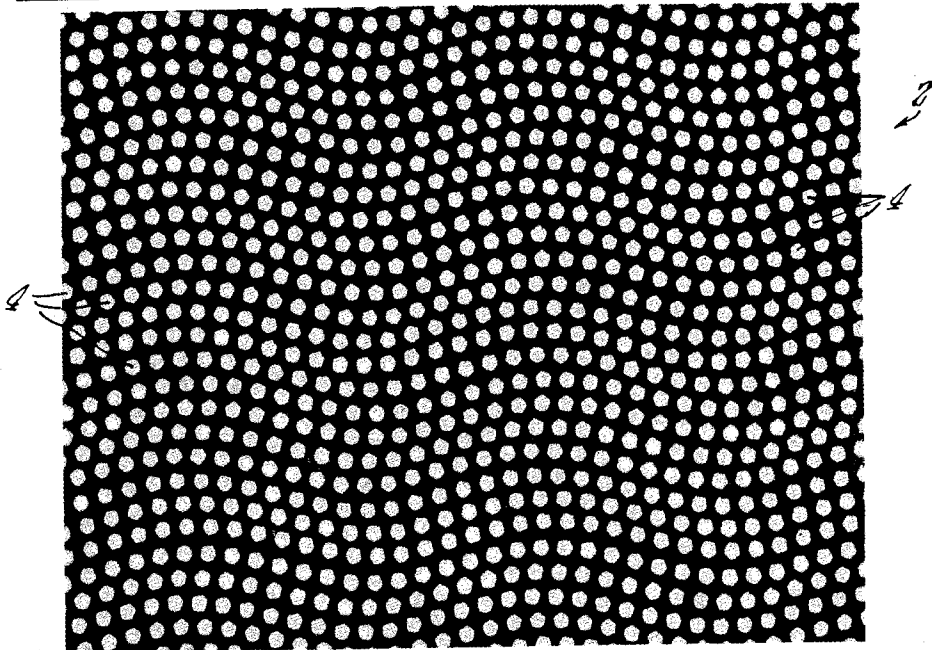
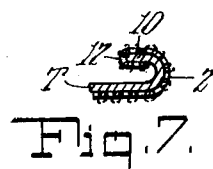
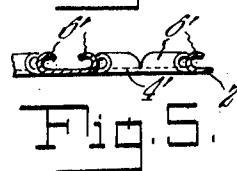


Fig. 6.



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ABRASIVE ARTICLE

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1 Claim. (Cl. 29—78)

This invention relates to improvements in abrasive devices.

The novel features of the invention are directed to the provision of a metallic, relatively thin, sheet-like, device having an abrasive face adapted to function in the manner of sandpaper and other similar materials having abrasive particles of various types secured to the face thereof.

The device of the invention, while being equal for all purposes and function to that of sandpaper and the like, not only has many advantages thereover but also is superior thereto in many important respects.

Sandpaper and similar materials soon become unserviceable through use. They tear and are easily ruptured, the abrasive particles thereof become loosened, and the abrasive surfaces thereof become worn and clogged. The result is that these prior art abrasive sheets have a relatively short life, and the paper or similar backing becomes limp from moisture so as to be unfit for use.

According to one novel feature hereof, the abrasive sheet is flexible so that it may conform to supporting blocks or to tools or devices with which sandpaper and the like is ordinarily used.

The abrasive device hereof may be readily cut or shaped by shears, as in the case of sandpaper and the like, and it is possible to provide a plurality of different grades or degrees of coarseness, as is the case with sandpaper and similar materials.

According to this invention, a thin sheet of flexible and bendable metal is provided on one side thereof with rows of relatively spaced groups of points or projections which form the abrasive face. Such points or projections are formed by punching apertures or openings in the sheet, or by displacing the metal of the sheet at a multiplicity of places from one side or face thereof in such a manner that groups of upset portions or points are projected around the holes so as to form the abrasive surface.

According to a special feature of the invention, the groups of points are related in an important novel manner. They are spaced in rows which are non-straight. The rows extend transversely and longitudinally of the sheet so that the holes or groups of points of a row are not in alignment or in a straight row. In other words, a hole and its group of related points is offset to some extent relative to another hole adjacent thereto.

