J. GRANZ.

EXPANSIBLE PULLEY.

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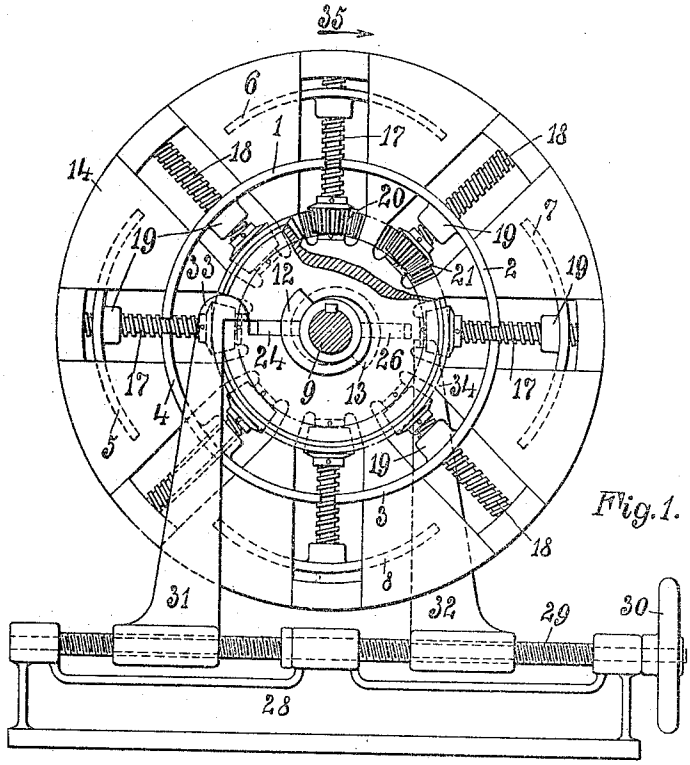
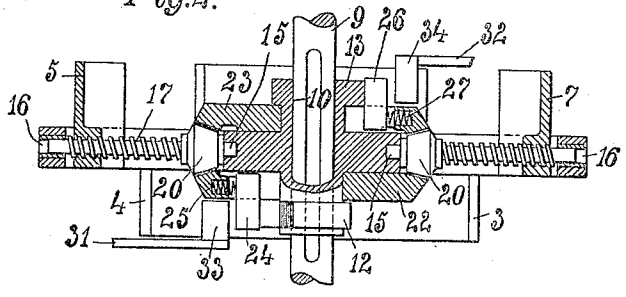


Fig. 1.

Fig. 2.



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EXPANSIBLE PULLEY.

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To all whom it may concern:

Be it known that I, JOSEF GRANZ, a subject of the German Emperor, residing at Plauen, Vogtland, in the Kingdom of Saxony and Empire of Germany, have invented certain new and useful Improvements in Expansible Pulleys, of which the following is a specification.

The present invention has reference to a mechanism for changing or altering the diameter of rope and belt pulleys and kindred drivers. To this end the rim or pulley is divided into several parts or segments, and each segment is movable in a radial direction. According to the present invention two pulleys are arranged side by side on the same shaft, and their segments are connected with each other by special mechanisms in such a way that the parts of the one pulley are moved in an outward direction while at the same time those of the other pulley are moved in an inward direction. In this manner the diameter of the first pulley is increased while, at the same time, that of the second is reduced.

Two constructions of the invention are shown in the accompanying drawing by way of example.

Figure 1 is a side view of the device. Fig. 2 is a horizontal cross section through the center of Fig. 1.

The constructional forms, shown by way of example are belt pulleys, but the present invention is also equally applicable to rope pulleys or to any other pulley whatsoever which serves for the transmission of rotary movements.

The rim on the one side consists of the four parts 1, 2, 3 and 4, while the other rim is composed of the four parts 5, 6, 7 and 8. In the position shown the rim 1, 2, 3, 4 has almost its smallest diameter, while the rim 5, 6, 7, 8 has its maximum diameter. To the shaft 9 there is rigidly attached a boss 10. Its two ends are fashioned as eccentric disks 12, 13. The central portion forms a pulley 14 in which there are situated the bearings 15 and 16 for the rotary screw spindles 17, 18.

In the constructional example shown in Figs. 1 and 2 the spindles 17 are provided with right-handed threads, while the spindles 18 have left-handed threads. The portions of the rim 1, 2, 3, and 4 are each provided with a boss 19 in the interior of which there is a left-handed screw thread corresponding to the screw spindles 18. In a similar manner the right handed thread of the bosses of rim portions 5, 6, 7 and 8 also corresponds to the screw spindles 17.

On the spindles 17, 18 there are mounted conical gears or bevel-wheels 20, 21, and in suchwise that they are rigidly connected thereto. These wheels 20, 21 engage with the teeth of the two large bevel wheels or feed wheels 22, 23 which are mounted on the boss 10 in suchwise that they are adapted to rotate thereon.

In the wheel 22 a slider 24, which is forced inward by means of a spring 25, is arranged in suchwise as to be adapted to slide radially. A precisely similar slider 26, which is also forced inward by means of a spring 21, is likewise movable in the wheel 23 in a radial direction.

