Nov. 4, 1952 H. V. ALLISON 2,616,229

ABRASIVE WHEEL

Filed April 10, 1950 2 SHEETS—SHEET 1

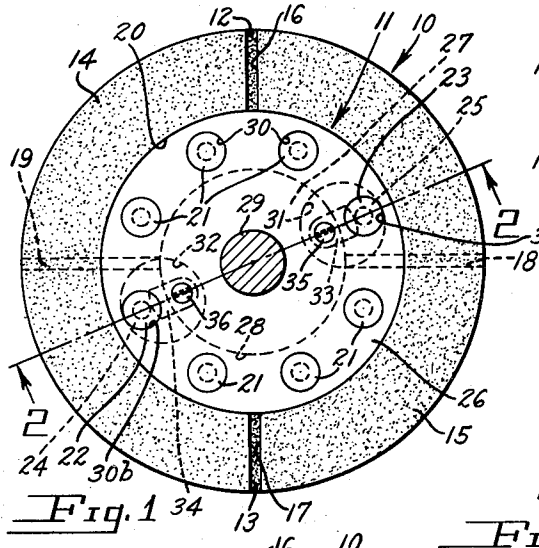


Fig. 1

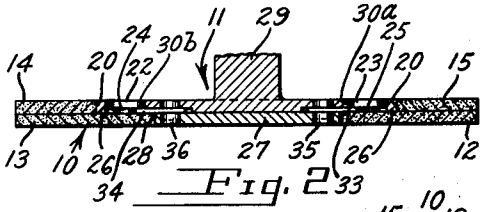


Fig. 2

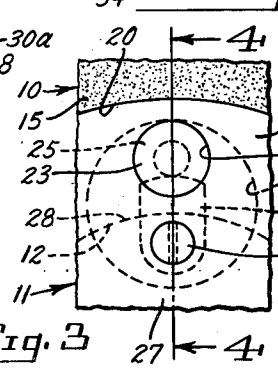


Fig. 3

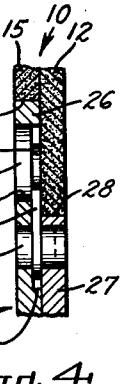


Fig. 4

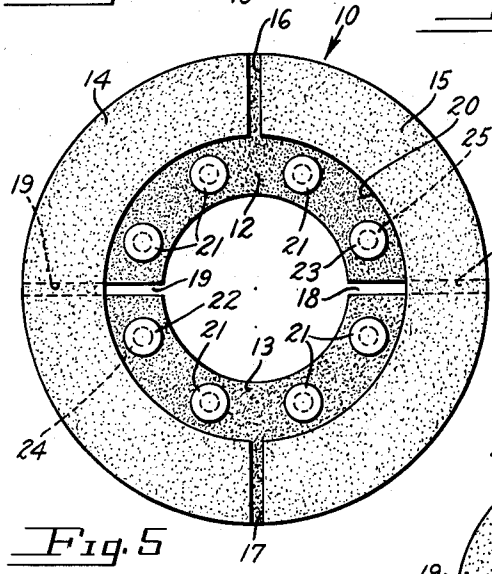


Fig. 5

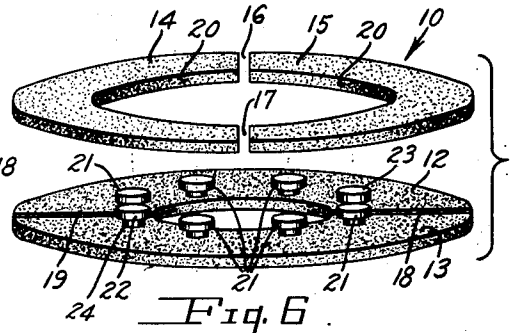


Fig. 6

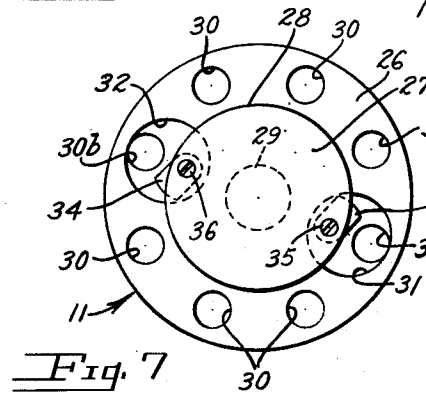


Fig. 7

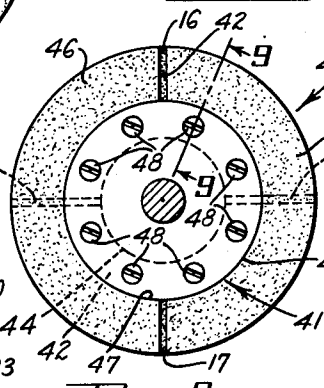


Fig. 8

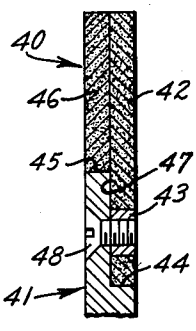


Fig. 9

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Nov. 4, 1952 H. V. ALLISON 2,616,229

