

May 13, 1958

M. E. KINGDOM
EXPANSIBLE PULLEY

2,834,220

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2 Sheets-Sheet 1

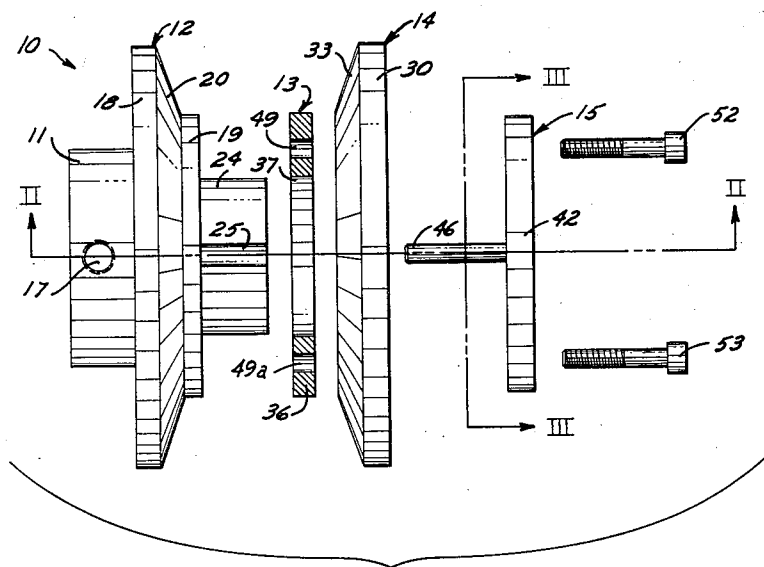


fig. 1

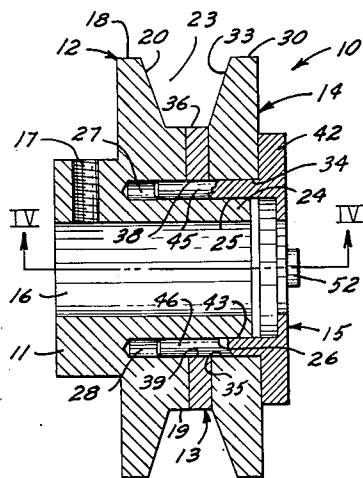


fig. 2

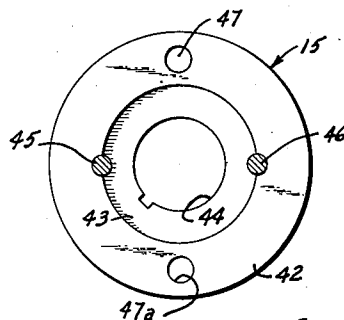


fig. 3

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2 Sheets-Sheet 2

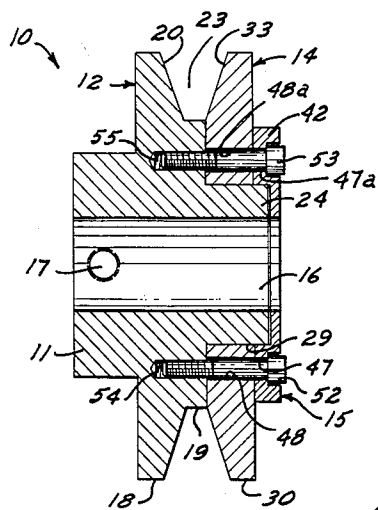


fig. 4

fig. 6

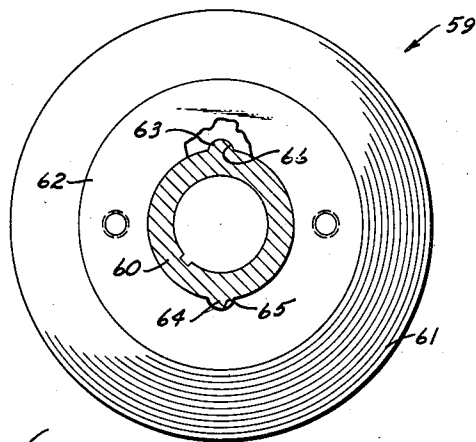
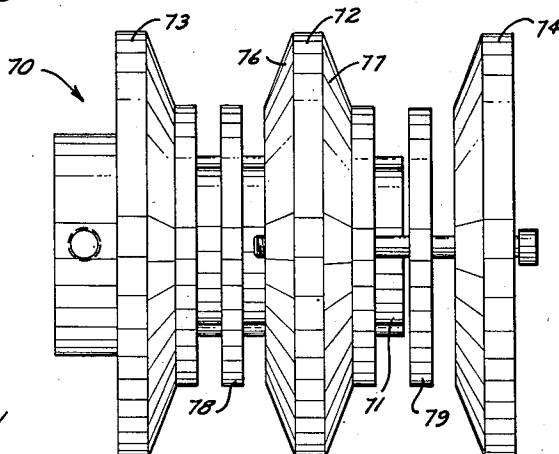


fig. 7

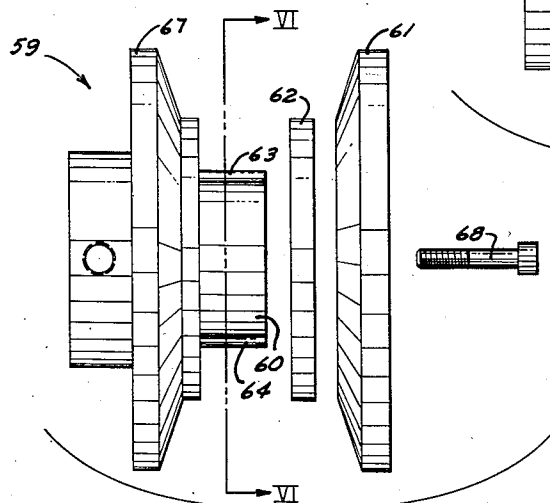


fig. 5

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2,834,220

EXPANSIBLE PULLEY

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1 Claim. (Cl. 74—230.17)

This invention relates in general to a pulley having a V-shaped groove in the periphery thereof and, more particularly, to a type of such pulley wherein the width of said groove can be quickly and easily changed.

It is well known that endless belts of the type used with grooved pulleys, and commonly referred to as "V-belts," are provided in a variety of widths, which are designated in the trade by the letters A, B, C, D, etc. The "B" belt is wider and stronger than the "A" belt, and so forth, as the designation moves along the alphabet. It is also known that the pulleys, or sheaves, must be provided in corresponding widths to accommodate the various widths of the belts. Thus, it is presently necessary for a supplier of such items to keep a complete stock of all pulley sizes corresponding to all belt widths. For the small merchant, this necessitates a large inventory, hence, a large investment and a corresponding space requirement. It is thus desirable to devise a single pulley such that, with minor and insignificant adjustment, it can be easily and quickly adapted for handling at least two different belt widths. With such a pulley, this burden of excessive inventory could be substantially reduced.

Accordingly, a primary object of this invention has been the provision of a pulley for use with V-belts, which can be quickly and easily adapted for use with V-belts of two or more widths, which would be as completely effective in use as the presently existing, conventional type of pulleys designed for use with belts of one width only, which can be manufactured economically, and which can be changed from one width to another by persons who are unskilled in mechanics.

A further object of this invention is the provision of a pulley, as aforesaid, which will be as strong and as durable as a conventional, non-expansible pulley of substantially the same size and for substantially the same purposes.

Other objects and purposes of this invention will become apparent to persons familiar with this type of equipment upon reading the following specification and examining the accompanying drawings, in which:

Figure 1 is an exploded, side elevational view of a pulley embodying the invention;

Figure 2 is a sectional view taken along the line II—II of Figure 1.

