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PITCH DIAMETER INDICATOR FOR ADJUSTABLE SHEAVES

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Fig. 1. 2←

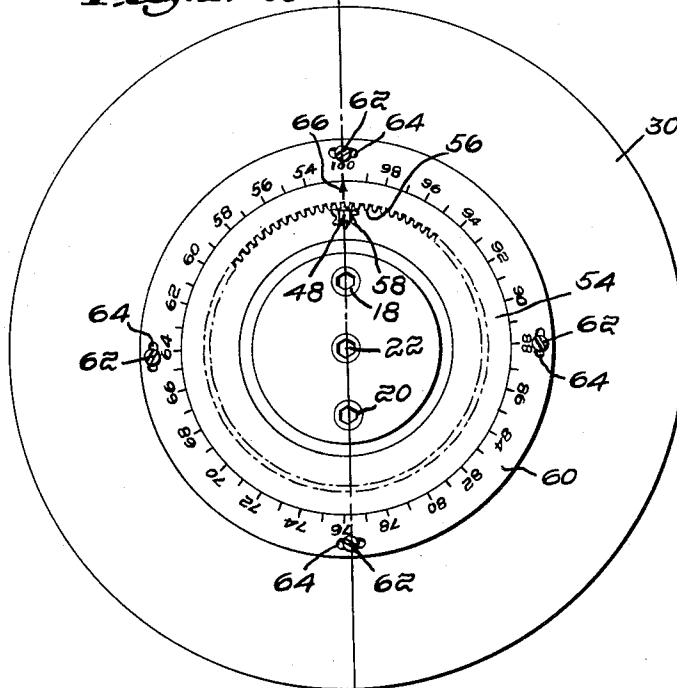


Fig. 2. 2←

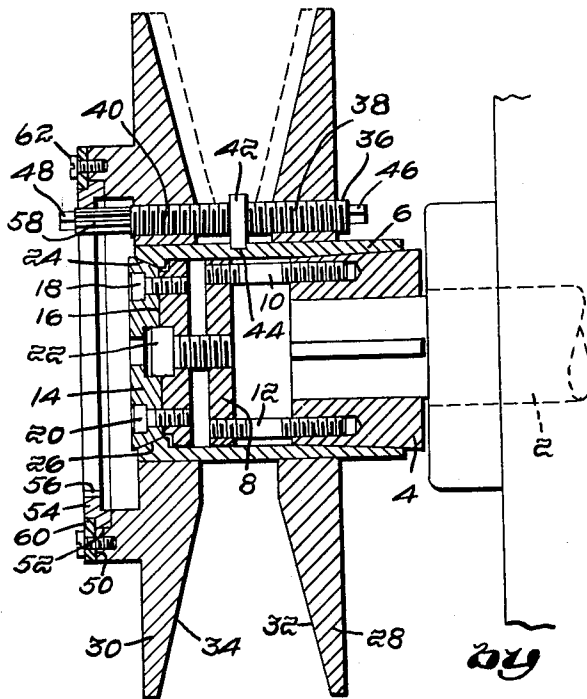
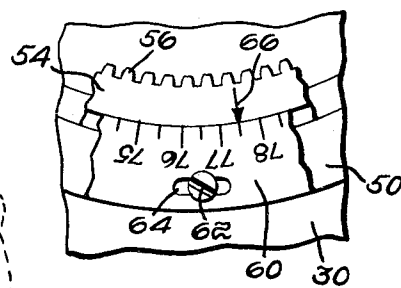


Fig. 3.



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PITCH DIAMETER INDICATOR FOR ADJUSTABLE SHEAVES

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12 Claims. (Cl. 74—230.17)

This invention relates to adjustable sheaves or pulleys and is particularly concerned with an adjustable sheave incorporating therein means for indicating the pitch diameter to which the sheave at any time may be adjusted.

The adjustable sheave with which this invention is used is of that type having interior V-shaped walls with one or both sides of the sheave being movable toward or away from the other.

