(Model.) 3 Sheets—Sheet 1.

J. M. POLLARD.

SPLIT PULLEY.

No. 401,586. Patented Apr. 16, 1889.

Fig 1

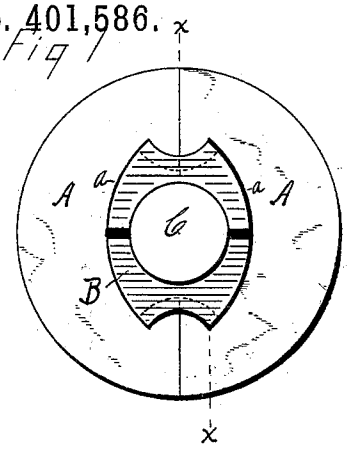


Fig 2

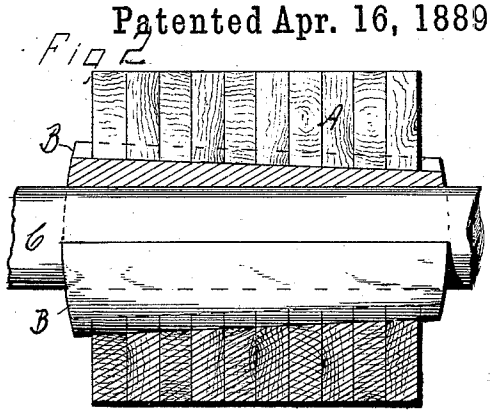


Fig 3

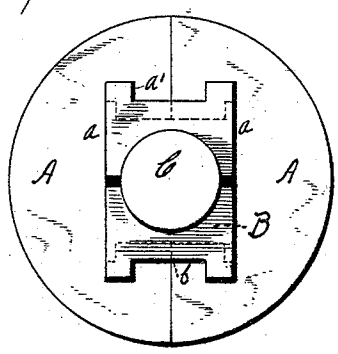


Fig 4

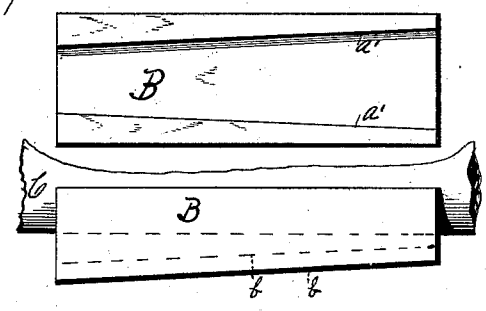


Fig 5

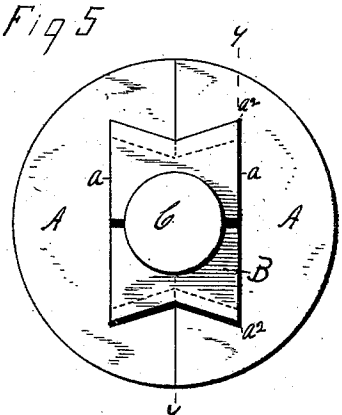
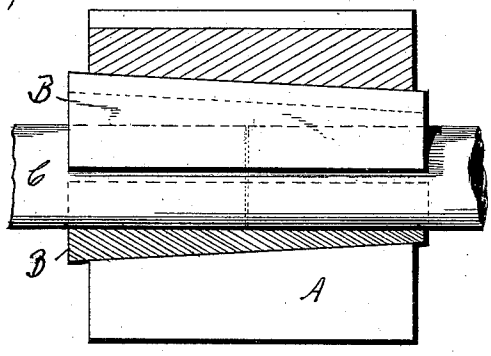


Fig 6



Witnesses.

A. M. Currie.

T. A. Currie

Inventor

J. M. Pollard

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(Model.) 3 Sheets—Sheet 2.

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SPLIT PULLEY.

No. 401,586. Patented Apr. 16, 1889.