Figure 3 is a sectional view taken along the line III—III of Figure 1.

Figure 4 is a sectional view taken along the line IV—IV of Figure 2.

Figure 5 is an exploded, side elevational view of a modified form of the invention.

Figure 6 is a sectional view taken along the line VI—VI of Figure 5.

Figure 7 shows a further modification of the invention showing a double pulley.

As shown particularly in Figures 1, 2 and 5, the objects and purposes of the invention may be carried out by providing a grooved pulley comprised of a hub having a circular flange fixed thereon between the axial ends there-

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of, said flange providing one wall of the pulley groove. Another circular flange, which provides the other wall of the pulley groove and has an open center for removably and slidably receiving said hub. Means are provided for preventing rotation of the removable flange with respect to the fixed flange, and further means are provided for preventing axial movement of said removable flange with respect to said fixed flange when supported upon said hub. A circular insert ring is provided for mounting upon said hub between the two flanges, the axial thickness of said insert ring being such that it will change the width of the pulley groove from one belt size to another.

For purposes of convenience in description, the terms "inner," "outer," and derivatives thereof, will have reference to the geometric center of the pulley to which this invention relates, and parts associated therewith.

Detailed construction

As shown in Figures 1, 2 and 4, the pulley or sheave 10, to which this invention relates, is comprised of a hub 11, a fixed circular flange 12 integral with the hub 11, an insert ring 13, a removable flange 14 and a lock member 15. The hub 11 (Figures 1 and 2) is provided with a co-axial shaft opening 16 and a threaded set screw opening 17, communicating with said shaft opening 16 near one end thereof in a substantially conventional manner. The fixed flange 12 is integral and co-axial with the hub 11 and extends radially therefrom between the axial ends thereof.

Said flange 12 has an outer, peripheral and cylindrical surface 18 and a co-axial, cylindrical surface 19 of reduced diameter, said surfaces being axially spaced and connected by a conical surface 20, which constitutes one wall of the pulley groove 23. The smaller, cylindrical surface 19 defines the bottom of said pulley groove 23. The portion 24 of the hub 11 adjacent to the surface 19 is of reduced diameter, in this particular embodiment, and has a pair of diametrically disposed, parallel grooves 25 and 26 (Figures 1 and 2), which are semi-cylindrical in cross-sectional shape, and are substantially parallel with the axis of the hub 11. A pair of cylindrical recesses 27 and 28, which are axial extensions of the grooves 25 and 26 and have the same radius, are provided in the fixed flange 12.

The removable flange 14 (Figure 4) is a disk-shaped element, having a co-axial, circular hub opening 29 and a peripheral surface 30 of substantially the same diameter and shape as the surface 18 on the fixed flange 12. Said removable flange 14 also has a conical surface 33, which is preferably substantially identical to the conical surface 20 on the fixed flange 12, and which provides the other wall of said pulley groove 23. The reduced portion 24 of the hub 11 is slidably, but snugly, receivable into the hub opening 29 in said flange 14, said opening 29 being provided with a pair of diametrically disposed, semi-cylindrical grooves 34 and 35 (Figure 2). When said removable flange 14 is mounted upon the hub portion 24, said grooves 34 and 35 are alignable with the semi-cylindrical grooves 25 and 26, to define cylindrical openings of substantially the same diameter as, and alignable with, the cylindrical recesses 27 and 28.

The insert ring 13 (Figure 1) has an outside, cylindrical surface 36, which is preferably substantially equal in diameter to the surface 19 on the fixed flange 12. Said ring 13 also has a co-axial, circular opening 37 of substantially the same size and shape as the hub opening 29 in the removable flange 14. Thus, said hub opening 37 has a pair of semi-cylindrical grooves 38 and 39, which, when said ring is supported upon the hub portion 24, are alignable with the grooves 34 and 35 in the hub opening 29 of the flange 14.

