June 3, 1941. F. H. THOMPSON 2,244,582

BUFFING WHEEL

Filed July 7, 1939 2 Sheets-Sheet 1

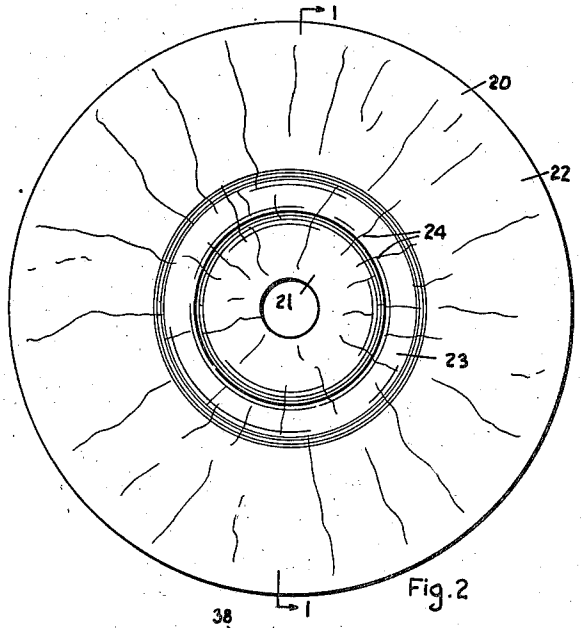


Fig. 2

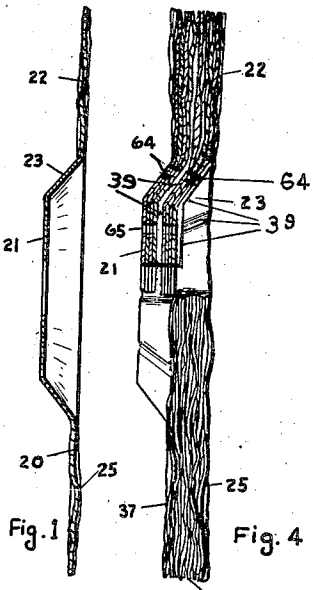


Fig. 1

Fig. 4

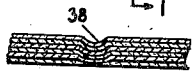


Fig. 8

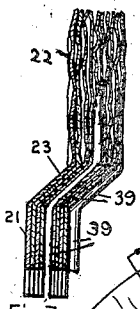


Fig. 7

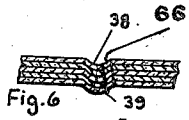


Fig. 6

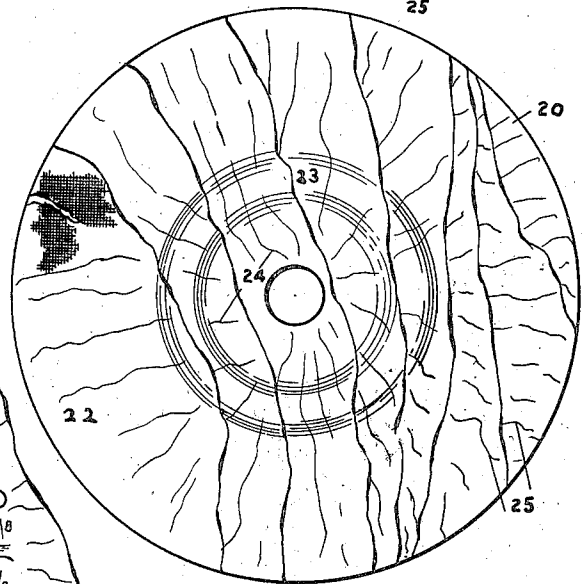


Fig. 3

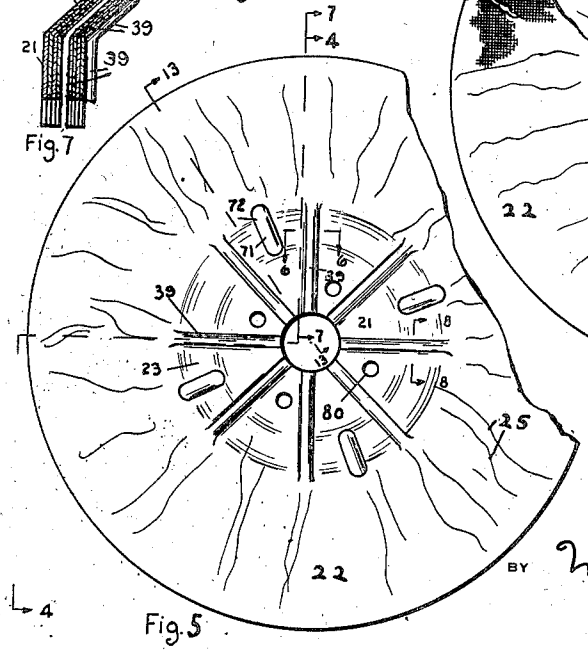


Fig. 5

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June 3, 1941. F. H. THOMPSON 2,244,582