Adjustable sheaves of the type in question utilize V-belts in transmitting power from the driving to the driven sheave. The V of the sheave in which the belt fits is made to a standard angularity and the V-belts have their engaging wall formed to the same angle so that engagement between the walls of the sheave and the corresponding surfaces of the V-belts is a maximum.

In adjusting a sheave of the type generally shown in this invention, it is desirable to know the effective pitch diameter of any setting of the walls of the sheave when used with a V-belt of known cross-sectional dimensions. If such knowledge is available it then becomes possible to make prompt and accurate adjustment of the adjustable driving sheave to produce any desired speed of the constant diameter driven sheave. While the present invention will ordinarily be used on a single or multiple belt adjustable driving sheave which drives a non-adjustable driven sheave, it will be understood that the invention can also be used in other installations where both the driving and driven sheaves are adjustable or where only the driven sheave is adjustable.

It will be appreciated by those familiar with this art that when the sheave sides are brought as close together as possible the effective pitch diameter will be a maximum. As the sheave sides are gradually moved apart, the V-belt will move closer to the shaft with a corresponding decrease in effective pitch diameter. When the sheave sides are at a maximum distance apart, while still engaging the V-belt, the effective pitch diameter will be a minimum.

The invention contemplates the addition of an indicating device to an adjustable sheave which device will give a direct reading of the effective pitch diameter at any given setting of the sheave sides when used with a V-belt designed appropriately for the sheave in question.

The invention will be more clearly understood as the description proceeds with the aid of the accompanying drawings in which

Fig. 1 is a side elevation of a sheave incorporating the indicator of the present invention.

Fig. 2 is a vertical section on the line 2—2 of Fig. 1.

Fig. 3 is a fragmentary enlarged side elevation of a portion of Fig. 1 showing the sheave adjusted to another effective pitch diameter.

Referring now to the figures, the sheave shaft is shown at 2. To this shaft is secured a tapered sleeve 4 over which fits a correspondingly interiorly tapered sleeve 6. A plate 8 is secured by screws 10 and 12 to the outer end of shaft 2 and sleeve 4. Two other plates 14 and 16 are secured together by screws 18 and 20 and these two joined plates are arranged to be drawn by screw 22, which is

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threaded into plate 8, toward plate 8 as screw 22 may be rotated in a tightening direction. Plate 16 has a bevelled exterior 24 which engages with a corresponding interior bevel 26 at the outer end of sleeve 6. It is believed apparent that if plates 14 and 16 are drawn toward plate 8 by screw 22, sleeve 6 will thereby be forced tightly against sleeve 4 so that these two sleeves will then be secured against rotation. In this way sleeve 6 which is cylindrical on its exterior provides a surface (concentric with shaft 2) on which the adjustable portions of the sheave are mounted.

The sheave comprises two adjustable side plates 28 and 30 having oppositely disposed conical interior surfaces 32 and 34 which when viewed in section as in Fig. 2, produce the well-known V section within which the V-belt fits. The sheave sides 28 and 30 are keyed to sleeve 6, the key and keyway, however, not being shown in the present figures as this is standard procedure and well understood in the art.

Means is provided for moving the sheave sides 28 and 30 toward or away from each other in the form of a screw 36 which is in threaded engagement with the sides 28 and 30. The threads 38 are left handed while the threads 40 are right handed. A collar 42 is located at the middle point of screw 36 with the inner part of its circumference fitting in a corresponding groove 44. The outer ends of the screw as at 46 and 48 are formed to render them engageable by a wrench or other tool whereby the screw 36 may be rotated to move the sheave sides 28 and 30 toward or away from each other thereby to provide the adjustment.

The indicating means is constructed as follows: Sheave wall 30 has a circular flange 50 extending therefrom which is cut away as at 52 and within the groove so formed is positioned an annular member 54 having a cross-section as shown in Fig. 2. This annular member 54 has teeth 56 about its interior which engage with corresponding pinion teeth 58 on the left hand end of screw 36 as seen in Fig. 2. These teeth are also shown in Fig. 1. Annular member 54 is held in position by an annular plate 60 which is secured to the flange 50 by screws 62. Elongated openings 64 are provided in plate 60 so that limited angular adjustment of plate 60 may be made with respect to the sheave side 30. The dimensions of the various parts just described are such that the annular member 54 may be rotated freely with respect to sheave side 30 whenever screw 36 is rotated. That is to say, the engagement of teeth 58 with the teeth 56 is such that when the small pinion 58 is rotated upon the turning of screw 36, annular member 54 will be moved angularly with respect to sheave side 30.

