Oct. 18, 1949. E. W. HALL 2,484,994

ABRADING ELEMENT

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Fig. 1.

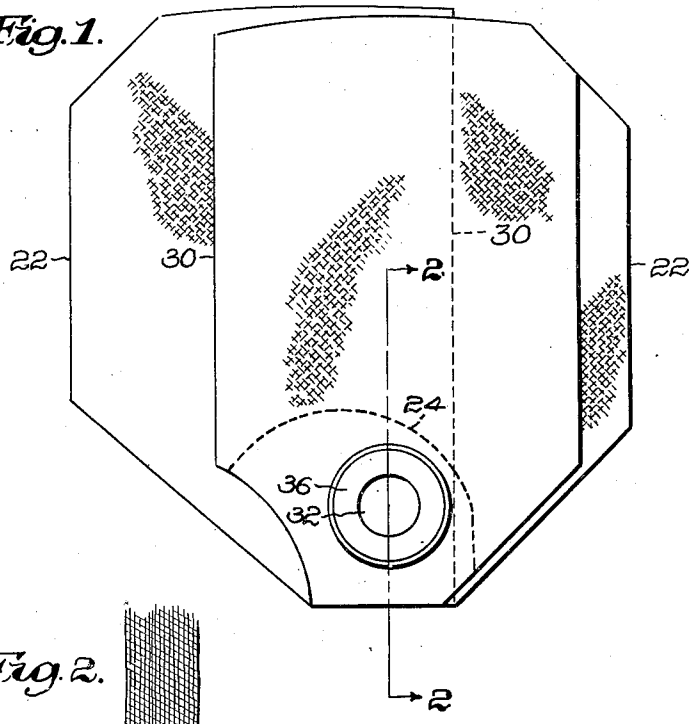


Fig. 2.

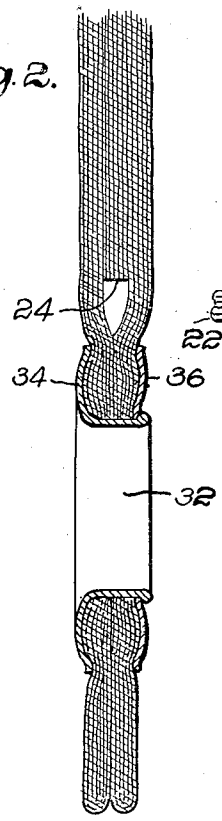
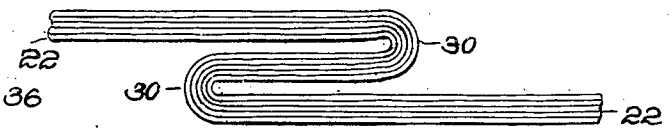


Fig. 2A



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Fig. 3

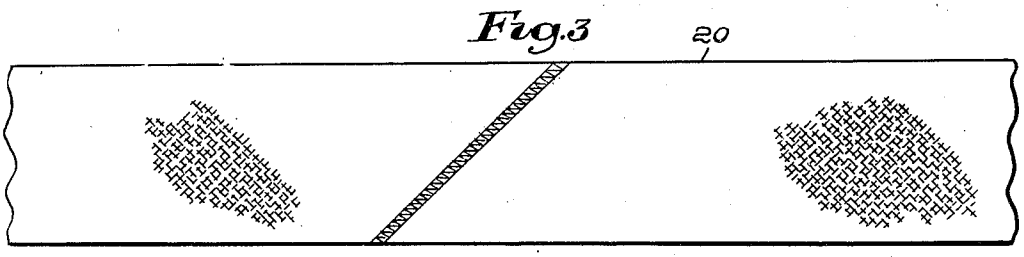


Fig. 4



Fig. 5.

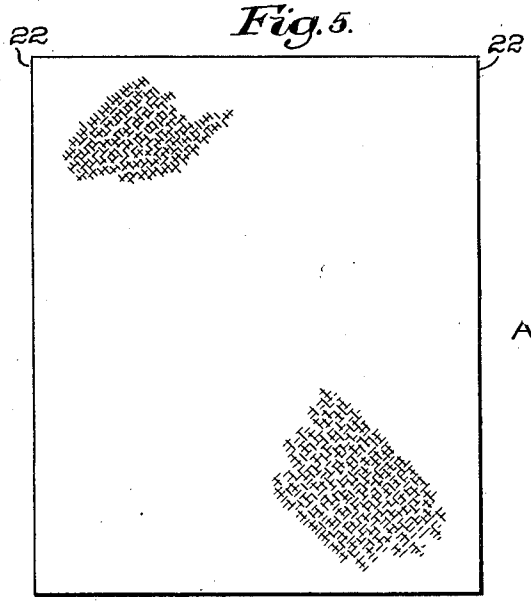


Fig. 6.