Fig 7

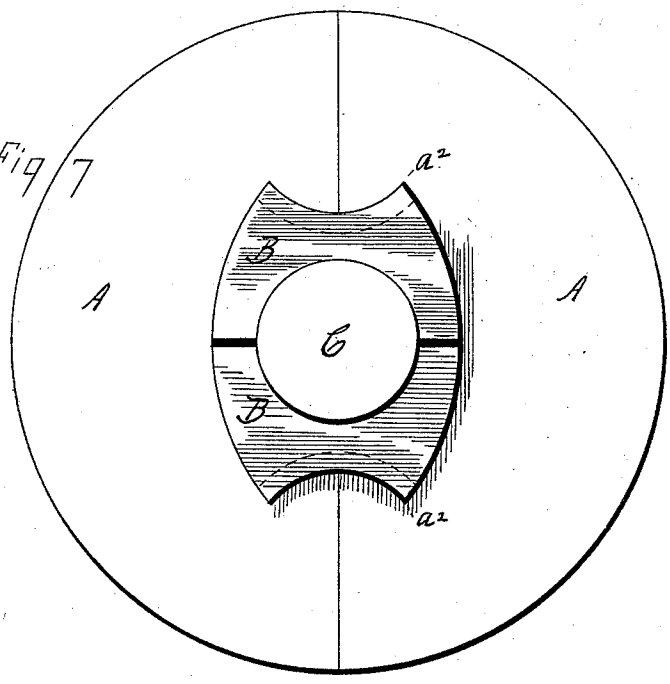


Fig 8

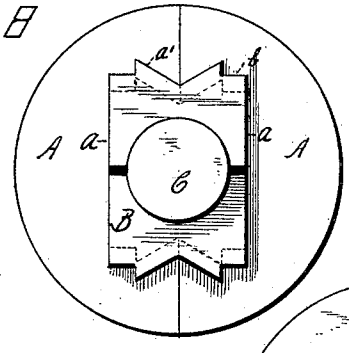


Fig 9

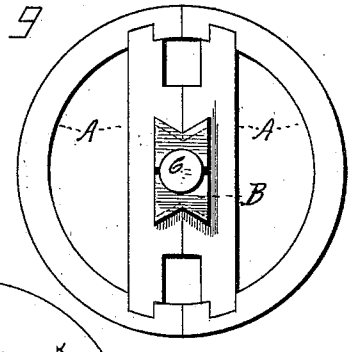
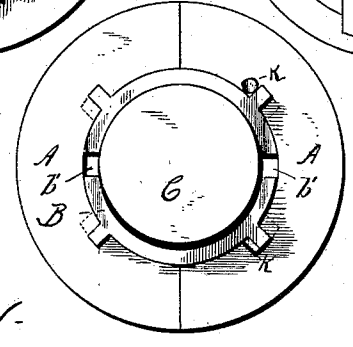


Fig 12



Witnesses.

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(Model.) 3 Sheets—Sheet 3.

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SPLIT PULLEY.

No. 401,586. Patented Apr. 16, 1889.

