No. 641,485. Patented Jan. 16, 1900.

E. D. WOODS.

POLISHING WHEEL.

(Application filed Oct. 29, 1898.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.

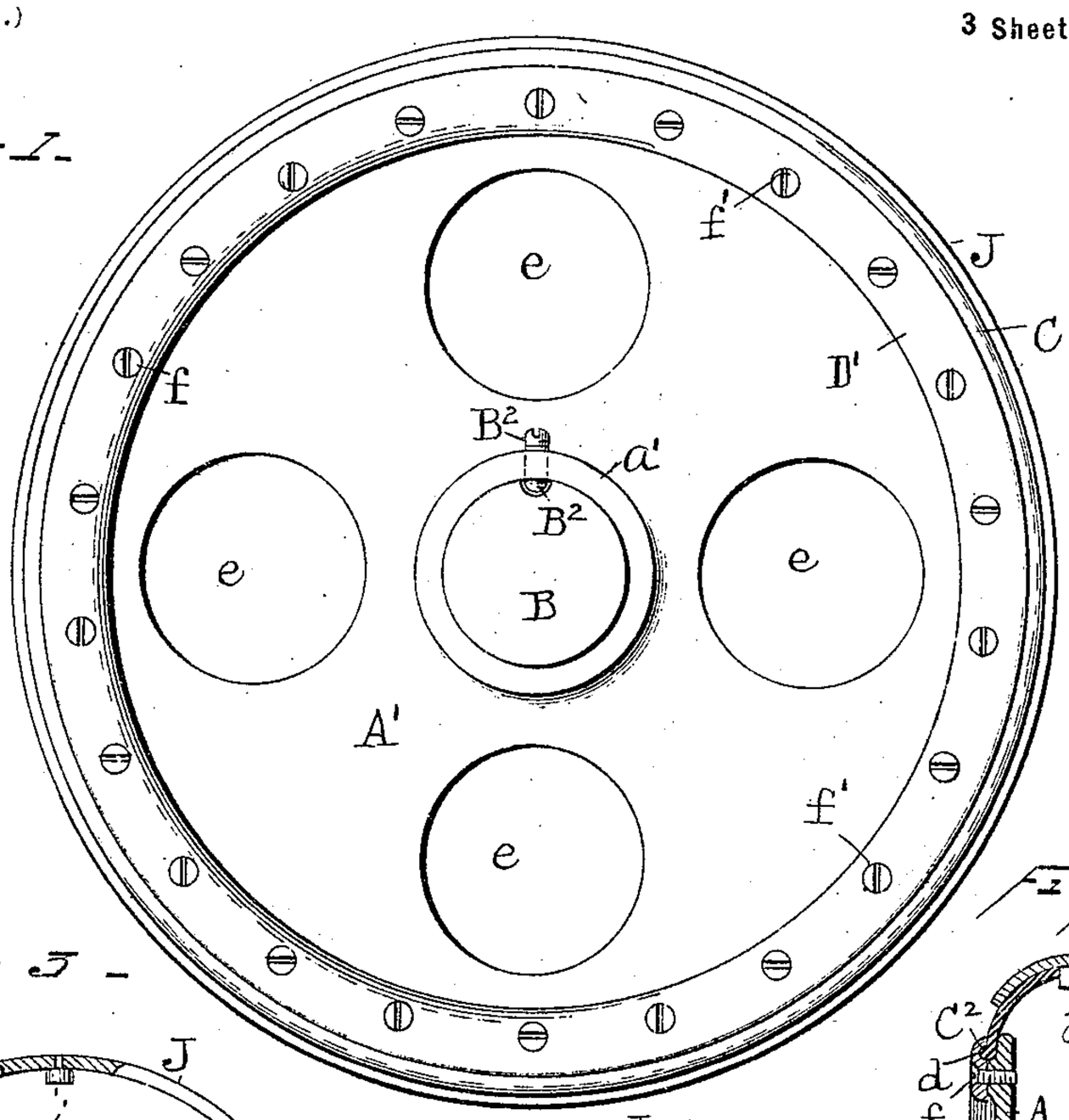
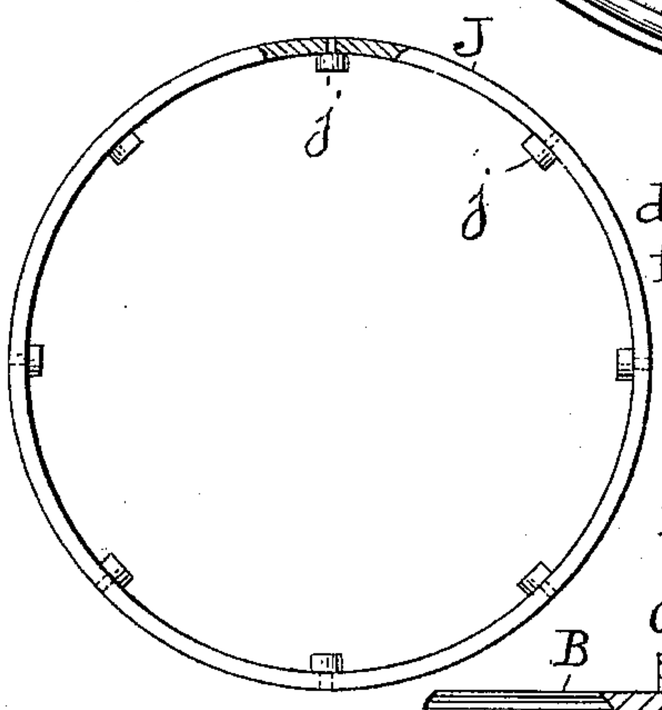


Fig. 3.