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Filed July 7, 1939 2 Sheets-Sheet 2

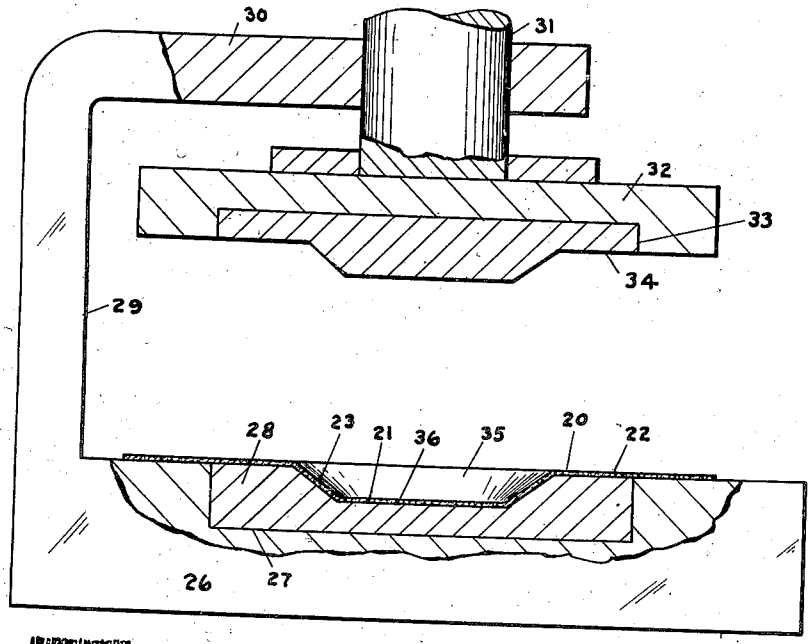


Fig. 9

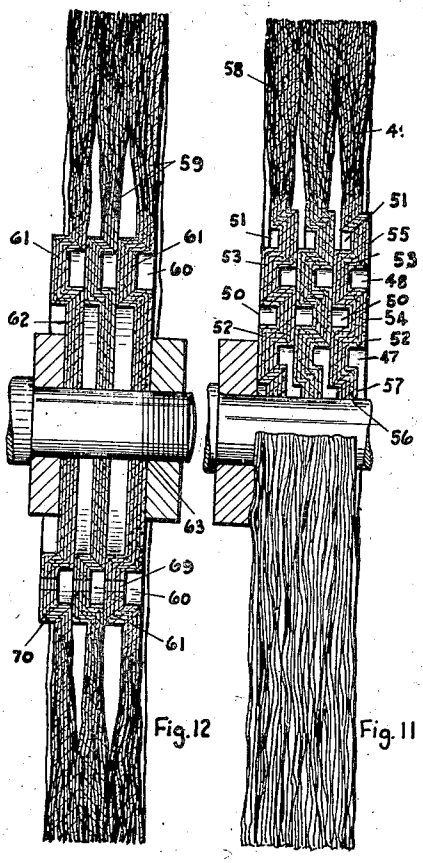


Fig. 12

Fig. 11

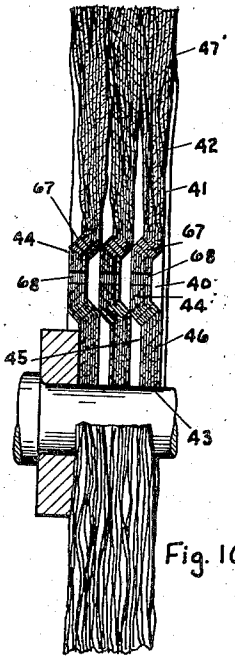


Fig. 10

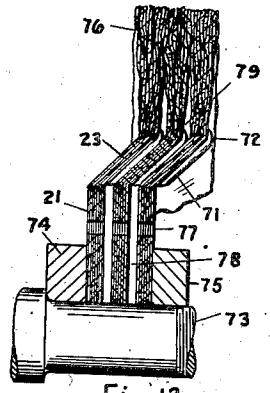


Fig. 13

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UNITED STATES PATENT OFFICE

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BUFFING WHEEL

Frederick Hanson Thompson, Dayton, Ohio, assignor to Divine Brothers Company, Utica, N. Y., a corporation of New York

Application July 7, 1939, Serial No. 283,243

6 Claims. (Cl. 51—193)

My present invention relates to buffing and polishing wheels and the sections thereof and the layers for said sections and the process of making such buffing and polishing wheels, buffing and polishing wheel sections and the separate layers for such sections.

The purpose of this invention is to provide a new and improved form of buffing and polishing wheel of the general type where a plurality of layers of fabric or other suitable material usually in round pieces or the equivalent thereof are arranged face to face and the circle of their edges forms the periphery of the wheel and the working surface thereof.