Upon the stationary frame of the machine 28 there is mounted a screw spindle 29 adapted to be rotated by means of the hand wheel 30. When this spindle 29 rotates the two upwardly extending arms 31, 32 are moved simultaneously either to the left or simultaneously to the right. The upper end 33 of the arm 31 is fashioned of a hooklike shape and is arranged in such a position that the stop 33 bears against the slider 24, when the arm 31 is moved to the right by means of the spindle 29. The upper end 34 of the arm 32 is so fashioned that it will bear against the slider 26 when the arm 32 is moved to the left by means of the spindle 29.

As soon as the stop 33 bears against the slider 24 the pulley 22 is prevented from rotating farther with the shaft 9, that is to say in the direction of the arrow 35 shown in Fig. 1. As the boss 10 is rigidly attached to the shaft 9 only the wheel 22 is prevented from rotating by the stop 33. All the other parts, however, continue to rotate farther together with the shaft 9. Consequently the small bevel wheels 20, 21 must be rotated by the teeth of the wheel 22, whereby a rotary movement is thus imparted to all the spindles 17, 18. In this way the segments 1, 2, 3, 4 are caused to move inwardly, and the rim portions 5, 6, 7, and 8 are caused to move outwardly. The spiral-shaped eccentric 12, however, rotates farther with the shaft 9, when the spring 25 moves the slide 24 inwardly as far as the slide is permitted by the outline of the eccentric 12. The displacement

of the slider 24 continues until it has passed out of the reach of stop 33. Then the wheel 22 rotates farther with the shaft 9, and the alteration in the diameters of the two pulleys ceases. If, therefore, the arm 31 be moved to the right by means of the spindle 29, then the rim parts 1, 2, 3, and 4 will be moved inwardly and the rim portions 5, 6, 7 and 8 will be moved outwardly.

In order to change the diameters of the two pulleys in the contrary direction use is made of the upper end 34 of the arm 32. When the slider 26 comes in contact with the stop 34 then the wheel 23 will be prevented from rotation until the spiral shaped eccentric 13 allows the slider 26 to slide off the stop 34. But as long as the wheel 23 is prevented from rotation the bevel wheels 20 and 21 must rotate with the spindles 17, 18 in such a direction and manner that the rim parts 1, 2, 3 and 4 are moved outwardly, while the rim parts 5, 6, 7 and 8 are moved inwardly.

The aim and object of the arrangement thus described of two rims adjustable in different directions, is to augment the effect of the adjustment or change. When, for instance, the pulley described above is used as an intermediate gear then, with a slight alteration of the two pulley diameters, double the effect can be realized than that which would be possible with a pulley only able to be adjusted or altered in one direction. It cannot be avoided, that the guiding of the belt around the pulley corresponds to an exact circle only in one single position of the segments; but whether by increasing or reducing the diameter of the pulley it consists of arc-like pieces, the central point of each of which does not coincide with the center of the shaft. This inconvenience is considerably diminished by means of the new arrangement, so that there cannot be any prejudicial effect in all those cases which may occur in practice.

Having now described the nature of my invention, and the manner in which it is to be performed, I declare that what I claim is:—

1. In an expansible pulley, a stationary frame, a threaded rod journaled thereon, threaded standards movable on said rod, and an expansible pulley comprising a plurality of spindles alternately threaded right and left hand, an outer and an inner rim in sections, which are radially movable on said spindles, gears on the inner ends of the spindles, meshing with said gears, yieldingly actuated sliders on said feed wheels, spiral shaped eccentric disks against which the sliders are forced, and a drive shaft to which said eccentric disks are rigidly connected.

2. An expansible pulley mechanism comprising a stationary frame, a threaded rod journaled on said frame, threaded vertical standards movable on said rod, and an expansible pulley comprising radial spindles, bevel wheels on the inner ends of said spindles, said spindles alternately having right and left hand screw threads, threaded bosses on said spindles having threads corresponding to the threads on the spindles, rim sections on said bosses and mechanism coöperating with the bevel wheels and engaged by the said standards so as to operate said spindles.

3. An expansible pulley mechanism comprising a stationary frame, a threaded rod journaled on said frame, threaded standards movable on said rod, and an expansible pulley comprising radial spindles, bevel wheels on the inner ends of said spindles, said spindles alternately having right and left hand threads, threaded bosses on said spindles whose threads correspond to the threads on the spindles, rim sections on said bosses, wheels engaged by said bevel wheels, a driving shaft, eccentric members on said shaft, sliding members mounted on said wheels and controlled by said eccentrics, and engaged by said standards, and springs forcing said sliding members inwardly.

4. In a device of the character described, two pulleys, in which the diameter of one is increased while the diameter of the other is reduced, this effect being produced by the combination of a suitable frame support, a threaded rod on said frame, standards movable to and fro on said rod at a uniform distance from each other, radial spindles, conical bevel wheels mounted on said spindles, wheels 23, engaged by said conical wheels, bosses on said spindles, sections of wheel rims carried by said spindles, a driving shaft, eccentric members on said shaft, sliding members and springs forcing said sliding members inwardly.

In testimony whereof I affix my signature in presence of two witnesses.

JOSEF GRANZ.

Witnesses:
ROBERT BYERMAN,
ROBERT H. NIER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."