Jan. 10, 1950 L. J. WALLING 2,493,791

BUFF

Original Filed March 14, 1938

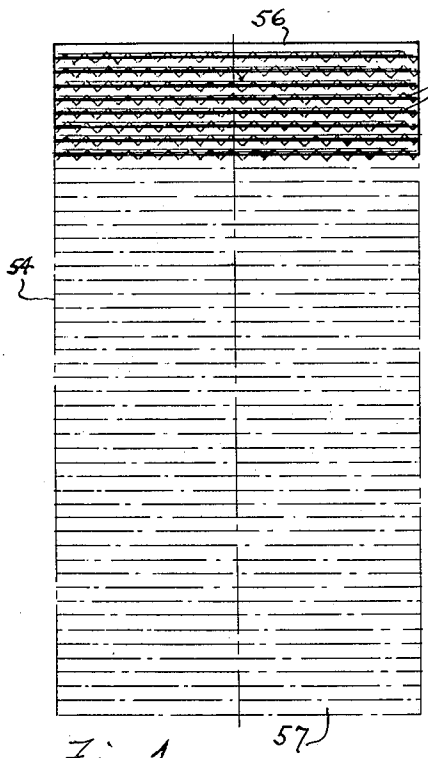


Fig 1

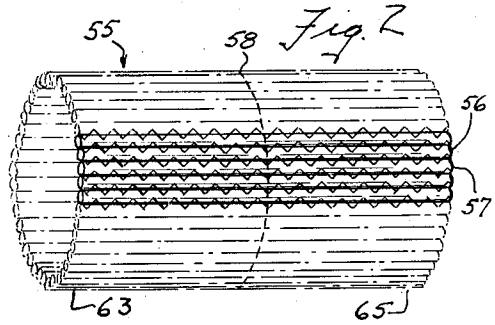


Fig. 2

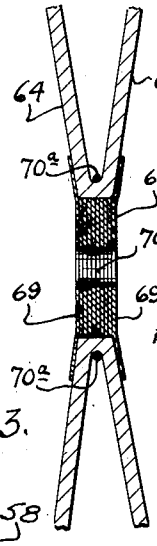


Fig 3.

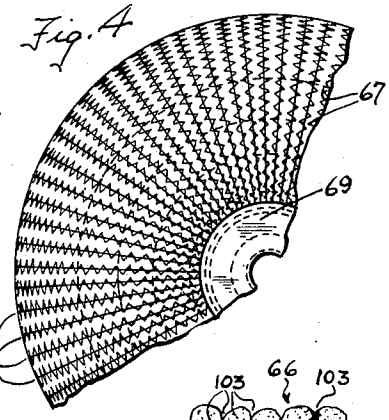


Fig. 4

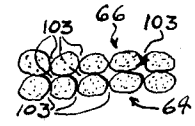


Fig 5.

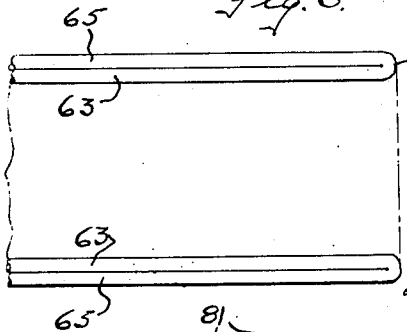


Fig. 6.

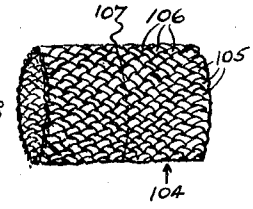
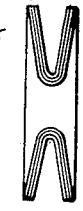


Fig. 9.



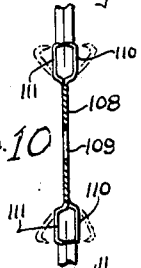


Fig. 8

Fig. 10

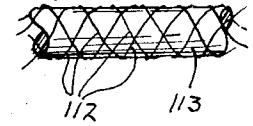


Fig. 12

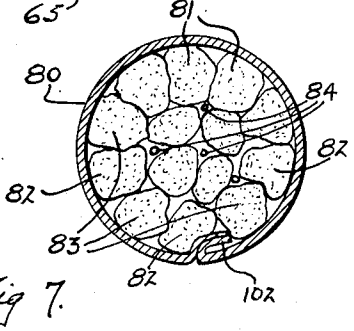


Fig 7.

