

No. 615,906.

Patented Dec. 13, 1898.

E. RICHARDSON.
BUFFING AND POLISHING ROLL OR TOOL.

(Application filed Nov. 1, 1897.)

(No Model.)

2 Sheets—Sheet 1.

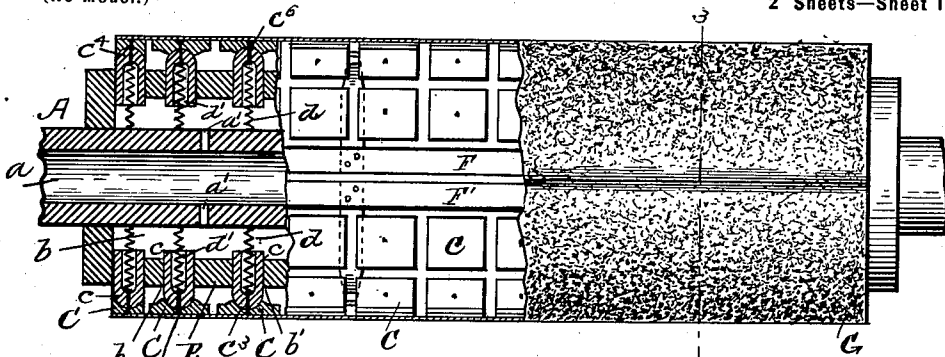


FIG. 1.

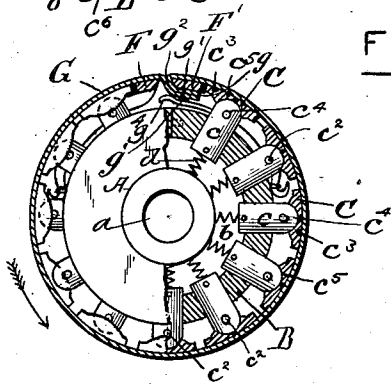


FIG. 2.

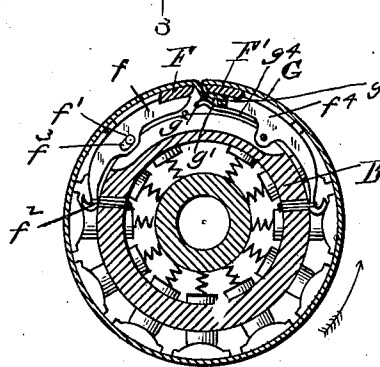


FIG. 3.

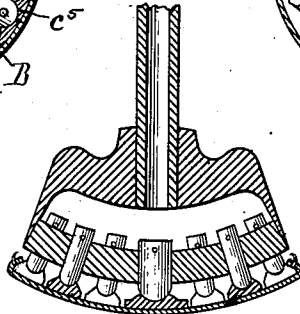


FIG. 6.

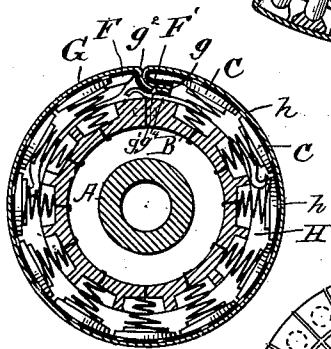


FIG. 4.

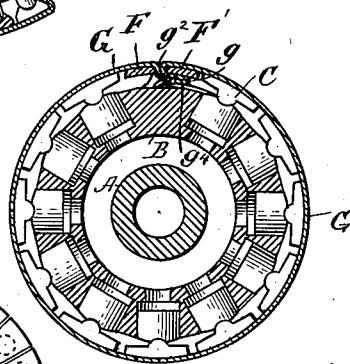


FIG. 5.

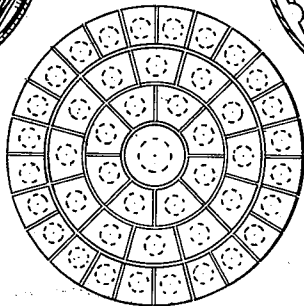


FIG. 7.