Heretofore the common and almost universal way of making buffing wheels and polishing wheels of this type (hereinafter for brevity called simply buffing wheels upon the basis that that term in its broader usage includes polishing wheels) has been to arrange disks of fabric or pieces of fabric forming disks one on top of another until a section of the proper thickness has been formed and then enough of these sections were placed side by side to form a buffing wheel of the desired thickness. This method of forming a buffing wheel of this type has several disadvantages among which may be named; the high cost of the wheel due to the wheel being in effect solid fabric, the definitely localized action of each separate layer of fabric and the absence of ventilation or air space between the layers of fabric in the sections of the wheel, the two latter results being due of course to the high centrifugal force placed upon the layers when the wheel is revolved at the regular high speed of such wheels causing the layers to stand out straight in a plane normal to the axis of the wheel and so substantially as close together at the periphery of the wheel as the fabric is placed near the center of the wheel where it is mounted upon the usual rotated arbor.

Among the purposes of this invention is the production of a buffing wheel of the said type that is more economical in the amount of material used to produce a buffing wheel of given diameter and thickness and working strength and character and which wheel is more effective in that it cuts more in a given time, runs cooler, buffs and polishes more evenly without producing local lines and is less liable to damage the wheel or the article being worked on and is easier for the workman to use.

These purposes and advantages are attained by forming a buffing wheel section or the layers of material used for a section so that the central portion of the layers are offset relative to the respective main outer working zones or the central portions are otherwise distorted and drawn inward radially so that the fabric or material of the parts so offset or otherwise distorted and the connecting portions and also the outer working zone are caused to have more or less definitely formed ridges or wave-like formations and this offset location of the central portion relative to the outer working zone of the layers or said distortion otherwise of said central portion and the said ridges and waves are rendered substantially permanent by treating or impregnating the central portion and its adjacent part forming the intermediate zone reaching out to the outer zone, with a suitable size or adhesive and allowing the adhesive to set or permanently stiffen while the said layers or sections are in their said offset or distorted shape.

A further purpose of this invention is to point out a method or process of forming the product above described.

Further purposes and advantages of this invention will appear from the specification and claims herein.

Fig. 1 is a central sectional view through a single layer of fabric shaped pursuant to one form of this invention to form one of several layers for a buffing wheel section.

Fig. 2 is a plan view of the whole disk of fabric of which a sectional view is shown in Fig. 1.

Fig. 3 is a plan view of a plurality of layers or disks of fabric placed one on top of another to form a section of a buffing wheel embodying this invention, the disks or layers of said section having their central portions depressed relative to their outer working zones, said layers or disks having their right hand portions broken away to successively less extent through the section in order to show the random and intersecting arrangement of the ridges and waves that may take place under some circumstances when the central portions of a pile of disks are offset or otherwise distorted relative to their outer zones.

Fig. 4 is a view partly in edge elevation of and partly in central section through the two sections of Fig. 5 form.

Fig. 5 is a plan view of two buffing wheel sections embodying this invention where the ridges and incidental valleys have been definitely located by proper means during the process of distorting the layers of the section.

Fig. 6 is a detail sectional view on line 6—6 of Fig. 5 through one section showing a definitely formed ridge with a corresponding indentation.

Fig. 7 is a detail sectional view on line 7—7 of Fig. 5.

Fig. 8 is a sectional view on line 8—8 of Fig. 5, but through one section only.

Fig. 9 is a vertical sectional view through a conventionalized machine that may be used to perform the step of depressing or otherwise distorting the central portions of a stack of disks of a section pursuant to this invention.

Fig. 10 is a central sectional view through three adjacent sections of a buffing wheel of a modified form but embodying this invention, where the distortion is offset to one side of the sections but not at the center of the sections.

Fig. 11 is a similar sectional view through three adjacent sections of a buffing wheel of another modified form of buffing wheel embodying this invention in that the distortions project to both sides of the plane of the section.

Fig. 12 is a similar sectional view through several adjacent sections of a buffing wheel of another modified form of buffing wheel embodying this invention.

Fig. 13 is a view similar to Fig. 12 of another form of the invention.

It will be understood that the different views of various forms of my invention and the detailed description of such specific illustrations are illustrative of my invention but are not to be taken as limitations of this invention.

This invention is not limited to a buffing wheel formed exclusively of layers of fabric but is applicable to a buffing wheel formed of layers of leather, sisal, sandpaper, emery cloth or abrasive coated paper or cloth, and to buffing wheels formed partly of any or several of the foregoing fibrous materials and partly of filling layers as of paper, cardboard or the like.

The term "disk" as herein used may refer to a disk which is one integral piece of fabric or other suitable material or may refer to disks which are composed of one or more or a plurality of pieces used to form a disk. Disks may also be made of a plurality of folded pieces either originally disks or other shaped pieces.

