July 5, 1960 C. F. SCHLEGEL 2,943,426

BUFFING WHEEL

Filed Nov. 25, 1957 2 Sheets-Sheet 1

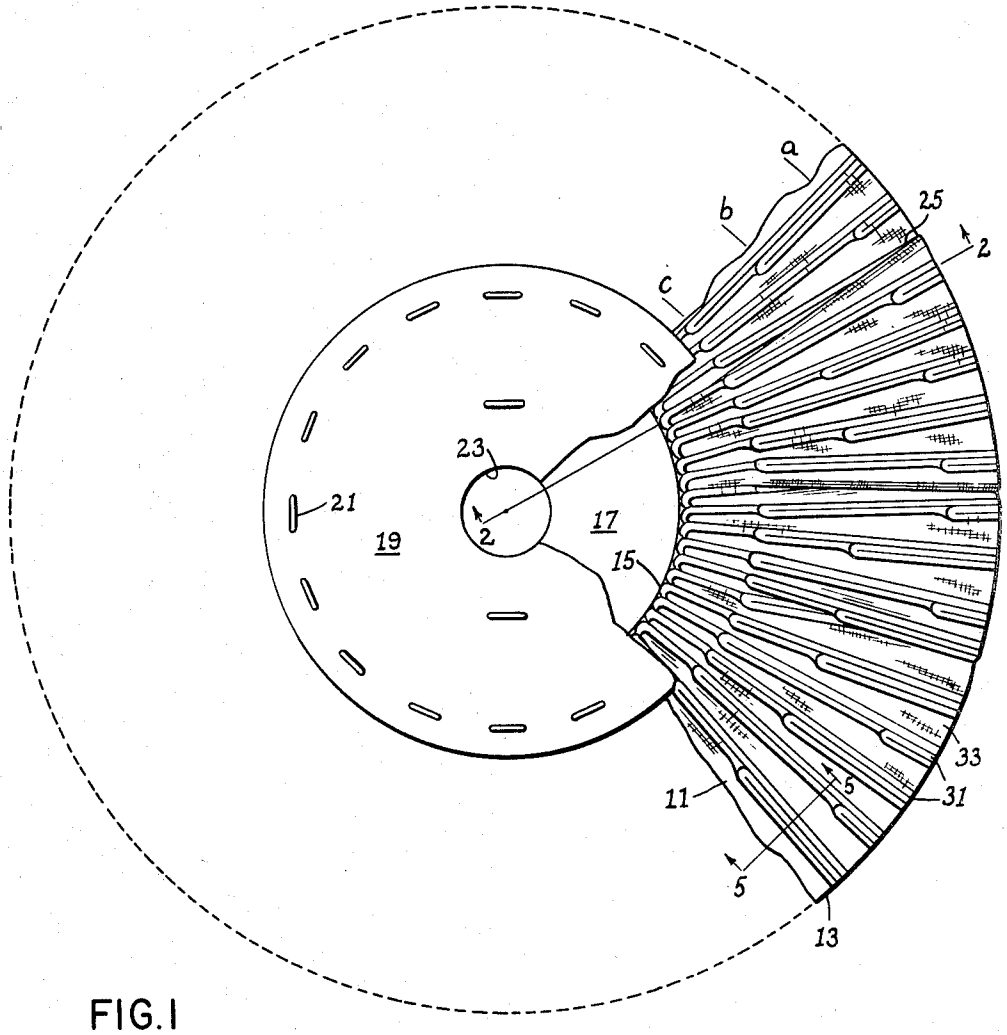


FIG.1

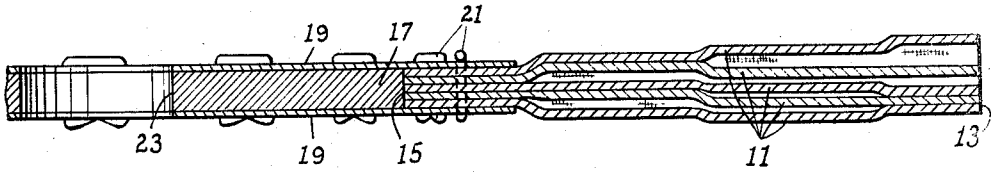


FIG.2

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BUFFING WHEEL

Filed Nov. 25, 1957 2 Sheets-Sheet 2

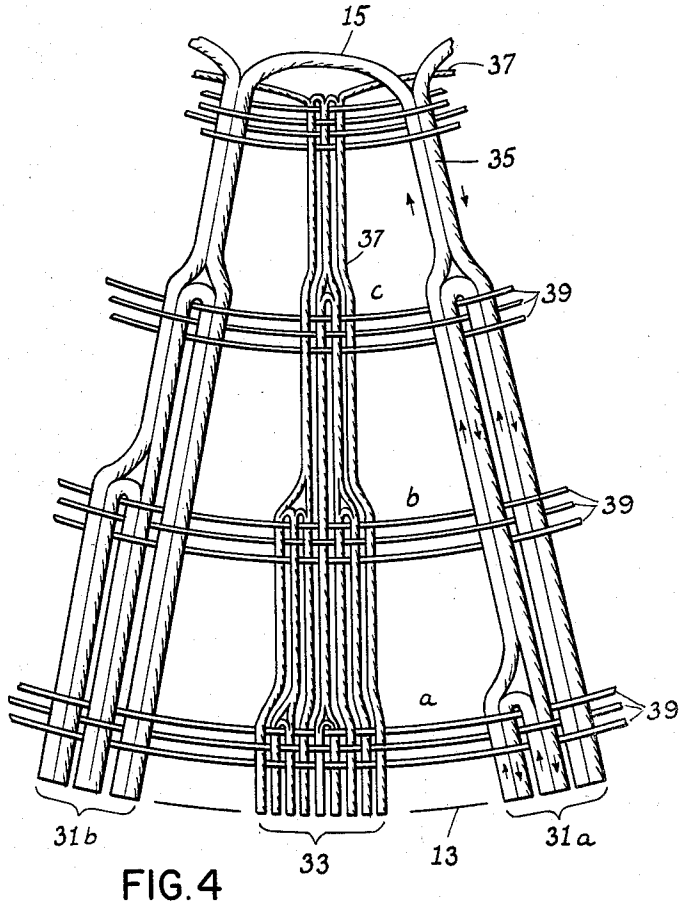


FIG.4

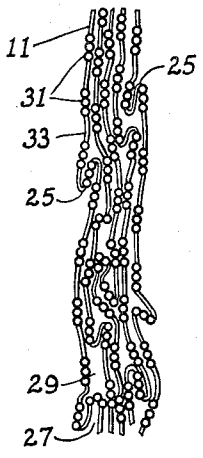


FIG.3

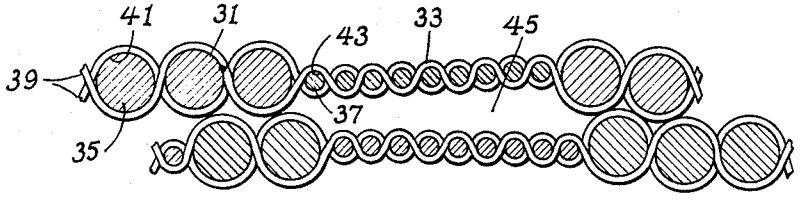


FIG.5

United States Patent Office 2,943,426 Patented July 5, 1960

2,943,426

BUFFING WHEEL

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6 Claims. (Cl. 51—193)

The present invention relates to buffing wheels or polishing wheels and, more particularly, to a new and improved ventilated buffing wheel.

A buffing wheel of the type to which the present invention is directed is rotated at high speed in use and generates a considerable amount of heat which, of course, causes the wheel itself progressively to heat up. In a ventilated buffing wheel, the wheel is so constructed as to have built-in ventilation characteristics allowing the wheel to run cooler. A cooler running wheel, obviously, is advantageous because it increases the life of the wheel while at the same time increasing its efficiency.

The ventilated buffing wheel herein disclosed may be made in several manners, however, it is most conveniently made using a radial strand type of construction. In this type of buffing wheel the working surface is composed of radial strands or filaments extending radially of the wheel.

An object of this invention is to provide a new and improved ventilated buffing wheel having improved ventilation characteristics, thereby resulting in a cooler running wheel.

Another object of this invention is to provide a buffing wheel constructed in a new and improved manner so as to be self ventilated as the wheel is rotated at high speeds.

Yet another object of this invention is to provide a new and improved buffing wheel or polishing wheel of the radial strand type having better self ventilation than prior wheels having radial strands.