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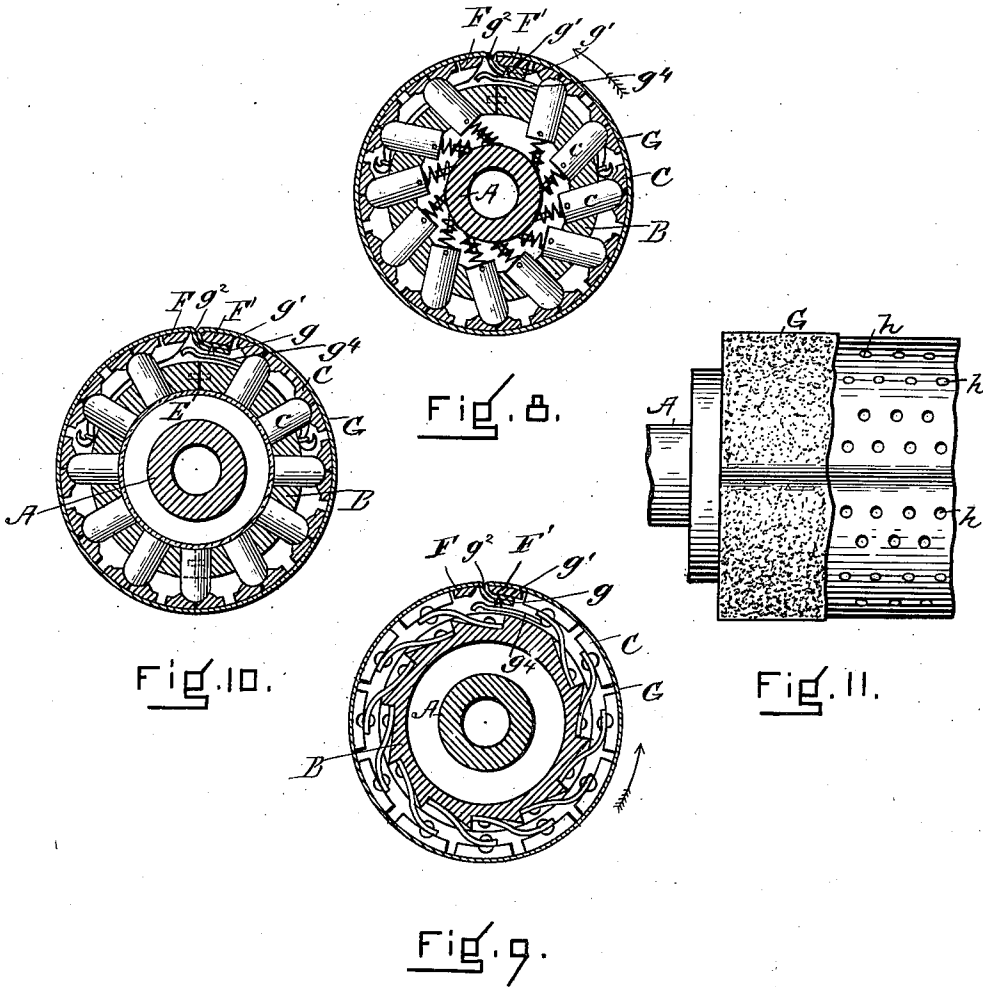
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EDWARD RICHARDSON, OF GUILFORD, NEW HAMPSHIRE.

BUFFING AND POLISHING ROLL OR TOOL.

SPECIFICATION forming part of Letters Patent No. 615,906, dated December 13, 1898.

Application filed November 1, 1897. Serial No. 657,012. (No model.)

To all whom it may concern:

Be it known that I, EDWARD RICHARDSON, a citizen of the United States, residing at Guilford, in the county of Belknap and State of New Hampshire, have invented a new and useful Improvement in Buffing and Polishing Rolls or Tools, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification, in explaining its nature.

The invention relates to a buffing, polishing, or similar roll or tool which has a supporting-surface for abrading, polishing, scouring, or brushing material. This surface is provided by means of a relatively large number of independently resilient or conformable sections or blocks the exterior of which have any desired shape, and which sections or blocks unitedly provide a practically continuous resilient and conformable surface, and which sections or blocks separately are individually resilient in relation to each other.

The invention further relates to a roll of the character specified having means by which its working surface in action is cooled by the play or passage of air through the roll or tool adjacent to said working surface.

It further relates to means by which an envelop, wrapper, or cover is adapted to be attached to and removed from the roll or tool; also, to means for taking up the slack in the said wrapper, envelop, or cover as it is formed in the operation of the tool.

It further relates to various features of invention which will hereinafter be fully set out.