Referring first to my now preferred construction of my invention, as shown in Figs. 1–8, the invention in its simplest form may be said to consist of a disk or proper piece of cloth or similar suitable material as used for buffing wheels and the like which piece of fabric 20 has had its central portion 21 distorted so as to be depressed or pushed out of the plane of the main outer annular portion 22, but still connected thereto by the slanting or curved intermediate annular portion 23 and which depressed or recessed or offset portions 21 and connecting portions 23 have been definitely and substantially permanently set into their recessed or offset or depressed positions by being supplied with or impregnated with some form of a suitable adhesive, cement or the like either at some time prior to the parts being so forced out of shape or while the parts are so forced out of their former shape and where said adhesive or cement-supplied portions are held in their distorted or depressed positions temporarily but long enough to retain permanently said offset or depressed positions. In Fig. 1 I have shown a cross section through a single layer of fabric or other suitable material after it has had its central portion so depressed or offset relative to the plane of its main outer annular portion 22. It will be understood that when such layer of material has had its central portion distorted or depressed in this manner relative to the outer main annular portion 22, the central portion 21 and the connecting annular ring 23 will be pushed or drawn into ridges or flutings or puckerings 24, and these distortions of the material or fabric will remain in the material when the adhesive has dried and rendered permanent the shape thus imparted to the piece of material. The process which has been used to offset or depress the central portion and its surrounding annular ring also draws in from its original size the whole piece of fabric or other material and thus forms ridges or waves 25 in the outer annular ring 23, but these flutings or waves 25 are not permanently localized in their position as is the case with the ridges or flutings 24 in the central portion 21 and the connecting annular zone 23. The flutings or puckerings 25 in the annular portion or zone 22 in other words may be straightened out by hand or temporarily during use of a buffing wheel, but the fluting or wave thus temporarily straightened out will at once manifest itself in adjoining portions of the outer zone 22.

In Fig. 9 I have shown a more or less conventionalized form of a machine that may be used for performing the step of depressing or otherwise distorting the central portion of a disk or other proper piece of cloth or suitable material relative to the main outer working zone 22 and partly depressing as by slanting or curving the intermediate zone 23 connecting the depressed center 21 and the main outer working zone 22. In this machine a bed plate 26 has a countersunk hole 27 in which is placed a lower die 28 of the proper size, such lower die being of course preferably removable so that another die of different form and proportion of parts may be placed in the machine when required. From one or both sides of the bed plate 28 there projects upwardly a solid post 29 upon which is supported an overhanging strong arm 30 in which is reciprocatingly mounted an upright 31 to the lower end of which is securely attached the upper presser plate 32 having in its lower side a countersunk recess 33 in which may be removably placed an upper die 34. For the purpose of definiteness it will be assumed that this machine is organized to form a central depression in a disk of fabric or material 20 with the depression of relative proportion shown in the sectional view, Fig. 1, and also that the machine may be used and usually will be used to at one stroke depress or otherwise distort the central portions of a whole stack of disks or a section of a buffing wheel as shown in Fig. 4. For this purpose the lower die 28 will have a central depression 35 having a suitable bottom 36 corresponding to the size of the desired central depressions of the central part 21 of the disk. The sides of the depression 35 are shown as slanting upwardly of an extent and at an angle to correspond to the slanted connecting or intermediate ring or zone 23 of the single disk of fabric as shown in Fig. 1 or of the plurality of such disks as shown in Fig. 4. The upper die 34 will be reversely shaped but of corresponding size so that when the upper die is forced down as by proper power or hand-operated means (not shown) the plain flat layer of fabric will as shown in Fig. 9 have its central portion pushed down so as to form the depressed or otherwise distorted central portion 21 of Fig. 1 and so as to form the slanting connecting intermediate zone 23 leading from the depressed or distorted central portion 21 to the main outer zone 22 of the piece of fabric. As already sug-

gested, when a piece of fabric is so manipulated or distorted the fabric will be drawn in radially from its outer edge to a greater or less extent and ridges or flutings 24 will be formed in the central depressed portion 21 and the slanting or curved partly depressed intermediate zone 23.

In order to maintain such distorted shape of the piece of fabric and to retain permanently the ridges 24 the said piece of fabric prior to being so depressed will be treated, impregnated, or saturated to the desired extent with a suitable adhesive or size. In practice and in order to produce the disks or sections with said depressed centers on a commercial basis, the adhesive will be applied to the disks far enough in advance of the machine operation of forming the depression so that the adhesive or size will have almost reached its setting state so that when a disk of cloth or a plurality of disks of fabric applied one on top of another to make a section of a buffing wheel are placed in the machine of Fig. 9 or its equivalent and the dies brought together and the central portion of the layer of fabric or of the layers of fabric depressed or offset or otherwise distorted, this distortion will remain in the layer of fabric or the set of disks for the section sufficiently to be effective even though the layer of fabric or in practice the plurality of disks forming a section of a buffing wheel are removed from the machine and set to one side where the completion of the setting operation of the adhesive or size may be completely effective.

