May 2, 1939. O. MITCHELL 2,156,920

PRESSED STEEL PULLEY AND METHOD OF PRODUCING SAME

Filed June 20, 1936

Fig. 1.

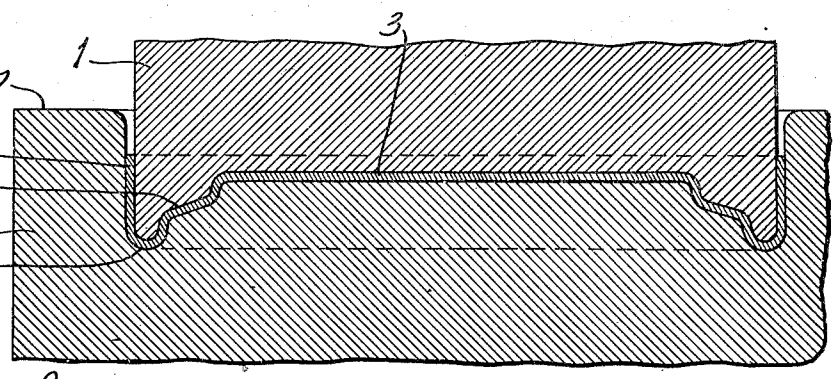


Fig. 2.

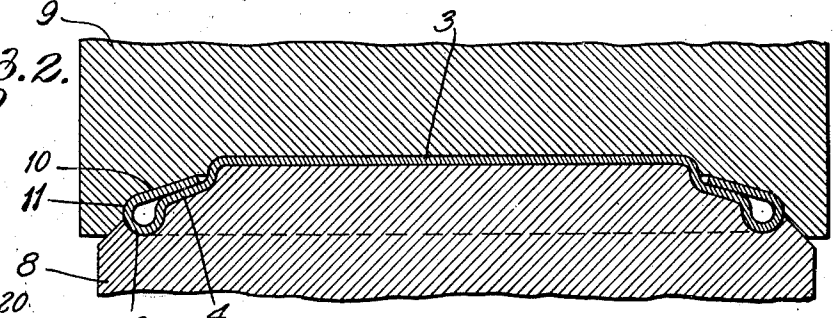


Fig. 3.

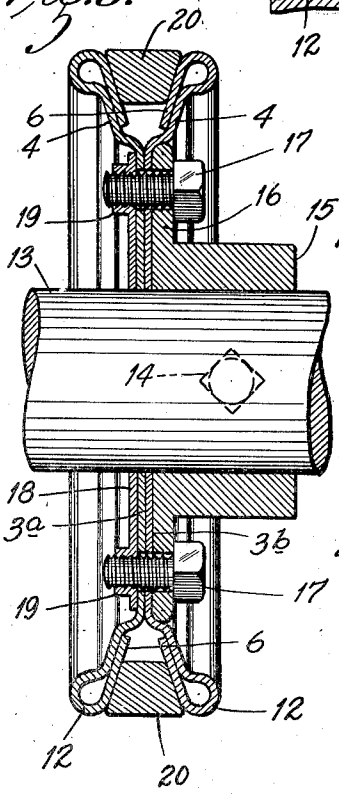
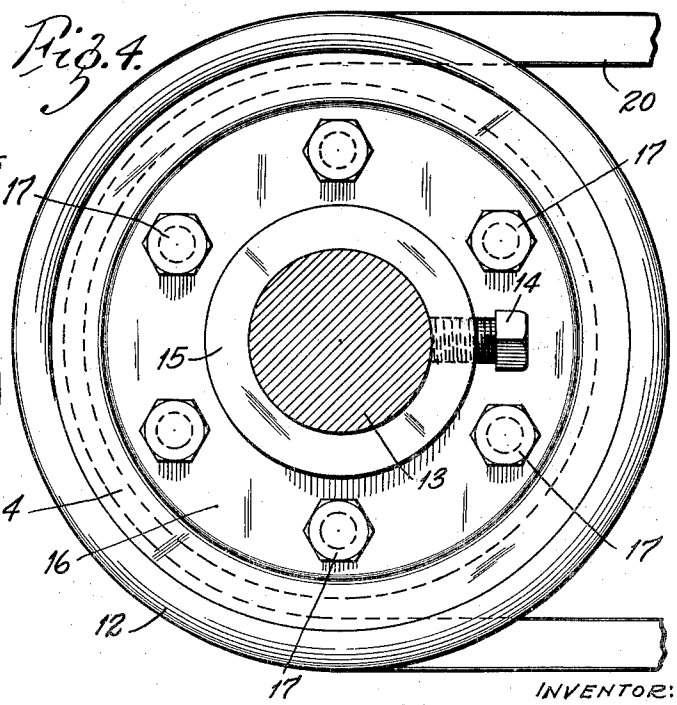


Fig. 4.



