M. L. SEVERY.

EXPANSIBLE PULLEY.

APPLICATION FILED JULY 8, 1913.

1,126,100. Patented Jan. 26, 1915.

2 SHEETS—SHEET 1.

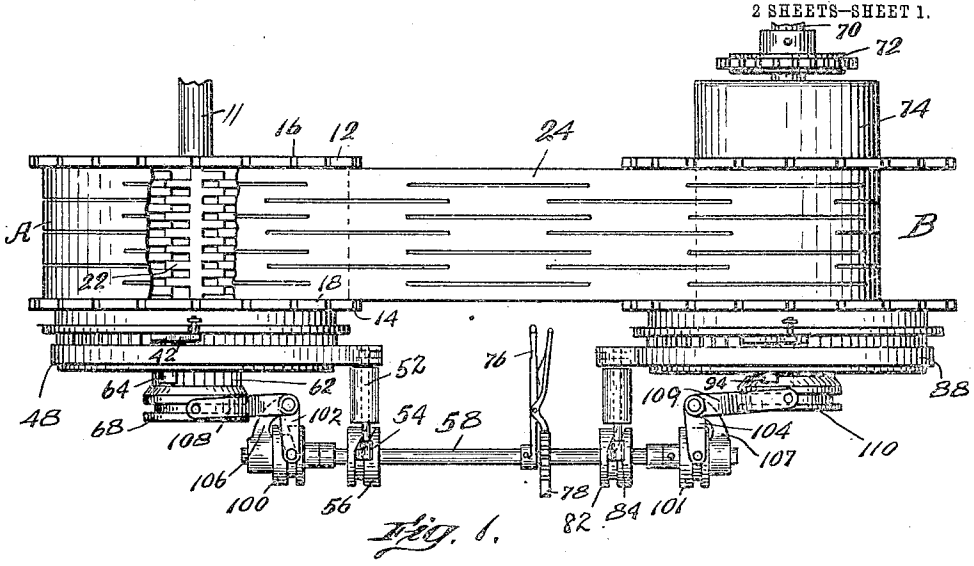


Fig. 1.

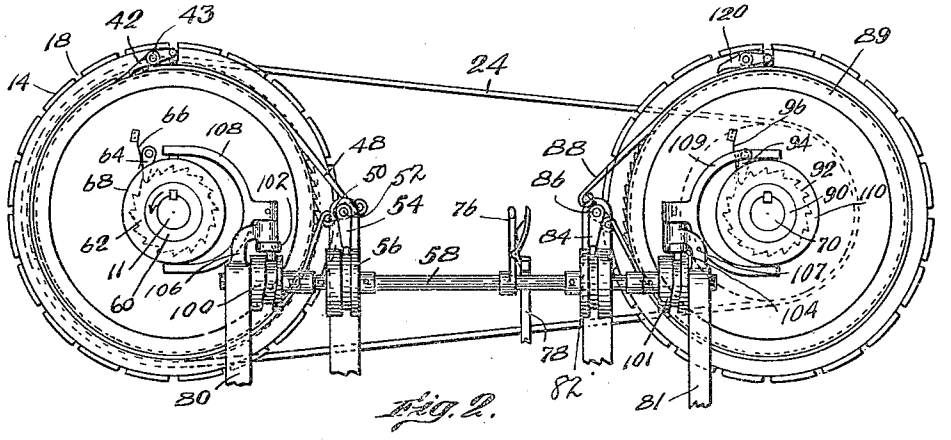


Fig. 2.

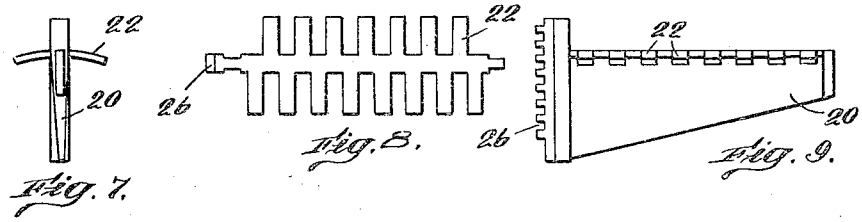


Fig. 7.

Fig. 8.

Fig. 9.

