Aug. 30, 1960 A. D. BEAUCHAINE 2,950,582

CENTER INSERT FOR ABRASIVE WHEELS

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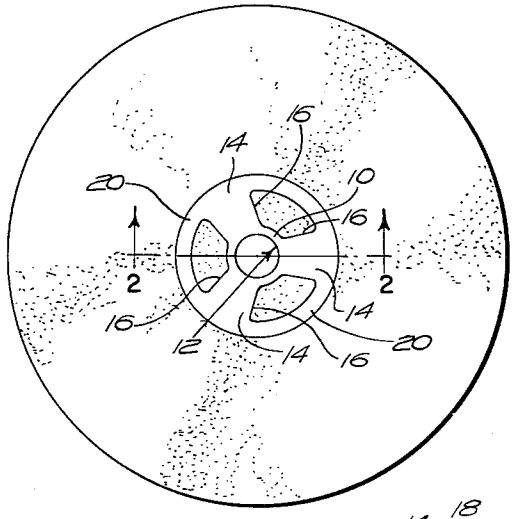


FIG. 1

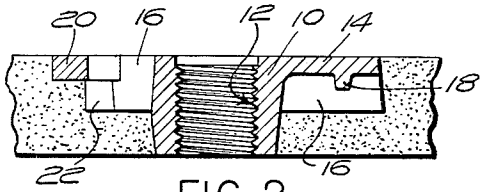


FIG. 2

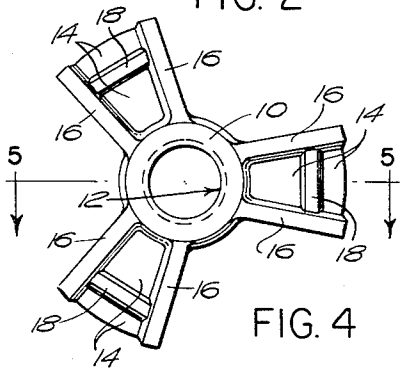


FIG. 4

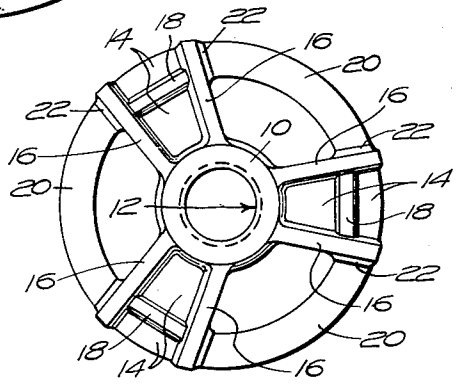


FIG. 3

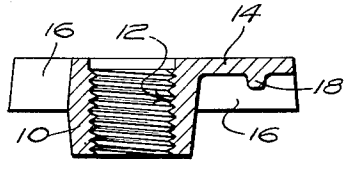


FIG. 5

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CENTER INSERT FOR ABRASIVE WHEELS

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This invention relates to center inserts for abrasive wheels and more particularly to a one piece center insert.

Abrasive wheels used in grinding necessarily attain high rotational velocities, and, because of this, it is necessary to use some form of center insert which will help to prevent centrifugal forces from pulling the wheel apart. When in use, an abrasive wheel will also be subject to lateral forces, and an effective center insert should give some support to the wheel against lateral forces.

In the past, the most common form of center insert has been a simple interior threaded device, annular in cross section, with flanges around both edges. This form of insert has been found to give insufficient support to its abrasive wheel, and it has been necessary to form the grinding wheel with an extra metal ring embedded in it, concentric with the insert and spaced between the insert and the outer circumference of the wheel. Obviously, this presents difficulties and increased expense in manufacture.

Another form of insert has been made from a stamped metal disc with upturned edges, welded to an interior threaded center piece. This has had the disadvantage of being made in two pieces, which means that extra steps are required in its manufacture. Also, two pieces joined to each other have been found to be weaker than inserts formed in one piece. It is an object of my invention to provide a center insert for abrasive wheels which is in one piece and which can be formed in a single operation. It is another object of my invention to provide a one-piece center insert which will hold abrasive materials together as well as or better than inserts with outer rings embedded in the abrasive. A further object is to provide a center insert which will reinforce an abrasive wheel against lateral forces.

In the accomplishment of these and other objects of my invention, I employ an interior threaded hub with a number of sector-shaped elements radiating outwards from the hub. In one embodiment, each sector-shaped element is joined to the adjacent element by an arcuate rib. In another embodiment, no arcuate rib is employed. Other surfaces in other planes are joined to these basic elements.