INVENTOR:
ORVILLE MITCHELL,
By Bruce S. Elliott
ATTORNEY.

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PRESSED STEEL PULLEY AND METHOD OF PRODUCING SAME

Orville Mitchell, Dallas, Tex.

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4 Claims. (Cl. 29—159)

The general object of this invention is to provide a novel pressed-steel pulley, or sheave-wheel, having a V-shaped circumferential groove and made from circular blanks sufficiently large in diameter to permit folding the outer circumferential portion of the blanks inward far enough so that their edges terminate near the bottom of the groove, or below the bearing surface of the belt. The groove is of a shape to accommodate a belt trapezoidal in cross-section.

The method involved consists in forming each half of the pulley from a circular blank of metal, and by means of forming dies pressing and bending the circumferential edge portion of each blank in such manner that when their central flat portions are secured together a V-shaped circumferential groove, having double side walls and a smooth rolled outer rim, will be provided.

The method involved consists further in pressing the circumferential portion of each circular metal blank in such manner as to provide a substantially flat inclined, off-set portion removed some distance from the periphery and terminating in a concaved circular portion, and then folding the edge portion of the blank beyond said circular off-set portion inward by a second pressing operation to cause said edge portion to be received onto or against the flat off-set portion of the blank at the same time that the concaved off-set portion is further curved to form a closed smooth, rolled, outer rim.

Another object of the invention is to secure the pressed metal halves of the pulley to the flange of a cast hub by means of self-threading screws extending through bolt holes in the flange of the hub and through corresponding holes in the two halves of the pulley and threading into extrusions of a re-inforcing plate, so that by tightening the screws the two halves of the pulley are clamped between the re-inforcing plate and the flange of the hub.

Heretofore, pulleys have been made by forming same from pressed metal in separate halves, and securing the halves together and to the flange of a central hub; but so far as I am aware, the belt bearing surfaces of the two halves forming the V-shaped groove of such pulleys has always been formed from a single thickness of metal, with the outer edge portion of each half being rolled outwardly, i. e., away from the groove. The grooves of such pulleys are subject to spreading; that is, the walls are not strong enough to stand a heavy belt tension unless formed from metal of such thickness as would seriously interfere with the other forming operations involved, such as providing a smooth, rolled outer rim.

The advantage of my improved construction of pulley is that it enables relatively light gage drawing-steel to be used in forming the halves of the pulley, while by forming the walls of the V-shaped groove of double thickness, sufficient stiffness, or strength, is insured where it is needed to withstand the strain of the wedging action of the belt, and a smooth outer or rolled rim is provided; and by having the inner edge of the metal terminate near the bottom of the groove, there is no raw edge, or unfinished metal to show on the outside of the pulley. In other words, aside from providing required strength where it is needed from relatively light gage metal, a more highly finished and truer-running pulley is attained; and such pulley can be made with less wear and cost of upkeep on the dies required for forming the same than would be possible if the walls of the circumferential groove were of single thickness and the metal heavy enough to provide the same stiffness.

It will be obvious that if only a single thickness of metal is used for forming the circumferential portions of the pulley halves, the metal would have to be a great deal heavier to provide the same strength characterizing my improved pulley. Furthermore, the drawing difficulties involved in bending the heavier gage metal outward, results in a comparatively rough unfinished looking rim, with the edge of the metal more or less exposed.

The invention and the method of manufacturing are illustrated in the accompanying drawing in which—

Figure 1 is a cross-sectional view through a pair of forming dies with a metal blank between them, illustrating the first step in the method of producing the pulley;

Figure 2 is a similar view, showing another set of dies, the blank as formed by the dies of Figure 1 being shown inserted between these dies and pressed into the final shape;

Figure 3 is a vertical sectional view showing one of my improved pulleys mounted on a shaft and with a belt inserted in the circumferential groove of the pulley; and

Figure 4 is a view in side elevation of the construction shown in Figure 3.

Referring now to the drawing, the numeral 1 indicates an upper, and the numeral 2 a lower complemental forming die, the central portions of which are flat, and the circumferential portions of which are given a configuration such that, when a circular metal blank 3 of the proper size is inserted between them and the die 1 forced downward into the die 2, the circumferential portion of the blank will be shaped to afford an inclined, off-set portion 4, a curved, or concaved portion 5, and a marginal portion 6, extending at right angles to the body of the blank. The female die 2 is of larger diameter than the male die 1 and provides on its upper side a relatively wide ledge 7, on which the blank 3 is initially positioned. This blank is of such

diameter that when pressed downward into the die 2, as shown in Figure 1, a circumferential edge portion 6 is provided which after the pressing operation will form a circular flange extending upward between the opposing faces of the two dies, as shown.