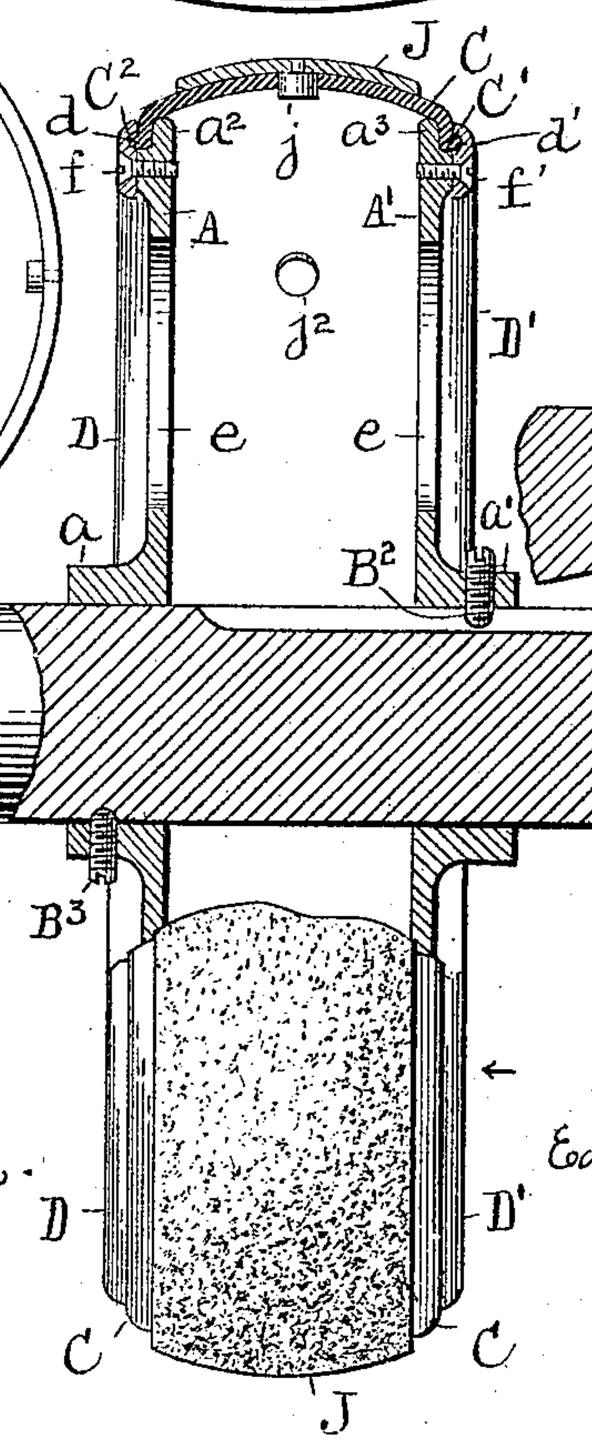


Fig. 4.

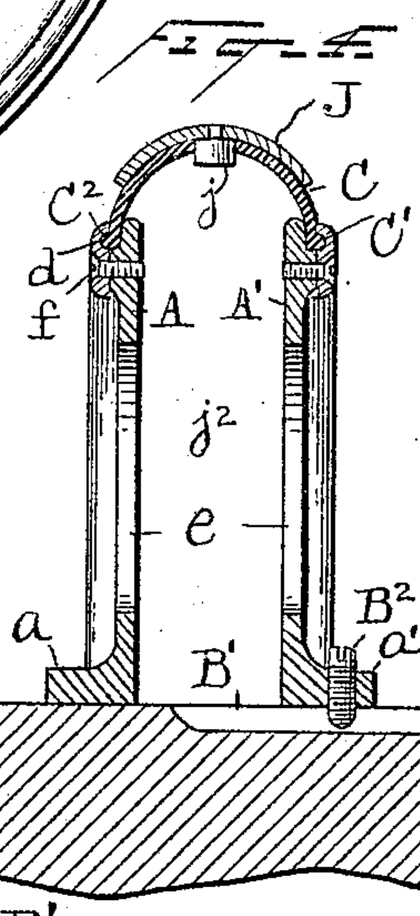


Fig. 2.

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POLISHING WHEEL.

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(No Model.) 3 Sheets—Sheet 2.