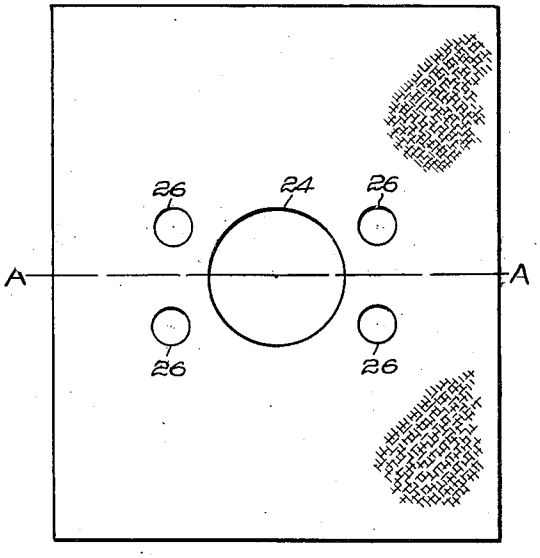
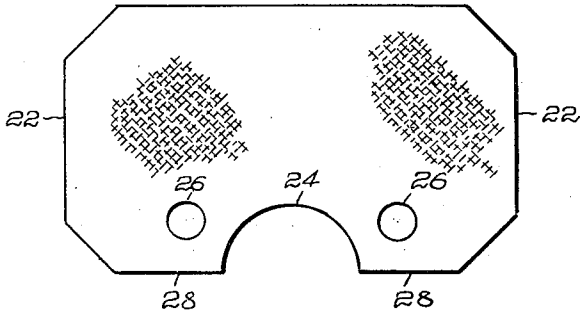


Fig. 7



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Fig. 8.

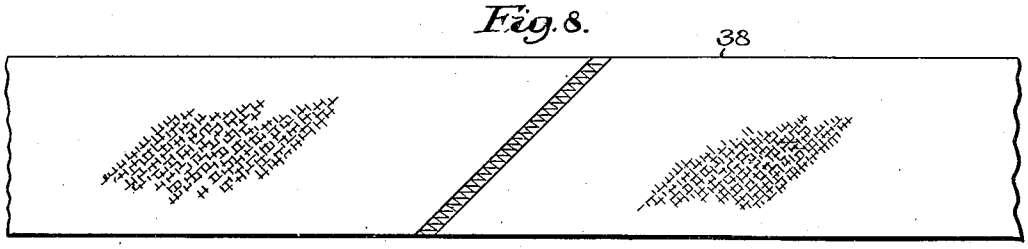


Fig. 9.



Fig. 10

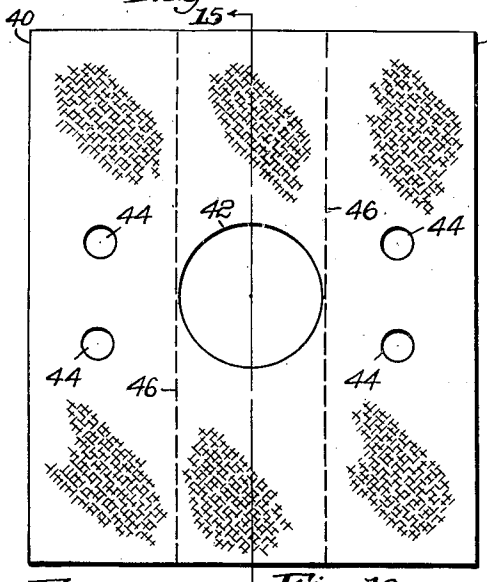


Fig. 11

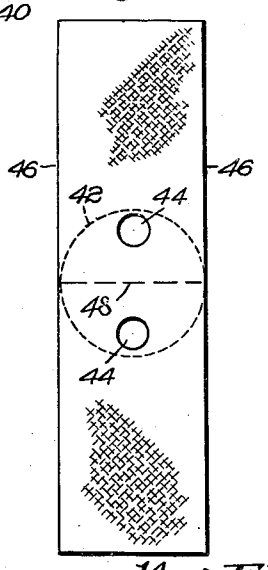


Fig. 12.