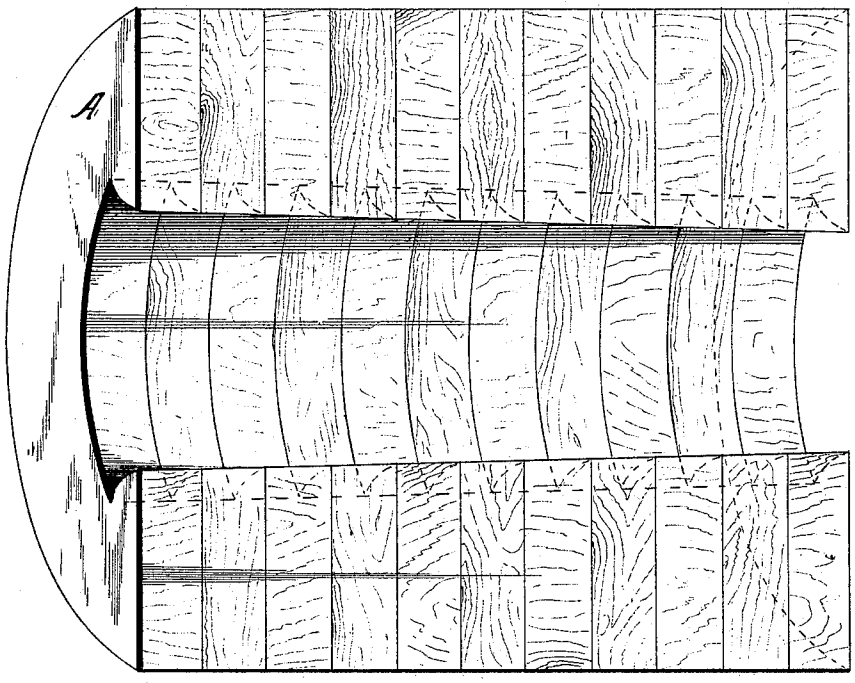


Fig. 10

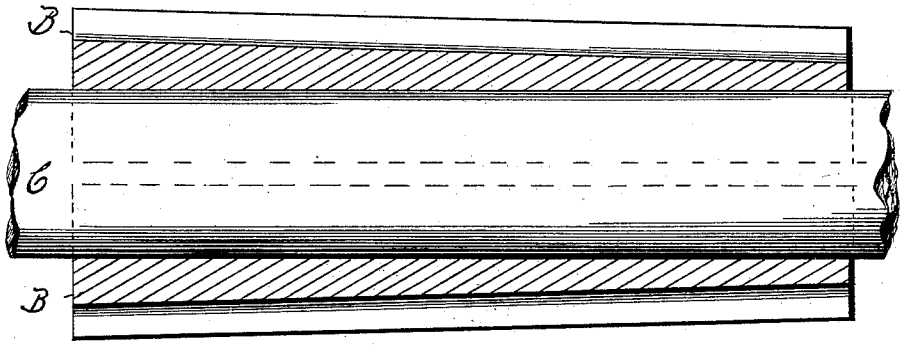
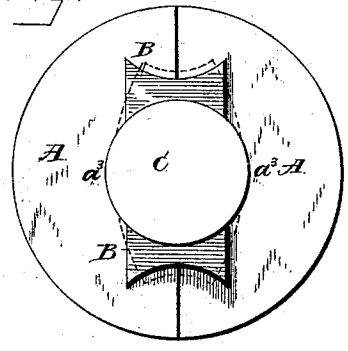


Fig. 11

Fig. 13.



Witnesses.
L. M. Currie.
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UNITED STATES PATENT OFFICE.

JAMES M. POLLARD, OF WASHINGTON, DISTRICT OF COLUMBIA.

SPLIT PULLEY.

SPECIFICATION forming part of Letters Patent No. 401,586, dated April 16, 1889.

Application filed June 30, 1888. Serial No. 278,630. (Model.)

To all whom it may concern:

Be it known that I, JAMES M. POLLARD, of Washington, District of Columbia, have invented a new and useful Split Pulley, of which the following is a specification.

My invention is especially designed for small pulleys, though applicable to any diameter, and is an improvement in the mode of fastening the parts together and to the shaft with which or upon which it is to rotate.

Split pulleys have become almost indispensable, because of their ready application to shafting already in place without the necessity of taking down the shaft and removing other pulleys, &c., as in the case of solid pulleys; but it has heretofore been found impracticable to make a split pulley of less than twelve (12) inches diameter, because of the lack of room for the fastening-bolts, &c. A few split pulleys have been made of nine (9) and ten (10) inches diameter, but at great expense and inconvenience, and these pulleys were lacking in strength, because the rims were necessarily very thin to admit of room for the fastening bolts and nuts with which the parts are clamped or drawn together.

The objects of my invention are to dispense entirely with the latter; to construct a split pulley of any desired size down to the smallest used, even if but two or three inches in diameter; to dispense entirely with metal in any form when making wood pulleys, and to so construct the parts that they will firmly interlock with each other, and while binding the rim securely together will also frictionally clamp the hub upon the shaft with the requisite degree of force to dispense with spline or key or set-screw or other fastening device.