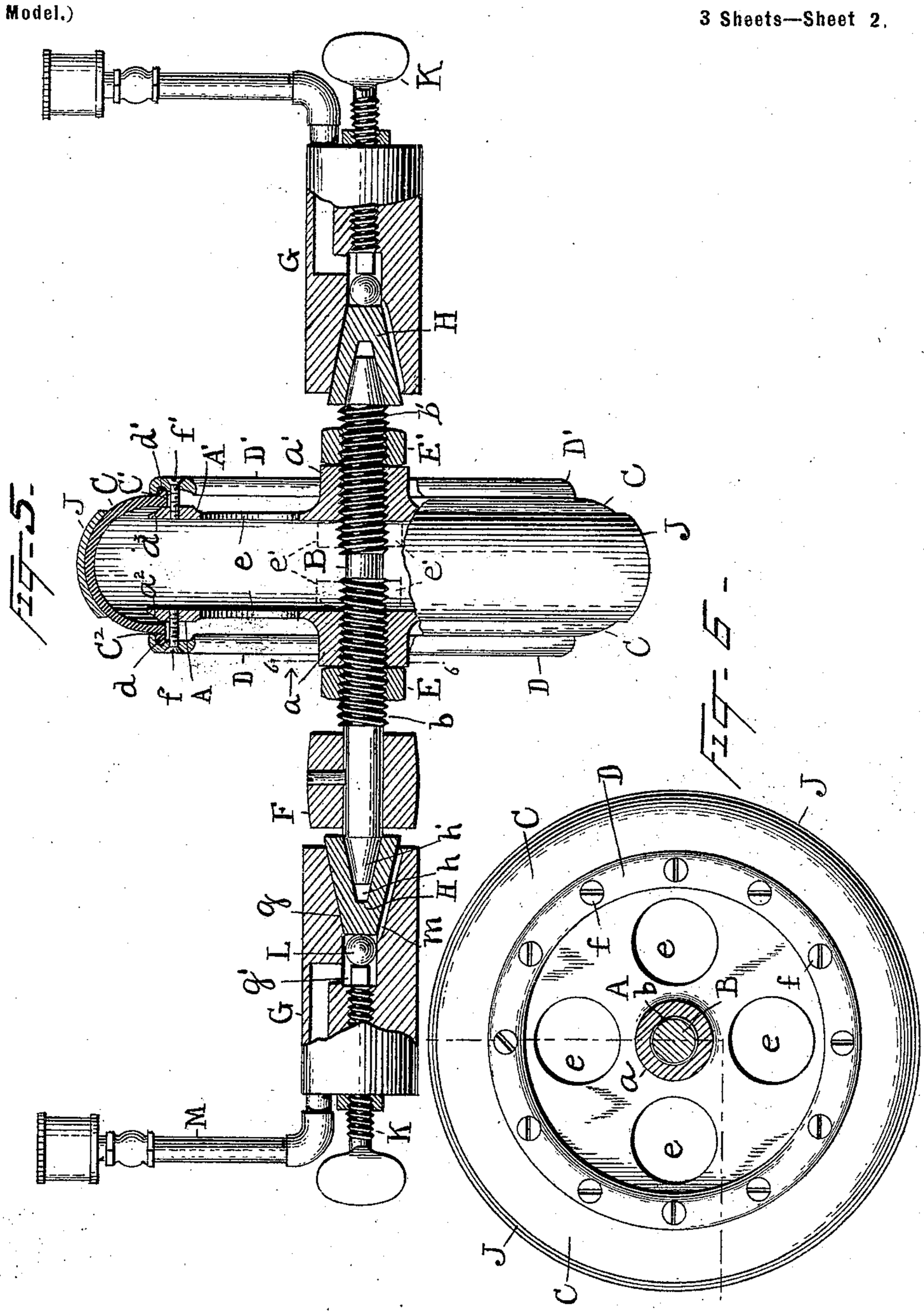

FIG. 5.

FIG. 6.

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(No Model.) 3 Sheets—Sheet 3.

Fig. 7.

