June 1, 1965 A. A. BURRELL 3,186,247

SHEAVES

Filed March 11, 1963 2 Sheets-Sheet 1

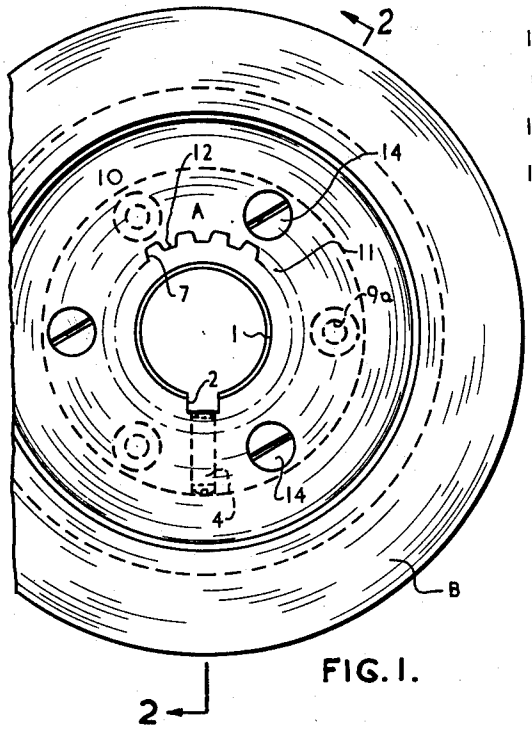

FIG. 1.

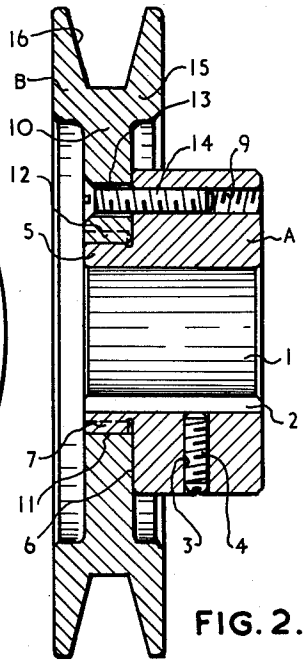

FIG. 2.

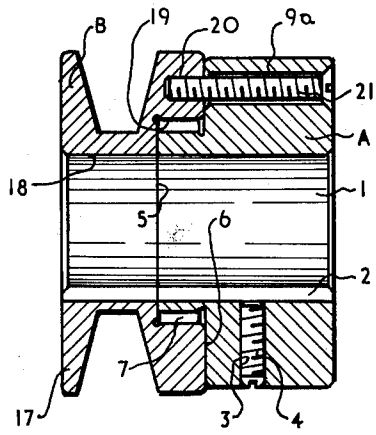

FIG. 4.

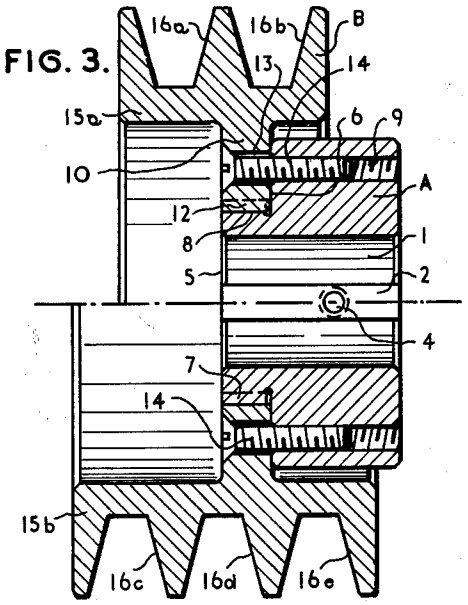

FIG. 3.