ABRASIVE WHEEL

Filed April 10, 1950 2 SHEETS—SHEET 2

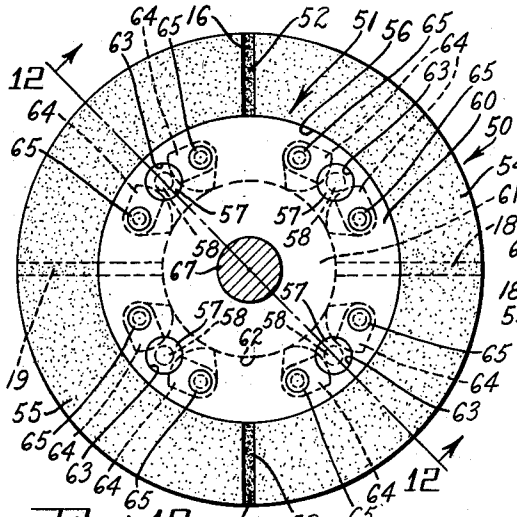


Fig. 10

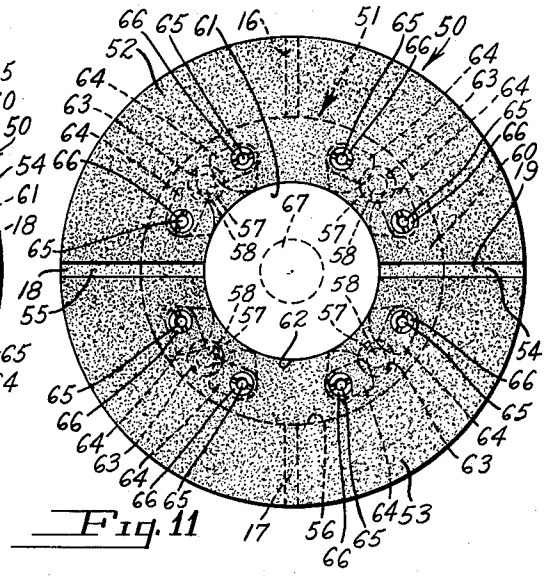


Fig. 11

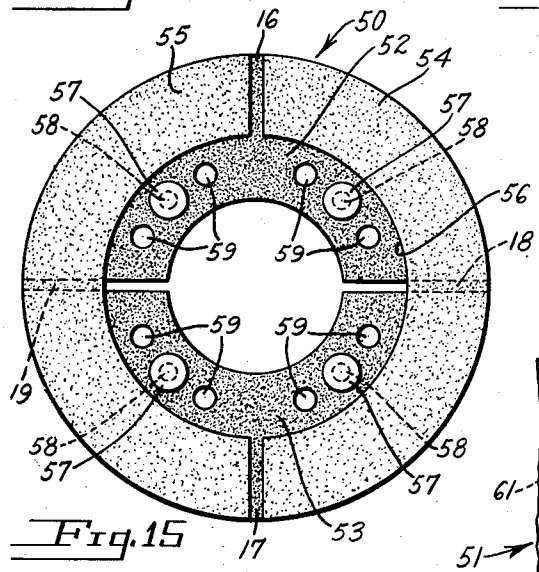


Fig. 15

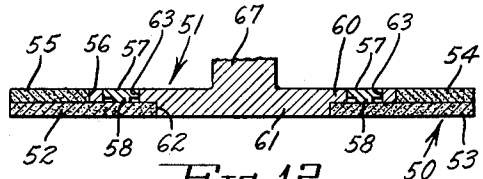


Fig. 12

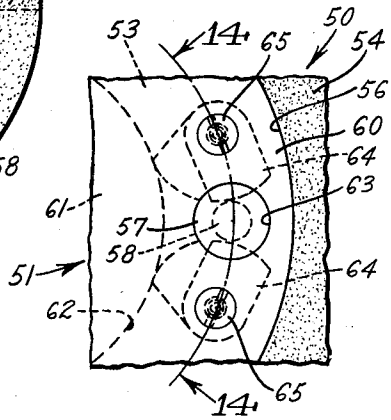


Fig. 13

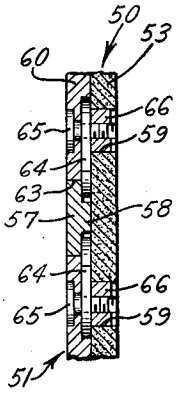


Fig. 14

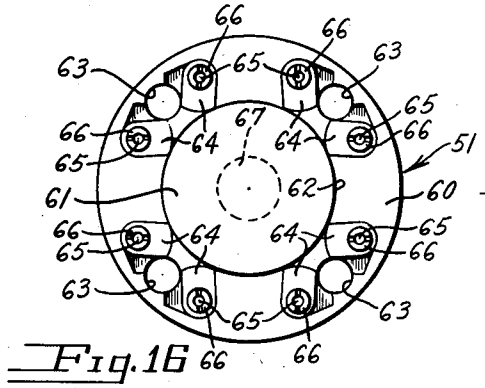


Fig. 16

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2,616,229

UNITED STATES PATENT OFFICE

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ABRASIVE WHEEL

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Application April 10, 1950, Serial No. 154,944

13 Claims. (Cl. 51—207)

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This invention relates to new and useful improvements in abrasive articles and has particular relation to abrasive cut-off wheels.