In practice the adhesive or size or the like will be applied to the sections by applying said size by any proper means first to one layer or group of several layers as it rests upon a bench or other proper support. Then another piece of cloth or group is placed over the first piece or group substantially centrally located thereof and another layer of adhesive is applied to the top of the said second piece or group. This process will be continued step by step for the proper number of pieces of cloth or groups of disks that are to go into one section of a buffing wheel. Such a stack of disks with their parts corresponding to the central depressed portion 21 and the connecting zone 23 are laid aside and allowed to dry or cure until as above mentioned the size or adhesive has almost reached its setting point, then such impregnated piles of fabric will be passed through the die-pressing machine in fairly rapid time and the central depressions or other distortions so imparted to the whole stack of pieces will be retained permanently after the stack of pieces have been removed from the machine.

It will be obvious that if a single piece of fabric as 20 of Fig. 1 were so depressed at its center while the cloth was still dry the ridges formed by the depression and contraction of the disks of cloth would be fairly evident or visible and these ridges would be likewise separately visible if a single layer of cloth impregnated as above mentioned was then subjected to the die-pressing of its central portion by the machine. Assuming that a plurality of such separately treated disks of fabric were brought together it will be apparent that these ridges which would have been placed particularly in the central portion 21 and in the connecting portion 23 would radiate outwardly in the main but would be of very random or hit or miss arrangement. It would further be obvious that the ridges so produced in each single piece of fabric would not coincide in successive disks and so if the disks of such treated material were placed together face to face, they would not nest together closely and evenly but the ridges would force the disks to stay apart to a considerable extent.

As a matter of fact when a stack of adhesive-treated disks are placed in the depressed-center-forming or distorting machine as of Fig. 9, the drawing in of the whole number of disks of cloth will form ridges or flutings or puckerings generally radially arranged in the now central portions 21 and the connecting portions 23. These ridges or flutings will be not very noticeable to the eye or to the hand perhaps, but they will still be present to greater or less extent according to the type of fabric being used and to some extent according to the pressure of the die-press machine. The depression or distortion of the central portions of the whole stack of disks or pieces of fabric that are used to make one section of a buffing wheel, however, will have formed ridges or puckerings that operate to make the adjoining layers of fabric stand slightly away from each other and at the same time the drawing in of the whole area of the disk of fabric will have correspondingly contracted the outer zone 22 of each piece of fabric which outer zones have not been treated with the adhesive. This general inward contraction and circumferential compression of these outer zones will cause more or less definite wave-like formations 25 in the outer zones 22. These waves will not necessarily coincide in adjacent disks and so will operate to give a wave-like formation to the periphery 37 of a section of a buffing wheel which will cause a section of a buffing wheel made pursuant to this invention to have a greater width across its periphery than would be the case were a section made from a similar number of like character of fabric used plain or flat as heretofore was the practice. It will also be seen that the ridges and flutings given to the central depressed portions 21 and connecting slanting or curved intermediate zones 23 will hold those parts of the disk spaced apart and so form a foundation through the dried adhesive maintaining the offset position of the several parts of the several disks in a section. It will be understood of course that the centrifugal action of a rapidly rotated buffing wheel will cause the working zones 22 to stand out straight from the adjacent outer edge of the intermediate annular zones 23. As those zones are held apart due to the now hardened offset or other distorted formation of the different disks, it will be seen that I have provided a buffing wheel section that can be of prescribed thickness by using less layers or disks of material than was the case prior to my invention. It will be seen also that with the intermediate portions 23 and the central portions 21 spaced apart due to the ridges or flutings formed in those parts the entirely flexible outer working zones 22 will be held apart more than the natural thickness of the fabric would cause and due to the waving formation imparted to these outer zones 22 these outer zones will be held apart sidewise from each other to a slight extent when made up into a buffing wheel and particularly the outer edge of the several disks of fabric embodying this invention instead of having an outer edge all in one plane will have that outer edge in a wave-like formation turned first to the right and then to the left of a plane located radially of the axis of the wheel. This wave-like formation of the pieces or disks of fabric will prevent any given piece of fabric from reaching only its precise portion upon the article being treated

by the buffing wheel and will cause that piece of fabric to treat a wider zone and correspondingly as the distortion from one wave will more or less extend into the distortion of an adjoining wave, any given part of the article being buffed will be acted upon by several layers of fabric which is known to produce an improved and more equal finish. Furthermore, the holding of the periphery of the disks of fabric in the buffing wheel apart provides a considerable element of ventilation in that the spaces between the waves of the outer zones of fabric 22 will have the air forced thereinto and constantly thrown out therefrom thus forming a cooling and ventilating action which is a desirable factor in a buffing wheel.

In Fig. 5 there is shown a plan view of a section of a buffing wheel showing one variation or modification of my invention in that the ridges formed during the depression of the center of the pieces or disks of fabric have been definitely located or localized as by using a die having radiating outward ridges in the part that will form the central portion 21 and the intermediate zone 23 of the stack of disks. Ordinarily correspondingly countersunk depressions will be provided in the other die. Thus there will be formed a series of depressions 38 upon one face of the section of a buffing wheel and corresponding projections 39 upon the other face as shown best in Figs. 5, 6 and 7. In these views the projections 39 are upon the face of the section that has the recess from the depressed center as is particularly shown in Fig. 7. These ridges and the corresponding depressions 38 could be reversely located by an obvious change of location of the ridges and depressions upon the die that is to be used in the die-press machine. Another variation is that shown in Fig. 8 wherein only depressions 38 are pushed into one side of the stack of disks without pushing out a local projection opposite thereto.