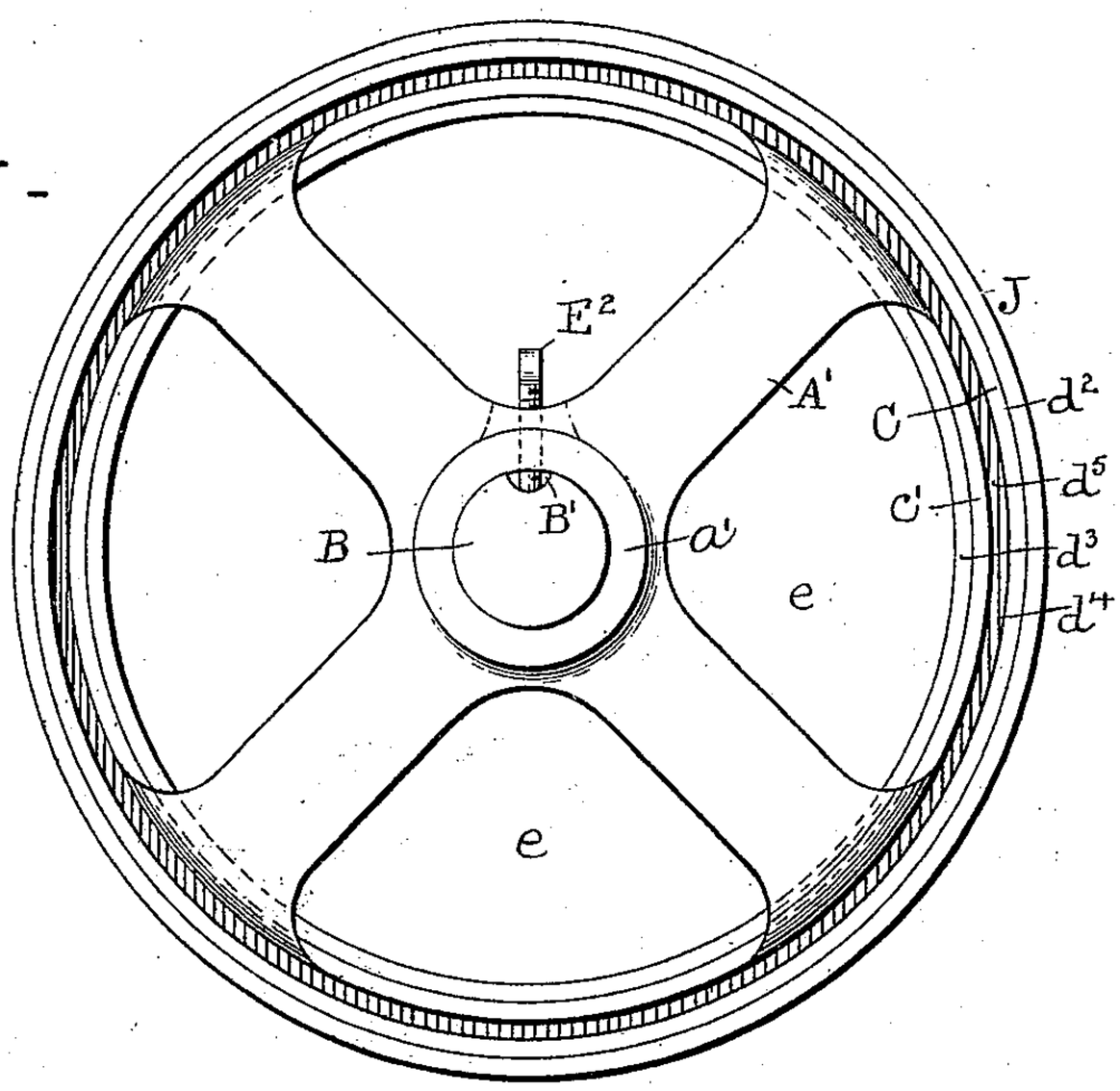
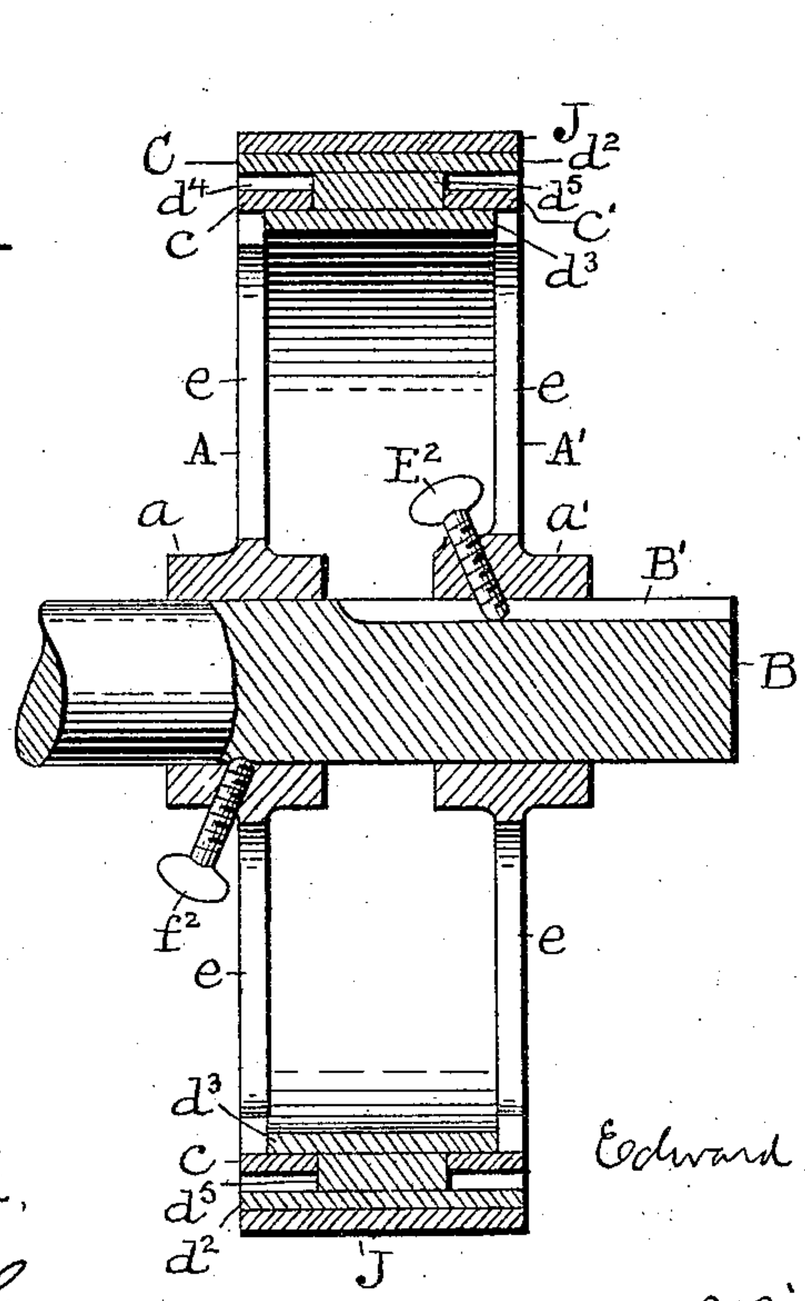


Fig. 8.



