2 Sheets--Sheet 1.

J. MURDOCK.

Casting Pulleys.

No. 166,799. Patented Aug. 17, 1875.

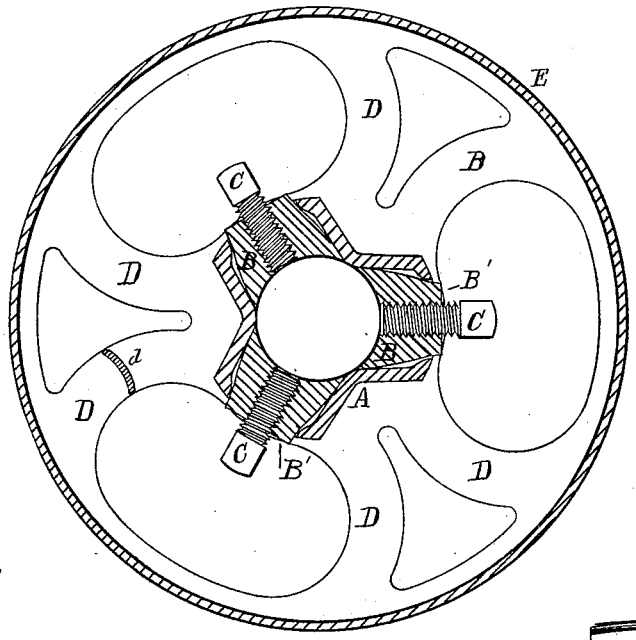

Fig. 1.

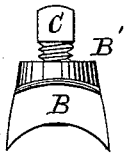

Fig. 6.

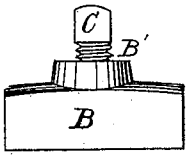

Fig. 5.

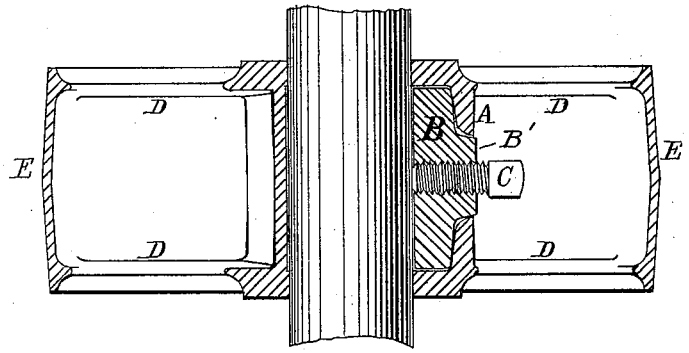

Fig. 2.

Witnesses.
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Jno. A. Clinch

Inventor.
John Murdock

2 Sheets--Sheet 2.

J. MURDOCK.

Casting Pulleys.

No. 166,799. Patented Aug. 17, 1875.

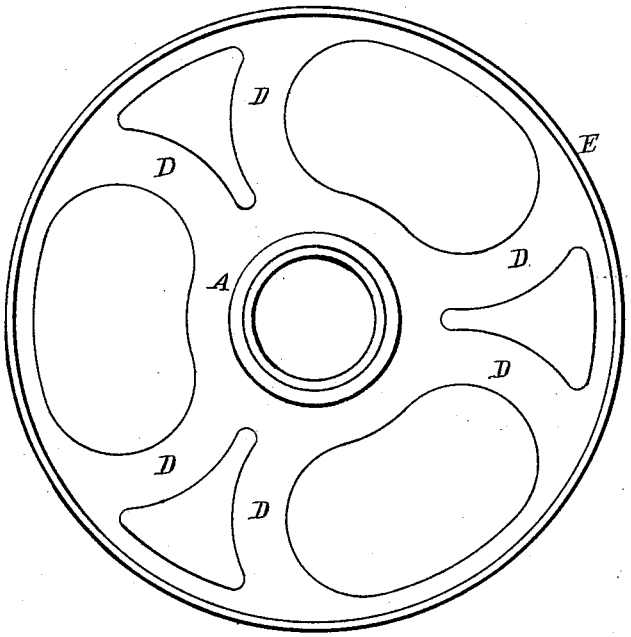

Fig. 3.

