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Patented Jan. 23, 1900.

T. CORSCADEN, Dec'd.

A. J. CORSCADEN, Administratrix.

DIE FOR MAKING SHEET METAL SPOKE ARMS FOR PULLEYS.

(Application filed Oct. 20, 1898.)

(No Model.)

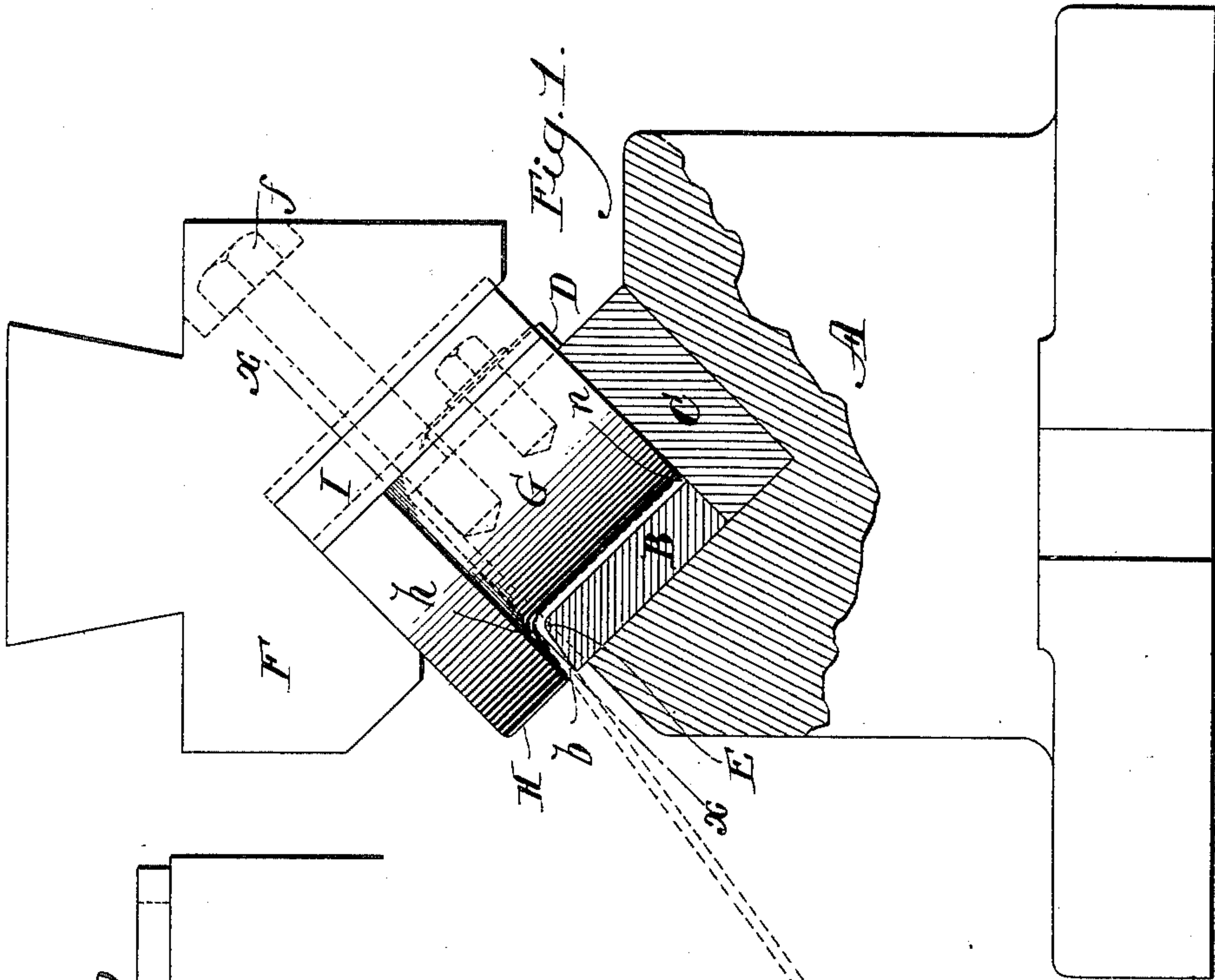
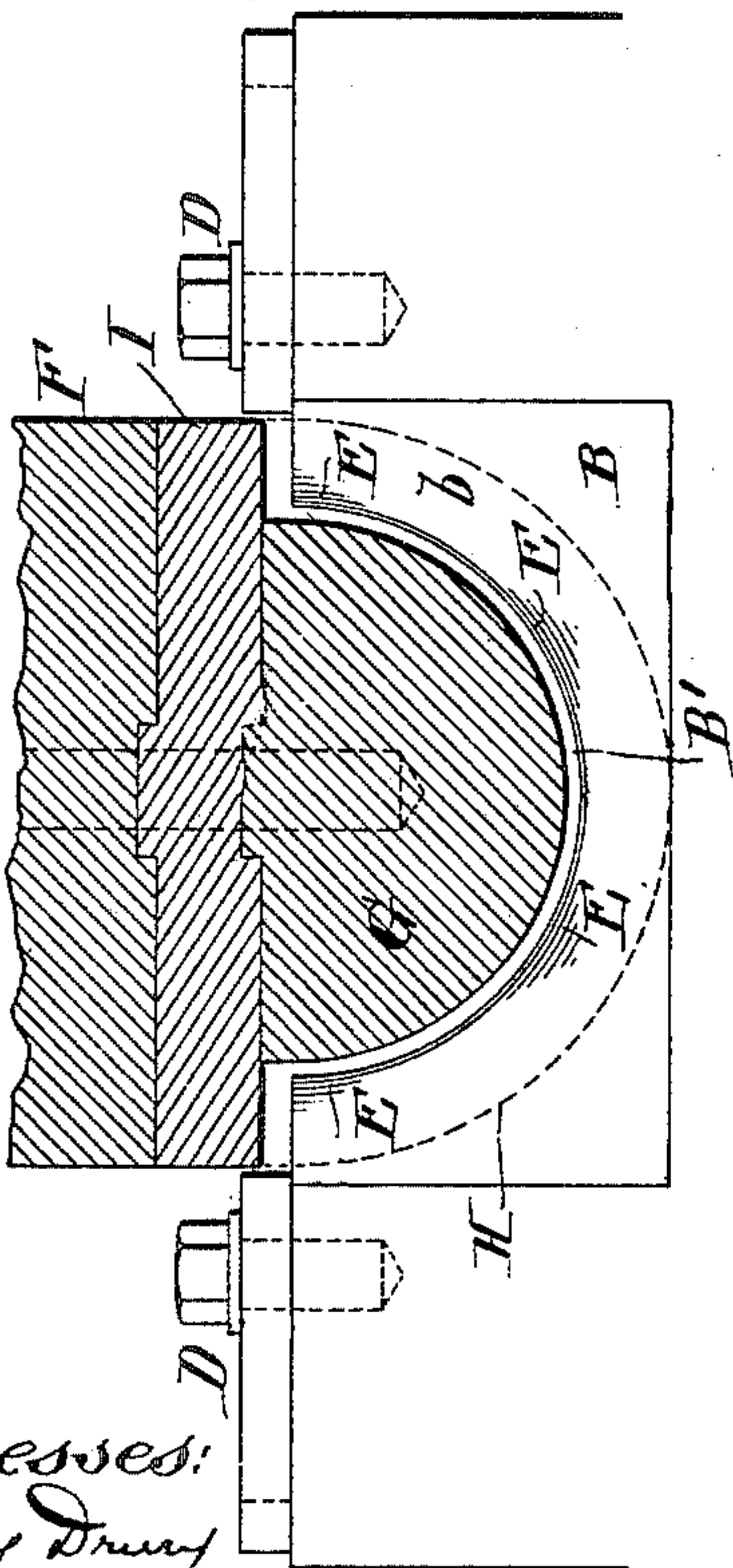


