(No Model.)

# J. E. DUSTIN.

## EXPANDING PULLEY.

No. 395,816. Patented Jan. 8, 1889.

Fig. 3.

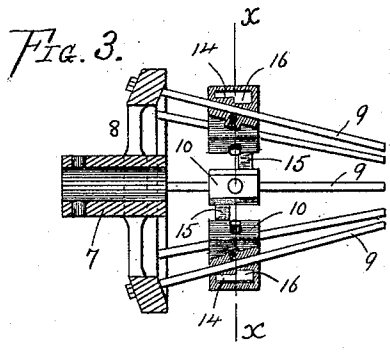



Fig. 2.

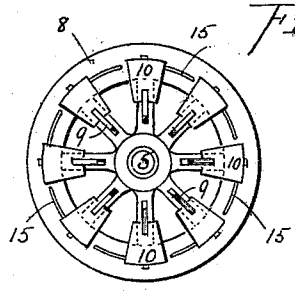



Fig. 1.

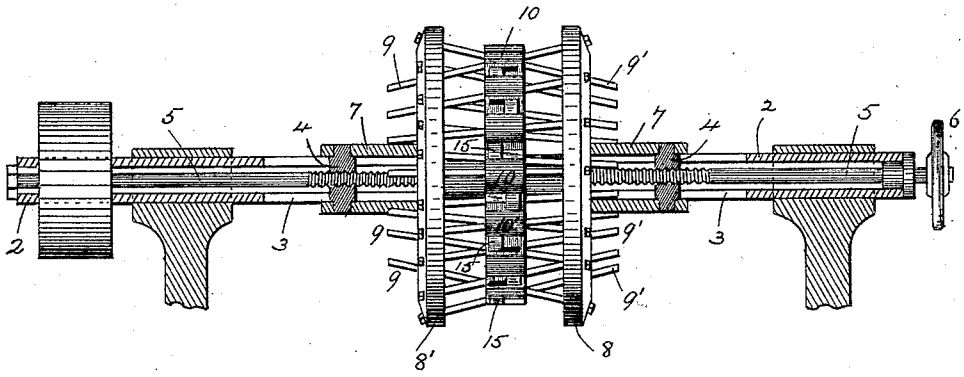



Fig. 4.

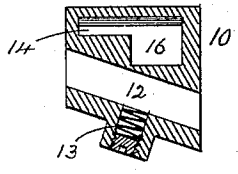



Fig. 5.

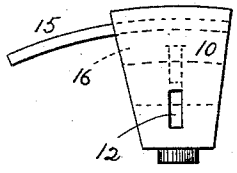
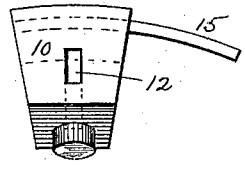



Fig. 6.



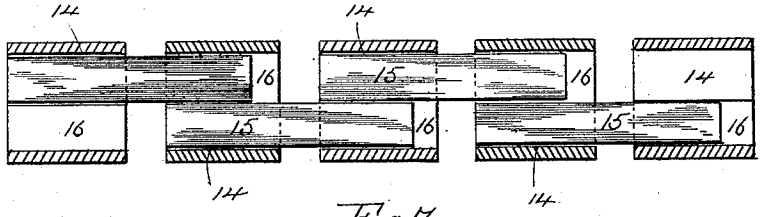




Fig. 7.

Witnesses.
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W. H. Ellis

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John E. Dustin.
per. H. E. Lodge Atty.

N. PETERS. Photo-Lithographer. Washington, D. C.

# UNITED STATES PATENT OFFICE.

JOHN E. DUSTIN, OF LAWRENCE, MASSACHUSETTS.

## EXPANDING PULLEY.

SPECIFICATION forming part of Letters Patent No. 395,816, dated January 8, 1889.

August 16, 1888. Serial No. 282,902. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN E. DUSTIN, a citizen of the United States, residing at Lawrence, in the county of Essex and State of Massachusetts, have invented certain new and useful Improvements in Expanding Pulleys; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

This invention relates to "expanding pulleys," so called, and has for its object to provide a pulley which is composed of a series of sectoral blocks arranged concentrically with respect to each other, in order to present a flat surface about which the belt is to travel. Furthermore, said sectoral blocks or belt-supporting portion is adapted to converge or diverge in the respective acts of diminishing or increasing the diameter of the pulley and move radially in a plane at right angles to the shaft supporting said pulley.