A further object of my invention is to produce a pulley of the greatest possible strength, simplicity of construction, ease of manufacture and application, and least possible number of parts.

I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is an end view of a pulley constructed according to one of the best forms of my invention; Fig. 2, a side view, partly in section, on the dotted line X X of Fig. 1; Fig. 3, an end view of a pulley, showing a modification; and Fig. 4, a plan of the upper half and elevation of the lower half of the bushing for same; Fig. 5, an end view of another modification; and Fig. 6, a side view of same, partly in section, on the dotted line Y Y of Fig. 5. Fig. 7 is an end view, enlarged, of a pulley similar to that shown in Fig. 1. Fig. 8 is an end view of another modification; Fig. 9, a similar view, on a reduced scale, of a large pulley with my invention adapted thereto; Fig. 10, an isometric perspective of one-half of the rim of the pulley shown in Fig. 7; Fig. 11, a side view of the bushing and shaft of pulley shown in Figs. 7 and 10, the bushing being shown applied to the shaft and in vertical section lengthwise of the latter. Fig. 12 is an end view of a very small wood pulley with iron bushing. In each of the end views I have shown in dotted lines the thickness of bushing and rim at the other end of the pulley, thus indicating the wedge or incline of the parts; and Fig. 13, a similar view of one of my split pulleys, in which the rim is made to bind upon the shaft.

It will be seen that my pulley consists, essentially, of four parts—viz., of two duplicate portions constituting the hub or bushing and of two duplicate portions constituting the rim—and that the construction is such that when the bushing, as in Fig. 11, is drawn endwise into the rim shown in Fig. 10 the wedge form of the parts binds the bushing tightly together, or closes the two halves toward each other and upon the shaft. At the same time the two halves of the rim are also drawn forcibly together by the transverse dovetail inclines of the bushing, so that the parts are held together and to the shaft with a force or friction-grip exactly proportioned to the force used in driving the parts together, all of which will now be specifically described.

A A in the drawings are the two halves of the rim, and these, as before stated, are exact duplicates of each other, so that a description of one will suffice.

As shown in Fig. 3, the rim is grooved or channeled out to any requisite depth, the vertical face of this groove *a a* being parallel

to the axis of shaft C and of equal depth from end to end of the pulley—that is to say, of equal depth at all points from the vertical central dividing-plane of the pulley-rim. The upper and lower portions of this mortise or channel are, however, tapered from end to end in two planes, as shown in the dotted lines, which indicate the dimensions of both mortise and bushing at the other end of the pulley.