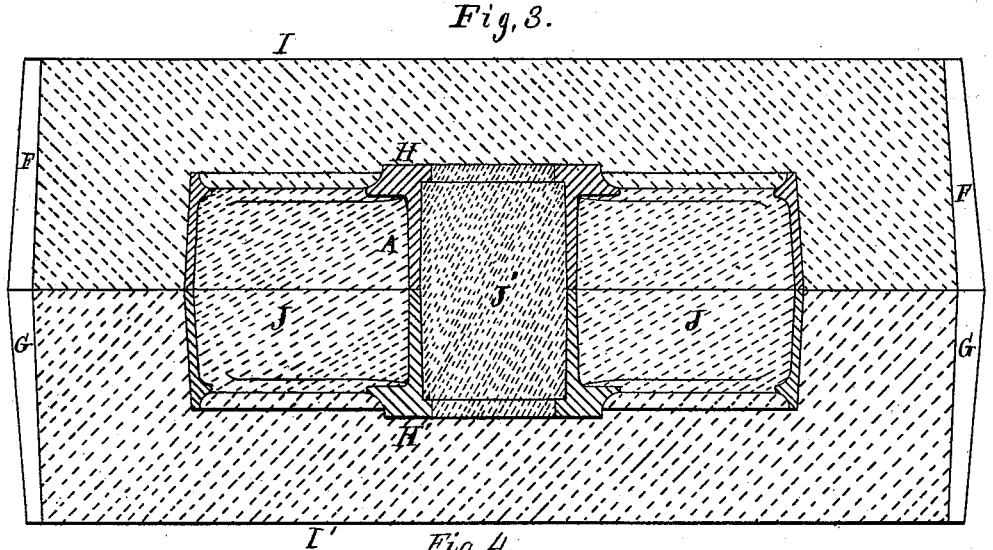

Fig. 4.

Witnesses
Wm. C. Edwards
Wm. C. Hibbard

Inventor,
John Murdock

UNITED STATES PATENT OFFICE.

JOHN MURDOCK, OF CARVER, MASSACHUSETTS.

IMPROVEMENT IN CASTING PULLEYS.

Specification forming part of Letters Patent No. **166,799**, dated August 17, 1875; application filed April 17, 1874.

To all whom it may concern:

Be it known that I, JOHN MURDOCK, of Carver, in the county of Plymouth and State of Massachusetts, have invented certain Improvements in the Manufacture of Cast Pulleys, of which the following is a specification:

My invention relates to a new mode of making pulleys of cast-iron or other metal, by which a pulley of the requisite strength can be made much lighter and cheaper with the same strength than by the mode usually practiced; and it consists, first, in the mode of constructing the pattern for molding such pulleys; second, in the pulley so made as a new manufacture; and, third, in a mode of securing such pulleys to their shafts.

In making cast-iron pulleys in the usual way, in which a single set of arms is used, which are placed in the middle of the length of the pulley, and of sufficient strength to support the strain, and are attached to a hub at their inner ends, it is difficult to prevent the breaking of the arms or distorting the rim by reason of the unequal cooling and contraction of the parts, as is well understood by foundrymen, and to avoid this various expedients are resorted to, such as making the arms of such form as to allow them to yield to the strain without breaking in cooling, allowing the pulley to cool in the sand, so as to make the cooling more uniform, or uncovering the hub of the pulley as soon as the metal is set by removing the sand from the hub to hasten its cooling, while the rest of the casting remains buried, with other analogous practices to accomplish the same purpose; but by my mode of operation most of those expedients are unnecessary.

