

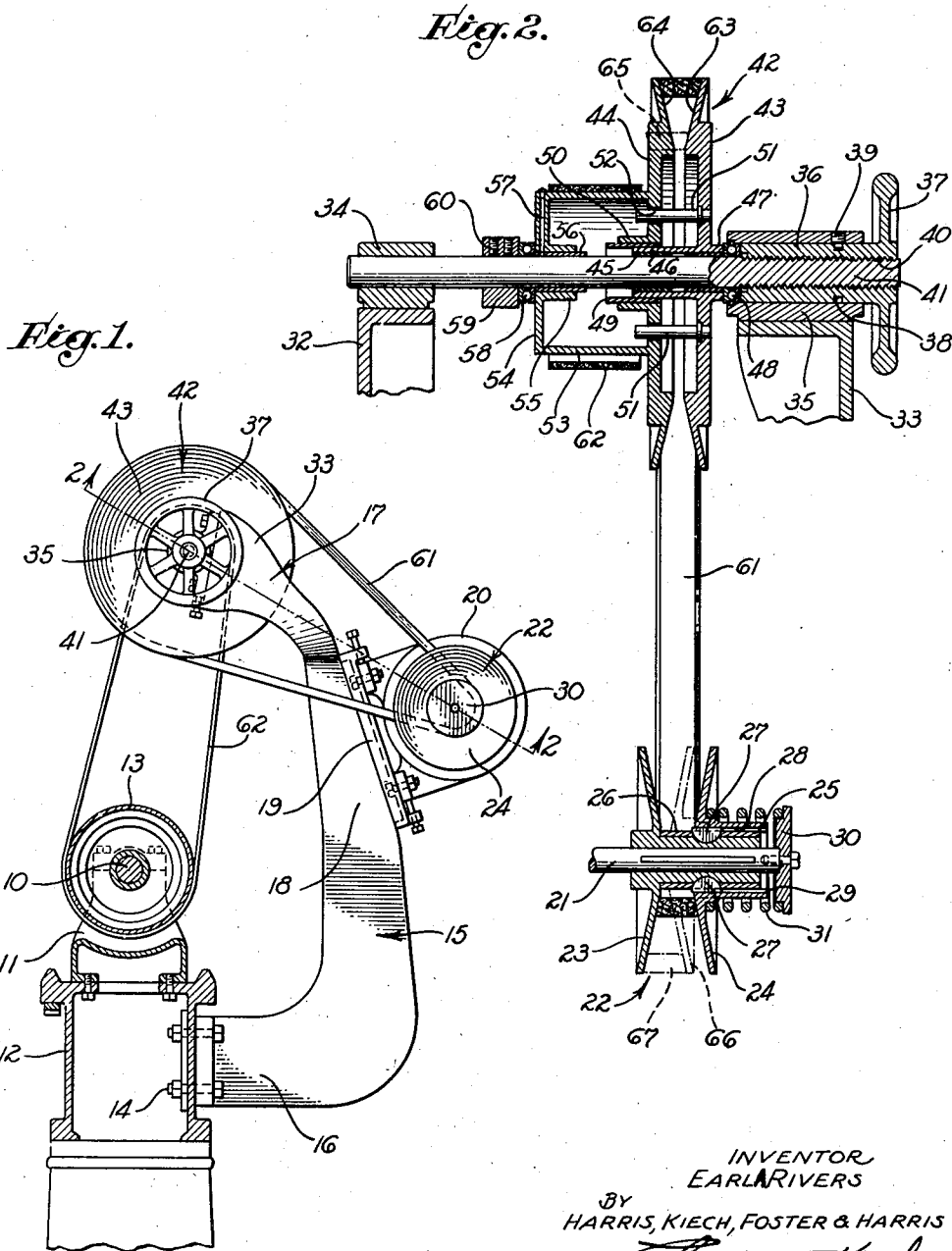
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VARIABLE-SPEED TRANSMISSION DEVICE

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VARIABLE-SPEED TRANSMISSION DEVICE

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My invention relates to variable-speed transmission devices, and more particularly to variable-speed devices employing variable-diameter pulleys of the V-type.

A primary object of my invention is to provide a variable-speed transmission device which is particularly adapted by its construction for use in connection with a lathe or other device to be driven, without interfering with the operation of the device to be driven, and at the same time having its controls readily accessible. I prefer to accomplish this by providing a roughly U-shaped frame for a support for the transmission device, so as to position the transmission device in a convenient position relative to the device to be driven.

Another object of my invention is to provide a novel power take-off for a variable-diameter pulley so as to permit the use of a flat belt for connecting the variable-speed transmission with the device to be driven.

Other objects and advantages will be evident from the drawing and from the following specification.

In the drawing, which is for the purpose of illustration only:

Fig. 1 is an elevational view, partly in section, showing my invention connected to a device to be driven.