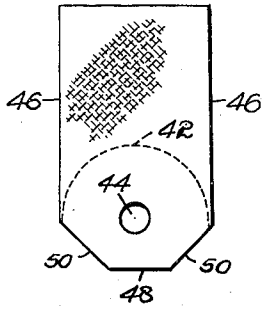


Fig. 14.

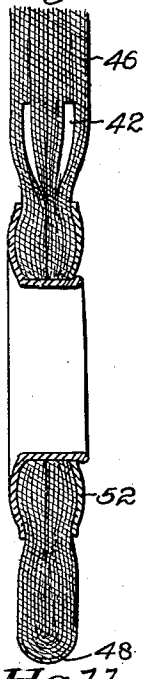


Fig. 15



Fig. 16.

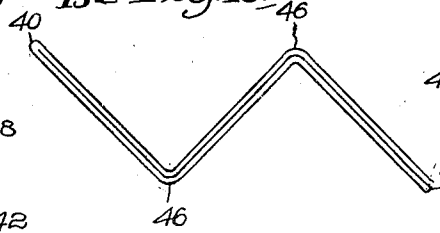
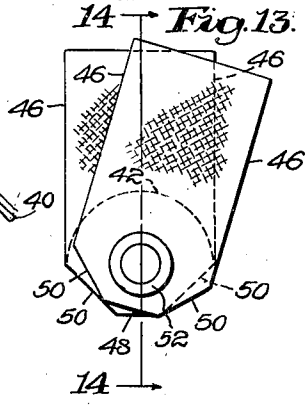


Fig. 13.



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Patented Oct. 18, 1949

2,484,994

UNITED STATES PATENT OFFICE

2,484,994

ABRADING ELEMENT

Elisha W. Hall, Scituate, Mass.

Application January 27, 1948, Serial No. 4,582

7 Claims. (Cl. 51—193)

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This invention relates to flexible, laminated, abrading tools and is concerned with an abrading element to be combined with other like elements on and about a hub having lugs such as pivots to which the abrading elements are intended to be secured, the abrading elements to that end being provided with grommets which serve the double purpose of securing the laminations together and of securing the abrading elements to the lugs of the hub.

The invention will best be understood by reference to the following description when taken in connection with the accompanying drawings of certain embodiments thereof, while its scope will be pointed out more particularly in the appended claims.

In the drawings:

Fig. 1 is an elevation of one form of abrading element embodying the invention;

Fig. 2 is a sectional view on an enlarged scale on line 2—2 of Fig. 1;

Fig. 2A is a plan of the abrading element shown in Fig. 1;

Fig. 3 is a plan showing a bias-cut strip of cloth to be folded to produce an abrading element embodying the invention;

Fig. 4 is an elevation (edge view) of the strip subsequent to the preliminary folding operation;

Fig. 5 is a plan of the strip folded as in Fig. 4 to form a rectangular plural-ply mass;

Fig. 6 is an elevation of the rectangular, plural-ply mass, folded as in Figs. 4 and 5, and punched to provide holes, namely, a large one to reduce bulk, and four small ones to receive a grommet after further folding;

Fig. 7 is an elevation showing the rectangular, plural-ply mass folded once more to reduce it to a smaller rectangle and with its four corners trimmed, in readiness for further folding and for the introduction of the grommet;

Fig. 8 is a plan showing a bias-cut strip of cloth to be folded to produce a second form of abrading element;

Fig. 9 is an elevation (edge view) of the strip as it appears after the first folding operation;

Fig. 10 is a plan of the strip folded as in Fig. 9 to form a rectangular, plural-ply mass, and with certain holes punched therein;

Fig. 11 is a plan of the rectangular, plural-ply mass folded again to produce a smaller rectangle;

Fig. 12 is a plan of the plural-ply mass folded once more and trimmed at two corners;

Fig. 13 is a plan similar to Fig. 12 but showing

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two such masses angularly displaced and held in such position by the now-clinched grommet;

Fig. 14 is a sectional view on an enlarged scale on line 14—14 of Fig. 13;

Fig. 15 is a sectional view on line 15—15 of Fig. 10; and

Fig. 16 is an edge view illustrating the mode of folding the mass from its condition in Fig. 10 to its condition in Fig. 11.

