

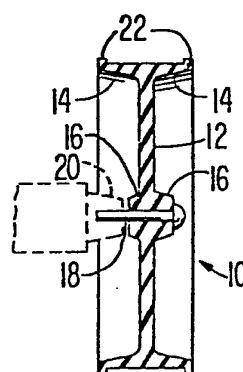


## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<b>(51) International Patent Classification <sup>3</sup>:</b> <b>F16H 55/36, 55/48; B24D 9/02, 17/00</b>	<b>A1</b>	<b>(11) International Publication Number:</b> <b>WO 80/00033</b> <b>(43) International Publication Date:</b> 10 January 1980 (10.01.80)
<b>(21) International Application Number:</b> PCT/US79/00393 <b>(22) International Filing Date:</b> 7 June 1979 (07.06.79)  <b>(31) Priority Application Number:</b> 913,721 <b>(32) Priority Date:</b> 7 June 1978 (07.06.78) <b>(33) Priority Country:</b> US  <b>(71) Applicant; and</b> <b>(72) Inventor:</b> PHILLIPS, Edward, Harrison [US/US] 2350 Perich Court, Mountain View, CA 94040 (US).  <b>(74) Agent:</b> McGANNON, John, L.; No. 5 Palo Alto Square, Palo Alto, CA 94304 (US).	<b>(81) Designated States:</b> BR, CH (European patent), DE (European patent), FR (European patent), GB (European patent), JP, SE (European patent).  <b>Published with:</b> <i>International search report</i>	

**(54) Title:** DRUM FOR SANDING BELT**(57) Abstract**

A drum (10) adapted to be coupled to the chuck (20) of a hand drill for mounting a sanding belt (24) for rotation. The drum (10) is of one-piece construction and has a central, imperforate web (12) integral with flexible flanges (14) on the outer periphery of the web (12). The web (12) and flanges (14) are formed from a resilient material, so that the web (12) can expand or stretch and the flanges (14) can flex under centrifugal force to increase the frictional engagement between the web (12) and flanges (14) and the inner surface of a sanding belt (24) on the drum (10). In one form of the drum (10) the flanges (14) have a pair of continuous ribs (22) at respective side extremities thereof. This drum (10) is adapted for use with a cylindrical sanding belt (24) having a pair of axially spaced annular shoulders (28) on the inner surface thereof, the ribs (22) being adapted to engage the shoulders (28) to prevent axial movement of the belt (24) on the drum (10). Another embodiment of the drum (10) is free of such ribs (22) and is adapted to be used with a sanding belt (24) which may have abrasive on both the inner and outer surfaces thereof.



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DRUM FOR SANDING BELT  
SPECIFICATION

BACKGROUND OF THE INVENTION

5 Rotary drums for sanding belts have been used in the past but, for the most part, they are made up of several parts and require assembly which adds to production costs. Also, a major drawback of drums previously made for this purpose is the relatively short operating life, requiring  
10 replacement and adding to the overall cost of sanding operations. Because of these drawbacks, a need has arisen for an improved drum for sanding belts wherein the drum is of simple and rugged construction, has a long operating life, and can be produced at minimal cost.

15

SUMMARY OF THE INVENTION

The present invention satisfies the aforesaid need by providing a drum of a one-piece construction. The drum is formed from a moldable, resilient material which has a  
20 long useful operating life and does would not need replacement except at relatively infrequent intervals.

To this end, the drum comprises a central, imperforate web integral with a pair of outer peripheral flanges provided with a cylindrical outer surface. The drum is  
25 formed from a resilient material, such as natural rubber, so that, when the drum is rotated at a high speed, the web will expand or stretch radially outwardly and the flanges will flex radially outwardly under centrifugal force. This will cause the web and flange to press firmly against the inner

30



surface of a sanding belt on the drum to enhance the frictional engagement therebetween. This feature assures that the sanding belt will not move circumferentially of the flange or axially of the drum itself when the drum and belt  
5 are rotated.

One embodiment of the drum uses a pair of annular ribs at the outer side extremities of respective flanges. A sanding belt having a pair of axially spaced, inner peripheral shoulders on the inner surface of the belt is  
10 used with this type of drum so that the ribs engage the shoulders when the belt is on the drum to prevent axial movement of the belt on the drum. A second embodiment of the drum has a cylindrical outer surface for the flanges with the surface being free of the ribs of the first embodi-  
15 ment. In this case, the drum is used with a sanding belt which may have abrasive on its inner surface as well as its outer surfaces. If the abrasive is used on the inner surface, it frictionally engages the cylindrical outer surface of the web and flanges to increase the friction engagement  
20 therebetween. However, the abrasive is not needed on the inner surface for this purpose.