These and other objects are attained in accordance with the present invention by providing a buffing wheel comprising a plurality of superimposed layers of flexible material of arcuate shape fastened together at their inner edges and preferable shirred at their outer edges. Each arcuate layer has substantially arcuate warp threads which bind together a plurality of substantially radial weft strands of a series of different lengths, the number of weft strands increasing toward the outer working surface of the wheel. The weft strands occur in alternate groupings of relatively large diameter strands and relatively small diameter strands, thus dividing the body into radially extending alternating bands of different thicknesses.

With the layers fastened together one upon the other, the thick and thin bands provide ventilation openings between the adjacent layers. Additional ventilation openings are provided by the shirred edges of the layers.

These and other objects and features of the invention may be readily perceived from the following detailed description of an illustrative embodiment thereof when taken in conjunction with the accompanying drawings in which:

Fig. 1 is a plan view, partly broken away, of a buffing wheel in accordance with a preferred embodiment of the present invention;

Fig. 2 is a cross-section drawn to an enlarged scale of the wheel of Fig. 1, taken approximately on the line 2—2 thereof looking in the direction of the arrows;

Fig. 3 is a diagrammatic edge view of a portion of the structure of Fig. 1 showing an illustrative pattern of thick and thin bands and the folds resulting from the shirred edge;

Fig. 4 is an enlarged diagrammatic view of the thick and thin radially extending weft bands showing the three units of weaving used, the bands being spaced and the weft strands composing each band being spaced, only a few of the warp threads being shown; and

Fig. 5 is a greatly enlarged section through two contacting layers of the apparatus of Fig. 1 taken approximately on the line 5—5 thereof and showing the ventilation openings formed between the two layers.

The same reference numerals throughout the several views indicate the same parts.

Referring to Figs. 1 and 2, the buffing wheel or polishing wheel comprises a plurality of ring-like superimposed layers of a suitable flexible material. In the preferred embodiment the layers are provided by a flexible strip **11** of arcuate shape, wound upon itself with the different layers in overlying relation to each other, with as many turns or convolutions as may be necessary to build up the required thickness of material. In Fig. 2 five layers are illustrated as a convenient example. The outer arcuate edge **13** of the strip forms the working surface of the wheel and may be of any desired diameter. For a reason which will subsequently be more clear, the inner edge **15** of the strip abuts the outer edge of a circular core **17** made of cardboard, chipboard, or the like. The core **17** preferably is of about the same thickness as that of the superimposed layers of strip **11**. To secure the strip **11** and the core **17**, a pair of circular disks **19** of greater diameter than the core overlie the core on either side, extending over the inner portion of the strip **11**. Appropriate fastening means such as a plurality of staples **21** secure the disks **19** to the core **17** and to the inner portion of the strip **11**. An arbor hole **23** is provided at the center of the core **17** and disks **19**.

The layers formed by the flexible strip **11** are flat one upon the other at the inner edge **15** but are full toward the outer edge **13** and form a plurality of pleats **25**. This is more evident in Fig. 3 where the shirred edge formed in this manner is shown. The fullness provided by the pleats produces openings, such as openings **27** and **29**, between folds of a single layer and between adjacent layers. When the buffing wheel is in use, these openings facilitate ventilation of the wheel. To provide this construction of flatness at the inner edge while having pleats at the outer edge, the strip **11** is manufactured with an arcuate inner edge which has a radius less than that of the core **17**. In assembly of the buffing wheel, the strip is wound around the larger radius core. The inner portion of the strip is wound snugly or tightly (in a circumferential direction) on the larger radius of the core, and remains flat, whereas the outer portion tends to gather and is given so much fullness that pleats are formed.

It can be appreciated from the description of the pleated fabric that the pleats **25** do not extend all the way to the inner edge **15**, and thus ventilation provided by openings between adjacent layers due to the pleats, such as openings **27** and **29**, does not penetrate all the way to the inner edge **15**. The invention provides for further ventilation openings or pockets between adjacent layers by alternately varying the thickness of the flexible strip **11** itself. To this end, the strip is composed of alternating thick bands **31** and thin bands **33**, the bands **31** and **33** being radially extending segments going from the inner edge **15** to the outer edge **13**.

