Jan. 25, 1955 M. E. LANDAU 2,700,257

ABRASIVE WHEEL WITH CONFORMING RIM

Filed Jan. 22, 1952 2 Sheets-Sheet 1

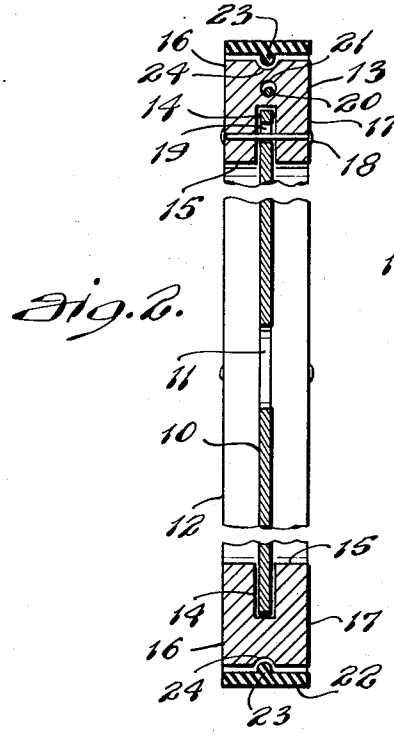


Fig. 2.

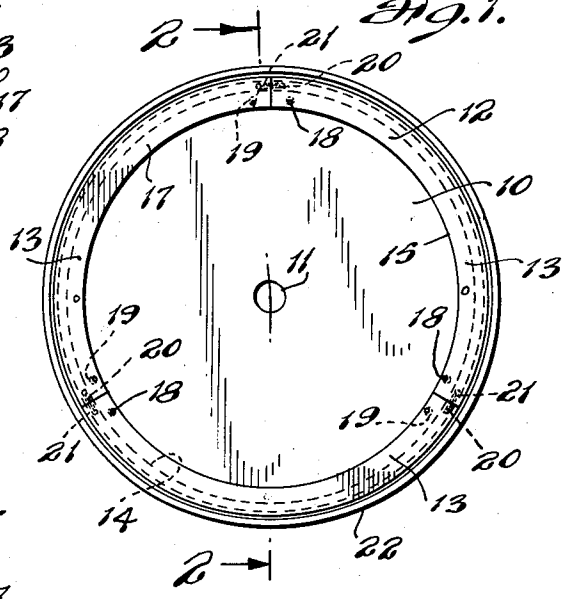


Fig. 1.

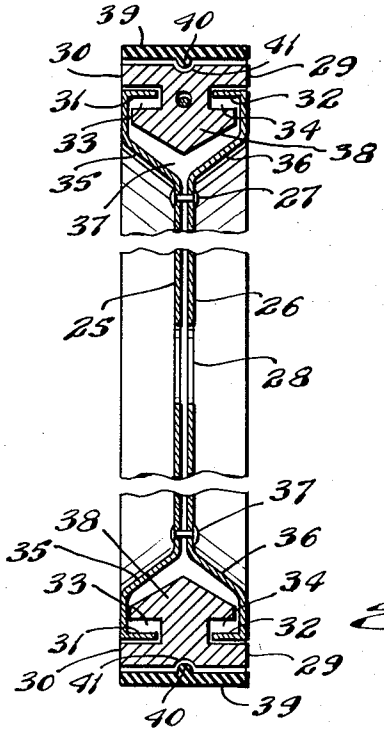


Fig. 4.

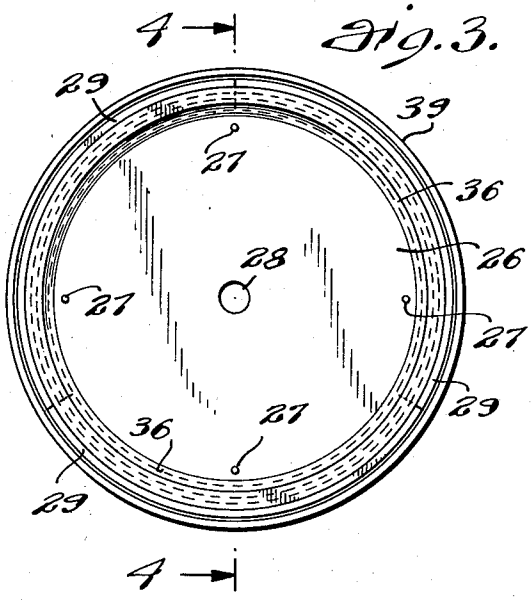


Fig. 3.