The primary object of this invention is to provide an improved drum for a sanding belt wherein the drum is of a moldable material, is of a simple and rugged one-piece  
25 construction, and can be made at minimal cost yet the drum has superior holding power to retain a sanding belt thereon even when operating at high rotational speeds.

Another object of this invention is to provide a drum of the type described wherein the drum is formed from a resilient material and has a central, expandable web integral with a pair of outer peripheral flexible flanges provided with a cylindrical outer surface, whereby the web will expand and the flanges will flex radially outwardly due to centrifugal force to frictionally engage the inner surface  
30 of a sanding belt to thereby substantially eliminate circumferential and axial movement of the belt on the drum.  
35

Other objects of this invention will become



apparent as the following specification progresses, references being had to the accompanying drawing for an illustration of the invention.

5 IN THE DRAWING:

Fig. 1 is a perspective view of one embodiment of the sanding drum of the present invention;

Fig. 2 is a vertical section through the drum and illustrating the way in which it is mounted on the chuck of a hand drill;

Fig. 3 is an enlarged fragmentary, cross sectional view of the drum, showing a second embodiment of the drum for use with a sanding belt having abrasive on both the inner and outer surfaces thereof;

Fig. 4 is a view of the sanding belt used with the drum of Fig. 3;

Fig. 5 is a view similar to Fig. 3 but showing the drum of Figs. 1 and 2; and

Fig. 6 is a view similar to Fig. 4 but showing a sanding belt of the type used with the drum of Figs. 1, 2 and 5.

A first embodiment of the sanding belt drum of this invention is broadly denoted by the numeral 10 and is shown in Figs. 1, 2 and 5. Drum 10 is formed from a resilient material and comprises a circular, flexible, imperforate central web 12 and a pair of flexible outer peripheral flanges 14 integral with web 12 so that drum 10 is of a one-piece construction. The web and flanges are preferably formed simultaneously in a molding process. The web is of a thin wall construction and, as shown in Figs. 2 and 5, is provided with a pair of bosses 16 at the center thereof for support purposes. The bosses project laterally from opposite sides of the web. While Fig. 5 shows the sides of the web parallel with each other, they could be tapered from the center outwardly with the thinnest part near the outer periphery of the web to provide additional support.

A pin 18 extends through the boss and the web as shown in Fig. 2. Thus, a chuck 20 on a hand drill or the like can grip the pin for rotating drum 10 about the central axis of web 12.

5 Flanges 14 have cylindrical outer surfaces and project laterally in opposed directions from the outer periphery of web 12 as shown in Figs. 2 and 5. The flanges have respective integral ribs 22 at their outer extremities. These ribs are formed with the flanges in a molding process.  
10 The flanges have a thin wall construction and, because they are resilient, they are essentially flexible so as to flex radially outwardly when subjected to centrifugal force. Similarly, web 12, being of a thin wall construction, and formed from a resilient material can expand or stretch  
15 radially outwardly under centrifugal force as drum 10 is rotated at high speed, such as 2200 rpm or the like. This assures a positive frictional engagement between the web and the flanges and the inner surface of a sanding belt mounted on the drum for rotation.

20 For additional holding capabilities, ribs 22 are provided for use with a sanding belt 24 (Fig. 6) which comprises a band 26 provided with annular shoulders 28 on the inner surface thereof at locations spaced inwardly from the opposed sides thereof. These shoulders can be formed by  
25 securing a band to the inner surface of band 26 with the inner band having an axial length less than that of band 26.

Shoulders 28 abut ribs 22 in the manner shown in Fig. 5 when band 26 is mounted on flange 14. Thus, a tendency for the belt to move axially of the drum is  
30 countered in two ways, first by the frictional engagement between the flange and the inner surface of band 26 and, secondly, by the stop feature provided by the engagement of ribs 22 with shoulders 28.

Drum 10 has the following typical dimensions:  
35 Maximum diameter of about 3.80 inches, web thickness of about .25 inch, total axial length of flanges 14 of about 1.40 inches, and angle  $\alpha$  (Fig. 5) of about  $5^\circ$ . The material



of drum 10 is typically 55 Durometer natural rubber but can have a hardness in the range of 45-65 Durometer.

In use, pin 18 is secured in the conventional manner to chuck 20 and sanding belt 24 is then placed on the drum and seated on the flanges 14 in the manner shown in Fig. 5. Then the hand drill associated with chuck 20 is actuated to rotate drum 10 and thereby permit the sanding of a surface by the outer surface of band 26 which is provided with an abrasive in the usual manner. During the sanding operation, web 12 will expand radially outwardly and flanges 14 will flex outwardly yet web 12 will generally maintain its disc-like shape since it is rotating in its own plane. There will be no circumferencial movement of band 26 relative to flanges 14 during rotation of drum 10 because of the frictional engagement of web 12 and flanges 14 and the inner surface of band 26. Moreover, this frictional engagement plus the stop action afforded by ribs 22 will prevent any substantial axial movement of band 26 relative to flanges 14.