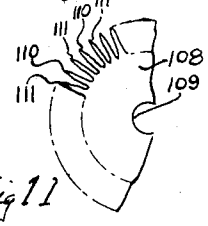


Fig 11

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UNITED STATES PATENT OFFICE

2,493,791

BUFF

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Continuation of application Serial No. 195,703, March 14, 1938. This application April 28, 1947, Serial No. 744,357

11 Claims. (Cl. 51—193)

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This invention relates to buffs for finishing the surface of various materials and has particular adaptation to buffs intended to produce an abrasive or cleaning action. Any desirable kind or degree of finish may be produced by varying the construction of the buff in accordance with the invention. The application is a continuation of my prior filed application Serial No. 195,703, filed March 14, 1938, now abandoned.

In my copending application Serial No. 744,356, filed April 28, 1947, now Patent No. 2,459,055, dated January 11, 1949, of which this application is a continuation-in-part, I have shown a buff constructed of strands of polishing material which extend substantially radially of the buff and are securely anchored at the center, the working surface of the buff being formed exclusively of the ends of the strands, so that the maximum of softness may be produced, while the construction affords, at the same time, a buff which does not tend to distort from a true circle or lose its dynamic balance.

Another object of the invention is to provide an improved strand or cable for constructing a buff which may not only make it easier to construct but may increase the life thereof.

Another object of the invention is to provide a buff with substantially radial strands arranged in planes, a single layer of strands being uniformly positioned in each plane.

Still another object of the invention is to provide an improved strand or cable for constructing a buff by means of which materials, such as polishing compounds, as well as cleaning or abrasive elements, may be introduced into the buff.

Another object of the invention is to provide a strand or cable to be used in constructing a buff which will have an increased tensile strength resulting in a buff which will have less tendency to fray out and therefore will have a longer life without decreasing its polishing qualities.

Still another object of the invention is to provide a buff which has a working surface composed of the ends of strands or cables, the arrangement being such that these ends tend to draw together in operation.

Another object of the invention is to provide an improved method of radially stitching strands in a buff which will tend to draw the strands together at the periphery when the buff is rotating thus stiffening the working surface of the buff.

Still another object of the invention is to provide a buff in which wires or strands of Tampico or other cleaning or abrasive elements are incorporated in the buff with the ends of the wires or strands always lying at the working surface.

It is also an object of the invention to provide a buff which will not tend to heat up but will be automatically cooled in operation.

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Other objects of the invention and objects relating particularly to the method of performing the various steps in the construction of the buff will be apparent as the description of the invention proceeds.

The invention has been illustrated in the accompanying drawings, in which:

Fig. 1 illustrates a sheet of the buff forming material in accordance with the invention;

Fig. 2 is a perspective view illustrating the material of Fig. 1 formed into a cylinder with the cables running parallel to the axis of the cylinder, the result of another step in the process of constructing the buff;

Fig. 3 is a sectional elevational view through the axis of the partially completed buff;

Fig. 4 is an elevational view showing a portion of a completed buff;

Fig. 5 is an edge view of a portion of the buff of Fig. 4 showing the ends of several of the cables;

Fig. 6 is a sectional elevational view of the cylinder of Fig. 1 folded preparatory to producing the distortion illustrated in Fig. 3 in another manner;

Fig. 7 is an enlarged sectional view of one form of cable which may be used in the buff of the invention;

Fig. 8 is a perspective view of a cylinder made of braided strands or cables and which illustrates one step in producing another form of the buff of the invention;

Fig. 9 diagrammatically represents the cylinder of Fig. 8 partially formed into the finished buff;

Fig. 10 is a sectional elevational view of an improved metallic center for the buff;

Fig. 11 is an elevational view of a portion of the buff center shown in Fig. 10; and

Fig. 12 shows a modified form of the cable shown in Fig. 7.