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UNITED STATES PATENT OFFICE.

EDWARD DINSMOORE WOODS, OF GRANVILLE, NEW YORK, ASSIGNOR TO THE WOODS SPECIALTY COMPANY, OF NEW YORK.

POLISHING-WHEEL.

SPECIFICATION forming part of Letters Patent No. 641,485, dated January 16, 1900.

Application filed October 29, 1898. Serial No. 694,892. (No model.)

To all whom it may concern:

Be it known that I, EDWARD DINSMOORE WOODS, a citizen of the United States, and a resident of Granville, in the county of Washington, State of New York, have invented certain new and useful Improvements in Polishing-Wheels, of which the following is a specification.

My invention relates to polishing-wheels.

It has for its object to provide a polishing-wheel whose diameter and width can easily and readily be varied, a wheel which is well suited for a great variety of different kinds of work, which is adapted for carrying removable polishing-bands and bands of different sizes, for the quick and easy substitution upon its periphery of one polishing-band for another, for the ready adjustment of the tire or polishing-surface as to hardness or softness, and for taking out lateral slackness or sponginess in the tire, and generally to provide a better and more durable polishing-wheel.

It consists of the novel devices herein shown and described.

In the drawings accompanying this specification and forming part hereof, in which corresponding reference characters in the different figures represent corresponding parts, I have shown and will now proceed to describe the preferred form of my improved device.

Figure 1 is a side view of the preferred form of my improved device viewed as shown by the arrow in Fig. 2. Fig. 2 is a vertical cross-section of my improved wheel; and Fig. 4 is a similar section of half of the wheel, showing the sides closer together; and Fig. 3 is a side view, partly in section, of a removable band. Figs. 5 and 6 are views of a modified form of my improved device, Fig. 5 being a view, partly in elevation and partly in vertical cross-section, of the wheel as mounted in bearings, and Fig. 6 is a side view of the same. Figs. 7 and 8 are views of another modified form of my improved wheel, being respectively a side view and a vertical cross-section of the same.

In my improved polishing-wheel the tire is so constructed and arranged as to be adapted to have a bodily radial movement toward or away from the center of the wheel, thus varying its diameter. This bodily radial movement of the tire is caused by the relative adjustment of the sides of the wheel supporting the tire toward or away from each other, in which case all of the tire moves bodily radially outward or inward except the edges where the tire is secured to the sides, as in the form of wheel shown in Figs. 1 to 6, inclusive, or it is a bodily movement of the entire tire radially inward or outward, as in the form of wheel shown in Figs. 7 and 8, the tire in the latter case not being secured to the sides, but being free to move outward into operative position under the action of centrifugal force as the wheel rotates and to drop inward when the wheel comes to rest. In both cases the edges of the tire are unsecured to any fixed supports and are free to move under the influence of the rotation of the wheel. This adjustability in the diameter of the wheel permits of the use upon the same wheel of different removable polishing-bands or endless belts of the same or of different sizes and of the ready removal of a band from the wheel and the replacing of another band thereon.

In my improved polishing-wheel, the two sides of the wheel which support the tire are adjustable relatively to each other upon the shaft of the wheel, so that the distance between them can be decreased or increased. The width and the diameter of one form of my improved wheel can thereby be consequently increased or diminished. This relative adjustment of the two sides of the wheel can be effected either by moving both of the sides along the shaft, as in the form of my invention shown in Figs. 5 and 6, or by moving one only of the sides, the other side remaining fast to the shaft, as illustrated in the form shown in Figs. 1, 2, 4, 7, and 8. In practice, however, I prefer the latter method of adjustment. This relative adjustment of the sides is effected automatically by the rotation of the polishing-wheel itself and may be effected either by motion toward each other, as shown in the normal operation in the form of my device shown in Figs. 1, 2, 3, 4, 7, and 8, or outward and away from each as illustrated by one operation of the form of device shown in Figs. 5 and 6.

In my improved device the tire itself may be

used as the polishing-surface or, preferably, it is used as a support for a removable polishing-band. When used merely as a support for a polishing-band, it may be made of any suitable flexible material adapted for the purpose.

I will first proceed to describe the form of my improved device which is illustrated in Figs. 1, 2, 3, and 4, in which form one side only of the polishing-wheel is movable upon the shaft, in which the adjustment of the sides is automatically caused by the rotation of the wheel and is normally inward toward each other, thus reducing the width of the tire and wheel, but increasing the diameter and making the tire more convex.

