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1,971,653

EXPANSIBLE WHEEL

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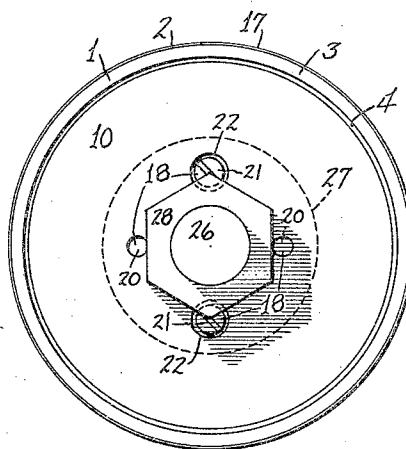
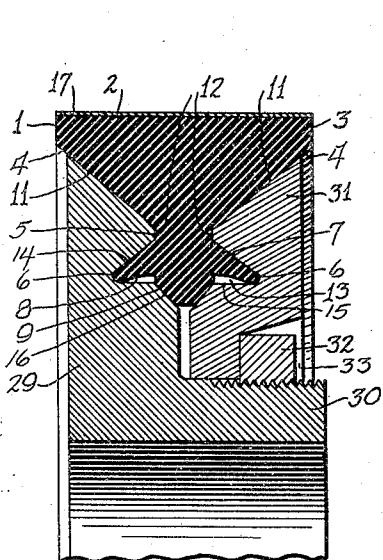
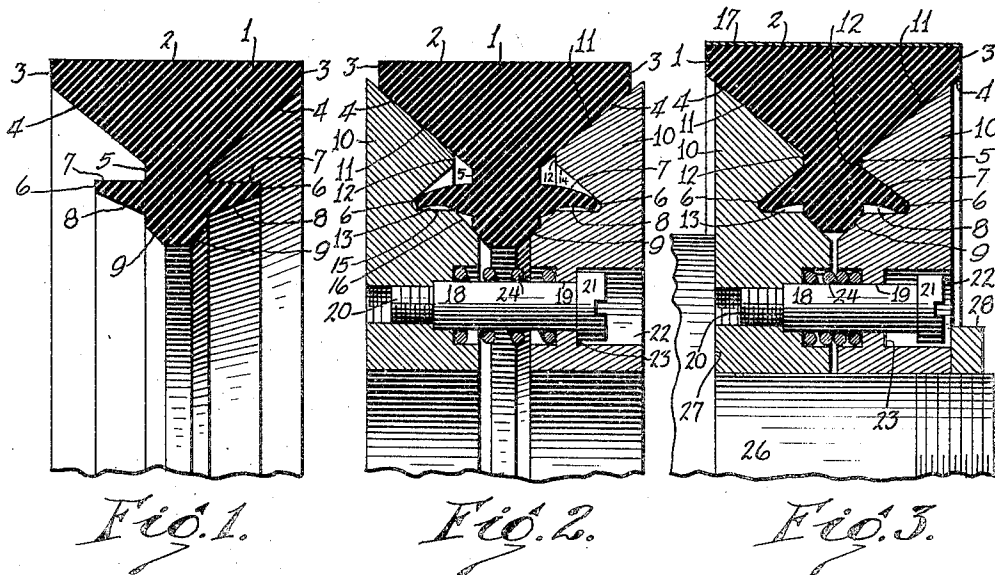


Fig. 5.

Fig. 4.

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UNITED STATES PATENT OFFICE

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EXPANSIBLE WHEEL

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9 Claims. (Cl. 51—190)

The present invention relates to improvements in expansible wheels and more particularly has reference to polishing or buffing wheels in which an endless band of sand paper or the like is used on a periphery of an expansible wheel for polishing purposes.

More particularly the present invention is an improvement over the invention described in the copending application of Joseph Levoy, one of the applicants in this application, Serial No. 592,608, filed February 12, 1932, on an expansible wheel.

The principal object of the invention is to provide an expansible wheel of the character described that is self-contained, easy to manipulate, economic in structure, and in which the endless band is firmly held to its seat and is supported so as to render its entire surface active at all times.

A further object of the invention is to provide an expansible wheel of the character described in which all the parts are firmly held against the effects of centrifugal force, and in which all possibility of parts loosening themselves is eliminated.

A further object of the present invention as compared with that described in the copending application is to simplify the construction of the expansible wheel, to lessen the number of parts, and to provide a novel way of anchoring a rubber ring to a pair of expansion rings used for the purpose of expanding the rubber ring to a desired size.

Further objects and advantages of the present invention will appear as the specification proceeds.

The preferred forms of our expansible wheel are shown in the accompanying drawing, in which

Figure 1 shows a fragmentary sectional view through a rubber ring used in connection with our invention;

Figure 2 a similar view of our expansion wheel in which compression rings are applied to the rubber ring in an intermediate stage of compression;

Figure 3 a similar view showing the expansible wheel in final operative form;

Figure 4 a side view of our expansible wheel complete; and

Figure 5 a fragmentary section through a modified form of expansible wheel.