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SHEAVES

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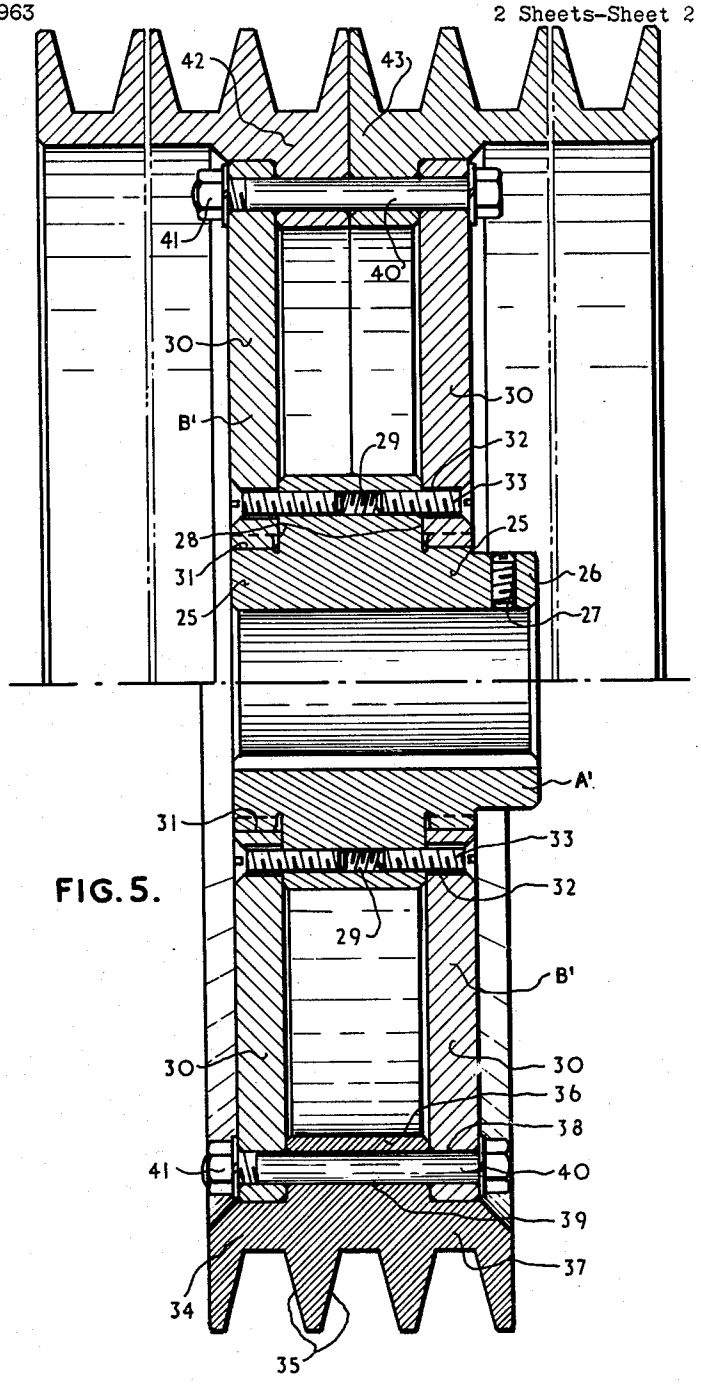

FIG. 5.

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SHEAVES

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4 Claims. (Cl. 74—230.4)

This is a continuation-in-part of application Serial No. 231,164, filed October 17, 1962.

My present invention relates to improvements in sheaves, appertaining particularly to a construction embodying a separable hub.

An object of the invention is to provide a sheave with a readily separable hub part on which various sheaves of one or more grooves and of the desired diameter may be interchangeably mounted whereby a complete range of sheaves can be made available from a relatively small stock of hubs of different sizes and sheaves of various diameters and rims having the desired number of belt grooves.

A further object of the invention is to provide a sheave of the type comprising separable or interchangeable parts in which the grooved rim-carrying part engages the hub in axially slidable relation and is secured thereto in self-aligning true radial position in a plane at right angles to the hub's axis.

A still further object of the invention is to provide a sheave of the character described, that is capable of assuming a wide variety of forms yet able with the minimum number of parts to meet all standard needs, the assembled sheave of whatever size or number of grooves being so constructed as to possess exceptional tension stability in all directions.

To the accomplishment of these and related objects as shall become apparent as the description proceeds, the invention resides in the construction, combination and arrangement of parts as shall be hereinafter more fully described, illustrated in the accompanying drawings, and pointed out in the claims hereunto appended.

The invention will be best understood and can be more clearly described when reference is had to the drawings forming a part of this disclosure wherein like characters indicate like parts throughout the several views.

In the drawings:

FIGURE 1 is a front elevation of a two-part sheave constructed according to this invention;

FIGURE 2 is a longitudinal section, as taken on the line 2—2 of FIGURE 1, looking in the direction indicated by the arrows;

FIGURE 3 is a composite section through a similarly constructed sheave, showing in the upper half a wheel part with a two-groove rim and in the lower half a wheel part with a three-groove rim;

FIGURE 4 is a section of a modified two-part sheave suitable for small sizes as when the groove bottom diameter is less than the exterior diameter of the hub; and

FIGURE 5 is another composite sectional view of a further modification, suitable for large diameter sheaves and showing in the upper half a complementary pair of multiple groove rims and in the lower half a one-piece three-groove rim.

As clearly set forth in my aforementioned co-pending application entitled "Sprocket Wheel," it is a basic feature of the present two-part sheave that the wheel part engages and is secured to the hub in such a way that it self-adjusts automatically into true radial position at right angles to the axis of the hub and is doubly held against relative rotative movement, providing unusual tension stability in all directions.