INVENTOR.
MILES E. LANDAU
BY
Clark & Alt
ATTORNEYS

Jan. 25, 1955 M. E. LANDAU 2,700,257

ABRASIVE WHEEL WITH CONFORMING RIM

Filed Jan. 22, 1952 2 Sheets-Sheet 2

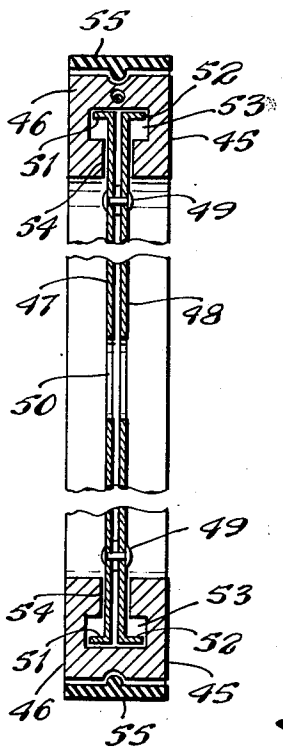


Fig. 6.

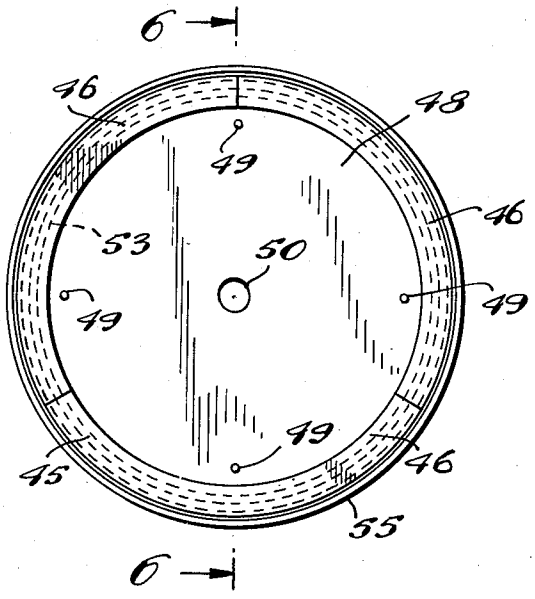


Fig. 5.

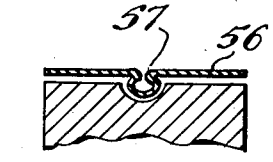


Fig. 7.

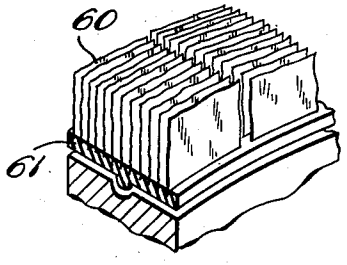


Fig. 8.

INVENTOR.
MILES E. LANDAU
BY
Clark & Alt
ATTORNEYS

United States Patent Office 2,700,257 Patented Jan. 25, 1955

2,700,257

ABRASIVE WHEEL WITH CONFORMING RIM

Miles E. Landau, Brooklyn, N. Y.

Application January 22, 1952, Serial No. 267,640

4 Claims. (Cl. 51—191)

This invention relates to a finishing wheel having an improved conformable rim of long arcuate members or divisions to allow the over-riding abrasive belt to conform to the surface of the material or article being finished and having means for expeditious interchange of abrasive and polishing belts so that one wheel with necessary accessory belts suffices to provide facilities for all customary finishing steps from preliminary grinding to the final polishing operation.

The invention comprehends the provision of a finishing wheel which is practical and dependable for its intended purpose, of simple and inexpensive construction and which is adapted for rapidly finishing flat and contoured surfaces of metal, hard rubber, plastic, glass, wood and the like by skilled or unskilled operators without danger of damage to goods incident to the use of rigid abrasive wheels.

The invention comprehends a more efficient finishing wheel with improved rim construction designed to overcome handicaps inherent in other finishing wheels and which eliminates impractical and expensive auxiliary contrivances heretofore resorted to in abrasive wheels.