The novel arrangement of the points is such that, as the abrasive surface of the device is drawn across a piece of work, the work will not be objectionably scored or scratched as would be the case were the points in alignment or in a straight line.

To attain the desired relationship of the groups of points and thereby to avoid scoring and scratching, the rows of the groups of points are wavy. That is, successive groups of points of a row thereof wave back and forth along the length of the row, thereby to insure that

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adjacent groups of points are relatively offset or out of alignment as to each other.

The abrasive surface is superior to that of sandpaper in that it has a much longer useful life. Additionally, the device is not unfavorably affected by moisture.

The abrasive surface may be readily cleaned out when clogged as by brushing or by a liquid, and this is not possible with prior art abrasive sheets, such as sandpaper.

As an important feature of the invention, the metal from which the sheet is formed, while being relatively bendable and flexible so that it may be readily conformed to a support, such as a block or the like, is such that it will retain its shape. That is, edge portions of the sheet may be bent around or clenched over a flange, lip or edge of a holding tool whereby the sheet will maintain its form and grip. This is to be distinguished from the backing of sandpaper and similar materials where the backing entirely lacks shape-retaining characteristics.

The novel features of the invention will be described in connection with the preferred form thereof.

In the drawings:

Fig. 1 is a plan view of a portion of the non-abrasive face or side of an abrasive sheet or device embodying the novel features of the invention;

Fig. 2 is an enlarged partial plan view of the abrasive face of the sheet shown in Fig. 1;

Fig. 3 is a sectional view on the line 3—3 of Fig. 2;

Fig. 4 is an enlarged partial plan view of the abrasive face of the sheet to explain certain features of the invention;

Fig. 5 is a sectional view on the line 5—5 of Fig. 4;

Fig. 6 is a plan view of one form of a tool or holder with the abrasive device associated therewith; and

Fig. 7 is a sectional view on the line 7—7 of Fig. 6.

Referring now to the drawings more in detail, the novel features of the invention will be fully described.

The abrasive device of the invention consists of a sheet 2 of relatively thin bendable and flexible metal which is provided with rows of holes, such as 4.

The holes 4 may be formed by punching or piercing the sheet by such a tool or tools as will displace spaced portions of the sheet from the upper face thereof and form a plurality of groups of projections or points such as 6, to form an abrasive face. There will be a group of points related to each said hole.

In all cases, the upper or non-abrasive face of the sheet will preferably be relatively flat and smooth.

The metal from which the sheet is formed will be sufficiently bendable and flexible so that with the smooth side superposed on a support such as a block, the sheet may be conformed thereto. It is customary with sandpaper and similar abrasive materials to wrap a sheet or a portion thereof entirely or partly around a supporting block. The abrasive sheet of the invention may be similarly employed. Also, the sheet may be secured in or clamped by devices which are commonly used for holding sandpaper and the like.

While the metal from which the sheet is formed will have the desired flexibility and bendability for conforming to a support or holder, it will have shape-retaining characteristics, as distinguished from the backing of sandpaper and similar material. Where a portion of the sheet or an edge thereof is bent or folded over or around an edge, lip, flange or other part of a tool or holder so as to secure the sheet thereto, the bend or fold will be retained so as to hold the sheet against separation from the tool or holder. While the backing of sandpaper, and the like, may be bent or folded, the characteristics thereof are not such that the bend or fold is easily retained.

Sheets may be formed from metal of various thick-

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nesses and characteristics which will provide the desired flexibility of sheet and stiffness of the projections or points.

It has been found, however, that sheet steel a few thousandths of an inch in thickness is particularly suitable for the practice of the invention.

The metal sheet will be displaced in such a manner as to provide the desired number of points in the groups thereof around the holes. The number of points, may be varied and it may be desirable to provide a greater or less number of points in groups around some of the holes than in the groups around other of the holes.

In all cases, the points will be short enough to withstand pressure and bending and they may have various degrees of sharpness. Such will depend on the characteristics of the tool or tools used in punching the holes or displacing portions of the sheet to form the points.