Witnesses:

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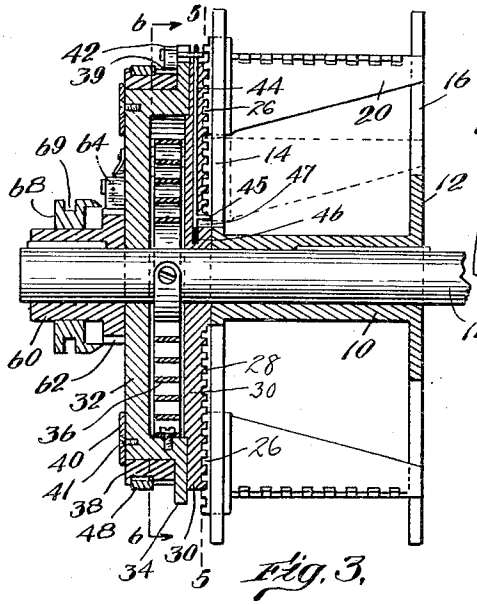


Fig. 3.

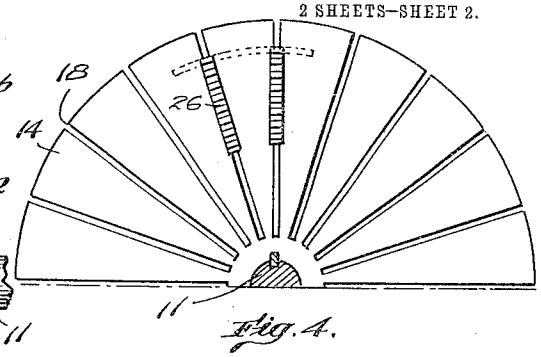


Fig. 4.

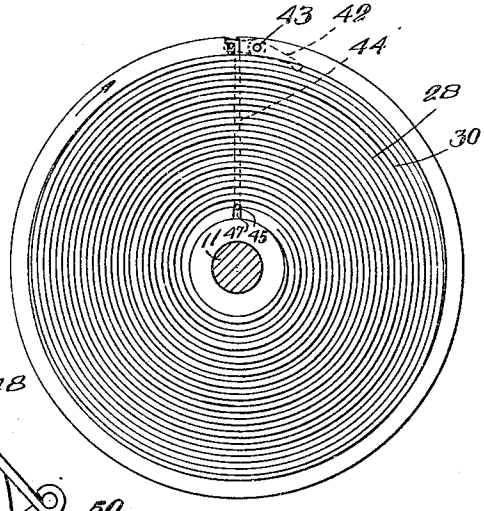


Fig. 5.

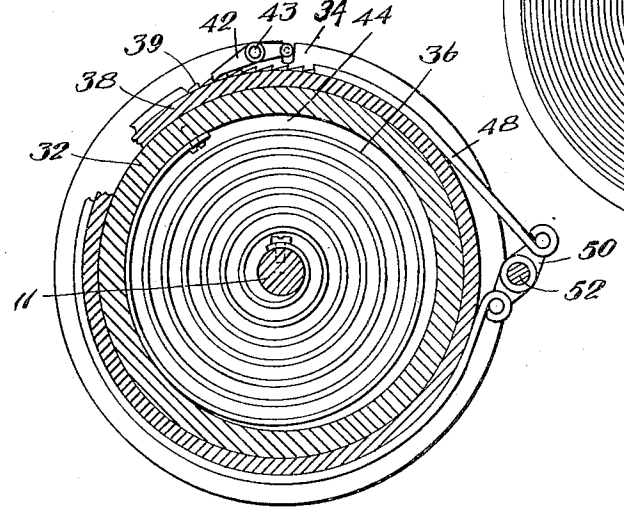


Fig. 6.

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UNITED STATES PATENT OFFICE.

MELVIN L. SEVERY, OF ARLINGTON HEIGHTS, MASSACHUSETTS, ASSIGNOR TO SEVERY MANUFACTURING COMPANY, OF BOSTON, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

EXPANSIBLE PULLEY.

1,126,100. Specification of Letters Patent. Patented Jan. 26, 1915.

Application filed July 8, 1913. Serial No. 777,871.