In its broadest concept the invention comprises the formation of a buff out of cables of cotton yarn or other suitable polishing, cleaning or abrasive material in such a manner that the cables all extend outwardly from the center with the result that the periphery of the buff, which is the working surface, is composed substantially entirely of cable ends, thus forming a soft working surface which is uniform in texture around the buff. The construction of the buff in this manner may be effected by weaving or braiding a plurality of the cables simultaneously in a certain manner, or by another method a single cable may be continuously fed into a particular apparatus and by winding and sewing in a certain manner the desired result may be attained. A feature of the invention also is a particular con-

struction of cable which has certain advantages to be hereinafter explained.

In one manner of producing the buff of the invention a single cable may be fed into a suitable machine continuously and wound around a cylindrical mandrel, forming a tubular helix, with each turn of the cable sewed with a zigzag stitch to the turns on either side of it. As long as the machine is operated and the cable is fed into it the tubular helix grows in length, and the cable may thus be wound in long pieces depending on the length of the mandrel.

After the tubular helix of cable is formed it may be cut off in lengths corresponding to the length from top to bottom of the piece shown in Fig. 1. Each length may then be slit axially along the side of the cylinder and the piece opened out into a flat sheet **54** as indicated in Fig. 1. In producing these sheets out of the tubular helix, the separate pieces may be cut first and then slit open, or the entire tubular helix may first be slit axially and then the resulting strip cut into the desired lengths.

The sheet shown in Fig. 1 may then be rolled at right angles to its former axis to form the cylinder **55** of Fig. 7 with the cables all running parallel to the axis, and the cable **56**, forming the upper end of the sheet **54** of Fig. 1 may then be sewed with the same zigzag stitch to the cable **57** at the opposite end of the sheet. This stitch may be made on the same machine or another similar one. Inasmuch as the zigzag stitch just referred to is similar to the stitches formed by the machine, each of the cable sections is attached to those adjacent to it in exactly the same manner and the structure is uniform around its circumference.

The length of the spiral tubular helix **26** of cable which is cut off will of course be measured from top to bottom of the sheet **54** of Fig. 1, and as these two extreme ends are brought together to form the cylinder **55** of Fig. 2, the length of these cut off pieces will determine the diameter of the tubular member **55** of Fig. 2.

The next step in the formation of the buff is to crowd or crush the cables together along the line **58** at the center of the cylinder. This may be done in any desired manner as by means of a double feed sewing machine.

After the step just described has been completed the outer ends of the tubular member **55** are opened or expanded and brought together to form the buff shown in section in Fig. 3. In this figure the end **63** is expanded to form the flat disc **64** and the opposite end **65** is expanded to form the flat disc **66**. These discs **64** and **66** may then be sewed together in any desired manner, as by the concentric circular stitching **67** (Fig. 4), depending on the desired rigidity of the finished buff.

The buff may be made in any desired size depending on the use for which it is intended, and the size of the finished buff may preferably be determined by the size of the mandrel around which the cable is wound. The circumference of this mandrel will determine the length of the tubular member **55** of Fig. 2, and while I have found that several sizes of buff may be made from the same size of mandrel by differently expanding the ends and crowding the center I prefer to make the diameter of the mandrel about the same as the desired diameter of the finished buff. I have found this proportion to give good results, but I do not wish to limit myself to any particular rule for determining the size of the

buff, as differences in the material used or the desired stiffness or strength of the finished buff may require different proportions which may be easily determined by trial.