I have represented a number of ways for providing the individual members of the conformable or resilient surface with resiliency and conformability.

Broadly speaking, the construction embodies a support for the resilient conformable sections which is adapted to be rapidly rotated in any common or usual way and which is shaped to carry, sustain, or support any desired number of independently-movable sections or blocks. Resiliency and conformability are imparted to these independently-movable blocks or sections by any desired means, and I have shown them as provided with resiliency by means of compressed air or other similar elastic medium, centrifugal force, and

metal or other springs, and I would say that any other means for imparting resilient pressure to the sections or blocks or any combination of various means may be used. The blocks not only have an independent resiliency by which they may be pressed inward against some resilient resisting pressure, but they also have independent conformability in respect to each other. To obtain these combined results, I prefer that the blocks may be made in two sections or parts, although it is not necessary, as will hereinafter appear, that they be so made; but when so constructed the inner parts are radially or otherwise arranged in the main support or case of the roll and act as pistons or slides, and the outer sections of the blocks are of any desired surface, shape, and size and are mounted upon said pistons or supports by what is substantially a universal joint or in a manner to permit them to have independent adjustment or conformability, thus providing each block or section with a flexibility which it otherwise would not possess. The resilient conformable surface thus provided acts as a support for the abrading, polishing, scouring, or other material, which may be directly applied to the surface of the blocks by means of a sheet, pad, envelop, or roll of paper or other material bearing upon its outer surface the polishing, abrasive, scouring, or brushing material, or the said abrading, polishing, scouring, or brushing material may be applied to the resilient conformable surface in any other manner, and there may be interposed between the said sheet, pad, roll, envelop, or support for the abrasive, polishing, or brushing material an interposed sheet or envelop of rubber, felt, or other similar material.

In the drawings, Figure 1 is a view of a buffing-roll, showing in plan a portion of the abrading-surface, a portion of the yielding support, and also showing in horizontal section a portion of the interior construction. Fig. 2 is a view, partly in end elevation and partly in vertical section, of the said roll. Fig. 3 is a view in vertical section upon the dotted line 3 3 of Fig. 1. Figs. 4 and 5 are views in vertical section illustrating slight modifications, which are hereinafter described. Fig. 6 is a view in horizontal section, and Fig. 7 in end elevation, of a modi-

fied form of a burnishing or polishing tool having the features of my invention. Figs. 8 and 9 are views in vertical section illustrating other modifications, to which reference will hereinafter be made. Fig. 10 is a view showing the employment of an interior elastic lining, to which reference is hereinafter made. Fig. 11 is a view representing a perforated envelop or covering, to which reference is hereinafter made.

Referring to the drawings, A represents a hollow axle or shaft. The means by which it is secured or attached to the shaft for rotating it are not shown. It has mounted upon it and fast to it a hollow casing or support B, provided with the interior chamber *b*. This support or casing B has any desired number of radial or other holes *b'* extending from it, preferably arranged in regular lines lengthwise it and around it. In each hole there is a piston or slide *c*, which has endwise movement in respect to the support, the extent of which in each direction may be limited by the stops *c'* *c''*. At the outer end of each piston is a bearing block or section C, the outer surface *c³* of which is rounded or shaped to any desired form, whereby it is brought into operative relation and harmony with the surfaces of the adjacent blocks or sections. It preferably is carried by the piston or slide in a manner to permit it to have universal movement upon it, and the connection between them is in the nature of a universal joint, the outer end *c⁴* of each piston or slide being hemispherical in shape and entering a rounded or hemispherical cavity *c⁵* in the inner surfaces of each block or section. Each block or section may be secured to the end of its piston or slide, if desired, by a rubber or other string or connection *c⁶*, adapted to hold the block to the piston or slide, but not to restrain its adjustable or conforming movement thereon. It is not necessary that the blocks should be so connected with the pistons or slides, as they may be held in place by an intermediate inclosing envelop where one is used or by being connected with each other by flexible connections.