It is a feature of my invention that the center insert can be made in one piece by a single casting operation of any suitable material, such as iron. No machining, welding or joining need be performed. It is another feature of my invention that this single center insert takes the place of conventional inserts and their accompanying surrounding ring. It is a further feature that because my center insert is molded in one piece, it is stronger than one piece inserts which must be made by joining two parts. Still another feature of my invention is that the surfaces of the center insert, when molded into an abrasive wheel, exert holding forces which act in every direction. Thus, I have provided a one-piece center insert which strengthens an abrasive wheel against both centrifugal and lateral forces.

These and other objects and features of the invention

will best be understood and appreciated from the following description of two preferred embodiments thereof, selected for purposes of illustration, and shown in the accompanying drawings in which:

Fig. 1 is a plan view of a first embodiment of a center insert in place in an abrasive wheel;

Fig. 2 is a cross-sectional view of a first embodiment of an insert in place in an abrasive wheel taken along lines 2—2 of Fig. 1;

Fig. 3 is a plan view of a first embodiment of a center insert;

Fig. 4 is a plan view of a second embodiment of a center insert; and

Fig. 5 is a cross-sectional view of a second embodiment of an insert taken along lines 5—5 of Fig. 4.

In a first preferred embodiment of my invention, a hub 10 has an interior threaded surface indicated at 12. Sector-shaped elements 14 and spokes 16 extend radially outwards from the hub 10. Ridges 18 form chords of the sectors 14, and ribs 20 extend between the spokes 16. At each end of rib 20 is a buttress 22 joining each rib 20 with each spoke 16. The flat surfaces of the spokes 16 are slightly out of parallel relationship with the central axis of the hub 10, so that each sector 14 and its adjacent spokes 16 form a truncated wedge when viewed in a cross-section taken perpendicular to a radius from the hub 10 through the center of the sector. Also, as can be seen from the plan views, Figs. 1 and 3, the longitudinal axes of the spokes 16 are not coextensive with radii from the hub 10. Thus, referring to the same figures, the sectors 14 are not true geometric sectors, but are nearly so, since the end of each sector 14 where it joins the ribs 20 is larger than the end where it joins the hub 10.

In order to make a grinding wheel, the insert is placed in the center of a mold, and abrasive compound is troweled, tamped and pressed to shape. The abrasive compound hardens in place around the insert when heat is applied. When in place, it can be seen that the insert holds the abrasive material securely, and reinforces it against forces exerted in any dimension including centrifugal, lateral, etc. In particular, the sectors 14, the ridges 18, the ribs 20, and buttresses 22 counteract centrifugal forces and perform much the same function as a separate outer ring performs with a conventional insert in an abrasive wheel. The flat surfaces of the spokes 16, which are nearly in the same plane as the central axis of the hub 10, prevent the abrasive wheel from slipping rotationally around the hub 10. Lateral forces are counteracted by the ribs 20, the sectors 14, and by the truncated wedge shape of the sectors 14 and the spokes 16.

These center inserts are most conveniently manufactured by the process of making a model, making a sand casting mold from the model, and then producing the center inserts in quantity by casting malleable iron in the molds. The use of this process explains the need for the buttresses 22, which of course also add to the usefulness of the insert in counteracting centrifugal forces. The buttresses 22 must be used on the model from which the sand casting mold is made, because the mold is made by pressing the model into tightly packed sand, and then pressing more sand over the top of the model. If there were no buttresses 22, it is evident that the sand would have to be pressed into an angular space between the spoke 16 and the rib 20. This would be extremely difficult and it is much easier to provide buttresses 22 to fill the spaces between the spokes 16 and the ribs 20. The sand casting technique produces an additional advantage in that the insert can be given a rough and uneven surface, which provides additional holding power for the abrasive material.

In a second preferred embodiment shown in Figs. 4 and 5, the center insert consists of a hub 10, with an

interior threaded surface at **12**, sector shaped elements **14**, spokes **16**, and ridges **18**. This form of center insert is particularly suited for use when the abrasive material which is to be tamped around the insert in particularly coarse textured and non-viscous. In such a case, an element like the rib **20** in the first embodiment might prevent the abrasive material from being packed evenly around the insert. The fact that this form of insert must be used with very coarse abrasive material in no way affects its efficiency in strengthening abrasive wheels. The generally sectoral shape of the sector elements **14**, together with the ridge **18**, and the uneven surfaces of these elements in combination with a very coarse abrasive material is sufficient to reinforce a wheel against centrifugal forces as effectively as an insert with ribs **20** reinforces wheels made with finer grained abrasive. In the same way, lateral forces are sufficiently counteracted by the sectors **14** and by the wedge shape of the sectors **14** and their adjacent spokes **16**.