An object of the invention is to provide an abrasive cut-off wheel including an outer usable abrasive rim member and an inner permanent mounting hub, both of improved construction, whereby a worn down rim member may be readily removed and replaced with a new one.

Another object is to provide an improved abrasive rim member for an abrasive cut-off wheel and an improved method of making the same.

A further object is to provide an abrasive cut-off wheel of the character set forth and including means whereby a worn rim member may be removed from the hub and replaced by a new rim member, all from the front side of the wheel.

Other objects and advantages of the invention will become apparent from a consideration of the following detailed description taken in connection with the accompanying drawings wherein satisfactory embodiments of the invention are shown. However, it is to be understood that the invention is not limited to the details disclosed but includes all such variations and modifications as fall within the spirit of the invention and the scope of the appended claims.

In the drawings:

Fig. 1 is a rear elevational view showing an abrasive cut-off wheel made in accordance with the invention;

Fig. 2 is a transverse sectional view thereof, the view being taken as along the line 2—2 of Fig. 1;

Fig. 3 is an enlarged rear elevational view of a small section of the wheel to show construction details;

Fig. 4 is a detail sectional view taken as along the line 4—4 of Fig. 3;

Fig. 5 is a rear elevational view of the abrasive portion or abrasive rim member of the wheel;

Fig. 6 is an isometric view showing the rim member sections separated but in positions for assembly;

Fig. 7 is a front elevational view of the front side or face of the hub;

Fig. 8 is a view similar to Fig. 1 but on a smaller scale and showing a modification;

Fig. 9 is a detail sectional view taken along the line 9—9 of Fig. 8;

Fig. 10 is a view similar to and on the scale of Fig. 1 and showing another modification;

Fig. 11 is a front elevational view of the wheel of Fig. 10;

Fig. 12 is a transverse sectional view taken as along the line 12—12 of Fig. 10;

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Fig. 13 is a rear elevational view of a small section only of the wheel on an enlarged scale;

Fig. 14 is a detail sectional view taken as along the line 14—14 of Fig. 13;

Fig. 15 is a rear elevational view of the abrasive rim member of the wheel of Fig. 10; and

Fig. 16 is a front elevational view of the hub of the wheel of Fig. 10.

Referring in detail to the drawing and at first more particularly to Figs. 1–7, the improved abrasive cut-off wheel there shown comprises essentially an outer rim member generally designated 10 and a hub member generally designated 11. Rim member 10 is shown as an abrasive annulus and has an annular outer periphery, although it could be differently shaped on its inner periphery. The rigid driving hub 11 is preferably of a light weight metal and has its outer peripheral portions shaped to correspond with the shape of the inner peripheral portions of rim member 10. As will hereinafter be set forth in detail, the rim member 10 is detachably mounted on the hub member 11 and is driven by the latter. With this construction, when a rim member wears down to the point where it is no longer of a diameter to be economically used, the worn rim member is removed from the hub member and replaced by a new full-sized rim member.

Rim member 10 is a laminated structure made up of a front layer and a rear layer. The front layer comprises a plurality of arcuate sections or elements 12 and 13 of an annulus while the rear layer consists of the arcuate sections or elements 14 and 15 of an annulus. In actual practise, rim 10 will, in many instances, be of relatively large outside diameter as, for example, a diameter of 36 inches or even more. Additionally, it is to be understood that the layers of the rim 10 may each comprise more than two segments and in fact, the rim may be made up of more than two layers.

The manufacture of a large diameter abrasive rim member by methods heretofore generally practised would involve the use of large and expensive equipment, not available to the smaller manufacturers of abrasive cut-off wheels. The present invention provides a method whereby the rim 10, of substantially any desired diameter, may be made without the necessity of the manufacturer providing himself with large expensive equipment. The rim 10 resulting from the practise of the above indicated novel method has many desired characteristics.

In manufacturing the rim member 10, I prepare the sections 12, 13, 14 and 15. Such sections are in the nature of strips curved edgewise

so that each comprises approximately ½ an annulus. The strips are of abrasive grain and a suitable bonding medium. The cure of the bond is generally determined by the use to which the abrasive cut-off wheel is to be put and thus the bond may be resinoid or rubber or of a combination of such materials.

In making the rim member, strips may be rolled out and the sections died therefrom. Then the sections 12 and 13 will be arranged with their adjacent ends slightly spaced as in Fig. 6 but with their outer edges defining substantially a complete circle. Thereafter, the sections 14 and 15 are placed on the sections 12 and 13 in staggered relation with the latter but with the end portions of the sections 14 and 15 also slightly spaced.