The relationship of the number of teeth 58 on screw 36 to the number of teeth 56 on the interior of annular member 54 is such that when screw 36 is rotated to move the pulley sides 28 and 30 from a position of maximum pitch diameter to a position of minimum diameter, annular member 54 will have rotated less than one revolution. By applying appropriate markings to the annular flange 60 and by placing a pointer on the annular member 54 or vice versa, it will be possible to read directly the effective pitch diameter of the sheave at any given setting.

The markings shown on annular flange 60, which are illustrative only, are laid out for a sheave in which the effective pitch diameter varies from a maximum of ten inches to a minimum of 5.4 inches. When the pointer 66 on the annular member 54 is positioned at 100 the spacing between the pulley sides 28 and 30 will be such that they are at their maximum position of closeness so that the V-belt will be close to the outer periphery with an effective pitch diameter of ten inches. When, however, the screw 36 is thereafter turned to the right as viewed

in Fig. 1, the sheave sides will be moved apart and the annular member 54 and pointer 66 will be moved clockwise with respect to the marked plate 60. If the pointer 66 should be stopped under the number 92 shown in Fig. 1 on plate 60, for example, it would mean that the pulley sides 28 and 30 had been moved apart an amount which would reduce the effective pitch diameter of the V-belt when located at this new position to 9.2 inches. To avoid congestion the odd numbers 99, 97, 95, 93, etc. have been omitted from Fig. 1 from their appropriate places on plate 60.

On referring to Fig. 3, it will be seen that the pointer 66 on annular member 54 has been moved clockwise with respect to plate 60 a sufficient angular distance to bring the pointer to 77½ on the scale. This means then that the pulley sides 28 and 30 have been moved apart sufficiently to reduce the effect of pitch diameter to 7.75 inches.

Thus, when the pointer 66 finally reaches the number 54 on plate 60 through further rotation of screw 36, the effective pitch diameter will have been reduced to 5.4 inches which is the minimum possible.

It is thought obvious from the foregoing that the ratio of the number of teeth 53 to the number of teeth 56 can always be controlled so that the annular member 54 carrying the pointer 66 will never make more than one rotation from maximum to minimum position, and accordingly, it will always be possible to calibrate plate 60 for all pitch diameters between maximum and minimum without any overlap.

While the invention has been shown as used with a single sheave, it is apparent that it will be equally effective with multiple sheaves, the spacing between the pairs of sides being controlled by a single screw. Of course the pitch of the threads on the screw must be known as well as the angularity of the conical portions of the sheave sides and the dimensions of the V-belt. These factors, however, are all standard in the adjustable sheave industry and constitute no part of the invention except as the elements are hereinafter claimed.

It is my intention to cover all changes and modifications of the example of the invention herein chosen for purposes of the disclosure which do not constitute departures from the spirit and scope of the invention.

I claim:

1. A sheave for use with a V-belt having adjustable sides movable toward and away from each other, an adjusting screw for moving said sides, a movable element mounted on the side of said sheave, means on said screw which upon rotation of said screw will cause proportional movement of said element, the ratio of rotation of said screw to movement of said element being such that when said sheave sides are moved from maximum to minimum effective pitch diameter position, said element will move correspondingly with respect to said sheave, and cooperating markings on said element and the side of said sheave calibrated to give a direct reading of the effective pitch diameter at any setting of said sheave sides.

2. The sheave construction set forth in claim 1 in which the said markings on said sheave are on a plate secured to the side of said sheave.

3. The sheave construction set forth in claim 1 in which the cooperating means between said screw and said movable element are teeth on said element and a corresponding pinion on said screw.