The lock member 15 (Figures 1, 2 and 3) has a cir-

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cular, end plate 42, which is substantially larger in diameter than the hub portion 24, and has a co-axial, circular recess 43, into which the free end of said hub portion 24 is slidably receivable. Said end plate 42 has a shaft opening 44, preferably of the same diameter as the shaft opening 16 in the hub 11. A pair of parallel, cylindrical, lock pins 45 and 46 are secured to, and extend perpendicularly from, that axial side of the end plate 14 containing the circular recess 43. Said pins 45 and 46 are so arranged that they will be slidably, and snugly, receivable simultaneously into the cylindrical recesses 27 and 28 when the hub portion 24 is received into the recess 43 in the end plate 42. Accordingly, if the removable flange 14 is mounted upon the hub portion 24, said pins 45 and 46 are also extendable between the cooperating grooves 34 and 35, and 25 and 26, respectively. If, as shown in Figure 2, the insert ring 13 is disposed between the flanges 12 and 14, said pins 45 and 46 can also extend through the grooves 38 and 39 in said ring 13. Thus, the lock pins 45 and 46 can prevent relative rotation both between the removable flange 14 and the hub portion 24, and between the ring 13 and the hub portion 24.

The end plate 42, the removable flange 14 and the insert ring 13 are each provided with a pair of diametrically disposed, bolt openings 47 and 47a (Figure 4), 48 and 48a, and 49 and 49a (Figure 1), respectively, through which a pair of bolts 52 and 53 are slidably receivable for threaded reception and engagement by the threaded bolt openings 54 and 55 in the fixed flange 12. The bolts 52 and 53 serve principally to prevent axial movement of the removable flange 14 with respect to the fixed flange 12.

Alternate structure

An alternate form of pulley 59, shown in Figures 5 and 6, embodies some, but not necessarily all, of the features provided by the pulley structure shown in Figure 1. The alternate pulley 59 differs from the pulley 10 in that the reduced hub portion 60, upon which the removable flange 61 and insert ring 62 are slidably supported, is provided with a pair of elongated, integral ridges 63 and 64, which are diametrically disposed with respect to, and are parallel with, the axis of the hub portion 60 and extend radially from the periphery thereof. The ridges 63 and 64 are slidably and snugly receivable into semi-cylindrical grooves 65 and 66 in the insert ring 62 and removable flange 61, respectively, as shown in Figure 6. The bolts 68 extend through suitable bolt openings in the flange 61 and insert ring 62 for threadably engaging the flange 67 in a manner similar to that described above with respect to the pulley 10. In other respects, including the shape of the removable flange 61, the insert ring 62 and the fixed flange 67, the alternate pulley 59 resembles the pulley 10 shown in Figure 1. The presence of the integral ridges 63 and 64 eliminates the need for the lock member 15.

The multiple groove pulley 70 (Figure 7) is provided by modifying the structure of Figure 5. More specifically, the reduced hub 71 of pulley 70 is substantially longer than its counterpart 60 on pulley 59. Also, an intermediate removable flange 72 is mountable upon the reduced hub 71 between the fixed flange 73 and removable flange 74, which latter flanges may be identical to the fixed flange 67 and removable flange 61 of pulley 59. The intermediate flange 72 has conical surfaces 76 and 77 on opposite, axial faces thereof, which provide one wall each of a pair of adjacent pulley grooves for a double pulley embodying the substance of the invention. Removable insert rings 78 and 79 are mountable upon the reduced hub 71 between the flanges 72, 73 and 74 for the same purpose discussed above with respect to the ring 62 of pulley 59.

The fixed flange 12 and removable flange 14 may be fabricated, as shown herein, by casting from suitable materials, such as cast iron. However, it will be recog-

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nized that, particularly where the pulley has a relatively large outside diameter by comparison with the diameter of its hub, the outer portion or rim of the pulley, including the surfaces near the periphery thereof, may be fabricated by stamping from sheet material.