While we have shown only the preferred forms of our invention we wish to have it understood that various changes or modifications may be made within the scope of the claims hereto at-

tached without departing from the spirit of the invention.

In our preferred form we use as an essential element of our expansible wheel a ring 1 made preferably of rubber or similar elastic and flexible material, the ring being shown as having a flat peripheral surface 2, comparatively short side faces 3 and tapered under faces 4, which terminate in an inner band 5 projecting toward the center of the ring and being much thinner than the ring near its outer circumference. The band 5 has two flanges 6 projecting laterally therefrom, the upper faces 7 of the flanges being substantially flat while the lower faces 8 are tapered in the manner shown in the drawing. The band 5 projects inwardly beyond the flanges and is formed with tapered edges 9, the taper of these edges corresponding substantially to the taper of the under faces 4 and being preferably slightly steeper.

It will be understood that the outer face 2 of the wheel may be made flat as shown in the drawing, or may be made of any other desired configuration, concave or convex, or slightly V-shaped, depending upon the use to which the expansible wheel is to be put.

In combination with this rubber ring we provide two compression rings 10 having tapered edges 11 adapted for engagement, from opposite sides, with the tapered under edges of the rubber ring. Below or inside of the tapered edge 11 each compression ring has a short straight portion 12, corresponding substantially in length to the straight portion of the band 5 between the under edges and the flanges and inside of this straight portion each compression ring is formed with an annular recess 13 adapted to receive the corresponding flange 6 of the rubber ring. It will be noted, however, that while the upper face 7 of each flange 6 is substantially straight, the upper edge 14 of the recess is tapered, while its lower face 15 is substantially straight. Inside of the recess each compression wheel is formed with a tapered edge 16 which in final position substantially corresponds and registers with the tapered edge 9 of the rubber ring.

In this manner when the two compression rings are engaged with opposite sides of the rubber ring, and are urged together, the tapered faces 11 of the compression rings engage the under edges 4 of the rubber ring, while the flanges 6 are accommodated in the recesses 13 and upon initial compression are bent inwardly by the slanting faces 14 of the two recesses in the manner shown in Figure 2. During the movement of

the compression rings toward each other the outer edges of the rubber ring will have a tendency to be forced out more rapidly than the central portion with the result that the outer surface of the rubber ring will be concave. In order to overcome this, we have provided the slanting edges 16 of the compression rings which will engage with the slanting edges 9 of the rubber ring and tend to crowd the middle portion of the band outward, this outward movement of the inner portion of the band being somewhat quicker than the outward movement of the edge portions of the rubber ring because of the steeper taper of the edges 16 than the edges 11, whereby the rim of the rubber ring will be straight. When finally tightened as shown in Figure 3, the compression rings fully engage with the rubber ring, the flanges 6 of the rubber ring assume substantially the shape defined by the recesses of the expansion element, and the entire band is crowded together to some extent by the slanting edges 16 of the compression element, whereby the rubber ring is firmly anchored against outward movement by the compression rings, while on the other hand the outer periphery of the rubber ring is expanded against a ring of abrasive material 17 which has been previously applied to the rubber ring. The same movement which causes the sides 16 to engage with the inclined sides 9 of the rubber ring and force the central portion of the ring outwardly is utilized in causing the sides 14 to engage with the sides 7 and to force the flanges 6 inwardly for anchoring the rubber ring to the compression rings so that the rubber ring is held against expansion due to centrifugal force.

For assembling and initially compressing the two compression rings, we preferably use a series of bolts 18, each bolt being slidable in one of the compression rings as at 19, and threaded into the other compression ring as at 20, while the head 21 of the bolt is free to move in a recess 22, and bears upon a shoulder 23 formed by the recess. A spring 24 opposes compressive movement. It will be seen that when the bolt is screwed home the two compression rings are tightened upon the rubber ring to a certain extent, but that the final compressive movement is caused by another agency to be described later, the bolts being arranged in such a manner as not to interfere with further compressive movement.

The bolts are preferably arranged in diametrically opposing pairs and in such order that the bolts of one pair are threaded into one of the compression rings, while the bolts of the other pair are threaded into the other compression ring.

For final compression of the compression rings and expansion of the rubber ring the wheel assembled as shown in Figure 2 is placed upon the end of the shaft 26, and is tightened upon the shoulder 27 of the shaft by means of a nut 28. The abrasive band 17 is placed over the rubber ring before final tightening, and is dimensioned to make a snug fit upon tightening.

The form shown in Figure 5 differs slightly from that shown in the other figures by the fact that one of the compression rings 29 is formed with a threaded sleeve 30 projecting centrally through the other compression ring 31, and the two compression rings are urged together by means of a nut 32 threaded on the sleeve 30, the nut being preferably accommodated in a recess 33 in the second compression ring.