The bushing B in Fig. 4 shows in plan the inclines a' a', which serve by their wedge form to draw the two halves of the pulley together, and in elevation the incline b or wedge by means of which the rim forces or draws together the two halves of the bushing. This form would be inconvenient to manufacture, and is shown and described merely because it illustrates better than any other form the double wedge action of the device. The curved or hollowed incline shown in Figs. 1, 2, 7, 10, and 11 and the dovetail incline shown in Figs. 5, 6, 8, and 9 are exact equivalents in their mode of action. The two parts of the bushing are either cut apart with a thick saw after having been bored out for the shaft as a whole or are separated a short distance when being bored; or when made separately, as I design, the bore in each half is less than the half of a circle, so that when applied to a shaft the bushings cannot come in contact with each other, and the entire wedge action is sustained by the shaft. It will be seen that a machine need only be designed to make half-bushings and half-rims I prefer in practice to construct small pulleys as shown in Figs. 7, 10, and 11, and larger sizes, or those above one foot in diameter, somewhat as shown in Fig. 9. By the first-named plan the rim is left of greater thickness at the points a^2 a^2, Figs. 5 and 7, and the bushings are more readily interchangeable. The rim is built up solidly of layers of wood glued and pressed together, with the grain of alternate layers crossing each other at a right angle, and to a thickness to form the requisite width of face or length of pulley. It is then cut or split into two equal halves or parts and dadoed out for the bushing. The latter is bored to the requisite size for the shaft and shaped exteriorly like the mortise in the rim when the two parts are placed together. The fit between the sides of the bushing and the sides a a of the mortise in the rim is not so close as to bind with any force even when the parts are forcibly driven together, while the bushing is upon its wedge-surfaces slightly wider vertically than the mortise, so that it cannot be driven in flush with the end of the pulley. The grain of the wood in the bushing is transverse to the shaft and at right angles with the division line or plane of the rim-sections, as shown by the lines in Fig. 1. It will thus be seen that the tensile strength of the wood in the bushing is available for holding the rim against centrifugal action and for rotating the shaft or pulley, as the case may be; that the tensile strength of half the layers of the rim is exerted to pull the rim-sections together, and that the tensile strength of the remaining rim-sections is exerted in drawing the bushings together upon the shaft. In practice I have found it best to place the bushings in position upon the shaft and to drive the rim-sections upon them by striking the halves alternately with a mallet. There is no danger of splitting the rim and no difficulty in securing a grip upon the shaft that is amply sufficient to perform any possible amount of work without slipping. Instead of driving the parts together, they may be drawn and secured by bolts and nuts passing from the thick end of the bushing on a line parallel at all points to the axis of the shaft and engaging the opposite ends of the pulley-rim, or by any other suitable means; but I have found this unnecessary in practice, and so do not illustrate or claim such means. It is designed to make the bushing externally of but two or three sizes for all small pulleys—for instance, a standard size and taper for pulleys five, six, seven, and eight inches in diameter, and another for pulleys nine, ten, eleven, and twelve inches diameter. For smaller diameters, special plans will be made. By this means the bushing will be interchangeable, and may be boxed and kept in stock to fit various diameters of shafting.

When pulleys of great width of face are required, they may be made to taper from each side to the center and the bushing of standard sizes driven from each end, two sets of bushings being used for each rim in such case.

While I have described a wood pulley, I do not at all limit myself to the use of this or any other material. For specially small pulleys where a comparatively large bore is required, an iron bushing may be used, as shown in Fig. 12.

Instead of making the mortises in the rim and the exterior of the bushings incline or taper lengthwise of the pulley, these parts may merely be dovetailed and tightened upon the shaft by means of dowel-pins or wedges or bolts, as indicated at K of Fig. 12; but these methods would be inferior to the methods I have adopted for practice, and are entirely within the intent of my invention.

Many other modifications of form might be devised that would accomplish the same results and be entirely within the spirit and scope of my invention, and I have not attempted to show or even to devise them. I also intend to make loose pulleys as shown in Fig. 12, and to do this by rabbeting the iron bushing and using space-blocks b' b' between the edges of the two parts of the bushing, so that the pressure derived from the wedge action of the parts shall be borne by the bushings coming in contact with each other and not upon the shaft. These space-blocks can

then from time to time be reduced in thickness and the bushings brought closer together, thus compensating for wear.

In my pulley, as shown in Fig. 13, instead of having the bushing alone engaging the shaft, I draw the sides of the pulley-rim against the shaft, so as to bind thereon. This pulley I make with the shaft-opening of a diameter from a^3 to a^3 less than the diameter of the shaft by the thickness of the said cut by which the pulley is split.

The bushings B B, which draw the pulley-halves together, are to be shaped substantially like those shown and described herein-before, but are narrower, so as to engage with their inner sides only small portions of the periphery of the shaft. Space is thus left for the inner sides of the two pulley-halves to engage and bind upon the shaft.

In full lines in Fig. 13 the sides of the narrow bushings B B are shown as substantially parallel with each other. If desired, I contemplate, however, making them as shown in dotted lines in said figure, with their sides, as seen in end view, sloping from their outer portions away from each other.

My invention can obviously be applied to the fastening of a wooden or metallic rim upon a pulley or wheel, as well as to the placing of a pulley on a shaft. In such case the rim, being in two halves and provided with any one of the described forms of bushing ways or grooves, is fastened or bound upon the exterior of the pulley or wheel by the bushings corresponding in shape with the ways in the rim.