In this assembly, a mid-portion of the section 15 will overlap the space between a pair of adjacent ends of the sections 12 and 13 while a mid-portion of the section 14 will overlap the space between the other pairs of ends of the sections 12 and 13. Then the mid-portions of sections 12 and 13 span the spaces between the pairs of adjacent ends of the sections 14 and 15. This staggering of the sections of one layer with respect to those of the other layer provides a rim member in the form of an annulus having through its rear face a pair of radially extending channels 16 and 17 extending from its inner through its outer periphery. Additionally, in the rim member the spaces between the ends of the sections 12 and 13 of the front layer define a pair of channels 18 and 19 through the front side of the rim member and extending from the inner periphery of the front layer to the outer periphery thereof.

The layers of the rim may be assembled green or prior to complete curing of the bonding medium although in a cured state they may be assembled with the use of proper adhesive. The layers are so assembled that their outer peripheries are substantially flush with one another. However, the sections 12 and 13 of the front layer are wider than are the sections 14 and 15 of the rear layer and thus the inner edges of the layers are not flush with one another. For example, in Fig. 5, the inner edge of the layer made up of sections 14 and 15 is of much smaller diameter than is the inner edge of the front layer made up of the sections 12 and 13. This results in the formation of a recess 20 of a depth equal to the thickness of one of the segments 14 or 15 and opening through the rear side of the rim member and through the inner peripheral edge thereof.

A series of short rigid studs 21 are rigidly attached to the portions of the front layer exposed through the recess 20. In a completed wheel, the mentioned portion of the front layer of the wheel is overlapped by the outer peripheral portion of the hub 11, as will be set forth, and thus in a completed wheel the studs 21 are carried by a portion of the rim member which is overlapped by a portion of the driving hub member. These studs are not abrasive or do not comprise a mixture of abrasive grain and a bond but preferably are of metal or a hard tough resin suitably adhered to the defined portion of the rim member.

For a purpose to be described, one or more of the studs is provided with a reduced diameter portion which is adhered to the rim member whereby there is a space between the outer portion of the stud and the rim member. In the wheel shown in Figs. 1–7, a pair of diametrically opposed studs, designated 22 and 23, have such reduced diameter portions whereby there are spaces or openings 24 and 25, respectively, between larger diameter heads of the studs and the rim member. The studs may be attached to the rim member either before or after final curing of the bond of the latter. Preferably, the studs are positioned while the sections of the rim are yet green and are placed in the curing chamber with the other elements of the rim. During the curing, the abrasive mix of the sections may shift or slightly shift the studs, but it is noted that if the holes (to be described) in the hub member are slightly oversize, accurate location of the studs is not too critical. A driving connection between the hub and rim members will be established as hereinafter described.

It will be understood that when the sections are assembled to form the rim member prior to final curing of the bond, during the final cure, the sections of one layer will become bonded to those of the other layer. Thus, a substantially homogeneous structure is provided.

In this way, the bond between the sections of one layer and those of the other layer will be of the strength of the bond securing the grain in place and will have an equal useful life. It will be understood that the final cure will depend upon the bond employed. For example, if the bond is of rubber it will contain sulphur and other necessary ingredients and the rim member will be vulcanized. If the bond is resinoid, the rim member will be cured by a process for accomplishing the desired cure.

The hub 11 includes a larger diameter portion 26 of a diameter to be received in the recess 20 of the rim member and concentric with the portion 26 includes a thicker portion 27 of smaller diameter. Here portion 27 is shown as a disc formed separate from the portion 26 and the portions are secured together in any desired manner but in concentric relation so that an annular shoulder 28 is formed.

A shaft portion or stud 29 may be formed with the hub portion 26 and portion 29 may be adapted to be held by a chuck or the like or may be otherwise driven and, in fact, may be a permanent part of some driving mechanism.

Through the hub portion 26, a series of holes 30 are formed. These holes will correspond in number with the number of studs 21, 22 and 23 and are of diameters to receive such studs. In assembling the present wheel, assuming that the hub 11 is part of a machine, the rim member 10 is disposed at the forward side of the hub with the studs of the rim member entering the openings 30 through the larger diameter portion 26 of the hub and with the hub portion 27 being received within the inner periphery of the forward layer of the rim member. It will be clear that the outer peripheral portion or hub part 26 is received in the recess 20 of the rim member.

With particular attention to Fig. 2, it will be seen that the hub 11 is of a thickness to be received between or within the planes defined by the front and rear surfaces of the rim member. Conveniently this is accomplished by having the larger diameter hub portion 26 of a thickness equal to or slightly less than that of the rear layyer of the rim member and by having the smaller diameter hub portion 27 of a thickness equal to or slightly less than that of the two layers of the rim member. With this construction, the wheel is adapted to cut through a work

piece of a diameter greater than the width of the abrasive wheel rim. This is true since the thin metal driving hub of the present wheel may enter into a cut made by its abrasive rim.

The hub carries means for cooperating with the undercuts of studs 22 and 23 in securing the rim member on the hub against lateral movement relative thereto. In providing this means, recesses 31 and 32 are provided in the forward face of the hub portion 26. In these recesses are disposed keys 33 and 34 each comprising a flat metal piece having one end fast to and pivotally mounted by a screw or other turnable pivoting element. In the drawing, key 33 is shown as fast with a screw 35 while the key 34 is shown as fast with a screw 36.