The blank 3 shaped as shown in Figure 1, is next removed from between the dies 1 and 2 and placed on a forming die 8, the upper surface of which is given a configuration corresponding to the shape imparted to the circumferential portion of the blank. An upper forming die 9 is now forced downward onto the blank. This die is provided with an annular inclined portion 10, and a curved portion 11, so that when the die 9 is forced home the edge portion 6 will be folded over inwardly and forced into engagement with the off-set portion 4. This action results in further curving the concaved portion 5 and forming a substantially circular bead 12, providing a smooth round rim for one side of the groove of the pulley. A second blank having been shaped and folded in the manner previously described, the two halves of the pulley thus provided are secured together in the manner now to be described, and as illustrated in Figures 3 and 4.

Either during the previous pressing operation, or in a subsequent operation, the central portion of the two formed blanks, indicated in Figure 3 by the characters 3^a and 3^b, respectively, are cut out to form, when the blanks are secured together, a circular aperture of the size of the shaft 13 on which the pulley is to be mounted. On this shaft is secured, by means of a binding screw 14, a hub 15, provided on one end with a circular flange 16, which flange is provided with apertures for receiving self-threading screws 17, six of which screws are usually employed, as indicated in Figure 4. The webs of the blanks 3^a and 3^b are provided with corresponding and aligning apertures for receiving the screws 17. These blanks having been placed together in the position shown in Figure 4, and one of them placed against the flange 16, the two blanks are secured firmly to said flange and to each other, preferably by placing against the web of the outermost blank a disk 18, having flanged bolt holes 19, aligning with the apertures in the webs of the blanks and those in the flange 16, and the self-threading screws 17 are then passed through the apertures in the flange and webs and threaded into the flange openings 19 of disk 18, thus firmly securing the two halves of the pulley to each other and to the flange 16 of hub 15.

While I prefer the method just described for securing the two halves of the pulley together and to the flange of the hub, it will be apparent, without illustration, that the disk 18 could be omitted and the screws 17 threaded into flanged openings formed in the web 3^a. However, this latter method of securing the two halves of the pulley together and to the flange of the hub is not as good as the preferred method involving the use of the disk 18, as there is a tendency to distort the shape of the outer half of the pulley in forming the flanged openings therein.

By referring to Figure 4 is will be seen that when the two blanks 3^a and 3^b, which have had the circumferential configuration described imparted to them, are secured together, the folded over circumferential edge portions 10 will provide a V-shaped circumferential groove which is adapted to receive the wedge-shaped belt 20, of conventional form.

It will be further seen, that the edges of the member 10 which now form the walls of the groove terminate near the bottom of the groove and well below the bearing surface of the belt.

Finally, it will be seen that in bending the edge portions 6 inward to form a double thickness of metal for the sides of the groove, I at the same time provide smooth round rims 12, which are devoid of any edges, or roughened portions, so that both on the inside of the groove and on the outside of the pulley, the exposed surfaces are smooth and uniform, so that a highly finished and true-running pulley is provided.

Finally, it is to be observed that the flange 16 on one side and the disk 18 on the other act as braces to the walls of the groove, thus imparting additional strength to the pulley over that afforded by the double thickness of its walls, so that there is no tendency whatever for the walls of the groove to spread apart even under abnormal tension of the belt 20.

I claim:

1. A pressed metal pulley comprising two circular metal blanks having flat central portions secured together and diverging circumferential portions bent upon themselves to provide smooth, round rims and inwardly extending members forming a groove having straight, converging sides and walls of double thickness.

2. A pressed metal pulley comprising two circular metal blanks having flat central portions secured together and diverging circumferential portions bent upon themselves to provide smooth, round rims and inwardly extending members forming a groove having straight, converging sides and walls of double thickness, the edges of said members extending substantially to the bottom of said groove.

3. The method of producing a pressed metal pulley which comprises separately pressing two complemental, circular metal blanks to provide in each a circumferential configuration consisting of an inclined portion and a plane marginal portion extending upward at right-angles to the blank, again pressing each blank to fold said marginal portion inward to form double thickness for said inclined portion, and then securing the inner portions of the blanks together to cause the outer configured portion thereof to form a circumferential groove, in which said folded-over portions will provide straight, inner walls converging inwardly.

4. The method of producing a pressed metal pulley, which comprises separately pressing two complemental, circular metal blanks to provide in each an inclined, off-set portion, a surrounding concave portion and a vertically-disposed plane marginal portion, again pressing each blank to fold said marginal portion inward against said inclined portion and thereby bend said concave portion into circular form, and then securing the inner portions of the blanks together to cause the outer configured portions thereof to form a circumferential groove having walls of double thickness, in which said folded marginal portions will provide straight inner walls converging inwardly, and said circular portion will provide on either side a smooth, round rim.

ORVILLE MITCHELL.