To all whom it may concern:

Be it known that I, MELVIN L. SEVERY, of Arlington Heights, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Expansible Pulleys, of which the following is a specification.

This invention relates to an improvement in expansible pulleys.

The object of the invention is to provide an expansible pulley, which is composed of parts that can be readily produced and assembled, and which can be used in coacting pairs of pulleys controlled by a single movement with which the diameters of the pulleys are simultaneously varied oppositely.

The invention will be clearly understood from an inspection of the accompanying drawings, in which—

Figure 1 is a plan view of a pair of coacting pulleys and controlling mechanism therefor, Fig. 2 is a front elevation of the same, Fig. 3 is a central longtiudinal vertical section through a pulley, Fig. 4 is a front elevation of the upper half of one of the flanges, Fig. 5 is a sectional elevation taken on the line 5—5 in Fig. 3, Fig. 6 is a sectional elevation taken on the line 6—6 in Fig. 3, and Figs. 7, 8 and 9 are detail views of the vanes or movable sections of the pulley.

As illustrated in the drawings, each pulley comprises a hub 10, keyed on a shaft 11, and a pair of flanges or end-plates 12, 14 provided with radial slots 16, 18. Slidably mounted in the slots 16, 18 are a plurality of vanes or movable sections, each comprising a web 20 having its ends reduced to enter said slots and form shoulders bearing against the inner faces of the flanges. The peripheral portions of the vanes are formed with dentated members 22, which are curved to conform to the circumference of the pulley face when expanded to its middle position. These dentations or teeth intermesh to form a substantially continuous surface when the pulley is contracted, and their ends are in line, or nearly so, when the pulley is expanded, so that the periphery of the pulley is not formed with wide gaps extending clear across its face. For this reason a smooth running pulley is provided over which a slitted belt 24 may be run, such a belt readily conforming to the surface of the pulley to obtain the desired traction without the suction incident to smooth belts and pulley faces.

The webs 20 of the vanes are deeper at one end than at the other, and this deeper end is formed with teeth 26, which are adapted to engage a scroll or spiral 28 formed on a plate 30, said plate being loosely mounted on the shaft 11, so that the rotation of said scroll causes a radial movement of said vanes.

A cover-plate or cap 32 is loosely mounted on the shaft 11 and fastened to the scroll, and is provided on its inner face with a flange 34, which bears against the scroll-plate. This cap forms a housing for the powerful spring 36, which is affixed at one end to the shaft 11 and at its other end to the inner periphery of said cap. A ring 38 is rotatably mounted on the external periphery of the cap 32, and is held between the flange 34 and a ring 40 held in place by screws 41. The ring 38 is formed with teeth 39 at one edge of its periphery, which are adapted to be engaged by a pawl 42 pivoted on a stud 43 on the flange 34. The pawl 42 is pivotally connected to a rod 44, slidable within the scroll-plate 30, and having its lower end bent laterally at 45 to project through an opening 47 in said scroll-plate into the path of travel of the inner edge of one of the webs 20. A spring 46 bears against the lower end of the rod 44 and tends to keep the pawl 42 in engagement with the teeth 39 on the ring 38. When the pawl 42 is thus in engagement, the ring 38 and cap 32 are locked together, but when the pawl is withdrawn said ring and cap are rotatable independently of each other.

A brake-band 48 encircles the ring 38, and is attached to the opposite ends of a lever 50, carried by a rock-shaft 52, which has a rocker-arm 54 engaged by a cam 56 on a shaft 58. A sleeve 60 is keyed fast to the shaft 11, and is provided with ratchet teeth 62, which are adapted to be engaged by a pawl 64 carried by the cap 32 and normally pressed into engagement with said teeth by a spring 66. This pawl is adapted to be engaged by an inclined face of a sleeve 68, which is slidable on the sleeve 60 and provided with a peripheral groove 69. When the pawl 64 is in engagement with the teeth 62, the sleeve 60 and the spring case or drum 32, and consequently the shaft 11, are locked

so that the spring 36 cannot unwind to expand the pulley. When the teeth 62 are disengaged from the pawl 64 the spring 36 is free to unwind and expand its pulley until stopped by the tension of the belt.