These keys are rotatable relative to the other portions of the hub member 11 and the keys being fast with the screws, it will be clear that as the screws are turned, the keys will be turned. These keys are so located that they may be turned from the released position of Fig. 7 to locking positions in which their free end portions project to extend somewhat across a pair of the openings 30 as the pair 30*a* and 30*b*, respectively.

In the assembled wheel, the slotted or operating ends of the screws 35 and 36 are at the forward side of the wheel being in the thickened central portion 27 of the hub. Therefore the hub being mounted and the keys being positioned in the inoperative positions of Fig. 7, a rim member may be disposed against the forward side of the hub. In doing this, care is taken to have the studs 22 and 23 enter the hub openings 30*b* and 30*a*, respectively. Now, through a suitable tool, the keys 33 and 34 are rotated or shifted through a slight increment so as to dispose their free end portions in the spaces or undercuts 25 and 24 associated with the studs 23 and 22, respectively. This entrance of the locking keys into the spaces or undercuts of the studs is fully illustrated in Figs. 1–4.

The rim member being disposed on the hub and the keys having been turned to their locking relations with certain of the studs, it will be clear that lateral movement of the rim member from the hub is prevented. Additionally, the studs preferably have rather snug fits in the openings in the hub and serve to establish driving connections between the hub and the rim member. Attention is directed to the fact that the keys 33 and 34 in their locking positions are in the positions to which they tend under centrifugal action when the wheel is being rotated. Further, it is noted that the studs of the rim member need not have snug fits in the openings in the hub. If there is any relative turning movement between the hub member and the rim member, one or more of the studs engages the side or sides of one or more of the openings and thereafter the members must rotate together.

When using the present wheel, the slots 16, 17, 18 and 19 opening through the front and rear faces of the rim member and extending radially serve a purpose in that they provide for the carrying of a cooling medium directly into a cut being made. Where these wheels operate in a flood of coolant, as is commercially done with rubber bonded cut-off wheels, the mentioned channels will be filled with the coolant and as each channel successively moves into a cut during rotation of the wheel, coolant is carried into the cut. Since circumferentially the channels are alternately in opposite faces of the wheel, it will be clear that coolant will be carried into the cut successively at alternate sides of the wheel. The formation of the rim members with the slots 16—19 is a preferred construction. However, it is to be understood that the invention is not limited to such construction as many features of the invention are useful with rim members not provided with slots or other coolant carrying features.

It will also be understood that the sections being bonded together in the staggered overlapping relationship shown and described, and the bond being generally effected in the final curing operation, the wheel is substantially a homogeneous structure. Further, the sections of one layer overlapping the adjacent spaced pairs of ends of the sections of the other layer, there is a mutual bracing or reinforcing of the sections.

When these cut-off wheels are in use they are rotated at high speeds and where the wheels are of large diameters it will be clear that many linear feet of a wheel pass through a cut per minute of operation. As the wheels wear down, the mentioned passage of linear feet is naturally reduced and finally a point is reached where efficient operation on a particular job is not had. With the present large diameter hub the wheel is stiff and true running and the abrasive rim is entirely used up so there is no large stub to be discarded.

With the present wheel, if efficient operation is no longer attained, the screws 35 and 36 are operated to turn the keys to released position and the worn rim member is removed and is replaced by a new rim member. The latter is secured in place merely by turning the keys back to locking positions with respect to the stud or studs carried by the rim member. In this connection it will be understood that an interlocking engagement of the key with one stud will prevent lateral separation of the rim member and hub, but generally it is preferred that one such structure be balanced by a similar structure at the diametrically opposite side of the hub. In fact, means may be provided by accomplishing a similar locking between the hub and each stud of a rim member.

Referring now to the modification of Figs. 8 and 9, the wheel shown comprises an abrasive rim member generally designated 40 and a driving hub member generally designated 41. Rim member 40 may be constructed identical with the rim member 10 with the exception that the member 40, in its overlapped portion or in the inner peripheral portion of the sections of its front layer 42, is provided with internally threaded bushings 43. The desired number of these bushings are employed and they are preferably molded into the material of the abrasive sections so as to be fast therewith.

Rim member 40 being of the construction of the rim member 10 with the exception that the member 40 mounts the bushings 43 rather than studs, it will be understood that the member 40 is made up of sections arranged to provide front and rear layers for a laminated wheel structure. The ends of these sections are slightly spaced whereby rim member 40 has the radially extending channels 16, 17, 18 and 19 exactly as in the rim member 10.

With this construction, the hub 41 may be of a single piece of material of two diameters having thus an annular shoulder 44 to be engaged by the inner periphery of the front layer 42 of the rim member 40 and having a second and larger diameter shoulder 45 to be engaged by the

inner periphery of the rear layer 46 of the rim member. Thus, it will be seen that the outer peripheral portion of the hub 41 is received in a recess 47 of the rim member 40 and which recess 47 corresponds exactly with the recess 20 of the rim member 10.

Through the outer peripheral portion of hub 41 which is received in the recess 47, a series of screws 48 are passed. These screws will in number equal the number of bushings 43 and to assemble the rim member 40 on the hub 41, the screws 48 are threaded into the bushings 43 drawing the rim member and hub into close relation. The screws and bushings establish a driving relation between the hub member and the rim member so that they are incapable of independent rotation and they also serve to connect these members against lateral separation.