Each piston or slide may be held in working place resiliently by a spring of any desired shape, and in Fig. 1 I have represented each piston or slide as pressed outward from the shaft or axle A by a coiled spring *d*, the inner end of which bears against the outer surface of the axle or shaft and the outer end of which bears against the piston or slide, a portion of the spring being contained in a long annular recess *d'* of the piston or slide extending from its rear end. These springs may be of any desired tension for providing the pistons or slides and their blocks with any desired degree of outward pressure. In lieu of springs for thus independently moving the pistons or slides and the blocks or independent surface sections or in addition thereto there may be employed compressed air or

other similar elastic medium, and when this is used I prefer to introduce the compressed air or other elastic medium into the chamber *b* by means of the passage or cavity *a* in the shaft or axle A, (see Fig. 6,) the said passage or cavity being connected at one end with a pipe by which air under pressure or other elastic medium is supplied it from a blower, pump, or other means, and being connected with the cavity *b* of the casing B by passages or holes *a'*.

Compressed air or other similar elastic medium being introduced into the chamber *b* and maintained there under pressure will yieldingly hold the said pistons or slides and their blocks against any pressure which may be exerted upon their outer surfaces and will independently hold each of the pistons or slides and its separate or independent face or block section against said inward pressure—such, for instance, as that produced by pressing the work to be buffed, polished, scoured, or burnished against the outer surface of the roll. If desired, there may be used in connection with the compressed air or other similar medium for thus resiliently holding the pistons, slides, and blocks light springs of the nature of the springs *d*, but not as stiff as said springs would be acting alone, which springs shall act to always maintain the pistons or slides and the blocks in their outermost positions when the compressed air is not present in the chamber *b*, so that the working surface of the roll or tool is always assured, although the force which maintains that surface and works it in action is not then present.

In some instances there may be employed in lieu of the spring-pressure or the air-pressure above described centrifugal force—that is, the pressure for providing the resiliency or conformability of surface required in actual work or while the thing being burnished, buffed, scoured, or otherwise treated is held in contact with the surface of the roll or tool may be obtained by this means, and in Fig. 2 I have represented the tool as thus constructed and operated. When centrifugal force is thus employed, it will be desirable, although not always essential, that the working position of the pistons or slides and blocks be maintained while the roll or tool is at rest and at all other times by the yielding positioning-springs above referred to and for the purposes stated, these light springs acting at all times to maintain the pistons or slides and blocks in their outermost or working position, and the compressed air or centrifugal force being employed to reinforce these positioning-springs during the action of the roll or tool. Of course there may be a combination or joint action of these two forces—that is, of the compressed air and the centrifugal action. Whether compressed air or centrifugal force is employed the pistons or slides and the blocks are made of the size or weight required for the best application of these

powers to them and are also graduated to the amount or extent of resiliency which it is desirable that each independent section or block shall have when opposed to the pressure of the work which is presented to the roll or tool.

From what has been said it will be seen that by the construction described there is provided a roll or tool the outer surface of which is made up of any desired number of independent sections or blocks, each one of which forms a part of the surface, and each of which is resiliently supported in place so as to yield radially, and each of which is also universally conformable upon its support. This furnishes the yielding and conformable backing for one or more flexible surrounding envelops, pads, or sheets, the outer of which carries upon its outer surface the abrading, polishing, or other material, and the object of providing the roll or tool with such a resilient and conformable structure is to furnish the abrading, polishing, or other surface or envelop with a uniform conformable pressure which shall permit it to yield at all points and yet shall always bear with the same stress upon it at all points, whereby the abrading-surface is always held against the work at all points with a uniform pressure and good and regular buffing, polishing, abrading, or similar action secured.

In Fig. 10 I have represented the yielding blocks as surrounded by and contained within a yielding envelop E of thin rubber, which serves to hold the blocks upon their pistons or slides.

In Fig. 4 I have represented the blocks C as mounted directly upon springs, preferably helical, partly contained in pockets upon the outer surface of the casing or support B, and in this construction the springs take the place of the pistons or slides and universal-joint connection of the construction of Figs. 1 and 2. The inner ends of the spring may be fastened to the said casing or support B and the outer ends to the blocks.

The intermediate and outer envelops or sheets may be attached to the roll or tool in any desired way, and I have represented in the figures as one means for so fastening them narrow bars or rods F F', which extend the full length of the roll parallel with each other and slightly separated from each other, which are yieldingly supported, the bar or rod F at the ends of yielding arms or levers f, pivoted to the casing B at f', the outer ends of said arms or levers serving to press outward the bar or rod, and the springs f², connecting the inner ends of said levers with the support B, serving to provide the outer ends and the bar with said yielding movement. The bar F is also adapted to be moved slightly laterally or toward the bar F' for the purpose hereinafter stated, and this function is represented as provided by giving the lever f the slots f³ for their attaching-pivots in order that the levers may move lengthwise the pivots and by con-

structing the springs f² and their surroundings in a manner to prevent their hindering the endwise movements of the levers. The bar F is supported by levers f⁴, which are similar to the levers f and act in the same manner, excepting that they are not lengthwise movable.