A pair of pulleys A and B, such as described above, are mounted on shafts 11 and 70, the latter being provided with a sprocket wheel 72, which may be connected to any suitable source of power, and said shaft may also be provided with a planetary reversing mechanism 74. The adjustment of the pulleys is controlled by a hand lever 76 cooperating with a sector 78, said lever being fast on the shaft 58, which is journaled in suitable bearings 80, 81. The shaft 58 is also provided with a cam 82 engaging a rocker-arm 84 connected to a lever 86, to the ends of which lever a brake-band 88 is attached. A sleeve 90 is keyed to the shaft 70, and is provided with ratchet teeth 92, which are adapted to be engaged by a pawl 94 pressed against said teeth by a spring 96.

A pair of cams 100, 101 are fast on the shaft 58, and coöperate with pins projecting from the under sides of rocker arms 102, 104, said rocker arms being fast to the lower ends of rock-shafts journaled in brackets 106, 107 on the bearings 80, 81. To the upper ends of said rock-shafts forked arms 108, 109 are fast, which engage the grooves in the sleeves 68 and 110.

When it is desired to reduce the size of a pulley, as for example the pulley A, the hand-lever 76 is turned to swing the cam 56 so that the brake-band 48 is tightened and the pawl 64 is in engagement with the teeth 62. Thus the spring drum 32 and the scroll-plate 30 are held against rotation, but the rotation of the shaft 11 winds up the spring 36, and the pawl 64 holds the tension of said spring as it is wound up, and the rotation of the vanes with respect to the scrool causes the vanes 22 to approach each other to reduce the diameter of the pulley. When the vanes are drawn in sufficiently to engage the arm 45, the pawl 42 is swung out of engagement with the teeth on the band 38, thus placing said scroll-plate and spring drum out of driving relation with said band 38 and preventing further winding-up of the spring 36. At the time that the pulley A is reduced in diameter, the handle 76 is in such a position that the cam 101 has moved the arms 104 and 109 so that the sleeve 110 is pushed in to release the pawl 94 from the teeth 92 of the pulley B, the brake-band 88 being also slack. Thus the spring in the pulley B is free to expand to keep the belt 24 taut, so that as the pulley A decreases the pulley B increases in diameter. When the pulleys have been adjusted to the desired relative diameters, the handle 76 is turned so that the cams 100 and 101 withdraw the sleeves 68 and 110 from engagement with the pawls 64 and 94, allowing said pawls to engage the teeth 62 and 92, respectively, and the pulleys remain thus adjusted.

It is to be noted that the direction of rotation of the pulleys is not reversible but is dependent on the direction of the wind of the springs. The terms "forward" and "backward" used in certain of the claims are therefore relative to the direction of rotation of the pulleys, which is necessarily fixed in any given pulley.

What I claim is:—

1. An expansible pulley comprising in combination a shaft; a pulley frame structure mounted thereon; a plurality of rim sections mounted in said frame structure and movable therein to vary their radial distance from said shaft; a spring coiled around said shaft; and operative connections between said spring and said rim sections adapted to cause said spring to urge said sections simultaneously outward.

2. An expansible pulley comprising in combination, a shaft; a pulley frame structure mounted thereon; a plurality of rim sections mounted in said pulley frame structure and movable therein to vary their radial distance from said shaft; a spiral cam rotatably mounted on said shaft and engaging said rim sections; and a spiral spring coiled around said shaft and connected with said cam to rotate the same in a direction to expand said rim sections.

3. An expansible pulley, comprising a plurality of adjustable sections, a scroll for moving said sections, a spring tending normally to rotate said scroll to expand the pulley sections, means for winding up said spring to contract said sections, and means for preventing said spring from unwinding.

4. An expansible pulley, comprising a plurality of adjustable sections, means for moving said sections to vary the diameter of the pulley, a spring drum, a spring in said drum arranged to normally expand said sections, and means for engaging said drum to enable the spring to be wound up to contract said sections.

5. An expansible pulley, comprising a plurality of adjustable sections, means for moving said sections to vary the diameter of the pulley, a spring drum, a spring in said drum arranged to normally expand said sections, means for engaging said drum to enable the spring to be wound up to contract said sections, and means for automatically releasing said drum when the sections have been fully contracted.