Fig. 2 is a cross-sectional view taken on the line 2-2 of Fig. 1.

Referring to the drawing, I show a power receiving shaft 10 which, as shown, is disposed horizontally, and may supply the motive power for a lathe or other article of machinery (not shown). The power receiving shaft 10 is rotatably supported by a suitable base member 11 which is in turn rigidly secured to a suitable frame 12. Fixed on the power receiving shaft 10 is a flat-faced take-off pulley 13 of the type well known in the art.

Also secured to the frame 12, as by bolts 14 or otherwise, is a supporting frame 15, which is roughly of U-shape, having a base leg 16 and an overhang leg 17 at the upper end thereof, the parts of the supporting frame preferably being made in a one-piece construction so as to insure rigidity of design, although it will be understood that the supporting frame may be made in separate parts if so desired. The supporting frame also has a central portion 18.

Secured to the central portion 18 of the supporting frame 15 is a motor base 19 having an electric motor 20 mounted thereon in any manner well known in the art. The electric motor

is provided with a drive shaft 21, as best shown in Fig. 2, on which is mounted a variable-diameter pulley 22 of the V-type. The variable-diameter pulley 22 is comprised of a fixed pulley flange 23, which is rigidly secured to the drive shaft 21, and an axially movable pulley flange 24, which is adapted to be axially moved relative to the fixed flange 23 to vary the effective diameter of the pulley 22. As will be noted, the fixed pulley flange 23 is provided with an integral hub 25 on which is disposed a sleeve 26, there being keys 27 rigidly holding the sleeve 26 to the hub 25, the outer ends of which extend into keyways 28 formed in a hub 29 secured to or formed integrally with the axially movable pulley flange 24. The axially movable pulley flange 24 may thus move axially relative to the fixed pulley flange 23, but due to the co-action of the keys 27 with the keyways 28 may not rotate relative thereto. The sleeve 26 may be made of bearing material so as to provide a suitable bearing surface for the axial movement of the axially movable pulley flange 24. Secured to the outer end of the drive shaft 21 is a circular plate 30 adapted to center a compression spring 31 held between the circular plate and the axially movable pulley flange 24. The spring 31 is under considerable compression tending to normally urge the movable pulley flange 24 toward the fixed flange 23.

The overhang leg 17 is made in the form of a yoke having two arms 32 and 33, as best shown in Fig. 2. Secured to the outer end of the arm 32 is a bearing member 34, and secured to the outer end of the arm 33 is a bearing element 35, the latter journalling a sleeve member 36 to the outer end of which is fixed a control wheel 37. The sleeve member 36 is provided with an annular groove 38 into which extends a set screw 39 carried by the bearing element 35. By reason of this construction, the sleeve member 36 may be rotated by the control wheel 37 relative to the bearing element 35 but may not be moved axially relative thereto. The sleeve member 36 is internally threaded at 40 to receive the threaded end of a shaft 41, the other end of which is journaled in the bearing member 34.

Carried on the shaft 41 is a driven pulley 42 of the variable-diameter V-type having a relatively fixed flange 43 and a relatively movable flange 44, the latter being relatively movable axially relative to the former. Carried on the shaft 41 is a first bearing sleeve 45 on which is journaled a hub 46 of the fixed flange 43, the hub having a shoulder 47 which engages a thrust

bearing 48 disposed between it and the inner end of the member 36. Carried on the hub 46 is a second bearing sleeve 49 on which is journaled a hub 50 formed integrally with the movable flange 44. Rigidly connected to the fixed flange 43 are studs 51 which extend through openings 52 in the movable flange 44 so as to permit axial movement of the movable flange relative to the fixed flange but preventing relative rotation therebetween. Also formed integrally with the movable flange 44 is a power delivery pulley 53, which is of the flat face type, having an end wall 54 provided with a hub 55 journaled on a third bearing sleeve 56 carried on the shaft 41. The end wall 54 is provided with a lubrication passage 57 through which oil or other lubricant may be fed into the device to lubricate the bearing surfaces thereof. The end wall 54 is also engaged by a thrust bearing 58 held in position by a nut 59 rigidly secured to the shaft 41 by suitable set screws 60. It will thus be noted that the driven pulley 42 may rotate relative to the shaft 41. The driven pulley 42 is operatively connected with the drive pulley 22 by a V-belt 61, and the power delivery pulley 53 is operatively connected with the take-off pulley 13 by a flat belt 62.

When the device is assembled, as best shown in Fig. 1, it is to be noted that the driven pulley 42 is positioned substantially vertically over the take-off pulley 13, and that the entire variable-speed transmission device is positioned above and out of the way of an operator using the device to which the power receiving shaft 10 is connected. This particular location of the units of the device is important in that it provides full accessibility to the control wheel 37 of the transmission device, but at the same time removes the same from the immediate vicinity of the device to be driven by the power receiving shaft 10.