A A′ are the two sides of my improved wheel and are provided, respectively, with hubs *a a′*, mounted on shaft B. Preferably I make one of these sides fast to the shaft. In the drawings the side A is made fast to the shaft by means of screw B^3, which passes through hub *a* and bears against shaft B, as shown in Fig. 2. The side A′ is loosely mounted on the shaft and is movable along said shaft toward or away from the other side. A groove B′ is cut into the surface of shaft B, and a pin B^2, preferably screw-threaded, projects from the movable side A′ through its hub *a′* into the said groove. This arrangement permits the side A′ to move freely along the shaft, but causes the side to rotate with the shaft. Normally the pin B^2 is in the position shown in Fig. 2, in which position its lower edge does not bear upon the bottom of the groove B′. If it is desired, however, at any time to lock the side A′ to the shaft, it can be done by screwing the pin B^2 against the under side of the groove. In this way the width of the wheel, and consequently its diameter, can be varied or adjusted manually. I prefer, however, to have the relative adjustment of the sides A A′ to each other to be automatically regulated by the rotation of the wheel. In this case the pin B^2 is left in the position shown in Fig. 2.

C is the tire of the wheel. It is secured to and supported by the sides A A′ and is flexible in character. In the drawings I have shown the edges of the tire secured to the periphery of the sides by means of clamping-rings D D′, fastened to the sides by screws *f f′*, passing through the rings and into the sides A A′, so that the tire may be removed by removing the rings D D′. By this arrangement an injured tire can be readily replaced by a new one or tires differing in thickness, hardness, shape, and otherwise may be readily interchanged at will. The rings D D′ are preferably provided with grooves *d d′*, which receive ribs C^2 C′, formed by the edges of the tire C, so as to more firmly clamp the tire in place, and the outer edges of the sides A A′ are preferably provided with beveled edges a^2 a^3, respectively, to support the inner margins of the tire when it is flattened out, as will be hereinafter explained. The sides of the wheel have openings, such as *e*, so that air may be freely admitted into the interior of the wheel, thus aiding the centrifugal action of the wheel in throwing out the tire to a more or less convex form and increasing the rigidity or hardness of the tire when the wheel is rotated.

The sides A A′ are adjustable with respect to each other, so that they may be brought nearer together or spaced farther apart, thus varying the diameter of the wheel and varying the effective width and shape of the tire. For this purpose one or both of the sides A A′ may be movable on the shaft; but, as above described, I prefer and have shown in Figs. 1, 2, 3, and 4 one of the sides only—viz., A′—movable, the other side A being fast on the shaft. As the wheel is rotated centrifugal force will tend to throw out the tire C and bring closer together the two sides A A′. Fig. 2 represents the wheel at rest, and Fig. 4 shows the relative position of the two sides and the tire C during the rotation of the wheel. The adjustment of the two sides relative to each other is thus performed automatically by the rotation of the wheel. This adjustment is inward or toward each other, thus lessening the width of the wheel and the effective width of the tire and increasing the diameter of the wheel. The extent of this adjustment is dependent, of course, upon the speed of rotation. The greater the speed the narrower becomes the width of the wheel and the tire and the greater their diameter.

I preferably use a removable polishing-band or endless belt J, which can be slipped upon the tire C when the wheel is at rest and which will be firmly held upon the tire when the wheel rotates by reason of the increase in diameter of the tire. In ordinary cases this increase in diameter is alone and of itself sufficient to hold the band upon the tire. Where it is desired to have further means to prevent the slipping of the band upon the tire, either laterally or longitudinally or in any direction, one or more projections from the endless band can be adapted to fit into one or more depressions in the surface of the tire. By means of such locking projections and locking-recesses slipping of the band upon the tire is effectually prevented. Such depression in the tire may, if desired, extend entirely through the tire and form holes through the tire. For the above purpose I preferably provide stops *j* and holes j^2. These stops *j* are projections extending from the inner side of the band and are adapted to extend into holes j^2 in the tire. I preferably make the polishing-band J of leather, which is coated on its surface with emery in the usual manner, and the stops *j* are preferably made of a separate piece of leather secured to the band J in any suitable manner.

My improved wheel is well adapted for different kinds of work by reason of the ease with which the diameter and width of the

wheel and the shape, effective width, and the rigidity of the polishing-surface can be varied. By reason of the changes in the diameter of the wheel it is adapted to the use of endless polishing belts or bands of different sizes, and by reason of the easy variation in the diameter of the wheel one band of the same or a different size can readily be substituted for another band. Heretofore when the polishing-surface of a polishing-wheel has worn out through the rubbing off of the emery or for any other cause it has been necessary to wholly discontinue the use of the wheel until the polishing-surface has been recoated with emery or has been repaired. In my improved device when the polishing-surface in use is worn out for any reason it can readily be removed from the wheel and a new polishing-surface put in its place, and the wheel thus can be kept continuously employed. In this respect it is of advantage to use endless belts or bands coated with emery, as they can be taken off and put on upon the tire of the wheel with great rapidity. In this way a wheel may have a set of polishing-bands of the same or of different sizes and have polishing-surfaces of differing widths, shapes, or character, so as to readily adapt the wheel for the particular work to be done. I can, however, if desired, use the tire C itself as a polishing-surface. I prefer to make the tire C of rubber and the polishing-band of leather, although any other suitable material of a flexible character may be used for the tire and any suitable polishing material for the band.

The rigidity or hardness or softness of the polishing-surface can be of course varied by varying the speed of rotation of the wheel.