Operation

The pulley 10 can be assembled with the insert ring 13, as shown in Figure 2, or without the insert ring, as shown in Figure 4. Where said ring 13 is used, it is mounted upon the reduced hub portion 24 between the fixed and removable flanges.

The lock pins 45 and 46 on the lock member 15 which extend through the removable flange 14 and the insert ring 13, and into the fixed flange as described above, positively prevent rotation of said removable flange and said ring with respect to the hub 11, hence, with respect to the fixed flange 12. The removable flange 14 and ring 13 are held against axial movement with respect to the fixed flange 12 by means of the bolts 52 and 53, which can be quickly and easily removed from engagement with the bolt openings 54 and 55 in the fixed flange 12 for the purpose of removing the ring 13 and thereby changing the width of the pulley groove 23.

The pulley 10 can be assembled, as shown in Figure 4, without an insert ring 13, but otherwise the same as described above, for the purpose of use with, by way of example, an "A" type V-belt. When, in this embodiment, said pulley 10 is assembled with the insert ring 13, which widens the pulley groove 23, said pulley is adapted for use with a wider V-belt, such as a "B" type belt. In each case, the fixed and movable flanges 12 and 14 of said pulley 10 will be positively held firmly with respect to each other, both axially and rotationally. The presence of the lock pins 45 and 46, the cylindrical recesses 27 and 28, and the cooperating grooves in the hub portion 24 and in the insert ring 13 and removable flange 14 makes it possible to remove all of the shear load from the bolts 52 and 53. Thus, there is no chance of damaging the threads on the bolts 52 and 53, whereby it will make them difficult to remove for the purpose of converting the pulley 10 from one width to another.

The integral ridges 63 and 64 on the alternate pulley 59 serve substantially the same function as the lock pins 45 and 46 in that they remove all shear loads from the bolts 68. Thus, the alternate pulley 59 is assembled in substantially the same manner as the pulley 10. However, the ridges 63 and 64 eliminate the need for a lock member 15 (Figure 1). The structure 70 shown in Figure 7 is an adaptation of the principles, shown in the alternate structure 59 of Figure 5, to a double pulley.

Although particular, preferred embodiments of the invention have been disclosed hereinabove for illustrative purposes, it will be understood that variations or modifications thereof which lie within the scope of the invention, are fully contemplated unless specifically stated to the contrary in the appended claim.

I claim:

An expansible pulley, comprising: a hub having a co-axial, cylindrical shaft opening; an annular, co-axial flange fixed to, and extending radially from, said hub between, and spaced from, the axial ends thereof, said flange having two co-axial, axially spaced, peripheral surfaces of different diameters and a conical surface connecting said peripheral surfaces; a circular, movable flange, having a co-axial, cylindrical opening, through which that portion of said hub adjacent to the smaller peripheral surface on said fixed flange is snugly receivable, said movable flange having a conical surface substantially identical in shape and size to the conical surface on said fixed flange; an insert ring, having a co-axial opening through which said hub portion is slidably and

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snugly receivable, and having an outside diameter substantially equal to that of the smaller peripheral surface on said fixed flange; means defining cooperating, semi-cylindrical grooves in the periphery of said hub portion and the walls of the openings in said insert ring and said movable flange, the axes of said grooves being parallel with the axis of said hub, and said grooves being arranged to form cylindrical openings when said insert ring and said movable flange are mounted upon said hub portion; a lock member, having spaced, parallel and cylindrical pins extending from one side thereof and snugly, but slidably, receivable into the cylindrical open-

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ings created by said grooves; and screw means slidably receivable through said insert ring, said movable flange and said lock member, for preventing axial movement of said movable flange with respect to said integral flange.

References Cited in the file of this patent

UNITED STATES PATENTS

1,522,983	Strassner	Jan. 13, 1925
2,209,737	Livingston	July 30, 1940

FOREIGN PATENTS

11,911	Great Britain	May 25, 1904
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