6. An expansible pulley, comprising a pair of flanges having radial slots, adjustable sections guided by said slots and having dentated peripheral portions adapted to intermesh, a scroll for moving said sections, a spring tending normally to rotate said

scroll to move said sections outwardly, means for winding up said spring to contract said sections, and means for preventing said spring from unwinding.

7. In an expansible pulley the combination of a rotatable shaft; a pulley frame fixed thereon to rotate therewith; a plurality of rim sections mounted in said frame and movable therein to vary their radial distance from said shaft; a spiral cam rotatably mounted on said shaft in operative engagement with said sections to move the same in unison toward and from said shaft when said cam is rotated in one or the other direction relative to said frame; a spring connected with said cam and urging it to rotate forward relatively to said frame; and a brake adapted when actuated, to retard the rotation of said cam and cause a backward rotation thereof relatively to said frame.

8. In an expansible pulley the combination of a rotatable shaft; a pulley frame fixed thereon to rotate therewith; a plurality of rim sections mounted in said frame and movable therein to vary their radial distance from said shaft; a spiral cam rotatably mounted on said shaft in operative engagement with said sections to move the same in unison toward and from said shaft when said cam is rotated in one or the other direction relative to said frame; a spring connected with said cam and urging it to rotate forward relatively to said frame; a brake adapted when actuated, to retard the rotation of said cam and cause a backward rotation thereof relatively to said frame; and a throwout device adapted to be actuated at the limit of movement of said rim sections under the action of said brake to render said brake device inoperative.

9. In an expansible pulley the combination of a rotatable shaft; a pulley frame fixed thereon to rotate therewith; a plurality of rim sections mounted in said frame and movable therein to vary their radial distance from said shaft; a spiral cam rotatably mounted on said shaft in operative engagement with said sections to move the same in unison toward and from said shaft when said cam is rotated in one or the other direction relative to said frame; a spring connected with said cam and urging it to rotate forward relatively to said frame; an intermittent grip device normally acting to prevent the rotation of said cam by said spring; a brake adapted, when actuated during the rotation of said shaft, to retard the rotation of said cam to cause a backward rotation thereof relatively to said frame; and a control mechanism operative alternately to apply said brake while permitting the action of said intermittent grip device or to release said brake while holding said intermittent grip device inoperative.

10. In an expansible pulley the combination of a rotatable shaft; a pulley frame fixed thereon to rotate therewith; a plurality of rim sections mounted in said frame and movable therein to vary their radial distance from said shaft; a spiral cam rotatably mounted on said shaft in operative engagement with said sections to move the same in unison toward and from said shaft when said cam is rotated in one or the other direction relative to said frame; a spring connected with said cam and urging it to rotate forward relatively to said frame; an intermittent grip device normally acting to prevent the rotation of said cam by said spring; a brake adapted, when actuated during the rotation of said shaft, to retard the rotation of said cam to cause a backward rotation thereof relatively to said frame; a control mechanism operative alternately to apply said brake while permitting the action of said intermittent grip device or to release said brake while holding said intermittent grip device inoperative; and a throwout device adapted to be actuated at the limit of movement of said rim sections under the action of said brake to render said brake inoperative.

11. The combination with an endless belt and two expansible pulley structures engaged thereby and each comprising a rotatable shaft, a pulley frame fixed thereon to rotate therewith, a plurality of rim sections mounted in said frame and movable therein to vary their radial distance from said shaft, a spiral cam rotatably mounted on said shaft in operative engagement with said sections to move the same in unison toward and from said shaft when said cam is rotated in one or the other direction relative to said frame, a spring connected with said cam and urging the same to rotate forward with reference to said frame, an intermittent grip device normally acting to prevent the rotation of said cam by said spring, and a brake adapted when actuated during the rotation of said shaft to retard the rotation of said cam to cause a backward rotation thereof relatively to said frame; of a control mechanism operatively related to said pulley structures and adapted to apply the brake of either while rendering inoperative the intermittent grip device of the other.

In testimony whereof I have affixed my signature in the presence of two witnesses.

MELVIN L. SEVERY.

Witnesses:

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WILLIAM J. SPERL.

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