Referring to the first and preferred embodiment of the invention illustrated in Figs. 1 to 7, inclusive, and having reference at first to Fig. 3, there is shown a strip 20 of flexible material such as bias-cut cloth, of the desired length for folding to produce a plural-ply mass, rectangular as viewed in Fig. 5, and having folds 22 at two parallel edges. It will be convenient to refer to this as the first or preliminary folding and it may be accomplished, for example, by winding the strip 20 about a drum to form a ring, then removing the ring axially from the drum and finally flattening the ring so that it now appears as in Figs. 4 and 5, as a plural-ply mass with two folds 22 along parallel edges.

The plural-ply mass is now punched to provide a large hole 24 for the purpose of bulk reduction, the importance of which, as will presently appear, is to make the final mass thinner in the region of the grommet than elsewhere, with the result that the grommet can be shorter, axially, and will occupy less space on the lug of the hub to which it is to be applied. This punching of the large hole is, in practice, accomplished without loss of material because the disk resulting from the punching can be made into a small-diameter buffing wheel to be used, for example, in the table-silver industry in buffing "flatware" such as spoons, forks, and knives.

The punching of smaller holes 26 to receive a grommet may take place simultaneously with the punching of the larger, bulk-reducing hole 24, if desired (see Fig. 6) or later (see Fig. 7) after the mass has been folded along a line A—A (Fig. 6) to produce a fold 28 bisecting the large hole 24 and thus producing a semi-circular notch in the fold 28. If desired, however, the punching of the smaller holes 26 may be deferred until after the formation of the fold 28, or it may even be deferred until after folding the mass again, to produce two folds 30 (compare Figs. 1 and 2A).

In this final folding operation, wherein the right-hand side of the assembly is folded under to the left and the left-hand side over to the right, the smaller holes 26 for a grommet 32, herein metallic (see Figs. 1 and 3), are brought

into registration with each other. It will be apparent that to effect this the fold lines **30** are respectively spaced from the center of the adjacent hole **26** one quarter of the distance between the centers of the two holes **26**. It will also be observed that the extremities of the diameter of large hole **24** move over to the further side of the originally more remote smaller hole. The grommet **32** is now inserted and clinched to grip the material between its flanges **34** and **36**, the latter being actually a separate ring or washer. The importance of the bulk-reducing hole **24** now clearly appears from a comparison of Figs. 1 and 3 as it will be observed that the margin of the large hole **24** is beyond the zone of the grommet. The plies of the central fold are not engaged by the grommet but are integral at the fold lines with the plies of the two outer folds which are so engaged. This results in highly desirable bulk-reduction in the region of the grommet but with equally desirable greater bulk elsewhere for its effect upon the work and without undue weakening of the mass immediately about the grommet **32**.

An important feature of this embodiment is the fact that the abrading element has what may be termed a permanent reverse-curve, folded arrangement (see Fig. 2A) maintained at all times by the fact that the grommet extends through and holds the several portions of the folds in their desired relative positions. As the fold is permanent and is established at the point of manufacture, it is dependent in no way upon the skill or judgment of the user of a wheel, of which the abrading element is to form a part when assembled by the user.

The second form or embodiment of the invention, now to be described, has desirable characteristics in common with the first form, but as will appear, is a two-part construction, that is to say, there are two distinct masses united by a grommet as presently described. In this second embodiment, as in the first, bulk-reduction is achieved in a generally similar manner which will appear during the following description of the second form.

At the start, there is a bias-cut strip **38** (see Fig. 8) folded as before to provide a plural-ply, rectangular mass having two parallel edge folds **40** (see Fig. 9) which is then punched to provide a hole **42** through the several plies for bulk-reduction purposes. Grommet-receiving holes **44** may be punched at this time, or subsequently, as desired. The rectangular mass is next folded again (compare Figs. 10 and 16) to form two more folds **46** so that it then appears as in Fig. 11. Finally, the mass is folded once more to form a fold **48** perpendicular to the folds **46**, and two corners of the fold **48** are angularly trimmed as at **50**.