As has been mentioned previously, the buffing wheel of the preferred embodiment is of the radial strand type, such as that illustrated, for instance, in United States Patent No. 2,548,623, issued Apr. 10, 1951, to the same

inventor, and the present construction may be regarded as an improvement upon the construction shown in said patent. In this type of construction, radially extending strands or filaments are fastened together by arcuately extending warp threads, the whole being woven on what is sometimes called a circular loom. The thick and thin band pattern of the present invention is achieved by using weft strands of two different diameters, a relatively large diameter strand for the thick bands **31** and a relatively small diameter strand for the thin bands **33**. Because of the divergent nature of radii and the increasing length of arc between any two radii, it is necessary to have progressively more and more weft strands as the radius increases. Accordingly, as will be explained more fully, some of the strands in each of the thick and thin bands **31** and **33** extend from the outer edge **13** to the inner edge **15** whereas others of the strands extend from the outer edge **13** to intermediate radius levels *a*, *b*, or *c*. These radial levels are approximately spaced evenly between the inner and outer edges of the strip.

The manner of weaving the flexible strip **11** with thick and thin bands is illustrated in detail in expanded Fig. 4. In manufacturing the strip, a continuous strand is woven back and forth radially to produce a complete band, the outer loops forming the outer selvage edge of the band being cut off to produce the outer working edge **13**. Thus, in weaving an exemplary thick band **31***a*, the large diameter radial strand **35** is woven on a path from right to left as indicated by the small arrows marked on various portions of this strand in Fig. 4. Starting at the edge **15**, the strand **35** is taken to beyond the outer edge **13**, returned to the radial level *c*, looped around a warp strand **39** and taken radially outwardly to a point beyond the outer edge again, returned inwardly again to the radial level *a*, looped around another warp strand **39** at this radius, and taken beyond the outer edge **13** a third time, and finally returned to the inner edge **15**. The thick strand **35** at a later time in the weaving is looped over the subsequently woven thin band **33** and the thick band **31***b* is begun. The outer selvage edge is trimmed after the strip has been completely woven.

Preferably but not necessarily, there are two patterns of thick bands, these being illustrated in bands **31***a* and **31***b*. In the second pattern, the strand **35** is looped at radial level *b* rather than at radial level *a* as in the first pattern, the two patterns being otherwise woven in the same way. In each of the two patterns, the leftwise strand is returned to the inner edge **15** to be looped over the next adjacent thin band to start another thick band.

The thin bands **33** may be of different patterns as in the case of the thick bands, but in the form here illustrated all have the same pattern and are made of a strand **37** having a smaller diameter than that of the thick strand **35**. Each of the radially extending thin strands in Fig. 4 is actually composed of two strands **37** side by side, it not being possible to indicate the dividing line as was done for the thick bands. To trace partially the movement of a thin strand **37** as the strip **11** is woven, strand **37** is taken from the inner edge **15** to beyond the outer edge **13** and then is looped for return to the outer edge successively at the inner edge **15**, at the radial level *b*, at the radial level *c*, at the radial level *a*, at the inner edge **15**, again at the radial level *b*, at the radial level *a*, and again at the radial level *b*. The strand is returned to the inner edge and thence looped over the next adjacent thick band **31***b* to start another thin band **33**.

It is noted that each of the bands **31***a*, **33**, and **31***b* becomes wider in the direction of the outer edge **13**. As heretofore explained, the progressively increasing number of strands from the inner to the outer edge is required because of the divergence of the radii defining the sides of each band.

A series of arcuately extending warp threads **39** are being woven at the same time as the radial strands. The warp threads **39** are spaced relatively close to one another across the width of the strip **11**, only a few threads **39** being shown in Fig. 4 for the sake of clarity. As is common, adjacent warp threads go on either side of a radial strand to form a shed through which one or more strands pass. In Fig. 5, for instance, a radially opening shed **41** is formed by two adjacent warp threads **39**, and a pair of thick strands **35** pass through the shed **41**. (The dividing line between each pair of strands in a single shed is not shown.) In similar fashion, a smaller shed **43** is formed and the shed **43** receives two of the thin strands **37**. Each shed at every radial level receives only two radial strands. Of course each radial strand may pass through a separate shed of the warp strands, if desired, instead of passing through the sheds in pairs.

Because of the thick and thin pattern of the strip **11**, adjacent layers touching each other have openings or pockets **45** between them which permit ventilation of the buffing wheel when in use. These openings **45** have a scattered occurrence at the outer edge of the strip **11**, where adjacent layers do not always touch one another because of the pleats **25**. Toward the inner edge of the strip **11**, however, the adjacent layers are frequently in contact and the ventilation provided by openings or pockets **45** becomes increasingly important.