My split pulley is also capable of use as a shaft-coupler. As indicated in dotted lines in Fig. 6, it can be so placed as to bind at the same time upon the contiguous ends of two shafts in line with each other.

Having thus described my invention, I claim—

1. In a split pulley, the two-part rim and two-part bushing provided with interlocking ribs and grooves adapted to draw and lock the half-rims together as they are forced endwise upon the bushing, substantially as and for the purpose specified.

2. A split or separable pulley consisting of two duplicate portions constituting the rim and two duplicate portions constituting the hub or bushing, and having inclined or wedge surfaces whereby it is made self fastening and tightening by the act of forcing the parts together, as set forth.

3. A split or separable pulley having interior doubly-inclined mortises, and a separable bushing having exterior doubly-inclined surfaces and bored to fit over or upon a shaft, as set forth.

4. In a split or separable pulley, the two-part rim and the wooden bushing adapted to hold the rim parts together, having the grain of its wood at right angles to the shaft-opening in the bushing and to the plane of division of the rim into its two parts, substantially as and for the purpose shown.

5. In a split or separable pulley, the two-part bushing with each part having a doubly-inclined wedge shape, being tapered uniformly from end to end, and having on its inner side a longitudinal groove to partially inclose a shaft, and on its outer side being grooved, dovetailed, or channeled longitudinally, in combination with the two half-rims having their inner sides shaped to fit the bushing, so that as the rim and bushing are moved longitudinally with reference to each other the parts of the rim will be drawn together and the parts of the bushing will be forced toward each other, substantially as and for the purpose specified.

6. In a two-part split pulley, the two parts of the rim each having a dovetailed or equivalent undercut mortise, in combination with a two-part split bushing shaped exteriorly to fit said mortise, substantially as set forth and described.

7. In a two-part split pulley having a dovetailed or equivalent undercut wedge-shaped mortise in each part, a two-part split bushing shaped exteriorly to fit said mortise and bored to fit over or upon a shaft, the construction being such that when the bushing and other parts of the pulley are being put together the bushing draws and holds the two parts of the rim forcibly together and the rim draws and holds the two parts of the bushing firmly upon the shaft, as shown and described.

8. In a split or separable pulley, in combination with the two halves of the pulley-rim, formed of layers of wood glued and pressed together, the grain of the alternate layers crossing each other and having undercut wedge-shaped mortises in each half, a separable bushing formed of wood and having the longitudinal fibers or grain crossing the bore at a right angle thereto, whereby the tensile strength of the wood of the bushing is available for drawing the two parts of the rim together or toward each other, and the tensile strength of a part of the wood composing the rim is available for drawing the two parts of the bushing toward each other, as shown and described.

9. A split or separable pulley made in two equal or like halves united and held together solely by a split or separable bushing.

10. A split or separable bushing made in two equal and like halves, in combination with a rim, also made in two equal and like halves, the bushing forming the sole connection between the two halves of the rim, and the rim forming the sole connection between the two parts of the bushing, as set forth.

11. In a split pulley, in combination with the tapering bushing divided longitudinally into two parts, each part provided on its outer side with a longitudinal groove or channel

diminishing in width toward the smaller end of the bushing, the pulley-rim divided into two parts on a longitudinal plane at right angles to the plane of division of the bushing, each part rim being provided on its inner side with ribs to engage the opposite sides of the grooves in the outer sides of the bushing, substantially as and for the purpose described.

J. M. POLLARD.

Witnesses:
E. L. MILBURN,
CHAS. P. WIGGINS.

Correction in Letters Patent No. 401,586.

It is hereby certified that in Letters Patent No. 401,586, granted April 16, 1889, upon the application of James M. Pollard, of Washington, D. C., for an improvement in "Split Pulleys," an error appears in the printed specification requiring correction, as follows: In line 1, page 4, the word "smaller" should read *larger;* and that the Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed, countersigned, and sealed this 23d day of April, A. D. 1889.

[SEAL.]

CYRUS BUSSEY,
Assistant Secretary of the Interior.

Countersigned:

C. E. MITCHELL,
Commissioner of Patents.