Subject to modifications and variants such as those specifically disclosed herein, the sheave consists of a hub member A and a wheel part B that for purposes of illustration are shown with sheave rims having one or more belt-accommodating grooves.

The hub is of generally cylindrical form of suitable size, with its opposite ends parallel and flat and having the usual axial bore 1 with longitudinally extending radial key way slot 2 and a threaded radial bore 3 for a set screw 4 when desired. One end 5 of the hub is of reduced exterior diameter forming an abrupt flat radial shoulder 6 of substantial area and lying in a plane at right angles to the axis of the hub. This reduced diameter concentric hub end 5 has coarse pitch teeth 7 about its entire periphery that extend longitudinally of the hub and substantially parallel the axis thereof, though in some cases it may be found desirable to provide the teeth with a slight taper, and a suitable undercut or chip clearance recess 8 at the inner end thereof. Approximately midway of the height of the shoulder 6, a half dozen circumferentially spaced apertures are provided running parallel with the axis of the hub, three of these are interiorly threaded and designated 9 and the other three, alternately spaced therewith are of slightly larger bore and designated 9*a*, being designed to freely pass a machine screw such as would engage the first mentioned threaded bores.

The wheel part B will be seen in FIGURES 1, 2 and 3 to consist of a relatively thin flat disk 10 having a central bore 11 of a size to fit on the reduced diameter end 5 of the hub A and interiorly provided with teeth 12 substantially paralleling the axis, or slightly tapered, to correspond with and closely engage the complete circle of teeth 7 on the hub and preclude any possible relative rotative movement between the disk and hub. It will be noted that the thickness of the wheel disk 10 is here shown as preferably the same as the length of the coaxial reduced diameter end portion 5 of the hub A so that when pressed thereon, the outer face of the wheel disk 10 lies in the same plane as the end of the hub as the inner face of the disk engages the hub shoulder 6. Three circumferentially spaced bores 13 with their outer ends countersunk extend through the disk 10 for registry with the three interiorly threaded apertures 9 extending in from the hub shoulder 6 and through these bores 13, machine screws 14 pass to engage the threaded apertures 9, serving to draw the disk 10 on to the hub end and secure it in tight engagement with the shoulder 6. Thus the disk 10 is mounted on the hub A in self-aligning true radial position at right angles to the axis of the hub, fastened additionally in non-rotative relation, and secured against accidental longitudinal or axial movement. This structure and assembly of a two-part wheel results in the provision of a superior product that allows of ready interchangeability of components and all the advantages deriving therefrom without sacrificing the desired strength and assured true setting heretofore normally associated only with solid or one-piece wheels.

Sheaves may have flat rims when used with flat belts but the sheaves shown in this disclosure are designed for use with conventional V-belts that are in general use. Sometimes a sheave with multiple V-belt grooves is required and so I provide a range of sheaves B of different diameters and with rims having one, two, three or more V-belt grooves. In each case the wheel disk part 10 may be as already described but in FIGURES 1 and 2, I show a sheave in which the rim 15 of the disk 10 is like the crosshead of a T, being widened equally on each side of the disk and provided with one circumferential V-belt groove 16. In FIGURE 3, I show alternative rims on the wheel disk 10, the rim 15*a* on the upper half of the view having two circumferential V-belt grooves 16*a* and 16*b* and the rim 15*b* shown on the lower half of the view having three circumferential V-belt grooves 16*c*, 16*d* and 16*e*; the rims 15*a* and 15*b* being both substantially wider than the disk 10 but are not necessarily extended equally on

opposite sides. It will be noted that rims, be it the single groove rim **15**, double groove rim **15***a* or the triple groove rim **15***b*, are all formed integral with the wheel disk.

A small sized sheave is shown in FIGURE 4, one in which the diameter of the groove bottom is less than the exterior diameter of the hub A; actually less than the reduced diameter toothed end **5**. Here the wheel part B has a body **17** that extends from the hub A longitudinally of the axis, with a coaxial bore **18** that registers with the hub bore **1**. To accommodate the externally toothed reduced diameter end **5** of the hub, it has a coaxial pocket **19** on one side and three circumferentially spaced threaded bores **20** extending in from the same side for registry with the hub bores **9***a*. Machine screws **21** pass through the hub bores **9***a* and engage the threaded bores **20**. The pocket **19** may be toothed to engage the hub teeth **7** but in view of the meagre torque requirements of such a small diameter sheave, the teeth may be dispensed with and the three mounting screws **21** alone relied on.