My invention, moreover, consists of actuating mechanism by which the sectoral blocks composing the belt-supporting portion of the expanding pulley are controlled and actuated, and said mechanism, in brief, consists of two apertured disks or "spiders," so termed, located upon a shaft and operated simultaneously in opposite directions by a right-and-left-screw-threaded rod. Suitably disposed upon the adjacent inner faces of the rims of said spiders is a series of rigid converging bars so arranged that the two spiders may be caused to approach or recede without said bars interfering or touching each other. Said bars intersect, however, at a point midway between said spiders. The belt-supporting portion or sectoral blocks are mounted one-half on each series of said converging bars, and are interlocked in such a manner, hereinafter described, that they have no lateral movement, but are actuated radially of the supporting-shaft in a plane at right angles to the longitudinal axis thereof.

Of the drawings accompanying this specification, Figure 1 represents a vertical section longitudinally of the supporting-shaft with the pulley in elevation. Fig. 2 is an end view of one of the spiders, showing one-half the sectoral blocks and the converging operating-bars on which they are mounted. Fig. 3 is a vertical section longitudinally thereof. Fig. 4 is a central vertical section of one of the sectoral blocks. Figs. 5 and 6 are opposite end views of said block and the curved plates which interlock the blocks. Fig. 7 is a developed sectional plan of several of the sectoral blocks and their interconnecting plates, showing their position when the pulley is in an enlarged position.

Hitherto pulleys of the above-mentioned class have been composed of two tapering sections formed with alternating slots and extension-fingers, the slots of one section corresponding with and adapted to receive the fingers of the opposite co-operating section, in order that the two sections may be telescoped or caused to approach or recede from each other to vary the diameter of the pulley. In this class of expanding pulleys the belt-supporting portion of said pulleys is the point where the fingers of one section cross or intersect the fingers of the opposite section, and it is evident that the belt, in lieu of traveling upon a plane curved surface, is compelled to move in an obtuse V-shaped trough, whereby it is bent and crippled and its durability greatly impaired.

The object of my invention is to provide an expanding pulley in which a flat belt-supporting portion is created, and at the same time to enable the diameter of said belt-supporting portion to be changed, enlarged, or reduced in diameter, as circumstances may require.

To carry out my invention, as hereinbefore premised, I provide a hollow actuating-shaft, 2, suitably supported and longitudinally diametrically slotted at 3 to permit endwise travel of two similar sleeve-nuts, 4 4, which engage a rod, 5, provided with right and left screw-threads. This rod is interiorly of the tubular shaft, and is actuated by a hand-wheel, 6, or otherwise, as occasion may determine. The sleeve-nuts engage with twin hubs 7 7, which fit exteriorly of the shaft 2, and have longitudinal movement thereon, caused by the rotation of said hand-wheel. Simulta-

neous opposite travel of said hubs is thereby produced and the latter are caused to approach or recede. Cast upon or otherwise rigidly attached to the adjacent ends of said hubs are two apertured disks or "spiders," 8 8′, so called, which form a portion of the expanding pulley and are moved toward and from each other with said hubs by the means above described. Each of said spiders is provided with a series of bars, 9 9 9′ 9′, preferably rectangular in cross-section. Said bars are circularly arranged upon the rims of the spiders and are removably attached obliquely thereto, the ends most remote from the spider converging toward a common center, as shown in Figs. 1 and 3. The two series of converging bars are arranged to intersect midway between the apertured disks and alternate at equal distances apart; hence when the spiders are caused to approach or recede the said bars pass freely through and centrally of the spaces existing between the bars of the opposite co-operating spider. Thus in the present instance each spider is provided with eight bars, 9 9 9′ 9′, and in order to create a circular belt-supporting portion with a flat face upon which the belt shall rest I have provided one set of bars, 9 9, each with a sectoral block, 10, the opposite bars, 9′ 9′, with sectoral blocks 10′, all similar in shape and construction—that is, each block (see Fig. 4) is formed with an obliquely-disposed straight aperture, 12, aligned to coincide with the obliquity of the fixed bars 9 9 9′ 9′, upon which they are mounted. Beneath they are furnished with a hollow boss adapted to contain a spring, 13, which bears against the operating-bars 9 9′ to prevent rattling and render the pulley noiseless when in operation. Said blocks are disposed concentrically at a point midway between the spiders, or at the point of intersection between the oppositely-converging sets of bars 9 9 9′ 9′.