4. The sheave construction set forth in claim 1 in which the markings on said sheave are applied to a circular member secured to the side of said sheave, the said movable element being concentric with said circular member and positioned interiorly thereof and the means for moving said movable element with respect to said circular member comprises a pinion on said screw in engagement with teeth on the interior of said movable element.

5. A sheave for use with a V-belt having adjustable sides movable toward and away from each other, an ad-

justing screw for moving said sides, an annular movable element mounted on the sides of said sheave and concentric with the sheave shaft, means on said screw which upon rotation of said screw will cause proportional rotation of said annular element with respect to said sheave, the ratio of rotation of said screw to movement of said annular element being such that when said sheave sides are moved from maximum to minimum effective pitch diameter position, said annular element will rotate with respect to said sheave not more than 360° and cooperating markings on said annular element and the side of said sheave calibrated to give a direct reading of the effective pitch diameter at any setting of said sheave sides.

6. The sheave construction set forth in claim 5 in which the said markings on the said sheave are on an annular plate secured to the side of said sheave, and said plate being in partial overlying position over said movable element to act as securing means therefor.

7. The sheave construction set forth in claim 5 in which the cooperating means between said screw and said annular movable element are internal teeth on said element and a corresponding pinion on said screw.

8. The sheave construction set forth in claim 5 in which the markings on said sheave are applied to a circular member secured to the side of said sheave, the said annular movable element being concentric with the said circular member and positioned interiorly thereof and the means for moving said annular movable element with respect to said circular member comprises a pinion on said screw in engagement with teeth on the interior of said annular movable element.

9. A sheave for use with a V-belt having adjustable sides movable toward and away from each other, an adjusting screw for moving said sides toward and away from each other, and means carried by said sheave and rotatable relative thereto for indicating directly the effective pitch diameter at any setting of said sheave sides, said indicating means being operatively associated with and responsive to said adjusting screw.

10. A sheave for use with a V-belt comprising a sleeve adapted to be secured to a drive shaft, a second sleeve concentric with said first sleeve, means connecting said first and second sleeves locking said second sleeve to said first sleeve, first and second sheave side plates having oppositely disposed conical interior surfaces forming a V-section to accommodate a V-belt, said sheave side plates being adjustably mounted on said second sleeve, an adjusting screw for moving said side plates toward and away from each other, said adjusting screw having a collar fitting into a peripheral groove in said second sleeve, whereby said screw is rotatable but restrained against axial movement, a movable element mounted on one of said sheave side plates, means on said adjusting screw for causing proportional movement of said element relative to the side of said sheave when said screw is rotated, and cooperating markings on said movable element and said one sheave side plate calibrated to give a direct reading of the effective pitch diameter at any setting of said sheave side plates.

11. A sheave for use with a V-belt comprising two sides relatively movable toward and away from each other, an adjusting screw for varying the position of one of said sides relative to the other, an element rotatably mounted on one of the said sides, means on said screw which upon rotation of said screw will cause rotational movement of said element, the ratio of rotation of said screw to movement of said element being such that when the relative position of said sheave sides is varied, by rotation of the adjusting screw, from maximum to minimum pitch diameter position, said element will move correspondingly with respect to said one sheave side on which said element is mounted, and cooperating markings on said element and the said one sheave side, said markings calibrated to give a direct reading of the effective pitch diameter at any setting of the said sheave sides.

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12. A sheave for use with a V-belt comprising two sides relatively movable toward and away from each other, an adjusting screw for varying the position of one of said sides relative to the other, a rotatable annular element mounted on one of the said sides and concentric with the sheave shaft, means on said screw which upon rotation of said screw will cause rotational movement of said annular element, the ratio of rotation of said screw to movement of said annular element being such that when the relative position of said sheave sides is varied from maximum to minimum effective pitch diameter position, said annular element will rotate with respect to said

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sheave side on which it is mounted not more than 360° , and cooperating markings on said element and on the said sheave side on which said element is mounted calibrated to give a direct reading of the effective pitch diameter at any setting of said sheave sides.

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