In the form of wheel shown in Figs. 5 and 6 both sides A A′ of the wheel are movable upon shaft B. In order to increase the power of the inward movement of the two sides A A′ when the wheel rotates in one direction and also to permit of the outward movement of the two sides against the action of centrifugal force when the wheel rotates in the other direction, shaft B is provided with right and left hand screw-threads *b b′*, respectively, upon which fit correspondingly-cut threads upon the hubs *a a′*. By this construction when the wheel rotates in one direction both sides A A′ move inward and with increased power over that exerted in the form shown in Figs. 1 to 4, inclusive, thus increasing the diameter of the tire and decreasing its width, and when the wheel rotates in the other direction the sides separate, decreasing the diameter of the tire and increasing its width. One advantage resulting from this outward movement of the sides is to stretch the tire laterally, and thus to take out lateral sponginess or slackness of the tire. Check-nuts E E′ on the outside of the sides of the wheel and check-nuts *e′* on the inside serve as stops to prevent excessive movement of the sides outward or inward. By shifting the position of such stops the movement of the sides outward or inward can be checked at any predetermined point.

The relative adjustability of the sides of the wheel in the form shown in Figs. 5 and 6 is preferably automatic, being caused by the influence of the rotation of the wheel in one direction or another. It may, however, if desired, be manual, in which case the sides A A′ are shoved outward or inward to the desired position and are then locked by the check-nuts.

In practice my improved wheel is usually rotated at a high rate of speed, and in Figs. 5 and 6 I have shown bearings which are especially adapted for use with my wheel, although, of course, any suitable bearings may be employed. In the form of bearings shown G is a cup having a conical interior *g* and an inner cylindrical recess *g′*. H is a cone fitting the interior *g* and preferably having a conical recess *h* to receive the conical end *h′* of the shaft B. K is a screw-threaded pin for adjusting the cone H in its cup, and between the end of the screw and cone is interposed a steel ball L. Oil is supplied to the interior of the cup G through pipe M, and an oil-groove *m* is cut in the face of the conical interior *g*. F is a driving-drum fixed on shaft B. These bearings, however, I do not here claim, as they are made the subject of another application.

In the form of wheel shown in Figs. 7 and 8 the tire C is not secured to the sides of the wheel, but is free to move radially outward or inward wholly independent of the sides, with the exception that its outward movement is restrained at a certain predetermined point by one or more stops connected with the sides. When the wheel rotates, the tire is thrown outward against the stop and is then held in operative position by centrifugal force; but when the wheel comes to rest it drops inward. Its diameter is thus automatically increased by the rotation of the wheel. The outer surface of the tire C can itself be used as the polishing-surface, or a removable band J can be used for that purpose, as shown in Figs. 7 and 8. In the latter case the increase in the diameter of the tire due to the rotation of the wheel serves to hold the removable band firmly in place, and the variation in the diameter enables a band to be easily removed and be readily replaced by another. In this form of wheel I preferably make the tire of leather and of the shape shown in Figs. 7 and 8, although any suitable material may be employed and any suitable form of tire be adopted. The form of tire shown in said figures consists of an outer portion d^2, an inner portion d^3, and a connecting portion d^5, the three portions together constituting the tire C and being fastened together in any suitable manner, as by glue, or they may be made in one piece. Preferably a space d^4 is left on each side of the connecting portion d^5 between the outer and inner portions, and into these spaces project retaining-flanges *c c′* from the two sides of the wheel A A′. The

spaces d^4 are greater than the thickness of the retaining-flanges, thus permitting the tire a limited radial movement. When the wheel rotates, the tire is thrown outward, as shown in Figs. 7 and 8, until the inner portion d^3 presses snugly against the inner faces of the retaining-flanges c c', which act as a stop to prevent further radial movement of the tire outward. In this position the tire or a polishing-band supported upon it furnishes a yielding cushioned polishing-surface of great efficiency and one of especial value in polishing flat surfaces.

When the wheel is in use, the screw-threaded pin E^2 is turned down against the bottom of groove B', so as to lock side A' to shaft B. Side A is permanently locked to shaft B by means of screw f^2. When the tire is to be removed, pin E^2 is loosened, side A' is slipped off from the shaft and the tire is removed, and, if desired, a new tire put in its place. Thus tires can be easily removed and replaced, and tires of different widths or shapes can be employed, to suit the character of the work in hand.

The form of polishing-wheel shown in Figs. 7 and 8 I do not herein specifically claim, as I have made it the subject-matter of another application executed and filed simultaneously herewith, known as Serial No. 694,891, filed October 29, 1898.

My improved polishing-wheel is far more durable than any polishing-wheel known to me, can be continuously employed without being subject to the serious loss of time incident to all known polishing-wheels through the enforced idleness of the wheel due to the necessity of renewing the emery or other polishing material upon it and to the necessity for truing and balancing the wheel, can be readily adapted for different kinds of work, and gives a better and more durable polishing-surface and one whose hardness can be varied by the varying speed of rotation of the wheel. The ease with which the effective polishing-surface can be varied in width and shape also fits it in an especial manner for use upon many different kinds of work.

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

1. In a polishing-wheel, a tire the edges of which are unsecured to any fixed supports and are free to move under the influence of the rotation of the wheel, whereby the tire may have a bodily radial movement under the influence of the rotation of the wheel and the diameter of the tire may be varied by such rotation.