It will be understood of course that in a buffing wheel formed pursuant to this invention it is not necessary to use whole disks of material, but that a disk of material may be built up in any proper way as by using several pieces such as by using strips extending across the face of a section first in one direction and then in another direction, that is with broken joints as is commonly done in many types of buffing wheel. A further variation common to regular forms of buffing wheel is equally applicable to buffing wheels made according to this invention, namely that sector-like pieces or other regular-shaped or odd-shaped pieces may be used to build up a circular disk and these pieces will be joined together with rows or circles of stitches.

Various forms of adhesive may be used such as glue, cement, shellac, paint, varnish, size, moldable plastic material, rubber solutions and the like, but I have found that silicate of sodium or some of its variations makes a thoroughly practical and very permanent stiffening material for holding rigid the distorted pieces of fabric.

Broadly there may be used any form of adhesive that will permit the formation of the contortion or ridges or waves in the material by compression of the adhesive-treated layers of material and that will bind the layers together and that will set hard and permanently enough to retain the shape given to the treated portion of the material under this definition.

Fig. 10 is a somewhat diagrammatic central sectional view through three adjacent buffing wheel sections embodying a modified form of this invention. In this construction the distortion does not offset the central portion of the layers of the section to one side of the plane of the layers as is the case with the construction shown in Figs. 1–8. But in this Fig. 10 construction the distortion used to draw in the section and produce the ridges and waves, takes the form of a taper-sided groove or annular recess 40 pressed down in the surface 41 of the sections or group of disks 42 and producing a corresponding and taper-sided annular projection 44 extending out from the other face 45, such annular recess 40 being spaced out preferably concentrically from the arbor hole 43 and so leaving a central portion 46 in the same plane as before.

It will be obvious to those skilled in the art that such a distortion may be readily produced by such a machine as shown in Fig. 9, by using an upper die having a downwardly projecting annular ring corresponding more or less to the shape and size of the taper-sided groove or annular recess 40 and by having the lower die of that machine equipped with an oppositely-placed taper-sided recess having the shape approximately of the projection 44 desired to be produced on the other side of the fabric. The intention in this form of the invention is to have the projections 43 nest somewhat but not fully into the recesses 40 of the section or group of sections placed opposite to the said projection 43. It will be obvious that the forcing in of this annular recess 40 will draw the fabric or other fibrous material of the pieces forming the section inwardly and largely radially inwardly and that this inward drawing of the whole area of the pieces in the section will produce the herein before described ridges in the distorted portion and adjacent thereto and will produce the undulating or wave-like structure in the main working zone 47' reaching from the central adhesive-treated part outwardly to the periphery of the section. It will be understood of course that in this form of the invention the central portion including the recesses 40 and the projections 43 will be treated in the proper manner with the proper adhesive or size and this adhesive or size will be allowed to set while the distortion is still in place in the section of the groups of layers to form the section.

Fig. 11 shows a further modification of this invention wherein annular and preferably concentric recesses 47 and 48 are pressed into one side of the buffing wheel section 49 and intermediately arranged recesses 50 and 51 are pressed into the other side of the same section, resulting in there being a projection 52 on the other side of the fabric from that having the groove 47 and in there being an annular projection 53 in the other side of the section having the inner groove 48 and also in there being a projection 54 opposite the recess 50 and a projection 55 opposite the recess 51. By an examination of Fig. 11 it will be seen that immediately next to the arbor hole 56 there will be a circular zone 57 that is still at the original plane of the section and on a plane with the outer working zone 58 which has not been disturbed. It will be seen that this system of distortion of the section or of a group of layers of fabric or other fibrous material used to form a section will be contracted over its whole area and drawn inwardly radially towards its center and thus will produce the desired more or less distinct ridges in the distorted portion and will produce according to the character of the material and the extent of drawing inwardly of the whole area of the material the desired undulating

or wave-like structure in the working zone 58. In this form of the invention it will be seen that the distortion has offset parts, viz. the projections above named. In this form of the invention the recesses are shown as not so deep as in the form shown in Fig. 10 but the drawing-in distortion is fully effective because there are here two recesses on both sides of the section, that is a total of four recesses. It will be obvious that a section so distorted will not nest together closely but will be held slightly apart due to the annular projections extending from both sides of the distorted section. Of course in this form the section or group of layers will be treated with an adhesive or size, preferably some time prior to the distortions being impressed into the sections, and then the sections will be handled so as to maintain the distortions and allow the adhesive or size or the like to stiffen and becomes permanently hard and thus maintain the shape of the distortion given it as aforesaid.

The holding of adjacent sections slightly apart by reason of the projections above mentioned extending from each side of the section gives the fabric or other material in the working zone 58 an opportunity to expand slightly and also affords an opportunity for the buffing wheel to take on and discharge air between the sections and thus form a ventilated buffing wheel.