The distinguishing characteristics of my invention are, first, that the pulley is made with two sets of thin arms, each set being placed at or near each edge of the rim, and connected to the other at the center by a thin hub, so that the thickness of the metal in the pulley is nearly the same in all parts, and in all parts much thinner than would be safe in pulleys as usually made, which is accomplished by the use of two sets of arms placed at each end of the pulley, and making the hub connecting them thin, so that the rate of shrinkage in all parts is nearly uniform, and the castings can be emptied from the molds to cool as soon as the metal is set, and require no more care in cooling than ordinary castings; second, by the peculiar manner of constructing the pattern of such a pulley, and of molding the same, the pulleys can be molded with great facility entirely in green sand, and without the necessity of using any core-work; and, third, by the use of such a thin hub to the pulley some further provision is necessary to fasten the same to the shaft when it is desired to do this by set-screws, because the metal in the hub is not thick enough to form a sufficient nut for the screws, and for this purpose the hub is made of such shape as to form recesses upon the inside to receive bar-nuts, through which the set-screws work, and which nuts are made to bear against the inside of the hub close to the arms, so that the strain of the screws is received at the part of the hub which is strong enough to withstand it.

In the drawings, Figure 1 is a section through the middle of the pulley, showing the fastenings. Fig. 2 is a section at a right angle to Fig. 1. Fig. 3 is an inside elevation of one-half of the pattern made with a hub suitable for a loose pulley, where a chamber is made in the hub for a lining of soft metal for a wearing-surface. Fig. 4 is a section through the mold and pattern, showing the method of molding the same. Figs. 5 and 6 are two detached views of the bar-nuts and set-screws for securing the pulleys to the shaft, as shown in Figs. 1 and 2.

A is the hub of the pulley, which, as shown in Figs. 1 and 2, is made of such form as to have three recesses within it to receive the bar-nuts B, through which the set-screws work, by which the pulley may be secured to its shaft. These nuts are simply pieces of cast-iron, through which the set-screws C are screwed, as shown, and they are of such form upon the back side in relation to the recesses that they bear against the interior of them out to the ends, as seen in Fig. 2, and nearly under the arm. The bosses B′ on the nuts, which secure the set-screws C, pass through holes which are cast in the shell of the hub, as shown. D D are the arms, made of any desired form, but thin, and, by preference, of curved cross-section, as shown by the cross-

section at *d*, Fig. 1, by which the arms are made much stronger laterally without a material increase in the weight. B is the rim of the pulley, made of nearly uniform thickness throughout, with the draft upon the inside, made in the opposite direction from that usually made, as well as that of the hub.

The mode of constructing the pattern and of molding the same is shown in Fig. 4, in which F and G are the two parts of an iron flask, and H and H′ are the two parts of the pattern. I and I′ are the cope and nowel of the mold. J is the middle part within the pattern, and J′ is the inner part, which forms the core of the mold. In molding a pattern like Figs. 1 and 2 the parts J and J′ are connected through the holes in the hub, and form one piece. The drafts of the pattern are made so that the two parts draw away from the parting instead of toward it, as is usual.

In molding this pattern the method of procedure is as follows: One-half of the pattern is laid upon the molding-board, outside down, and rammed up inside, and stricken off, and then turned over upon a plain molding-board. The parting-surface at the face of the arms is finished, and parting-sand applied. Then one part of the flask is put over it and rammed up; then it is turned over, and the face is finished outside of the pattern; then the other half of the pattern is put on, and the inside is rammed up, uniting the sand with that in the other part of the pattern, and finished at the arms; then the parting-sand is applied to the whole surface; then the other part of the flask is put on, and rammed up. To draw the pattern the cope is lifted off down to the middle parting, and one-half of the pattern is then drawn; then the cope is replaced, and the whole mold turned over; then the other part of the mold is lifted off, and the other part of the pattern is drawn, and the mold is then closed ready for casting. As soon as the iron is set the casting is emptied from the mold like any other casting. By this means iron flasks may be used for the purpose without being so heated as to be difficult to handle. The other details of the work are similar to those in common use.

What I claim is—

1. The pattern described for molding pulleys, having two sets of arms joined to the rim and hub at the outsides of the pulleys, and parting at the center, the drafts being made so as to draw the two parts of the pattern away from the parting-joint, substantially as described.

2. The pulley made with two sets of arms joined to the rim at or near its edges, and to each other by a thin hub, as a new manufacture.

3. The recesses in the hub, in combination with the detached nuts and set-screws, substantially as described.

Executed April 11, 1874.

JOHN MURDOCK.

Witnesses:

WM. P. EDWARDS,

WM. C. HIBBARD.