Transversely of the aperture 12, which receives the bars 9 9′, and within the sectoral block, are formed two curved orifices, one, 14, adapted to receive a curved plate, 15, which is fastened securely therein, the length of said plate being equal to the length of two blocks, or thereabout. The adjacent orifice 16 is made much deeper, to enable the pulley to be expanded or contracted. Said orifices 14 16 are reversed in position on every alternate block. (See Fig. 7.)

To bind all the sectoral blocks together and compel them to move as a unit to maintain them concentric with each other, I have supplied each sectoral block with a curved plate, 15, above mentioned. Said plates alternate a line, *x x*, drawn centrally through the face of the belt-supporting portion of the pulley, (see Fig. 3,) and are confined in the orifice 14. The projecting end of said plate 15 engages in the orifice 16 in the next adjacent block, since each plate is about twice the length of a block. Thus the blocks are made to converge or diverge by means of the play of the plates 15, vertically and longitudinally in the orifices 16, while at the same time, by means of said connecting-plates 15, lateral divergence of the blocks is prevented and no eccentricity can occur. The entire series of blocks are compelled to move as a unit radially in or out, according to the size of pulley required.

The operation of this expanding pulley is as follows: The shaft 2, which serves to rotate the pulley mounted thereon, being properly journaled, rotation of the rod 5 will cause the spiders 8 8′, by means of their hubs and the actuating sleeve-nuts, which engage in the slots 3 3 in said shaft 2, to move in right lines along the latter either to approach or separate from each other. Presuming the sectoral blocks are in a contracted position by causing the spiders to approach the blocks are forced obliquely along the bars upon which they are mounted, causing them to diverge radially of the shaft 2. The belt-supporting surface is thereby increased in diameter and the pulley expanded. When the pulley is to be contracted, the spiders are caused to separate by reverse movement of the rod 5 and the blocks converge, always remaining in a fixed position relatively to the shaft lengthwise. When the pulley is fully contracted, the several sectoral blocks are contiguous and the curved plates 15 are concealed.

It is evident that the curved plates may be cast integral with the blocks 10, in which case the slot 14 now shown would not be required. This is an obvious modification, the function of the curved plates 15 remaining the same.

What I desire to claim is—

1. An expanding pulley consisting of a flat-faced belt-supporting portion, a series of sectoral blocks circularly disposed, two apertured disks or spiders oppositely movable in right lines, and the reversely-arranged converging series of bars secured to said disks, by which the sectoral blocks are caused to converge and diverge concentrically as a unit, substantially as herein explained.

2. An expanding pulley composed of two apertured disks or spiders movable in right lines, two series of converging bars reversely disposed and intersecting midway of the spiders, the sectoral blocks apertured to receive said bars, and the curved plates which connect said blocks to maintain them concentric, substantially as and for purposes herein described.

3. In combination with a supporting-shaft and the circular hubs movable in right lines thereon, an expanding pulley, substantially as herein described, composed of the apertured disks or spiders, two reversely-arranged converging series of bars, the sectoral blocks operated by the latter, and the rotary right-and-left-screw-threaded rod, and the non-rotary sleeve-nuts movable endwise thereon, substantially as stated.

4. In combination with two oppositely-

movable apertured disks or spiders and means, substantially as herein described, for actuating them in right lines, two series of oppositely-converging bars rigidly affixed to said spiders intersecting centrally between said disks, and the sectoral plates having the apertures 12, orifices 14 16, and the interconnecting curved plates 15, all for purposes substantially as herein explained.

5. In an expanding pulley, a circular flat-faced belt-supporting portion composed of sectoral blocks 10 10′, having a transverse aperture, 12, orifices 14 16, concentric with the face of the block, and a boss with a spring, 13, combined with two series of reversely-converging bars, 9 9 9′ 9′, affixed upon circular apertured disks or spiders oppositely movable to control the divergence or convergence of said blocks, substantially as herein stated.

6. In combination with two apertured disks or spiders, 8 8′, oppositely movable in right lines, and the reversely-converging series of bars 9 9 9′ 9′, the series of sectoral blocks 10 10′, formed with orifices 14 16, the positions of the latter being reversed in each alternate block, and the interconnecting alternating plates 15, affixed in the orifice 14 in one block and movable vertically and longitudinally within the orifice 16 in the next adjacent block, all for purposes herein set forth and described.

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

JOHN E. DUSTIN.

Witnesses:
H. E. LODGE,
W. H. ELLIS.