According to one important feature of the invention, the holes, and therefor the groups of points, are not in alignment so as to avoid scratching and scoring of the work as the abrasive face is drawn thereacross. That is, a hole and its group of points is offset to some extent relative to an adjacent hole and its points.

This is accomplished, in one way, by arranging the holes in longitudinal and transverse rows which are non-straight. Preferably said rows are wavy, so that throughout their length the rows of holes wave back and forth and up and down, in a substantially definite pattern.

The coarseness of the abrasive face of the sheet may be varied by varying the number of points in a group and/or by providing points of different length and different degrees of sharpness.

The abrasive sheet may be readily and easily cut or shaped as may be desired and used on a block or secured or clamped in a holding device, as is the case with sandpaper and similar materials.

By arranging points in non-aligned relation, the likelihood of scratching or scoring work is obviated. The abrasive sheet has a much longer life than that of sandpaper and similar materials, there being no backing likely to be unfavorably affected by moisture or to be otherwise ruptured and there being no abrasive particles which may be loosened from the backing. The abrasive face may be cleaned and restored to a useful condition merely by brushing or by application of a suitable liquid, all of which is not possible with sandpaper and like materials.

In Figs. 2 and 3, the abrasive points 6 are shown as being substantially straight. Such an arrangement will be desirable for some purposes, and the extremities may have the desired degree of sharpness. The points have relatively converging elongated opposite side edges, as shown.

Otherwise, as in Figs. 4 and 5, the points 6' around the holes 4' are non-straight and curving or curled for an abrasive function somewhat different than that of the abrasive faces of Figs. 2 and 3.

The curved or curled points 6' of a particular group are curved or curled away from each other as in Fig. 4.

In all cases, the points are such as to function similarly to the abrasive particles of sandpaper and the like. The points function with an abrasive action as distinguished from a scarving action as would be the case were there straight parallel cutting edges.

Various results may be obtained with metals of various

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thicknesses and characteristics, points of different lengths and stiffness, and with various numbers of points in the groups thereof, all within the spirit and scope of the invention.

Excellent results have been obtained with cold-rolled, half-hard, low carbon steel about six-thousandths of an inch in thickness. The holes or perforations being formed with a piercing or punching tool or needle having five sides to provide a group of five points around the holes. Metal of other characteristics and having more or less points around the holes will come within the spirit and scope of the invention.

As has been pointed out, the abrasive device or sheet will be formed from metal which is flexible and bendable but which is adapted to retain bends or formations. In this way, the sheet may be applied to various tools or holding devices for use.

As an illustration, one form of holder or tool is represented by T in Fig. 6. Such a holder has lips or flanges 10 and a sheet of the abrasive material is cut to the size and shape for the holder. With the smooth side of the sheet on the tool, the marginal edge portions 12 thereof are bent or folded around and over the flange or lip. The retaining characteristics of the metal of the sheet are such that bent or folded portions retain their shape and the abrasive sheet remains secure on the holder. The edges or portions of the sheet may be bent or folded over onto, or around lips, beads, flanges of various tools or holders and other objects for securing the sheet thereto, to facilitate use thereof.

Various changes and modifications may be made in the form of abrasive device, without departing from the spirit and scope of the invention, and therefor it is desired to be limited, if at all, by the accompanying claim, rather than the foregoing disclosure.

What I desire to claim and secure by Letters Patent of the United States is as follows:

An abrasive article having an abrasive surface on one face thereof comprising, a sheet of relatively thin and flexible metal having relatively spaced groups of elongated point portions displaced upwardly relative to said one face providing holes within the points of the groups thereof, said point portions of the groups thereof curling upwardly and radially outwardly away from the sides of their respective holes in different directions and being disposed to lie over and spaced above and along portions of said one face around and outwardly of said holes, said point portions being provided with opposite elongated edges relatively converging outwardly and away from the sides of their respective holes cooperating to form said abrasive surface, said groups of point portions being arranged in non-straight horizontal and vertical rows whereby adjacent groups of points and their respective holes are misaligned horizontally and vertically.

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