In the preferred embodiment, the warp is cotton thread and the weft also is of cotton. Because of the thick and thin weft bands, however, it is possible and desirable in certain applications to practice the invention using a combination of materials for the weft. Thus, the thick and thin bands may be one of steel wool and the other of cotton. Other possible combinations are linen and cotton, jute and cotton, and jute and linen.

A buffing wheel or polishing wheel made in accordance with the construction herein disclosed has superior ventilation characteristics when compared with prior constructions of radial strand type wheels. As has been pointed out, ventilation between layers at the outer edge of the wheel is provided both by the shirred edge and by the thick and thin band pattern of the strip. Thus, air circulates through openings such as openings **27** and **29** created by the pleats **25**. Air further circulates when adjacent layers are in contact through openings such as pockets **45**. Pockets **45** created by the thick and thin band pattern exist wherever the layers are in contact, even adjacent the inner edge **15**. Consequently, these openings allow air circulation throughout the entire wheel. As a result, heat created at the working edge **13** is dissipated over a large part of the wheel. The buffing wheel therefore runs cooler and has superior cutting qualities for many applications.

The shirred outer edge, in addition to providing ventilation, is further advantageous because it holds more buffing or polishing compound than prior radial strand constructions. If desired, the pleats **25** and the shirred edge may be eliminated. Ventilation in this case is largely by means of pockets **45**.

It is seen that the invention provides a new and improved construction for a ventilated buffing wheel or polishing wheel. Conveniently made of the radial strand type, it is inexpensively manufactured while being rugged and efficient in service.

It is to be understood that the foregoing disclosure is given by way of illustrative example only, rather than by way of limitation, and that the details may be varied within the scope of the appended claims without departing from the invention.

What is claimed is:

1. In a buffing wheel, a plurality of superimposed helically-wound layers of flexible fabric-like material of arcuate shape with substantially concentric arcuate warp threads and with substantially radial weft strands of different lengths, said weft strands being of two different diameters and providing alternating series of substantially

radially extending bands of different thicknesses, and means for securing together said layers adjacent their inner edges.

2. In a buffing wheel, a plurality of ring-like superimposed layers of flexible fabric-like material, said material comprising substantially arcuate warp threads interwoven with substantially radial weft strands of different lengths, said weft strands being of different diameters to provide alternating series of substantially radially extending bands of different thicknesses, and means for fastening together said layers adjacent their inner edges.

3. In a buffing wheel, a plurality of superimposed helically wound layers of flexible fabric-like material, said material comprising substantially arcuate warp threads interwoven with substantially radial weft threads of different lengths, said weft threads being of two different diameters to provide alternating series of substantially radial bands of two different thicknesses, said layers lying flat adjacent their inner edges, means for fastening together said layers adjacent their inner edges, and a plurality of substantially radial pleats in the outer portions of each layer to provide a shirred working edge.

4. A method of making a buffing wheel comprising the steps of weaving a fabric strip of arcuate shape with an innermost diameter less than that of a core to which it is to be applied, winding said fabric strip helically about a core of substantially greater diameter than the diameter to which the innermost edge of the arcuate strip is originally woven, to cause the outer portion of said strip to become gathered into pleats, and securing said layers together adjacent their inner edges.

5. A buffing wheel comprising a plurality of ring-like superimposed layers of flexible fabric-like material each having an inner edge adapted to be received on a core and an outer working edge, said material being composed of

alternating radial bands of at least two different thicknesses, said bands extending from said inner edge to said outer edge and each being substantially homogeneous, said layers lying flat at their inner edges and being fastened together adjacent their inner edges, the superimposed bands of different thicknesses providing ventilating spaces therebetween extending from said outer edge all the way to said inner edge.

6. A buffing wheel comprising a plurality of superimposed helically wound layers of flexible fabric-like material each having an inner edge adapted to be received on a core and an outer working edge, said material being composed of alternating radial thick and thin bands, said bands extending from said inner edge to said outer edge and each being substantially homogeneous, said layers lying flat at their inner edges and being pleated at their central and outer portions whereby said outer edge is shirred, and means for fastening together the flat portions of said layers, the superimposed layers of thick and thin bands and the pleated central and outer portions providing ventilating spaces extending from said outer edge all the way to said inner edge.

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