The invention comprehends an improved finishing wheel having a loosely anchored rim formed of long arcuate members three such members being preferable for wheels up to twelve inches in diameter and up to a maximum of six members for wheels of larger diameters, the principal purpose being to minimize the number of rim divisions to thereby concentrate the required weight into each individual rim division and to ensure contact against a long rim division at any point where pressure of the work is applied to thereby gain the advantage of adequate support imparted to the abrasive belt by the weight factor in the rim under the effect of centrifugal action during rotation of the wheel. The rim divisions may be formed entirely of metal for applications requiring maximum weight to withstand heavy external pressure as when finishing rough work or the rim divisions may be formed of composition material with weighting material incorporated therein and sets of rim divisions may be made with varying amounts of weighting material to produce rims of different weights to meet requirements of varying pressures for finishing different kinds of materials. The weight factor of the rim is of vital importance to more effectively utilize centrifugal action and derive adequate pressure on the underside of the abrasive belt so as to force the belt outward and maintain it in outward condition with sufficient resistance to withstand the required external pressure of the work applied thereagainst in the finishing process yet, when desired, to allow such external pressure to depress and conform the abrasive belt to the surface contour of the work. This improved rim construction has marked advantages over conventional rims of the type employing a multiplicity of small sections which in themselves cannot exert adequate pressure against the belt for proper support thereof during use, making it necessary to resort to subjoined weights, underlying springs, pneumatic tubes, or hubs with eccentric distenders in an effort to impart the required pliant support for the abrasive belt. Such contrivances are expensive to incorporate in the wheel construction and do not give satisfactory or dependable performance.

Due to the small number of divisions in the improved rim the individual sections are long, hence in a wheel having a rim of three sections each individual division carries with it one third of the total rim weight while at the same time the divided rim assures unhampered

and positive centrifugal expansion thereof during rotation of the wheel.

In large wheels, rims having a maximum of six divisions, the same proportionate weight factor is retained in each division since each division has a length of similar relationship to the circumference as exists in the relationship of the rim divisions to the circumference of the smaller wheels.

The invention further comprehends the provision in the improved rim of interengageable means on the rim sections and the abrasive belt for retaining the belt upon the rim during use yet permitting the belt to function in a pliant manner and allowing of expeditious replacement of the belt without dismantling of the supporting portion of the wheel.

With the foregoing and other objects in view, reference is now made to the following specification and accompanying drawings in which the preferred embodiments of the invention are illustrated.

In the drawings:

Fig. 1 is a face view of an abrasive wheel constructed in accordance with the invention and illustrating the supporting rim with the sectors in inward position.

Fig. 2 is an enlarged sectional view taken approximately on line **2—2** of Fig. 1 with parts broken away.

Fig. 3 is a face view of a modified form of abrasive wheel illustrating the supporting rim with the sectors disposed in inward position.

Fig. 4 is an enlarged sectional view taken approximately on line **4—4** of Fig. 3 with parts broken away.

Fig. 5 is a face view of another modified form of abrasive wheel with the sectors of the rim shown in inward position.

Fig. 6 is an enlarged sectional view taken approximately on line **6—6** of Fig. 5 with parts broken away.

Fig. 7 is an enlarged fragmentary sectional view showing a modified form of abrasive belt.

Fig. 8 is an enlarged fragmentary perspective view illustrating a modified form of belt.

Referring to the drawings by characters of reference and more particularly to the form of the invention illustrated in Figs. 1 and 2 of the drawings, the abrasive wheel includes a disk **10** having a central aperture **11** for mounting the disk on a driving shaft for rotation therewith. The disk is provided with a rim **12** composed of arcuate sectors **13** which are mounted thereon to permit of independent radial expansion and contraction of the sectors during operation. As illustrated, the sectors **13** are each provided with a longitudinally extending slot **14** which opens through the inner arcuate face **15** thereof medially between the opposite side faces **16** and **17** and extends inwardly approximately to the center of the sector. The slots **14** provide a continuous recess extending peripherally about the inner periphery of the rim and which is of a width to freely receive the outer peripheral edge portion of the disk to permit of relative movement of the sectors with reference to the disk.