In operation, the parts when positioned as shown in Fig. 2 provide a maximum effective diameter of the driven pulley 42 and a minimum effective diameter of the drive pulley 22. Rotation of the drive shaft 21 is transmitted through the pulley 22, the belt 61, and the driven pulley 42 to the power delivery pulley 53, which in turn transmits rotation through the belt 62 to the take-off pulley 13. By rotating the control wheel 37, the shaft 41 may be moved axially, carrying with it the nut 59, and if it is desired to reduce the effective diameter of the driven pulley 42, the control handle is rotated so as to move the shaft 41 and the nut 59 to the left from the position shown in Fig. 2. As the nut 59 is moved to the left, the pressure exerted by the nut through the thrust bearing 58 on the end wall 54 is reduced, and consequently the force tending to hold the flanges 43 and 44 together is likewise reduced, and the belt 61 tends to move inwardly between the pulley flanges to force them apart. This movement of the belt is assisted by the compression spring 31 of the drive pulley 22, which at all times tends to force the movable flange 24 thereof toward the fixed flange 23 to force the belt outwardly from the center of the drive pulley to increase its effective diameter. By continued rotation of the control wheel 37 and the resultant axial movement of the shaft 41 and the nut 59 thereon, the pulley flanges 43 and 44 may separate to such an extent that the belt 61 moves inwardly on the sloping opposed faces 63 and 64 thereof to approximately the position shown by dotted lines 65 in Fig. 2, in

which the driven pulley 42 is adjusted to its minimum effective diameter. At the same time, the compression spring 31 of the drive pulley 22 will force the movable flange 24 thereof axially toward the fixed flange 23 to approximately the position shown by dotted lines 66 of Fig. 2, to force the belt 61 outwardly between the flanges to the position approximately shown in dotted lines 67, in which the drive pulley 22 is adjusted to its maximum diameter. Obviously, the pulleys 22 and 42 may be adjusted to any intermediate position by predetermined rotation of the control wheel 37. As will be understood, as the movable flange 44 of the driven pulley 42 moves axially, the power delivery pulley 53 will move with it, but by reason of the flat face thereof power transmission through the belt 62 to the take-off pulley 13 will not be effected. By making the power delivery pulley 53 an integral part of the movable pulley flange 44, the construction is simplified and cheapened, which is an important feature of the invention.

Although I have shown and described a preferred form of my invention, it is to be understood that certain parts thereof may be modified and changed without departing from the spirit of my invention, and I do not intend to be limited to the construction shown but intend to have the benefit of the full scope of the following claims.

I claim as my invention:

1. In a variable-speed transmission device, the combination of: a drive pulley of the variable-diameter V-type having a pair of flanges one of which is axially movable to vary the effective diameter of said drive pulley; means for rotatably mounting said drive pulley; a driven pulley of the variable-diameter V-type having a pair of flanges one of which is axially movable to vary the effective diameter of said driven pulley; means for rotatably mounting said driven pulley; a flat-faced pulley mounted rigidly on the movable flange of said driven pulley and adapted to receive a flat power transmitting belt thereon, said flat-faced pulley being axially movable in response to axial movement of said movable flange; belt means operatively connecting said drive pulley and said driven pulley; and adjustment means for varying the effective diameter of one of said pulleys.

2. In a variable-speed transmission device, the combination of: a drive pulley of the variable-diameter V-type having a pair of flanges one of which is axially movable to vary the effective diameter of said drive pulley; means for rotatably mounting said drive pulley; a driven pulley of the variable-diameter V-type having a pair of flanges one of which is axially movable to vary the effective diameter of said driven pulley; means for rotatably mounting said driven pulley; a flat-faced pulley mounted rigidly on and formed integrally with the movable flange of said driven pulley and adapted to receive a flat power transmitting belt thereon, said flat-faced pulley being axially movable in response to axial movement of said movable flange; belt means operatively connecting said drive pulley and said driven pulley; and adjustment means for varying the effective diameter of one of said pulleys.

3. In a variable-speed transmission device, the combination of: a drive pulley of the variable-diameter V-type having a pair of flanges one of which is axially movable relative to the other to vary the effective diameter of said drive pulley; means for rotatably mounting said drive pulley;

an axially movable control rod; a driven pulley of the variable-diameter V-type having a pair of flanges one of which is axially movable relative to the other to change the effective diameter of said driven pulley; means for rotatably mounting said driven pulley on said control rod; a flat-faced pulley rigidly connected with said movable flange of said driven pulley and adapted to receive a flat power transmitting belt thereon, said flat-faced pulley being axially movable in response to axial movement of said movable flange; stop means on said control rod for limiting the axial movement of said movable flange of said driven pulley in a direction away from the other flange thereof; belt means operatively connecting said pulleys; and means for moving said control rod axially so as to move said stop means to vary the effective diameter of said driven pulley.