Two such masses, as now completed, are assembled angularly (see Fig. 13), a grommet **52** is introduced through the holes **44** and clinched, and the grommet holds the two masses angularly displaced as shown, in readiness for application to a lug of a hub. It should now be observed that the perimeters of the bulk-reducing holes **42** are wholly beyond the radial limits of the grommet **52** so that there is much less bulk of the material on and about the grommet than elsewhere beyond the region of the grommet, yet without undue weakening of the mass immediately about the grommet **52**. The grommet can be relatively short, axially, and will occupy a desirably diminished space on the lug of the hub, while, on the other hand, the working portion of the abrading element is relatively thick and covers a very considerable area of the work.

Each embodiment is characterized by this idea of relatively small bulk at the grommet and relatively greater bulk elsewhere. Each embodiment is characterized also by the fact that its working surface is relatively large in the direction of the axis of rotation of the hub, and further by the fact that there is an axially directed wiping effect due to the staggered relationship between certain portions of the working end of the abrading element. For example, in the case of the first embodiment, the reversely folded (and in fact permanently folded arrangement) is particularly desirable because of the fact that the reverse bend is intermediate two other portions, one of which is in advance of the other at the work surface. In the case of the second embodiment, the reversely folded feature is absent, but there remains the other characteristic of two portions, one in advance of the other, at the work surface.

Having thus described these embodiments of the invention, what I claim is:

1. In an abrading element for assembly with other like elements on a hub, the combination of a grommet to be attached to the hub, and three plural-ply masses of abrading material, each mass having a hole through which said grommet extends, one of said masses, intermediate the other two masses, having its hole larger in diameter than the other two, and larger in diameter than said grommet.

2. In an abrading element for assembly with other like elements on a hub, the combination of a grommet to be attached to the hub, and a plural-ply mass of abrading material folded to provide three masses, one of them intermediate the remaining two masses, said remaining two masses being provided with holes in which said grommet is snugly received, said intermediate mass having a clearance opening with a margin radially beyond the margin of said grommet, thereby providing a reduced bulk of abrading material on said grommet.

3. In an abrading element for assembly with other like elements on a hub, the combination of a grommet to be attached to the hub, and a plural-ply mass of abrading material having a reverse-bend formation with two folds, providing three masses, one of them intermediate the remaining two masses, said remaining two masses being provided with holes in which said grommet is snugly received, said intermediate mass having a clearance opening larger than said grommet to reduce the bulk of abrading material in said grommet.

4. An abrading element for an abrading wheel comprising a multiplicity of plies of sheet material extending for edge-wise exposure at the periphery of the wheel, the plies being folded together along substantially radial lines, the inner portions of interior plies being cut away, parts of exterior plies extending past the margin of the cut-away area and means securing together such exterior plies with resultant drawing together of such parts within the cut-away portion.

5. An abrading element for an abrading wheel comprising a multiplicity of plies of sheet material extending for edge-wise exposure at the periphery of the wheel, the element as a whole being of limited circumferential extent and comprising interior plies having their radially inner portions cut away and exterior plies on either side secured together at the area of said cut-away portions and drawn into the same.

6. An abrading element for an abrading wheel comprising a multiplicity of plies of sheet material extending for edge-wise exposure at the periphery of the wheel, the element as a whole being of limited circumferential extent and comprising sheets folded reversely to provide at least one interior group of plies and exterior groups of plies, plies of the interior group having their radially inner portions cut away while retaining integral connection at the fold lines with other plies and exterior plies at either side being secured together at the area of said cut-away portions and drawn into the same.

7. An abrading element for an abrading wheel comprising a multiplicity of plies of sheet material folded to present their edge portions at opposite sides of the fold at the periphery of the wheel and also being folded together on substantially radial lines, the inner portions of interior plies being cut away and parts of exterior plies

extending past the margin of the cut-away area, the remaining portion of said interior plies being integrally connected to exterior plies at the radial fold lines and plies exterior thereto being at either side connected one to another on the first mentioned fold line and means securing together such exterior plies with resultant drawing together of such parts within the cut-away portion.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
Re. 15,226	Levett	Nov. 15, 1921
569,014	Condon et al.	Dec. 21, 1897
1,927,862	Zimmerman	Sept. 26, 1933
2,309,553	Twyning et al.	Jan. 26, 1943