The sectors are retained in position on the disk by means of pins **18** extending through the sectors and through the slots **14** and openings **19** in the disk **10** adjacent the periphery thereof. The openings **19** are relatively larger than the cross-sectional area of the pins **18** and when the sectors are in inward position on the disk, the pins **18** extend through the openings **19** adjacent the inner edge thereof as illustrated in Fig. 2 of the drawings. This permits of radial outward expansion of the sectors by centrifugal action during operation and when in outward position due to centrifugal action, the pins **18** extend through the openings **19** adjacent the outer peripheries thereof. This construction also permits of independent inward movement of the sectors during operation when the pressure of the work is imposed against the abrasive surface of the wheel.

The sectors **13** are formed of any desired material such as metal or pliable synthetic plastic material or rubber composition which will provide sectors having inherent resiliency and flexibility. The sectors may be weighted by means of incorporating in the plastic material or rubber composition finely divided metallic particles or metal weights which additional weight increases the effectiveness of the centrifugal action to force the sectors into said out-

ward position for supporting the finishing belt during rotation. The rim sectors are disposed in abutting relation when in the inward position on the disk and have the pins 18 extending therethrough adjacent the outer ends of each of the sectors and intermediate the ends thereof. While in the illustrated embodiment the rim 12 is composed of three sectors which is found preferable for abrasive wheels up to 12" in diameter, a maximum of six sectors may be employed in wheels over 12" in diameter. The sectors are maintained in alignment at their ends during operation by means of pins 20 loosely fitting in aligned openings 21 in the confronting ends of adjacent sectors to permit of freedom of movement of the sectors yet serving to assure uniformity of movement of the sectors in relation to each other when subjected to external pressure during operation.

The rim 12 provides an expandable and contractable support for a flexible abrasive belt 22 which belt is of an internal diameter slightly larger than the diameter of the rim to permit the expeditious emplacement of the belt thereon and which firmly engages the rim sectors when the same are flung outwardly by centrifugal action during rotation of the wheel. The belt 22 is provided with a centrally arranged peripheral bead 23 on the inner periphery thereof which is adapted to fit in a correspondingly shaped groove 24 in the outer periphery of the rim sectors to prevent lateral movement of the belt during use.

In the form of the invention illustrated in Figs. 3 and 4 of the drawings, the abrasive wheel includes two disks 25 and 26 which are secured together by any desired means such as by spot welding or by arcuately spaced rivets 27 as illustrated and which have aligned central apertures 28 for mounting the disks on a driving shaft for rotation therewith. The disks provide a support for a rim 29 composed of arcuate sectors 30 which are inserted there between before the disks are secured together and which are mounted on the disks to permit of independent radial expansion and contraction of the sectors during operation. In this form of the invention the disks are provided with inwardly directed annular flanges 31 and 32 formed on the outer peripheries of the disks respectively and which engage loosely in annular recesses 33 and 34 in the opposite sides of the rim sectors so as to retain the rim on the disks and permit of the radial outward expansion of the sectors by centrifugal action during operation and the independent inward movement of the sectors during operation when the pressure of the work is imposed against the abrasive surface of the wheel. The disks 25 and 26 are formed with outwardly extending portions 35 and 36 which are integral with the inwardly directed flanges at the outer peripheral edges thereof to provide an annular recess 37 extending peripherally about the said disks for freely anchoring the inner peripheral portions 38 of the rim sectors 30.

The sectors 30 are formed of any desired material as in the previous form of the invention and when formed of synthetic plastic material or rubber composition may be weighted by means of incorporating therein finely divided metallic particles or metal weights so as to increase the effectiveness of the centrifugal action to force the sectors into said outward position for supporting the finishing belt thereon. The rim 29 provides an expandable and contractable support for a flexible abrasive belt 39 similar to the flexible abrasive belt 22 in the previous form of the invention and which is of an internal diameter slightly larger than the diameter of the rim to permit of the convenient emplacement of the belt thereon and which firmly engages the rim sectors when the same are flung outwardly by centrifugal action during rotation of the wheel. The belt 39 is similarly provided with a centrally arranged peripheral bead 40 on the inner periphery thereof which is adapted to fit a correspondingly shaped groove 41 in the outer periphery of the rim sectors to prevent lateral displacement of the belt during use.