I have found that for small buffs a few inches in diameter, the tubular helix **55** of Fig. 2 may have its central portion **58** reduced in diameter sufficient to fit a shaft upon which the buff may be mounted. Large buffs, however, cannot be reduced sufficiently at the center without increasing the thickness too much at this point, and I therefore prefer to use such proportions for producing the desired outside diameter of the finished buff, as to leave a relatively large hole at the center. This hole I may then fill in with a center made of any suitable material, as, for instance, discs **68** (Figs. 3 and 4). These discs may be made of cloth, cardboard, fibre, or other suitable material, and may be built up to the desired thickness and then secured to the body of the buff by providing a pair of discs **69** of heavy canvas, a little larger than the central hole, one at each side, and securely sewing these to the sides **64** and **66**. A hole **70** for the arbor may be provided through the center. Any other of the well known ways of filling in the center of the buff may be used in order to strengthen and support the buff at the center. An improved metal central support which may be found desirable for the buff of the invention is shown in Figs. 10 and 11 and will be subsequently described. If desired, the central portion of the buff may be strengthened by a wire ring **70a** which may be securely sewed to the strands in the position shown. Also, I may cover the entire sides of the buff with discs of sheeting which may be stitched in place in any desired manner.

One way of decreasing the diameter of the tubular helix **55** of Fig. 2 has already been described. This may also be done by folding the end **65** outwardly about the center line **58**, as shown in Fig. 6, so that the two ends form two tubular members, one within the other, and then sewing the doubled over end with a double feed machine, as previously described, to crowd the cables together at this point. By this method the crowding and sewing operation may be accomplished on a machine with less clearance between the needle and the upright support.

In some instances I may prefer to make the tubular helix **26** in one long piece, slit it all the way down one side, run the entire strip thus formed through a double feed sewing machine to crowd the central line together, and subsequently cut off the pieces for the individual buffs and sew opposite severed ends together to form the buff cylinders **55**. The sequence of the various steps in the construction of the buff may thus be varied somewhat as desired.

In the several figures already described the cable used may be made in any suitable manner and of any suitable material for the purpose for which the buff is to be used. In order to increase the thickness of the finished buff I may prefer to make the cable out of several strands of yarn twisted together. This twisting may be done in a manner well understood in the art.

In making the buff of the invention I have found that the character of the cable used has a great deal to do with the operation of the finished buff. I have found that the twist in the individual strands of the cable making up the buff helps to prevent raveling at the periphery when in use and gives the buff a firmer working surface. By using several yarns in the cable,

some with a right hand twist and some with a left hand twist, the individual yarns of the resultant cable tend to lock into each other in a very desirable manner to form a soft firm working surface or edge.

For instance, certain yarns having a left hand twist may be used, while others may be provided with a right hand twist. I may prefer to have about half of them twisted in the opposite direction.

I may prefer, however, under certain conditions and for certain purposes to use a specially constructed cable which has certain advantages to be hereinafter pointed out and which forms a feature of the invention. An enlarged cross-section of the cable itself is shown in Fig. 7. The cable may comprise a cylindrical casing **80** formed of cotton cloth or other suitable material which may, if desired, be cut on the bias. This casing may be made with a seam **102** on the inside to form a smooth outer surface. Inside of this casing may be provided a plurality of strands or cables **81**, similar to the strands and cables already described in the paragraph above. Also, as described in connection with the cable already described, I may prefer to use some strands which have been given a right hand twist and some which have been given a left hand twist, and I may prefer to alternate the direction of twist on adjacent strands, as for instance, the strands **82** in Fig. 7 may have a right hand twist while the strands **83** may have a left hand twist.

Also, in this type of cable I have found that I can introduce an abrasive or cleaning element which is very effective for certain purposes. Thus several fine stiff filaments **84** may be placed inside the casing with the cables **81**. These filaments may be wires of copper or brass or harder metal such as iron or steel, or they may be made of non-metallic material, as, for instance, certain fibres or grasses, such as Tampico grass. Such filaments would be used where a cleaning or scouring action is desired but not generally for producing a high polish when they would be omitted, the softer materials being used alone.

I have found that this cable also permits me to impregnate the interior strands with certain polishing or cleaning or scouring agents, as, for instance, rouge, pumice, flint, emery, fuller's earth or rotten stone, lime polish, pitch or other desirable materials in which while in a liquid form, the strands may be soaked before inserting in the casing **80**. In this manner the polishing or cleaning agents may be brought to the working surface without flying out as has usually been found to occur when it is attempted to use such compounds with buffs of the prior art.