To attach an envelop and the outer covering G to the roll, one edge g of the sheet which forms the envelop or outer covering is passed between the bars F F' and attached to spurs or pins g' or other holding devices. It is then carried around the roll and bar F' and its other or opposite edge g² turned inward between the two bars or rods F F' and attached to said pins g' or other holding devices. The pins are upon spring arms or holders g⁴, which serve to press them outward and hold them pressed outward toward or against the inner surface of the bar or rod F', or, in other words, the abrading-envelop and the intermediate envelop, if one be used, are in the form of sheets, which when applied to the roll have their edges brought together at the opening between the bars F F' and held by holding devices beneath them or one of them.

The bar F is in the nature of a take-up bar—that is, the roll is always revolved so that the strain upon the abrading-envelop is from the bar F', and this causes the slack to be worked around to the bar F, which bar or rod not only has an outward movement by which this slack is taken up, but also an onward movement or a movement toward the bar F', which assists in its taking-up action, and by this means all bagging or wrinkling of the exterior or abrading envelop or surface at the end of the sheet forming the envelop is prevented.

I would not be understood as limiting the invention to this especial means for attaching the abrading or polishing sheet or envelop thereto, but may use any other means for securing it to the sectional resilient and conformable surface.

The rapid rotation of the roll or tool is apt to heat the surface thereof to a greater extent than is desirable, and I have provided the tool with means whereby a circulation of air is obtained upon the inner side of the abrasive covering. This effect is produced by not covering the ends of the roll, whereby the channels or spaces H between the outer ends of the pistons or slides and the blocks communicate with the outer air and each other and also by providing the intermediate envelop, when it is used, with the holes or perforations h, which communicate with these spaces and afford means whereby the air therein may reach and act directly upon the inner surface of the outer envelop or the one which carries the abrading or polishing material, and, if desired, a forced current or draft may be provided by forcing cool air through these passages, although as the roll is rapidly rotated a current sufficient for all practical purposes will generally be generated. By this means the back or inner sur-

face of the abrading-sheet is cooled and the abrading-surface also cooled or less rapidly heated.

In Fig. 5 I have represented a structure in which the pistons are contained in piston-chambers having larger areas than the areas of the air-inlets to the chambers. The pistons and blocks may be made of any suitable material—that is, they may be of wood or they may be of metal.

In Figs. 6 and 7 I have represented a buffing-tool of a somewhat different order from that represented in the other figures, the tool having a convex surface and rotating upon an axis at a right angle to its center. It is provided with the same type of yielding or conformable surface, and it in all respects embodies the features of the invention as described. The shape of the surface provided by the yielding blocks is of course different, and the shape of the pad or abrading or polishing sheet conforms to this surface, and it is attached by its edge, which is continuous, to attaching devices carried by the outer line or row of blocks. (See Fig. 6.)

The advantages of the invention have been given in connection with the description thereof and need not further be named.

In Fig. 8 I have represented the yielding conformable blocks as supported by pistons or slides which are arranged tangentially in their supporting-case to reduce the friction incident upon them to their inward movement while the roll is rapidly rotating, the movement of the blocks with this construction being tangential to a radius. In Fig. 9 the same result is accomplished by means of the tangentially-arranged spring-arms fastened to the case or shaft, extending tangentially and bearing at their outer ends the blocks.

It will be observed that the yielding conformable supports are separated from each other by channels which extend lengthwise the roll or tool and circumferentially around it and that this provides space for the conformable movements of the blocks and also air-channels, by which air is brought into contact with the inner surface of the enveloping abrading or polishing sheet. This means for cooling or reducing the temperature of the abrading or polishing surface is very desirable, as it not only increases the wear of the abrading or polishing sheet and prevents burning of the thing scoured or polished, but it also permits the roll to be run at a faster rate than would otherwise be possible, which is a desirable result to obtain.