In Figs. 5 and 6 of the drawings another form of the invention is illustrated for supporting a rim 45 to permit of independent radial expansion and contraction of the sectors 46 thereof during operation. In this form of the invention the abrasive wheel includes two disks 47 and 48 which are secured together by spot welding or arcuately spaced rivets 49 as illustrated and have aligned central apertures 50 for mounting the disks on a driving shaft for rotation therewith. The disks are provided with outwardly directed annular flanges 51 and 52 respectively which are formed on the outer peripheries of the disks respectively and which engage loosely in a recess 53 of rectangular formation in cross-section extending peripherally about the rim and communicating with a narrow slot 54 which opens through the inner periphery thereof. The disks 47 and 48 engage freely through said slot with the flanges overlying the wall portions on opposite sides of the slot so as to retain the rim on the disks and permit of radial outward expansion of the sectors by centrifugal action during operation and the independent inward movement of the sectors during operation when the pressure of the work is imposed against the abrasive surface of the wheel.

As in the previous forms of the invention, the rim 45 is composed of three sectors 46, which is found preferable for abrasive wheels up to 12" in diameter, while a maximum of six sectors may be employed in wheels over 12" in diameter. The rim 45 provides an expandable and contractable support for a flexible abrasive belt 55, which belt is similar to the flexible abrasive belts 22 and 39 in the previous forms of the invention and which is of an internal diameter slightly larger than the diameter of the rim to permit of the convenient emplacement of the belt thereon so as to firmly engage the rim sectors when the same are flung outwardly by centrifugal action during rotation of the wheel. The abrasive belts 22, 39 and 55 are preferably composed of rubber composition with an abrasive material uniformly incorporated therein.

In place of the abrasive belts 22, 39 and 55, the belts shown in Figs. 7 and 8 may be employed. The belt 56 shown in Fig. 7 consists of a thin strip of flexible material having an abrasive substance bonded to the outer face thereof such as sand paper, emery cloth and the like. The belt is of an internal diameter to freely engage over the rims of the several forms illustrated and is provided with an inwardly extending bead 57 adapted to engage in the peripheral grooves in the rims for retaining the belt thereon and preventing lateral displacement thereof during use.

The belt illustrated in Fig. 8 of the drawings is adapted for buffing or polishing and consists of rows of fabric strips 60 secured to a flexible belt 61 which is similar to the belts 22, 39 and 55 and provided with a bead 62 for disposing the same on any one of the grooved rims of the several forms of the invention illustrated herein with the upper ends of the strips being substantially even and arranged with the length of the strips extending circumferentially of the rim and the rows of strips extending transversely thereof.

While the preferred forms of the invention have been illustrated and described herein, it is to be understood that the same are not limited thereto but include any and all forms and adaptations of the invention which fall within the purview thereof.

What is claimed is:

1. In a finishing wheel employing an annular supporting frame adapted for mounting on a power driven shaft for rotation therewith, a conforming rim assembly comprising equal elongated arcuate weight members with the ends thereof in abutting relation to form a ring circumferentially arranged on said frame, said rim having not more than three arcuate rim members for wheels up to twelve inches in diameter and not more than six such rim members in the rim for wheels of larger diameters, the purpose of so dividing the rim being to permit the rim to expand and contract during rotation of the wheel and by so minimizing the number of divisions in the rim to retain sufficient mass in each rim member to utilize the resulting concentration of weight therein for enhancing the force thereof from centrifugal action during rotation to properly support an abrasive band carried on said rim, connector pins having their ends loosely fitted in openings in the confronting ends of adjacent rim members and being adapted to adjust freely in said openings as the rim members move outward and inward during rotation for aligning and uniting the rim members in their movement to thereby control and consolidate the members to act as a unitary rim to derive the cumulative effect of the total weight and force under centrifugal action during rotation.