The manner in which our expansible wheel is

to be used will be readily understood from the foregoing description. The two compression rings are engaged with opposite faces of the rubber ring with the springs 24 in place and the bolts 18 are then applied in the manner previously described, and screwed home to flex the flanges 6 inwardly in the recesses 13 and to partly expand the rubber ring. After the wheel is thus assembled it is placed upon the shaft 26 so as to rest against the shoulder 27 and the final tightening is brought about by means of the nut 28. The tightening of the two compression rings upon the rubber ring causes the latter to expand, while at the same time the flanges 6 are anchored in the recesses 13 and the rubber material of the band 5 is further compressed by means of the tapered edges 16. The band with its flanges is therefore firmly anchored in the recesses of the compression rings and there is no danger whatever of the rubber ring working loose during operation.

We claim:

1. An expansible wheel comprising a rubber ring having tapered under edges, compression rings having tapered edges engageable with the under edges on opposite sides of the rubber ring, means for tightening the compression rings upon the rubber ring whereby the latter is expanded and means for interlocking the rubber ring and the compression rings, the said means comprising flanges making a sharp angle with and projecting from the rubber ring interiorly of the under edges and recesses in the compression rings adapted to receive the flanges.

2. An expansible wheel comprising a rubber ring having tapered under edges, a band projecting inwardly therefrom and flanges projecting laterally from the band, compression rings having tapered edges engageable with the under edges on opposite sides of the rubber ring, and means for tightening the compression rings upon the rubber ring whereby the latter is expanded, the compression rings having tapered recesses adapted to receive the flanges and to bend the same inwardly when the compression rings are tightened.

3. An expansible wheel comprising a rubber ring having tapered under edges, a band projecting inwardly therefrom and flanges projecting laterally from the band, compression rings having tapered edges engageable with the under edges on opposite sides of the rubber ring, and means for tightening the compression rings upon the rubber ring whereby the latter is expanded, the compression rings having tapered recesses adapted to receive the flanges and to bend the same inwardly when the compression rings are tightened, and the band and the compression rings having tapered edges engaging one another for crowding the band material outwardly during the same operation.

4. An expansible wheel comprising a rubber ring having tapered under edges, compression rings having tapered edges engageable with the under edges on opposite sides of the rubber ring, means for tightening the compression rings upon the rubber ring whereby the latter is expanded, the said means comprising bolts slidable in one of the compression rings and threaded into the other compression ring with heads bearing on the first ring for bringing about a desired degree of compressive movement without interfering with further compressive movement and means independent of the bolts for compressing the rings together still further.

5. An expansible wheel comprising a rubber ring having tapered under edges, compression rings having tapered edges engageable with the under edges on opposite sides of the rubber ring, means for tightening the compression rings upon the rubber ring whereby the latter is expanded, the said means comprising bolts slidable in one of the compression rings and threaded into the other compression ring with heads bearing on the first ring for bringing about a desired degree of compressive movement without interfering with further compressive movement, and the bolt heads being accommodated in recesses in the first compression ring so as to stay within the confines of the said ring even upon further compressive movement and means independent of the bolts for compressing the rings together still further.

6. An expansible wheel comprising a rubber ring having tapered under edges, compression rings having tapered edges engageable with the under edges on opposite sides of the rubber ring and means for tightening the compression rings upon the rubber ring whereby the latter is expanded, the said means comprising bolts slidable in one of the compression rings and threaded into the other compression ring with heads bearing on the first ring for bringing about a desired degree of compressive movement without interfering with further compressive movement, and the bolts being arranged in pairs of oppositely disposed bolts threaded alternately into one and the other compression ring.

7. An expansible wheel comprising a rubber ring having tapered under edges with flanges, the sides of the flanges disposed adjacent to the tapered under edges extending at right angles to the center plane of the ring and constituting non-

tapered sides, compression rings having tapered edges engageable with the tapered under edges on opposite sides of the rubber ring, said compression rings having annular recesses with tapered walls for engaging with the non-tapered sides of the flanges, and means for tightening the compression rings upon the flanges for bending the flanges inwardly for securing the rubber ring in place.

8. An expansible wheel comprising a rubber ring having annular flanges with their outer peripheral sides extending at right angles to the center-plane of the ring, compression rings disposed on opposite sides of the rubber ring and having annular recesses for receiving the flanges, the outer peripheral sides of the recesses being inclined for bending the flanges inwardly when the rings clamp the rubber ring, whereby the rubber ring is securely anchored to the compression rings, and means for securing the compression rings together.

9. An expansible wheel comprising a rubber ring having tapered under edges, a central web, and flanges extending from the web, said web projecting inwardly beyond the flanges and having tapered under edges, and compression rings having tapered edges for engaging with the first and second named tapered under edges of the rubber ring for expanding it so that the outer periphery of the ring will be straight, said compression rings also having recesses with tapered sides for forcing the flanges inwardly for anchoring the rubber ring to the compression rings and for preventing the stretching of the rubber ring due to centrifugal force.

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