Inasmuch as the seam **102** of the cable is inside the casing the latter has a perfectly smooth outer surface and may be formed into the buff already described as easily as the cable composed of simple cotton strands. By means of the casing the advantageous effects previously described may be obtained.

The cable may also be made of strips of cloth, rolled or crushed in to the size desired and either used alone or as a filler for the casing **80**, described above.

An important feature of the invention is the effect of the construction to produce a cooling action when the buff is operating. When an object being polished is pushed against a rotating buff there is a tendency to deform the buff; i. e. push it towards one side or the other or force the periphery towards the center. This causes the

internal strands or threads making up the buff to rub against each other, and inasmuch as the buff is rotating at a high speed this rubbing action is extremely rapid, in fact so rapid as to sometimes cause the temperature to rise to such a point as to char the buff.

In buffs of the prior art it is difficult to cool the buff to reduce this heating effect. In the buff of the invention, however, the construction produces an automatic cooling effect which greatly reduces the tendency of the buff to heat and thus increases the efficiency of the buff and lengthens its life.

The manner in which the cooling is accomplished may be seen from an inspection of Fig. 5 which shows the ends of the cables looking at the periphery of the buff of Fig. 4. The cables lying in the flat surfaces **64** and **66** are sewed together, and inasmuch as these cables are substantially round they touch each other at only a small portion of the circumference, leaving V-shaped radial grooves **103**, also indicated in Fig. 4, which extend from the circumference to the center along the outside of the buff and also between the layers. When the buff is rotating, these grooves form passages for air to pass from the centre to the periphery, and the buff acts like a centrifugal pump sucking in the air at the center and drawing it through the grooves to pass out at the edge. This continuous stream of fresh air rapidly cools the buff and thus prevents the overheating referred to, which has been a common fault of buffs of the prior art.

The zigzag stitching used in sewing each cable to the cable adjacent to it is an important factor in producing the advantageous results of the invention. When the buff is rotating at a high speed centrifugal force will tend to stretch each cable axially thereof, and the zigzag stitch not only permits this stretching of the cables but draws the cables closer together as they are stretched. An inspection of Fig. 4 will explain this action. When the stitching is pulled out or stretched in one direction the spread of the stitches is decreased in the other direction, thus, pulling them out axially of the cable causes the side loops of the stitches to draw closer together. This results in a stiffer, tighter formation at the periphery of the buff, aids in maintaining a uniform working surface, and helps to keep a proper balance as the buff wears down.

Any of the cables or strands described above may be used with the braided type of buff already mentioned. A perspective view of the tubular braid **104** used in making this buff is shown in Fig. 8. A plurality of the cables **105** pass around the circumference of the tube in one direction, while a plurality of cables **106** pass around the circumference of the tube in the other direction, the cables being woven under and over each other. This tube of braided strands may be continuously formed in a braiding machine of well known construction and cut off at the proper lengths to form the cylinders as indicated in Fig. 8. The cylinder **104** may then be constricted, as by the crowding process already described, along the central circumferential line **107** and the ends spread out as indicated in Fig. 9, the ends being then stitched together to form the completed buff.

In Figs. 10 and 11 I have shown a metallic center for the buff which may be attached easily and quickly without the stitching necessary with the canvas discs. This center comprises a disc **108**, preferably of steel, having a hole **109** at the center and a plurality of teeth **110** and **111** around

the periphery. These teeth may be rather slender and the ends may be sharpened so that they will easily penetrate the material of the buff. The teeth 110 may be bent to the right as indicated by the dot and dash lines, while the alternate teeth 111 may be bent to the left as indicated. The disc may be inserted in the central opening of a buff and the teeth pressed together, the sharp pointed ends of the teeth clinching into the material of the buff. This holds the buff securely and makes the rigid support which may be accurately centered on the arbor for driving the buff.