In use, the wheel of Figs. 8 and 9 will be employed in the same manner as the wheel of Figs. 1–7. When a rim member of the wheel of Figs. 8 and 9 is worn down and is to be replaced, screws 48 are all loosened and screwed out of the bushings 43. This may be accomplished from the front side of the wheel and then a new rim member is placed on the hub and the screws threaded into the bushings of this new rim member and the wheel is ready for use. The hub member 41 is of less thickness than the rim member 40 and so may enter a cut made by the rim member. Therefore, the present wheel is adapted for the cutting through of work of greater diameter than the width of the rim member 40.

Referring now to Figs. 10–16, the abrasive cut-off wheel there shown comprises an abrasive rim member generally designated 50 and a central driving hub member generally designated 51. While the outer peripheral edge of rim member 50 is a true circle, its inner peripheral edge portions need not be so and the outer peripheral edge portions of the hub 51 will be complemental to the inner peripheral edge portions of the rim 50. This wheel will be used in the same manner as the wheels previously described and to that end, as will be set forth in detail, the rim member 50 is removably mounted on the hub member 51. Further, this rim member 50 is built up as a laminated structure although in the completed product is a homogeneous or substantially homogeneous structure as in the case of the rim members 10 and 40.

As rim member 50 is built up it comprises a front layer made up of relatively wide arcuate sections or elements 52 and 53 and a rear layer comprising narrower arcuate sections or elements 54 and 55. The sections of one layer are in staggered relation with respect to those of the other layer whereby the mid portions of the sections of one layer overlap the end portions of the sections of the other layer. In addition, the end portions of the sections of the respective layers are slightly spaced whereby in the completed rim member the radially extending channels 16, 17, 18 and 19 described in connection with Figs. 1–7 are formed.

Additionally, the sections of the front layer being wider than those of the rear layer, a recess 56 is formed in the rim member and opens through one of its sides and through its inner peripheral edge. The portion of the front layer defining a side of the recess 56 is in the assembled wheel overlapped by the outer peripheral portion of the hub 51 and this overlapped portion of the rim member carries a plurality of studs 57. Each stud is formed with a reduced diameter

under portion 58 which is adhered to the rim member. Thus, each stud has a head and below such head and about said reduced diameter portion is a space or undercut. Such space or undercut is circular and no care is required in positioning the studs on the rim member.

At each side of each stud 57 is an opening 59. Hub 51 comprises a metallic or other rigid structure including an outer peripheral portion 60 of substantially the thickness of the rear layer of the rim member. Then the hub includes an inner thickened portion 61 of substantially the thickness of the forward layer of the rim member. This hub 51 is of less thickness than that of the rim member and may enter a cut made by the rim member whereby the wheel is adapted to cut through a work piece of greater diameter than the width of the rim member 50. Portions 60 and 61 between them define a shoulder 62 which is actually the outer peripheral edge of the portion 61.

Through portion 60 are openings 63 corresponding in number with the number of the studs 57 and of diameters to receive these studs to provide a driving connection between the hub and annulus. The studs need not have snug fits in the opening and need not be located with exact accuracy for the reasons given above in connection with Figs. 1–7. Mounted in recesses in the outer hub portions at each side of each opening 63 is a key 64, such key being fast with headed studs 65 which are shown as passing through the keys. The studs are turnable in the hub 51.

Forwardly of the keys 64, slotted nuts or elements 66 are fast with the studs and thus with the keys. These elements or nuts 66 may be welded or otherwise made fast with the studs and keys preferably by threading of the nuts or elements onto the shanks of the studs and then welding, as in Fig. 14.

With this construction, the hub member 51 which carries a shaft or mounting piece 67 being position on a machine, should the abrasive rim member wear down so that it needs to be replaced, the operator stands at the forward side of the wheel and engages the slotted elements 66 with the bit of a screw driver or the like and turns them about their own axes to turn the keys to released positions as to the positions in which they are shown in Fig. 16. All of the keys being in this position, the worn rim member may be removed from the hub simply by moving the rim member laterally forwardly. The new rim member is then placed on the hub and the studs 57 of the rim member are lined with and enter the openings 63 in the hub.

At the same time, the elements or nuts 66 of the hub enter the openings 59 of the rim member. Also, the outer peripheral portion 60 of the hub is now in the recess 56 opening through one side and the inner periphery of the rim member and the thickened hub portion 61 is within the outer layer of the rim member with its shoulder 62 engaged or substantially engaged with the inner peripheral edge of such front layer of the rim member.

Now the operator still standing in front of the wheel, by a screw driver or other tool manipulates the nuts or elements 66 to rotate the keys through approximately 90° to enter their free edge portions into the spaces about the reduced diameter portions 58 of the studs. This locks the rim member onto the hub against lateral movement from the latter and it will be clear that the studs

57 together with the nuts or elements 56 provide adequate driving connection between the hub and rim member whereby any rotation imparted to the hub is in like manner imparted to the rim member.