Certain minor variations of this preferred embodiment will be apparent to those skilled in the art. For instance, the number of sectors, spokes and ribs could be increased or decreased. The ribs could be straight elements describing chords joining the spokes. Also, the number and positions of ridges on the sectors could be changed. Therefore, it is not my intention to confine the invention to the precise form herein shown but rather to limit it in terms of the appended claims.

Having thus described and disclosed a preferred embodiment of my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. A center insert for abrasive wheels, comprising a hub, a plurality of flat spokes extending from said hub, said spokes defining first spaces between adjacent spokes and second spaces between adjacent spokes alternating with said first spaces, and substantially sector-shaped elements filling said first spaces.

2. A center insert for abrasive wheels, comprising a hub, a plurality of flat spokes extending from said hub, said spokes defining first spaces between adjacent spokes and second spaces between adjacent spokes alternating with said first spaces substantially sector-shaped elements filling said first spaces, and arcuate elements within said second spaces, concentric with and spaced from said hub.

3. A center insert for abrasive wheels, comprising a hub, a plurality of flat spokes extending from said hub, said spokes defining first spaces between adjacent spokes and second spaces between adjacent spokes alternating with said first spaces, substantially sector-shaped elements filling said first spaces, and ridges on said sector-shaped elements describing chords of said sectors.

4. A center insert for abrasive wheels, comprising a hub, a plurality of flat spokes extending from said hub, said spokes defining first spaces between adjacent spokes and second spaces between adjacent spokes alternating with said first spaces, substantially sector-shaped elements filling said first spaces, ridges on said sector-shaped elements describing chords of said sectors, and arcuate elements within said second spaces, concentric with and spaced from said hub.

5. A center insert for abrasive wheels, comprising a hub, said hub being annular in cross-section and threaded on its interior surface, a plurality of flat spokes defining first and second alternating spaces between adjacent spokes, sector-shaped elements filling said first spaces, and ridges on said sector-shaped elements describing chords of said sectors.

6. A center insert for abrasive wheels, comprising a hub, said hub being annular in cross-section and threaded on its interior surfaces, a plurality of flat spokes defining first and second alternating spaces between adjacent spokes, sector-shaped elements filling said first spaces, ridges on said sector-shaped elements describing chords of said sectors, and arcuate elements within said second spaces, concentric with and spaced from said hub.

7. A center insert for abrasive wheels, comprising a hub, a plurality of radially extending equiangularly spaced sector-shaped elements attached to said hub, a like plurality of ribs disposed in alternately occurring relation with said sector-shaped elements, and means connecting the opposite ends of each rib to the two immediately adjacent sector-shaped elements.

8. The center insert defined in claim 7 further characterized by said means connecting opposite ends of each rib to the immediately adjacent sector-shaped elements consisting of planar elements attached to said hub, and each said sector and its adjacent planar elements forming a truncated wedge in a cross-section perpendicular to a radius from said hub through the center of said sector.

9. The center insert defined in claim 8 further characterized by all elements of said insert in contact with abrasive material having rough and uneven surfaces.

10. A center insert for abrasive wheels comprising a hub, a plurality of radially extending equiangularly spaced sector-shaped elements attached to said hub, all said sectors residing in a common plane, ridges describing chords of said sectors, a like plurality of arcuate ribs disposed in alternately occurring relation with said sector-shaped elements, and means connecting the opposite ends of each rib to the two immedaitely adjacent sector-shaped elements.

11. The center insert defined in claim 10 further characterized by said means connecting opposite ends of each rib to the immediately adjacent sector-shaped elements consisting of planar elements attached to said hub, and each said sector and its adjacent planar elements forming a truncated wedge in a cross-section perpendicular to a radius from said hub through the center of said sector.

12. The center insert defined in claim 11 further characterized by all elements of said insert in contact with abrasive material having rough and uneven surfaces.

13. A center insert for abrasive wheels, comprising a hub, a plurality of flat spokes extending from said hub, said spokes defining first spaces between adjacent spokes and second spaces between adjacent spokes alternating with said first spaces substantially sector-shaped elements filling said first spaces, arcuate elements within said second spaces, concentric with and spaced from said hub, and rounded buttresses connecting said arcuate elements to the adjacent spokes.

14. A center insert for abrasive wheels, comprising a hub, a plurality of radially extending equiangularly spaced sector-shaped elements attached to said hub, a like plurality of ribs disposed in alternately occurring relation with said sector-shaped elements, and rounded buttresses and other means connecting the ends of each rib to the two adjacent sector-shaped elements.

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