In larger sheaves, say those with a diameter in excess of 7 inches, I deem it advisable to form the wheel part of two spaced wheel disks for greater strength and stability, accordingly in FIGURE 5 such a modification is shown. The hub A' has a reduced diameter toothed portion **25** at each end and on one end there is an extension **26** of smaller exterior diameter for the set screw **27**. At each end there is the flat radial shoulder **28** of substantial area lying in a plane at right angles to the axis of the hub, and parallel to each other, and through the hub, intermediate of the height of the shoulders **28** circumferentially spaced threaded apertures **29** extend. An identical pair of wheel disks **30** each have a circumferentially toothed central bore **31** to engage the toothed reduced diameter ends of the hub and spaced countersunk apertures **32** to pass machine screws **33** that engage the threaded apertures **29** in the hub. Thus are the spaced pair of wheel disks **30** applied and secured to the doubled shouldered hub A' in the same true and dependable manner without mitigating against their easy interchangeability as in the previously described forms of separable sheaves, all of which I term "Adapta Groove Sheaves." The rim **34** with the desired number of V-belt grooves **35** is formed as a separate ring, here shown in the lower half of FIGURE 5 as T-shaped in cross section with the stem part **36** disposed between the outer portions of the wheel disks **30** and the cross head **37** extending over the peripheries of the disks. A circle of spaced apertures **38** near the periphery of each disk and registering apertures **39** in the stem **36** of the rim accommodate transverse bolts **40** with cooperating nuts **41** that tightly secure the grooved sheave rim **34** on the wheel.

In the upper half of FIGURE 5, there is shown a multi-groove sheave rim composed of two laterally separable sections **42** and **43** that together constitutes a T-shaped rim as just described, each of the sections providing one-half of the stem that is split down the center and these two sections are mounted on the wheel disks **30** and secured to each other by the transverse bolts **40** and nuts **41** as already described.

Throughout the several sheaves illustrated, the engaging teeth on the hub portion that projects beyond the flat end shoulder and those on the circumference of the central opening in the wheel disk may be such involute, straight or tapered teeth as found most desirable, having regard to the material of which the unit is constructed and the use to which it will be put; the kind and coarseness of the teeth depending in part on the torque requirements and the structural materials being chosen from such suitable conventional materials as cast iron or steel, suitable light-weight metals and alloys, synthetics of wood and plastic materials and the like.

Essentially, the structure will be found particularly advantageous in allowing of the easy interchangeability of

components, greatly reducing the number of parts required for stocking to provide a complete assortment, whilst providing a sturdy self-aligning wheel which, especially in the larger diameters employing the spaced pair of parallel disks, affords unusual versatility of end product of exceptional quality.

From the foregoing description taken in connection with the accompanying drawings, it will be manifest that a sheave of extensive utility and possessing unique qualifications is provided, but as a wide variety of forms may be constructed within the scope of the appended claims, without departing from the spirit or scope thereof, it is intended that all matters contained in the said accompanying specification and drawings shall be interpreted as illustrative and not in a limitative or restrictive sense.

What is claimed as new is:

1. A sheave comprising a hub having at one end a flat radial shoulder of substantial area, lying in a plane at right angles to the axis of the hub, with a toothed coaxial projection of reduced diameter extending therefrom; a wheel disk having a central opening with a toothed circumference for axially sliding fit on the toothed projection on the hub; attaching means threaded into said hub tightly securing said disk to the hub shoulder in self-aligning true radial position at right angles to the axis of the hub; and a rim like the crosshead of a T on the periphery of said disk having at least one circumferential belt groove.

2. A sheave comprising a hub having flat radial shoulders of suitable area near opposite ends lying in planes at right angles to the axis of the hub and parallel to each other and a toothed coaxial projection of reduced diameter extending from each shouldered end; a pair of similar wheel disks each having a central opening with a toothed circumference for axially sliding fit on the respective toothed projections of the hub; means tightly securing said disks to the respective shoulders in spaced, pareilel, self-aligning true radial position at right angles to the axis of the hub; and a grooved rim mounted on the periphery of said wheel disks in non-rotatable relation.

3. A sheave comprising a hub having flat radial shoulders of substantial area near opposite ends lying in planes at right angles to the axis of the hub and parallel to each other and a toothed coaxial projection of reduced diameter extending from each shouldered end; a pair of similar wheel disks each having a central opening with a toothed circumference for axially sliding fit on the respective toothed projections of the hub; means tightly securing said disks to the respective shoulders in spaced, parallel, self-aligning true radial position at right angles to the axis of the hub; a grooved rim mounted on the periphery of said wheel disks; and circumferentially spaced fastening means securing said spaced wheel disks and rim together near the periphery of said disks.

4. A sheave having interchangeable parts comprising a hub, a pair of axially spaced wheel disks and a grooved rim; wherein the disks are demountably applied to opposite ends of the hub and secured thereto in self-aligning true radial position at right angles to the axis of the hub; and said rim surrounds the peripheries of said spaced disks with an intermediate stem part disposed between the disks.

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