In this construction, two keys are entered in the space at the underside of the head of each stud. These keys enter such space at opposite sides of the stud. Since the two keys are used and located as described, the rim may not be tilted to exert a pry action on a stud such as could be accomplished if but a single key was used in the location shown. Additionally, it is noted that when the keys are in their locking positions (see Fig. 13) they are against the outer edges of the recesses or walls in which they are located. Therefore, centrifugal action during rotation of the wheel cannot throw the keys out of their locking positions.

In all the structures shown the stiff metal hub member provides for a flat stiff true running cut-off wheel of large effective diameter. The present wheel does not run out of true as may happen with larger diameter thin wheels wholly of an abrasive mix. Further, with the headed studs employed in Figs. 1–7 and 10–16, they need only be located as there is an annular space about the reduced diameter portion into which a key or keys may enter.

The rim members of the various forms herein are specifically shown as annuluses. However, the inner peripheral edges of the layers of the various rim members could be other than true circles, as ovals or as having angularly related edge portions. In any such instance, the hub member would or could have correspondingly shaped edge portions.

Having thus set forth the nature of my invention, what I claim is:

1. An abrasive cut-off wheel comprising an abrasive rim member having a recess opening through one side and its inner periphery, a driving hub of a diameter having its outer peripheral portion received in said recess in overlapping relation with a portion of said rim member, said hub of a thickness not greater than that of said rim member whereby to lie wholly between the planes represented by the side surfaces of the rim member, laterally extending studs on the overlapped portion of said rim member of a height equal to the depth of said recess, one of said studs defining a recess opening through a side thereof, said hub having openings receiving said studs whereby a driving connection is established between said hub and rim member, and a key on said hub and turnable relative thereto to and from a position entering the recess opening through a side of said one stud and thereby securing the hub and rim member together in driving relation.

2. An abrasive cut-off wheel comprising an abrasive rim member having a recess opening through one side and its inner periphery, a driving hub of a diameter having its outer peripheral portion received in said recess in overlapping relation with a portion of said rim member, said hub of a thickness not greater than that of said rim member whereby to lie wholly between the planes represented by the side surfaces of the rim member, laterally extending studs on the overlapped portion of said rim member of a height equal to the depth of said recess, one of said studs defining a recess opening through a side thereof, said hub having openings receiving said studs whereby a driving connection is established between said hub and rim member, a key on said hub and turnable relative thereto to and from a position entering the recess opening through a side of said one stud and thereby securing the hub and rim member together in driving relation, the side of the wheel wherein said abrasive segments are of the greatest width comprising the front side of the wheel, and means operable from the front side of said wheel to turn said key to and from a locking position entering said recess defined by said stud.

3. An abrasive cut-off wheel comprising an abrasive rim member having a recess opening through one side and its inner periphery, a driving hub of a diameter having its outer peripheral portion received in said recess in overlapping relation with a portion of said rim member, said hub of a thickness not greater than that of said rim member whereby to lie wholly between the planes represented by the side surfaces of the rim member, a series of internally threaded bushings fast in the overlapped portion of said rim member, and a series of screws passing through the overlapped portion of the hub and threaded into said bushings whereby the hub and rim member are detachably secured together in driving relation.

4. An abrasive cut-off wheel comprising an abrasive rim member having a recess opening through one side and its inner periphery, a driving hub member of a diameter having its outer peripheral edge portion received in said recess in overlapping relation with a portion of said rim member, said hub of a thickness not greater than that of said rim member whereby to lie wholly between the planes represented by the side faces of the rim member, laterally extending lugs on the overlapped portion of one of said members and of a height not greater than the thickness of the overlapped portion of the other member, one of said studs defining a recess opening through a side thereof, said other member having openings receiving said studs whereby a driving connection is established between said hub member and said rim member, and a key on said member having said openings therein and turnable relative to said member to and from a position entering the recess opening through a side of said one stud and thereby securing the members together in said driving relation.

5. An abrasive cut-off wheel comprising an abrasive rim member having a recess opening through one side and its inner periphery, a driving hub member of a diameter having its outer peripheral edge portion received in said recess in overlapping relation with a portion of said rim member, said hub of a thickness not greater than that of said rim member whereby to lie wholly between the planes represented by the side faces of the rim member, laterally extending lugs on the overlapped portion of one of said members and of a height not greater than the thickness of the overlapped portion of the other member, one of said studs having a recess opening through a side thereof, said other member having openings receiving said studs whereby a driving connection is established between said hub member and said rim member, a key on said member having said openings therein and turnable relative to said member to and from a position entering the recess opening through a side of said one stud and thereby securing the members together in said driving relation, the side of the wheel wherein said recess opens through the side thereof comprising the rear side of the wheel, and means operable from the front side of said wheel to turn said key

to and from a locking position entering said recess in the said one stud.