Fig. 12 shows a further modification of this invention in that the buffing wheel section 59 here illustrated has a single straight-sided annular depression 60 forced in from one side of the section, namely the right hand side, as this buffing wheel is shown, and such straight-sided recess also operates to push out a straight-sided annular projection 61 on the other or left hand side of the section. In this form of the invention therefore the offset portion formed by distorting the sections is all on one side of the several sections but is in a zone spaced outwardly from the central annular zone 62 next to the arbor receiving hole 63. The annular projection 61 obviously holds the adjacent section 59 slightly apart and affords an opportunity for air to enter and leave the buffing wheel and thus to form a ventilated zone. Fig. 13 is a view similar to Fig. 12 of another form of the invention.

It will be noted that buffing wheels made according to any form or modification of this invention are easily mounted upon the conventional buffing wheel machine or device in that none of the forms of this invention require any special means for holding the sections together and on the usual arbor or between the usual flange on the arbor against which the buffing wheel abuts and that the usual washer or nut or the equivalent on the outside of the wheel can be placed directly against the central portion of the most outwardly placed section of a buffing wheel made according to this invention.

It will be understood that in practice the ultimate arbor holes of all forms of buffing wheel sections formed pursuant to this invention will be made in the section after the section has been stiffened and permanently hardened by the application and setting of the desired size or adhesive. In this way the labor of arranging concentrically the different layers of fabric for a section is avoided and the arbor hole of a given section may be more accurately placed and more accurately made to its desired size.

Another feature which the distorting of the sections and the permanent stiffening of the sections already described allows is that such a distorting and stiffening of the sections provides a new and improved way of producing a ventilated buffing wheel or buffing wheel section. For instance, in the form of the invention shown in Figs. 1–8 there may be placed in the section or formed in the section, preferably after the section has been formed and stiffened, a plurality of air passages 64 extending through the slanted intermediate zone 23 and operating to admit air from outside the section into the space between that section and the adjoining section and so on through the axial length of the wheel. Another variation is to place these air passages through the stiffened inner zone 21 in the form of air passages 65 extending more or less longitudinally of a complete buffing wheel and operating similarly to conduct air from outside the section to the space between that section and the next inner section and so on indefinitely through the wheel. A further variation of this ventilating feature by the use of air passages 66 is to form the passages either in or adjacent to the depressions 38 as seen in Fig. 6.

The form of my invention shown in Fig. 10 especially adapts the invention to this feature of ventilation in that slantingly arranged air passages 67 may be provided in the outer wall of the depression 40 and other longitudinally extending passages 68 may be provided in the bottom of this recess 40. With these two sets of air passages it will be obvious that air will be drawn in through the longitudinally arranged passages 68 and discharged out through the outwardly slanting passages 67 between the different sections of the wheel; the outermost section being the right hand section as shown in Fig. 10, will receive its air through the slanting passages 67 directly from without the body of the wheel and this air will be thrown outwardly between this outermost section and the next section of the buffing wheel. On account of the portions or sections of buffing wheels embodying all forms of this invention being permanently hardened or stiffened, these various air passages will remain open even when a buffing wheel is in rapid rotation and so the air will be freely admitted and thrown outwardly through these air passages into the spaces between adjacent sections of the wheel for ventilation without the air passages becoming obstructed.

Similar ventilating results can be obtained by providing the sections 59 shown in Fig. 12 with axially arranged air passages 69 in the bottom of the recesses 60 and opening out through the projection 61 into the next adjoining recess 60. A sufficient number of these air passages 69 are provided in the sections to obtain the desired amount of air for the particular form of buffing wheel and outwardly slanting air passages 70 extending from the outer wall of the recesses 60 into the outer wall of the projection 61 and so opening into the space between adjacent sections of the buffing wheel. It will be seen that these two series of air passages provide for axial passage of the air through the wheel to the interior recesses 60 and thence outwardly to the spaces between adjacent sections through the air passages 70.

The detailed sectional view 13 is somewhat similar to Fig. 7 but being taken on line 13—13 of Fig. 5 shows another form of a purposely or definitely located ridge 71 which extends outwardly on the recessed side of the slanting intermediate zone 23 and preferably projects slightly over the upper part of the interior of the said

slanting portion 23 to form an extension 72 of the ridge 71. In Fig. 13 there are shown the parts of three adjacent sections of a buffing wheel having these short ridges 71 which do not extend down on to or across the central portion 21 of the section. These short ridges 71 function to hold adjacent sections spaced apart more or less as shown in Fig. 13. These relatively short ridges not extending across the central portions 21, it will be seen, will allow the said central portions 21 to be drawn flatwise towards each other when several sections are placed upon the arbor 73 of the buffing wheel against the hub 74 on the arbor and compressed by setting up the arbor nut 75, in which case the ridges 71 and their extensions 72 will act as a fulcrum, allowing the outer hardened portions of the slanting zones 23 to rock slightly away from each other at their outer sides and so to space the working zones 76 of these sections slightly farther apart at their bases and so tend to space slightly farther apart the peripheries of these working zones 76. It will be understood that it is within the scope of this invention to make a buffing wheel wherein the sections have only these relatively short spacing ridges 71 and extensions 72 instead of or in place of the long definitely formed ridges 39 going entirely across the central portion 21 and also the slanting portions 23 of the buffing wheel shown in Figs. 4 and 5. These short ridges 71 will be spaced around the whole circle of the slanting zone 23 and will obviously function to hold the recessed central portion of successive sections apart from each other when they are assembled upon the arbor.