4. In a variable-speed transmission device, the combination of: a drive pulley of the variable-diameter V-type having a pair of flanges one of which is axially movable relative to the other to vary the effective diameter of said drive pulley; spring means normally urging said movable flange of said drive pulley axially toward said other flange thereof; means for rotatably mounting said drive pulley; an axially movable control rod; a driven pulley of the variable-diameter V-type having a first flange and a second flange, said first flange being axially movable relative to said second flange to change the effective diameter of said driven pulley; thrust bearing means adapted to limit axial movement of said second flange of said driven pulley away from said first flange thereof; means for rotatably mounting said driven pulley on said control rod; a flat-faced pulley rigidly connected with said first flange of said driven pulley and adapted to receive a flat power transmitting belt thereon, said flat-faced pulley being axially movable in response to axial movement of said first flange; stop means on said control rod for limiting the axial movement of said first flange of said driven pulley in a direction away from the second flange thereof, including a thrust bearing adapted to engage a portion of said first flange; belt means operatively connecting said pulleys; and means for moving said control rod axially so as to move said stop means to vary the effective diameter of said driven pulley.

5. In a variable-speed transmission device, the combination of: a drive pulley of the variable-diameter V-type having a pair of flanges one of which is axially movable relative to the other to vary the effective diameter of said drive pulley; means for rotatably mounting said drive pulley; an axially movable control rod; a driven pulley of the variable-diameter V-type having a first flange and a second flange, said first flange being axially movable relative to said second flange to change the effective diameter of said driven pulley; means for rotatably mounting said driven pulley on said control rod; a flat-faced pulley rigidly connected with said first flange of said driven pulley and adapted to receive a flat power transmitting belt thereon, said flat-faced pulley being axially movable in response to axial movement of said first flange; stop means on said control rod for limiting the axial movement of said first flange of said driven pulley in a direction away from the second flange thereof; belt means operatively connecting said pulleys; a rotatable sleeve member adapted to move said control rod axially so as to move said stop means to vary the

effective diameter of said driven pulley; and means for rotating said sleeve member.

6. In a variable-speed transmission device, the combination of: a drive pulley of the variable-diameter V-type having a pair of flanges one of which is axially movable to vary the effective diameter of said drive pulley; means for rotatably mounting said drive pulley; spring means for resiliently urging said movable flange of said drive pulley toward said other flange thereof; a driven pulley of the variable-diameter V-type having a pair of flanges one of which is axially movable to vary the effective diameter of said driven pulley; means for rotatably mounting said driven pulley; a flat-faced pulley mounted rigidly on the movable flange of said driven pulley and adapted to receive a flat power transmitting belt thereon, said flat-faced pulley being axially movable in response to axial movement of said movable flange; belt means operatively connecting said drive pulley and said driven pulley; and adjustment means for varying the effective diameter of one of said pulleys.

7. In a variable-speed transmission device, the combination of: a drive pulley of the variable-diameter V-type having a pair of flanges one of which is axially movable to vary the effective diameter of said drive pulley; means for rotatably mounting said drive pulley; spring means for resiliently urging said movable flange of said drive pulley toward said other flange thereof; a driven pulley of the variable-diameter V-type having a pair of flanges one of which is axially movable to vary the effective diameter of said driven pulley; means for rotatably mounting said driven pulley; a flat-faced pulley mounted rigidly on and formed integrally with the movable flange of said driven pulley and adapted to receive a flat power transmitting belt thereon, said flat-faced pulley being axially movable in response to axial movement of said movable flange; belt means operatively connecting said drive pulley and said driven pulley; and adjustment means for varying the effective diameter of one of said pulleys.

8. In a variable-speed transmission device, the combination of: a drive pulley of the variable-diameter V-type having a pair of flanges one of which is axially movable relative to the other to vary the effective diameter of said drive pulley; means for rotatably mounting said drive pulley; spring means for resiliently urging said movable flange of said drive pulley toward said other flange thereof; an axially movable control rod; a driven pulley of the variable-diameter V-type having a pair of flanges one of which is axially movable relative to the other to change the effective diameter of said driven pulley; means for rotatably mounting said driven pulley on said control rod; a flat-faced pulley rigidly connected with said movable flange of said driven pulley and adapted to receive a flat power transmitting belt thereon, said flat-faced pulley being axially movable in response to axial movement of said movable flange; stop means on said control rod for limiting the axial movement of said movable flange of said driven pulley in a direction away from the other flange thereof; belt means operatively connecting said pulleys; and means for moving said control rod axially so as to move said stop means to vary the effective diameter of said driven pulley.

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