Fig. 3 illustrates another embodiment of drum 10, namely drum 10a. This drum is substantially the same in all respects as drum 10 except that drum 10a has no ribs 22. Instead, drum 10a has a completely cylindrical outer surface and is adapted for use with a sanding band 24a which may have abrasive on both its inner and outer surfaces. Abrasive need not be on the inner surface and, if used, it need not cover the entire inner surface as shown in Fig. 4. If used, however, the abrasive on the inner surface provides greater friction between the drum 10 and the sanding belt. Without the abrasive on the inner surface, there will be sufficient friction between the flange of drum 10a and the inner surface of sanding belt 24a because of the expansion or stretching of the central web of drum 10a and the flexing of outer peripheral flanges due to centrifugal force, thereby causing the web and flanges to be pressed with greater force against the inner surface of the sanding belt to achieve an increased frictional force.



Although the foregoing invention has been described in some detail by way of illustration and example for purposes of clarity of understanding, it will be obvious that certain changes and modifications may be practiced  
5 within the scope of the appended claims.



## CLAIMS:

1. A drum for a sanding belt comprising: a central web having a central axis and a circular outer periphery; and a pair of flanges integral with the web at the outer periphery thereof, the flanges projecting laterally from opposed sides of said outer periphery, the web being expandable and the flanges being flexible, whereby the web can expand radially outwardly and the flanges can bow radially outwardly due to centrifugal force upon rotation of the web about its central axis.

2. A drum as set forth in Claim 1, when the web is imperforate.

3. A drum as set forth in Claim 1, wherein the flanges have cylindrical outer surfaces.

4. A drum as set forth in Claim 1, wherein each flange has a projection on the outer side extremity thereof for engaging a respective shoulder on the inner surface of a sanding belt.

5. A drum as set forth as in Claim 4, wherein the projection on each flange comprises an annular rib projecting radially outwardly from the outer surface of the flange.

6. A drum as set forth in Claim 5, wherein is included a sanding belt having an inner peripheral surface provided with a pair of axially spaced annular shoulders thereon, the shoulders being spaced apart a distance equal to the spacing between the ribs on said flanges.



7. A drum as set forth in Claim 1, wherein the flanges have cylindrical outer surfaces, and including a sanding belt provided with an inner and outer surface, each of the inner and outer surfaces having abrasive thereon, the  
5 belt capable of being placed on the flanges and rotated thereby.

8. A drum as set forth in Claim 1, wherein the web and flanges are of a one-piece construction and are  
10 formed from natural rubber having a hardness in the range of 45-65 Durometer.

9. A drum as set forth in Claim 1, wherein is included a pin extending through the web at the central axis  
15 thereof for attachment to the chuck of a drive motor.

10. A drum as set forth in Claim 9, wherein said web has a boss integral therewith at the central axis thereof, the web and boss having a hole therethrough for  
20 receiving said pin.



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FIG. 1

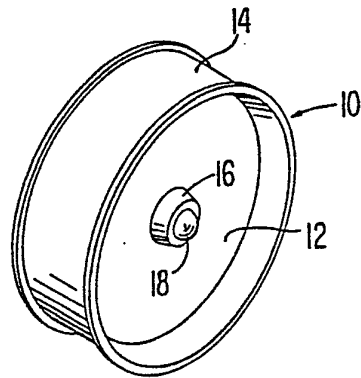


FIG. 2

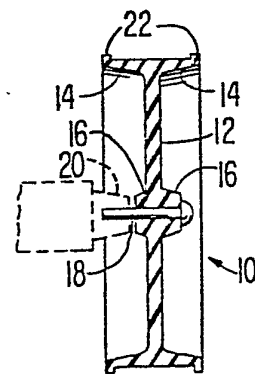


FIG. 3

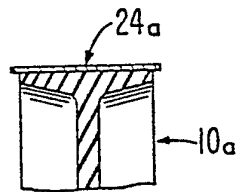


FIG. 5

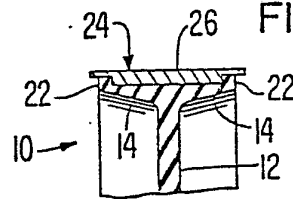


FIG. 4

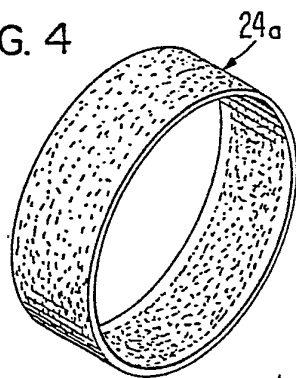
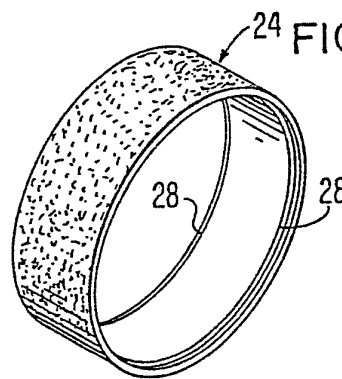