6. An abrasive cut-off wheel comprising an abrasive rim member having a recess opening through one side and its inner periphery, a driving hub of a diameter having its outer peripheral portion received in said recess in overlapping relation with a portion of said rim member, said hub of a thickness not greater than that of said rim member whereby to lie wholly between the planes represented by the side surfaces of the rim member, laterally extending studs on the overlapped portion of said rim member of a height equal to the depth of said recess, one of said studs defining a recess opening through the inner side thereof, said hub having openings receiving said studs whereby a driving connection is established between the hub and rim member, a key, means pivotally mounting said key on said hub for turning movement relative thereto to and from a position entering the recess defined by said one stud whereby to receive the hub and rim member together, and the pivotal axis of said key and the center of said one stud being substantially in the same radial line passing through the center of said wheel whereby the tendency of centrifugal action as said wheel is rotated is to maintain said key in locking relation with said one stud.

7. An abrasive cut-off wheel comprising an abrasive rim member having a recess opening through one side and its inner periphery, a driving hub of a diameter having its outer peripheral portion received in said recess in overlapping relation with a portion of said rim member, said hub of a thickness not greater than that of said rim member whereby to lie wholly between the planes represented by the side surfaces of the rim member, a laterally extending stud on the overlapped portion of said rim member of a height not greater than the depth of said recess, said stud defining openings through its opposite sides, said hub having an opening receiving said stud whereby a driving connection is established between said hub and said rim member, a pair of keys, a pair of depressions in said hub one at each side of said opening and entering through the opposite side of the latter, means pivotally mounting said keys one in each of said depressions for turning movement relative to the hub to and from positions entering the recesses defined by said stud whereby to secure the hub and rim member together, said keys located whereby as said wheel is rotated centrifugal action tends to move said keys into the recesses defined by said stud, and said depressions located whereby their side edges limit such movements of the keys to movements to locking relation with said studs.

8. An abrasive cut-off wheel comprising an abrasive rim member having a recess opening through one side and its inner periphery, a driving hub of a diameter having its outer peripheral portion received in said recess in overlapping relation with a portion of said rim member, said hub of a thickness not greater than that of said rim member whereby to lie wholly between the planes represented by the side surfaces of the rim member, a laterally extending stud on the overlapped portion of said rim member of a height not greater than the depth of said recess, said stud defining an opening through a side thereof, said hub having an opening receiving said stud whereby a driving connection is established between said hub and said rim member, a key, a depression in said hub at one side of said opening and entering through a side of the latter, means pivotally mounting said key in said depression for turning movement relative to the hub to and from a position entering the recess defined by said stud whereby to secure the hub and rim member together, said key located whereby as said wheel is rotated centrifugal action tends to move said key into the recess defined by said stud, and said depression located whereby its side edges limit such movements of the key to movements to locking relation with said stud.

9. An abrasive cutoff wheel comprising an abrasive rim member in the form of an annulus having a recess opening through one side and its inner periphery, a driving hub member of a diameter having its outer peripheral portion received in said recess in overlapping relation with the inner peripheral portion of said rim member, said hub member of a thickness not greater than that of said rim member whereby to lie wholly between the planes represented by the side surfaces of the rim member, means comprising circumferentially spaced means in the overlapped portions of one of said members, circumferentially spaced studs extending laterally from the overlapped portion of the other member and passing through said recesses, heads on the outer ends of said studs, and key means on the overlapped portion of the recess carrying member and pivoted for swinging movement to extend under said heads and lock said members together and for movement from under said heads to release said studs for separation of said members.

10. The cutoff wheel as in claim 9 including two of said keys for each of said studs and said keys of each pair having their pivots located at respectively the opposite sides of said studs.

11. The cutoff wheel as in claim 9 including two of said keys for each of said studs and said keys of each pair having their pivots located at respectively the opposite sides of said studs and in recesses limiting swinging movements of the keys.

12. An abrasive cut-off wheel comprising an abrasive rim member having an outer peripheral cutting surface and side surfaces parallel and equidistant from each other whereby said outer peripheral cutting surface remains of equal width as its diameter decreases through wear, a driving hub detachably mounting said rim member and lying wholly within the planes represented by said side surfaces, and securing means cooperatively connected between said rim member and hub detachably securing them against relative axial and rotative displacement and disposed wholly within said planes whereby the maximum cutting depth of said cutting surface is greater than the radial distance between said cutting surface and said securing means.

13. An abrasive cut-off wheel comprising an abrasive rim member in the form of an annulus having a recess opening through one side and its inner periphery, and having an outer peripheral cutting surface and side surfaces parallel and equidistant from each other respectively extending inwardly from said outer periphery to said inner periphery at one side and to the outer periphery of said recess at the other side, whereby said outer peripheral cutting surface remains of equal width as its diameter decreases through wear, said recess having a base surface disposed between the parallel planes represented by said side surfaces, a driving hub of a diameter having its outer peripheral portion detachably re-

ceived in said recess in overlapping relation with the base of said recess, said outer peripheral portion of said hub being of a thickness not greater than that of the inner member and lying wholly within said parallel planes, and securing means cooperatively connected between said recess part of said rim member and said outer peripheral portion of said hub detachably securing them against relative axial and rotative displacement and disposed wholly within said parallel planes, whereby the maximum cutting depth of said cutting surface is greater than the radial distance between said cutting surface and said securing means.

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