This last described form of my invention, as shown in Fig. 13, may be readily formed into a well ventilated buff by simply adding axially extending air passages 77 in the several flat central portions 21 of these sections. These air passages 77 will obviously supply air to the spaces 78 between the central portions 21 of these wheels and from these spaces the air may readily pass outwardly between the adjoining zones 23, which are spaced apart by the said short ridges 71 and the extensions 72 thereof, and thus air will be freely and over a large area supplied to the spaces 79 between the adjacent working zones 76 of this form of buffing wheel. A similar result of thorough air circulation between the working zones of adjacent sections may be had, it will be seen, by providing holes 80 in the flat portion 21 of the buffing wheel section shown in Fig. 5, in that the spaced positively located ridges 39 definitely hold such sections apart and make an opportunity for the air to escape from these central spaces by passing outwardly along the slanting zones 23 between the ridges 39 and then outwardly to the spaces between the working zones by passing between the outer ends of the said ridges 39.

What I claim as new and desire to secure by Letters Patent is:

1. For a buffing wheel, disc-like layers of material having their middle portions impregnated with a hard-setting adhesive or size and the central portions of said treated portions being offset relative to the untreated outer working portions with the intermediate parts of the layers extending slantingly from the offset to the main outer portions, said offset and intermediate portions permanently retaining their positions relative to each other by reason of the hardened adhesive therein, the layers of material in the buffing wheel arranged with their offset portions all extending in the same axial direction.

2. A buffing wheel section composed of a plurality of disc-like layers of buffing wheel material laid face to face and having the middle portions of the said layers impregnated with a hard-setting adhesive, the central parts of said treated portions being offset relative to the untreated outer main working portions of the layers with the intermediate parts of the layers being the outer parts of the treated portions, extending slantingly from the offset portions to the main outer portions, said offset and said connecting portions being thickened by the offsetting operation and permanently retaining their thickness and offset positions relative to each other through the setting of the adhesive, so that when a plurality of such sections are assembled in a wheel with their offset portions extending in the same axial direction the offset portions and the slanting portions only partly nest within one another and the outer working portions of the sections are spaced apart.

3. A buffing wheel section composed of a plurality of disc-like layers of fabric laid face to face and having the middle portions of the said layers impregnated with a hard-setting adhesive, the central parts of said treated portions being offset relative to the untreated outer main portions of the layers with the intermediate parts of the layers being the outer part of the treated portions, extending slantingly from the offset portions to the main outer portions, said offset and said connecting portions being thickened by the offsetting operation and permanently retaining their thickness and offset positions relative to each other through the setting of the adhesive, the offsetting of the central portions of said section producing ridges extending outwardly from its center and producing an axial undulation in the periphery of the section, so that when a plurality of such sections are assembled in a wheel with their offset portions extending in the same axial direction the offset portions and the slanting portions only partly nest within one another and the outer working portions of the sections are spaced apart.

4. A buffing wheel composed of a plurality of sections with each section comprising a plurality of disc-like layers of buffing wheel material, the central portions within the outer working zones of the several sections being distorted by having laterally extending projections impressed therein, which operation contracts the area of the sections and thickens the distorted portions, the distorted portions being permanently stiffened by a hard-setting adhesive to hold said distortions in their relative positions, said distortions preventing the sections of the wheel from fitting closely together and causing the portions of the sections outwardly of the distorted portions to be supported in spaced-apart position.

5. A buffing wheel composed of a plurality of sections with each section comprising a plurality of disc-like layers of buffing wheel material, the central portions within the outer working zones of the several sections being distorted by having laterally extending projections impressed therein, which operation contracts the area of the sections and thickens the distorted portions and causes an undulating form in the periphery of the layers, the distorted portions being permanently stiffened by a hard-setting adhesive to hold said distortions in their relative positions, said distortions preventing the sections of the

wheel from fitting closely together and causing the portions of the section outwardly of the distorted portions to be supported in spaced-apart position.

6. A buffing wheel composed of a plurality of sections with each section comprising a plurality of disc-like layers of buffing wheel material, the central portions within the outer working zones of the several sections being distorted by contracting the pieces of material radially inwardly, said distortions thickening said central portion and producing a wave-like structure in the outer working zone, said distortions being made stiff and permanent by size or the like, and said stiffened distortions making the sections occupy a greater space axially than a similar number of plain pieces of material.

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