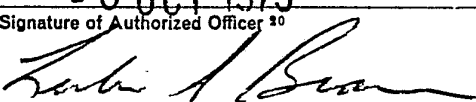
FIG. 6



## INTERNATIONAL SEARCH REPORT

International Application No PCT/US79/00393

Wo 86/000 33

<b>I. CLASSIFICATION OF SUBJECT MATTER</b> (if several classification symbols apply, indicate all) <sup>3</sup>		
According to International Patent Classification (IPC) or to both National Classification and IPC Int. Cl. F16H 55/36, F16H, 55/48; B24D, 9/02; B24D 17/00 U.S. Cl. 74/230.05, 230.7; 51/374, 381		
<b>II. FIELDS SEARCHED</b>		
Minimum Documentation Searched <sup>4</sup>		
Classification System	Classification Symbols	
U.S.	74/230.05, 230.5, 230.7; 51/364, 372, 374, 381,	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched <sup>5</sup>		
<b>III. DOCUMENTS CONSIDERED TO BE RELEVANT</b> <sup>14</sup>		
Category <sup>*</sup>	Citation of Document, <sup>16</sup> with indication, where appropriate, of the relevant passages <sup>17</sup>	Relevant to Claim No. <sup>18</sup>
A	US, A, 3,597,883, published 10 August 1971 Choplin.	1-10
X	US, A, 2,881,572, published 14 April 1959 Miller.	10
X	US, A, 2,963,833, published 13 December 1960 MacIntosh et al.	1-10
X	US, A, 2,221,173, published 12 November 1940 Gutsell.	1,2,3,8,9,
X	US, A, 3,211,016, published 12 October 1965 Carter.	4-6
X	US, A, 1,033,934, published 30 July 1912 Reid.	4-6
X	US, A, 3,140,621, published 14 July 1964 Stone.	4-6
A	US, A, 4,067,149, published 10 January 1978 Ali et al.	1-10
A	US, A, 3,698,141, published 17 October 1972 Landmark et al.	1-10
A	US, A, 3,105,536, published 01 October 1963 Cappa.	1-10
A	US, A, 3,083,584, published 02 April 1963 Nanson.	1-10
A	US, A, 2,494,818, published 17 January 1950 Kristek.	1-10
A	US, A, 2,874,519, published 24 February 1959 MacIntosh.	1-10
<sup>*</sup> Special categories of cited documents: <sup>15</sup>		
"A" document defining the general state of the art		"P" document published prior to the international filing date but on or after the priority date claimed
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"L" document cited for special reason other than those referred to in the other categories		"X" document of particular relevance
"O" document referring to an oral disclosure, use, exhibition or other means		
<b>IV. CERTIFICATION</b>		
Date of the Actual Completion of the International Search <sup>2</sup>	Date of Mailing of this International Search Report <sup>2</sup>	
12 July 1979	16 OCT 1979	
International Searching Authority <sup>1</sup>	Signature of Authorized Officer <sup>20</sup>	
ISA/US		

III. DOCUMENTS CONSIDERED TO BE RELEVANT <sup>14</sup>		
Category *	Citation of Document, <sup>16</sup> with indication, where appropriate, of the relevant passages <sup>17</sup>	Relevant to Claim No. <sup>18</sup>
X	GB, A, 992,300, published 19 May 1965 Lidster.	7
A	GB, A, 416,076, published 10 September 1934 Warburton et al.	1-10
A	CA, A, 545,597, published 03 September 1957 Landau.	1-10
A	DE, A, 2,432,815, published 29 January 1976 Hacoba.	1-10
X	DE, C, 559,229, published 17 September 1932 Fezer.	10
A	US, A, 3,142,192, published 28 July 1964	1-10

**V. ☐ OBSERVATIONS WHERE CERTAIN CLAIMS WERE FOUND UNSEARCHABLE <sup>19</sup>**

This international search report has not been established in respect of certain claims under Article 17(2) (a) for the following reasons:

1. ☐ Claim numbers ..... because they relate to subject matter <sup>12</sup> not required to be searched by this Authority, namely:

2. ☐ Claim numbers ..... because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out <sup>12</sup>, specifically:

**VI. ☐ OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING <sup>11</sup>**

This International Searching Authority found multiple inventions in this international application as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims of the international application.

2. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims of the international application for which fees were paid, specifically claims:

3. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claim numbers:

Remark on Protest

☐ The additional search fees were accompanied by applicant's protest.

☐ No protest accompanied the payment of additional search fees.