From the above description it will be seen that I have provided a highly efficient buff which has an extremely soft uniform working surface. The buff maintains its shape and balance even after long use and may be worn completely down to the central hole. It therefore not only produces a better polish than buffs heretofore used, but has a longer life. Inasmuch as it is produced from a single cable of soft material and not from cloth, the raw material is much less expensive than that for buffs made from the latter. Another advantage which makes the buff of the invention less expensive to construct is the fact that every bit of the raw material used goes into the buff; there is no waste, as is the case where the buff is formed of discs cut out of cloth, and the corners and the center must be cut away and discarded.

The encased cable provides a means to incorporate cleaning, scouring, and abrasive material, as well as polishing compounds, and makes a particularly desirable buff where such features are needed.

I wish to emphasize the fact that the construction of the buff lends itself to a substantially continuous process. The yarn used for forming the cables may be in the form first produced from the raw cotton. These yarns may be fed directly into a zigzag stitching machine for winding into a tubular helix, or it may be fed into a machine, where it receives a casing, and then into the first mentioned machine. The abrasive compounds may be impregnated at any stage, although I may prefer to do it prior to the encasing operation.

A modified form of cable has been illustrated in Fig. 12, where, instead of the cloth casing, shown in Fig. 7, a casing formed similar to the braided tube of Fig. 8 may be used. The strands 112 of this casing may be loosely braided around a soft center 113 of cellulose material, or twisted yarn, as previously described.

Changes may be made in the structure of the buff itself and in the steps of constructing it. I do not therefore wish to limit myself to what has been shown and described except by the limitations of the appended claims.

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

1. A buff comprising a plurality of cables, each of said cables comprising a plurality of strands and a flexible casing surrounding said strands, and means to attach each of said cables to the cables adjacent to it.

2. A buff comprising a plurality of radially disposed cables each of said cables comprising a plurality of filamentary strands including at least one stiff strand and a casing surrounding said strands, and means to attach each of said cables to the cables next adjacent to it.

3. A buff comprising a plurality of substantially radially disposed cables, each of said cables comprising strands impregnated with an abrasive compound and a flexible casing surrounding said strands, and means to attach each of said cables to the cables next adjacent to it.

4. A buff comprising a plurality of radially disposed cables, each of said cables comprising a plurality of strands and a flexible casing surrounding said strands, and means to draw aid cables closer together when centrifugal force stretches said cables in a radial direction.

5. A buff comprising a plurality of radially disposed cables, each of said cables comprising a plurality of strands and a flexible casing surrounding said strands, and members holding said strands together, said members being arranged at an acute angle to said cables, whereby said cables are drawn closer together when centrifugal force stretches said cables in a radial direction.

6. A buff comprising a plurality of radially disposed cables, each of said cables comprising a plurality of strands and a flexible casing surrounding said strands, and zigzag stitching holding said cables together.

7. A buff comprising a plurality of radially disposed cables, each of said cables comprising a plurality of strands including at least one stiff strand and a casing surrounding said strands, and means to attach each of said cables to the cables next to it, said means acting to draw said cables closer together when centrifugal force stretches cables in a radial direction.

8. A buff comprising a plurality of radially disposed cables, each of said cables comprising a plurality of strands including at least one stiff strand and a casing surrounding said strands, and members holding said cables together, said members being arranged at an acute angle to asid cables, whereby said cables are drawn closer together when centrifugal force stretches said cables in a radial direction.

9. A buff comprising a plurality of radially disposed cables, each of said cables comprising a plurality of strands including at least one stiff strand and a casing surrounding said strands, and zigzag stitching holding said cables together.

10. A buff comprising a plurality of substantially radially disposed cables, each of said cables comprising strands impregnated with an abrasive compound, and a flexible casing surrounding said strands, and means to attach said cables together, said means acting to draw said cables closer together when centrifugal force stretches said cables in a radial direction.

11. A buff comprising a plurality of substantially radially disposed cables, each of said cables comprising strands impregnated with an abrasive compound and a flexible casing surrounding said strands, and zigzag stitching holding said cables together.

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