2. A polishing-wheel having a tire adapted to move radially under the influence of the rotation of the wheel, and a removable polishing-band adapted to be slipped upon the tire when the wheel is at rest and to be firmly held thereon when the wheel rotates, whereby the diameter of the tire may be varied by the rotation of the wheel, and the removable polishing-band be firmly held in place during the rotation of the wheel.

3. A polishing-wheel having sides, adjustable relatively to each other, and provided with a flexible tire, and a removable polishing-band adapted to be slipped upon the tire when the wheel is at rest, whereby the width and diameter of the tire may be varied at will and whereby the band may be securely held in place upon the tire as the wheel rotates.

4. In a polishing-wheel sides, adjustable relatively to each other under the influence of the rotation of the wheel, and provided with a flexible tire secured to the sides, whereby the width and diameter of the tire can be varied by the rotation of the wheel.

5. A polishing-wheel having sides, adjustable relatively to each other under the influence of the rotation of the wheel, and provided with a flexible tire secured to the sides, and a removable polishing-band adapted to be slipped upon the tire when the wheel is at rest, whereby by the rotation of the wheel the width and diameter of the tire may be varied.

6. In a polishing-wheel sides, adjustable relatively to each other under the influence of the rotation of the wheel, and provided with a flexible tire secured to the sides, a shaft upon which the sides are mounted, one of said sides being loosely mounted upon and movable along said shaft toward and away from the other side, whereby upon rotating the wheel the width and diameter of the tire will be varied.

7. The combination of a shaft, a pair of side-wheel members mounted thereon against rotation relative thereto, one of said members being free to slide on said shaft, and a flexible tire attached to and connecting said side members.

8. A polishing-wheel having sides, adjustable relatively to each other, and provided with a flexible tire secured to the sides, and a removable polishing-band adapted to be slipped upon the tire when the wheel is at rest, a shaft upon which the sides are mounted, one of said sides being loosely mounted upon and movable along said shaft toward and away from the other side, whereby upon rotating the wheel the width of the tire will be lessened and its diameter will be increased, and whereby the removable polishing-band will be firmly held in place.

9. In a polishing-wheel the combination of sides, adjustable relatively to each other under the influence of the rotation of the wheel, and provided with a flexible tire secured to the sides, a shaft upon which the sides are mounted, one of said sides being loosely mounted upon and movable along, said shaft toward and away from the other side, a groove in said shaft and a pin projecting from said movable side into said groove to cause the said side to rotate with the shaft but to permit it to move along the shaft toward or away from the other side, whereby upon rotating

the wheel the width of the tire will be lessened and its diameter will be increased.

10. A polishing-wheel having sides, adjustable relatively to each other under the influence of the rotation of the wheel, and provided with a flexible tire secured to the sides, and a removable polishing-band adapted to be slipped upon the tire when the wheel is at rest, a shaft upon which the sides are mounted, one of said sides being loosely mounted upon and movable along, said shaft toward and away from the other side, a groove in said shaft and a pin projecting from said movable side into said groove to cause the said side to rotate with the shaft but to permit it to move along the shaft toward or away from the other side, whereby upon rotating the wheel the width of the tire will be lessened and its diameter will be increased and whereby the removable polishing-band will be firmly held in place.

11. A polishing-wheel having sides, adjustable relatively to each other under the influence of the rotation of the wheel, and provided with a flexible tire, a shaft upon which the sides are mounted, one of said sides being loosely mounted upon and movable along, said shaft toward and away from the other side, a groove in said shaft, a screw-threaded pin projecting from said movable side into said groove and adapted to lock said side to the shaft or to unlock it, whereby the location of said side during said rotation may be fixed at will or the said side may be free to move inward under the influence of the rotation of the wheel.

12. A polishing-wheel having sides, adjustable relatively to each other and provided with openings to the outer air, and having a flexible tire whereby the width, diameter and hardness of the tire may be varied at will.

13. A polishing-wheel having sides, adjustable relatively to each other under the influence of the rotation of the wheel, and provided with openings to the outer air and having a flexible tire secured to the sides, a shaft upon which the sides are mounted, one of said sides being loosely mounted upon and movable along, said shaft toward and away from the other side, whereby upon rotating the wheel the width of the tire will be lessened and its diameter and hardness will be increased.

14. In a polishing-wheel a tire, provided with one or more depressions in its surface and a removable band mounted upon the tire having one or more projections extending into said depressions, whereby the slipping of the band upon the tire is prevented.

15. In a polishing-wheel the combination of a tire, sides to which the tire is secured, clamping-rings for securing the tire to the sides, means for fastening the clamping-rings, grooves in the clamping-rings and ribs upon the edges of the tire adapted to fit into the grooves whereby the tire will be firmly held in place upon the wheel.

16. In a polishing-wheel the combination of a tire, sides to which the tire is secured having beveled edges, clamping-rings for securing the tire to the sides, means for fastening the clamping-rings, grooves in the clamping-rings, and ribs upon the edges of the tire adapted to fit into the grooves, whereby the slipping of the band upon the tire is prevented.

17. An endless flexible removable polishing-band having its interior provided with locking projections adapted to engage locking-recesses of a suitable polishing-wheel.

18. In a polishing-wheel, the combination of two side rims having their peripheries beveled, and a flexible tire connected and secured to said beveled rims.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

EDWARD DINSMOORE WOODS.

Witnesses:
EDWIN SEGER,
SIDNEY MANN.