I wish to be understood that in some instances the blocks may not be provided with means for imparting to them conformable or lateral movements, in which case they would have the resilient movements only.

While in Fig. 1 the blocks have been represented as arranged in regular order or lines, I would say that they may be arranged out of line with each other or so as to break joints, if so desired. In Fig. 10 I have represented

the chamber *b* as having a rubber or other elastic lining which preferably is continuous, excepting as it has holes for the admission of the compressed air thereto. This lining serves to prevent the escape of the air from the chamber and also as a medium for receiving the inner ends of the pistons or slides, which bear against the outer portion thereof. The lining is distended against the confining-wall of the case and held against it by the air-pressure and serves to support the pistons or slides in their outermost position, to impart the elasticity of the elastic medium thereto, and also to give some degree of resiliency arising from its own elasticity.

Having thus fully described my invention, I claim and desire to secure by Letters Patent of the United States—

1. The combination in a buffing or similar roll or tool of the bar or rod *F'*, its yielding levers, yielding springs or arms *g*² having spurs *g*³ with the bar *F*, the yielding levers *f* provided with endwise movement, the said bars being separated to form a recess extending from the outer surface of the roll or tool.

2. A buffing roll or tool having a yielding surface comprising a series of yielding conformable blocks separated from each other by recesses or channels extending longitudinally and circumferentially, and providing means whereby the blocks may be independently moved, and also channels for the circulation of air within the enveloping covering of the roll or tool.

3. In a buffing roll or tool the outer pad or abrading-material support consisting of a large number of yielding blocks of the same size placed closely together so that their edges very nearly abut, to provide for the said pad or abrading material a practically-continuous and uniformly-yielding supporting-surface, in combination with a thin and flexible pad or envelop applied to said surface and supported thereby, and whereby each section thereof independently yields inward to pressure applied to said enveloping pad.

4. A buffing roll or tool, the outer pad or abrading-material support of which is obtained by means of a large number of blocks of the same size which are independent of each other, and the edges of which very nearly abut, which blocks are also provided with a universal tilting movement in relation to each other upon a central independent radially-yielding support.

5. A buffing roll or tool, having an outer pad or abrading-material support obtained by means of a large number of blocks of the same size which are independent of each other and are independently yielding, and the edges of which very nearly abut, and also having means extending lengthwise the roll for holding below the surface of the roll the edges of an enveloping pad or enveloping abrading material.

6. A buffing-roll having an outer pad or abrading-material support obtained by means

of a large number of blocks of the same size, which are independent of each other and independently yielding, and the edges of which very nearly abut, and devices for holding beneath the surface of the roll the edges of an enveloping pad or enveloping abrading material, comprising yielding sections of the surface of the roll which are separated from each other to form an entrance to a recess for receiving the ends of the enveloping pad or abrading-envelop, and means within the recess for fastening the said ends to the roll.

7. A buffing roll or tool having an outer pad or abrading-material support obtained by means of a large number of blocks of the same size which are independent of each other and independently yielding, and the edges of which very nearly abut, with yielding sections of the roll forming portions of its yielding surface and also an entrance to a recess within the roll and within which the edges of the enveloping pad or abrading envelop are secured, and one of which yielding sections is movable toward and from the other, as and for the purposes set forth.

8. A buffing-roll having the yielding longitudinal sections F, F' forming a part of the outer surface of the roll separated from each other to form an entrance to a recess within the roll, means for securing in said recess the ends of an enveloping pad or abrading-en-

velop, one of which yielding sections is also automatically movable toward and from the other on a line or arc with the surface of the roll, as and for the purposes set forth.

9. A buffing roll or tool having an outer pad and envelop of abrading material, radially-movable blocks the outer ends of which yieldingly support said pad and envelop, and means for holding said blocks in yielding contact with said pad or envelop comprising an interior flexible or yielding distended case which bears against said blocks and forces them outward with a yielding pressure and which also permits the independent inward-yielding movement of each of said blocks.

10. A buffing roll or tool having an outer pad or envelop of abrading material, radially-movable blocks to yieldingly bear against the inner surface of said pad or envelop, a support for the blocks and means within said support for holding said blocks in yielding contact with said pad or envelop comprising an interior flexible or yielding distended case common to all the blocks and against which they bear, and which case also permits the independent inward movement of each block in its said support.

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Witnesses:

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