2. In a conforming type finishing wheel, an annular supporting frame adapted for mounting on a power driven shaft for rotation therewith, a conforming rim assembly designed to expand and contract in relation to the frame during rotation and to permit a surrounding

finishing band to adjust to the surface of the work held thereagainst, said rim being loosely positioned on said frame and divided into three equal arcuate sectors for wheels up to twelve inches in diameter and a maximum of six equal arcuate sectors for wheels of larger diameters, the purpose being to minimize the number of divisions sufficient to allow expansion but retaining mass in each sector for retention of weight therein to thus enhance the force of centrifugal action during rotation to properly support the finishing band during use, the said rim sectors being in the form of arcuate weight members which may be composed entirely of metal for heavy duty finishing and which may also be made in compositions of varied weights for different types of finishing, the said sectors being loosely anchored to the peripheral portion of the annular supporting frame with limited freedom to move outward and inward in relation to the frame during rotation, the said rim members having loose unattached interconnective means arranged dowel fashion between the abutting ends of the sectors to align and control the said sectors with each other during expansion and contraction to thereby derive the effect of the united rim weight and cumulative force for enhancing the thrust imparted by centrifugal action, the outer periphery of the said rim having means to interengage and mate with means formed on the inner periphery of an endless pliant finishing band of suitable type for each successive grinding and polishing operation to thereby ensure the retention of the said band upon the rim during use.

3. In a conforming type finishing wheel, an annular supporting frame having inwardly directed peripheral flanges and adapted for mounting on a power driven shaft for rotation therewith, a rim assembly comprising equal elongated arcuate weight members loosely anchored on said supporting frame, the said rim members having recesses in the opposite side faces thereof for freely receiving the inwardly directed peripheral flanges of the said annular supporting frame to permit limited outward expanding movement of the said rim members during rotation and corresponding inward motion thereof during rotation, the said elongated rim members resulting from not more than three divisions in the rim for wheels up to twelve inches in diameter and not more than six divisions in the rim for wheels of larger diameters, the purpose of so dividing said rim being to minimize the number of divisions sufficient to permit the said rim to expand and contract during rotation of the wheel and still retain mass in each rim member to utilize the concentration of weight therein for enhancing the force thereof imparted by centrifugal action during rotation to properly support the abrasive band carried on said rim, said rim members having loosely fitting unattached interconnective means arranged between the abutting ends of the rim sectors to align and control the said sectors with each other during expansion and contraction to thereby derive the effect of the united rim weight and cumulative force for enhancing the thrust imparted by centrifugal action, the outer periphery of the said rim having means to interengage and mate with means formed on the inner periphery of an endless pliant finishing band of suitable type for each successive grinding and polishing operation to thereby ensure retention of said band upon the rim during use.

4. In a conforming type finishing wheel, an annular supporting frame having outwardly directed peripheral flanges and adapted for mounting on a power driven shaft for rotation therewith, a rim assembly comprising equal elongated arcuate weight members loosely anchored on said supporting frame, the said rim members having interior cavities opening through a slot in the inner periphery of said rim members for freely receiving the peripheral portion of said annular supporting frame with its outwardly directed flanges in interengagement with the interior cavities of said rim members to thereby afford said members limited movement outward and inward in relation to said frame during rotation, the said elongated rim members resulting from not more than three divisions in the rim for wheels up to twelve inches in diameter and not more than six divisions in the rim for wheels of larger diameters, the purpose of so dividing said rim being to minimize the number of divisions sufficient to permit said rim to expand and contract during rotation of the wheels and still retain mass in each rim member to utilize the concentration of weight therein for enhancing the force thereof imparted by centrifugal action during rotation to properly support the abrasive band carried on said rim, said rim members having loosely fitting unattached interconnective means arranged between the abutting ends of the rim sectors to align and control the said sectors with each other during expansion and contraction to thereby derive the effect of the united rim weight and cumulative force for enhancing the thrust imparted by centrifugal action, the outer periphery of the said rim having means to interengage and mate with means formed on the inner periphery of an endless pliant finishing band of suitable type for each successive grinding and polishing operation to thereby ensure retention of said band upon the rim during use.

References Cited in the file of this patent

UNITED STATES PATENTS

267,132	Belding	Nov. 7, 1882
1,186,058	Woods	June 6, 1916
2,236,709	Hillix	Apr. 1, 1941
2,264,589	Rydquist	Dec. 2, 1941
2,410,536	Vonnegut	Nov. 5, 1946
2,415,308	Schulte	Feb. 4, 1947
2,466,030	Sandau	Apr. 5, 1949