Fig. 2.



Witnesses:
Henry Drury
R. M. Kelly.

Fig. 4.



Fig. 8.



Fig. 5.

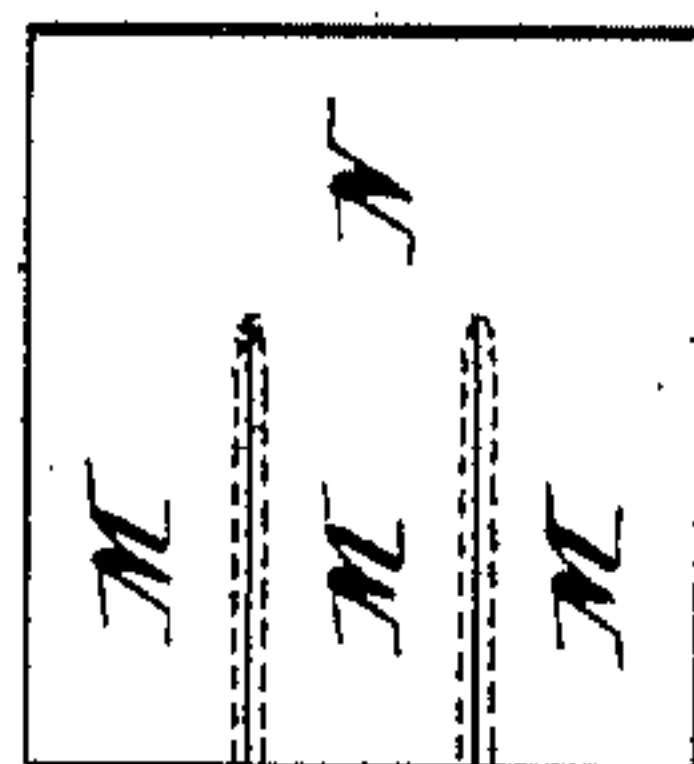


Fig. 6.

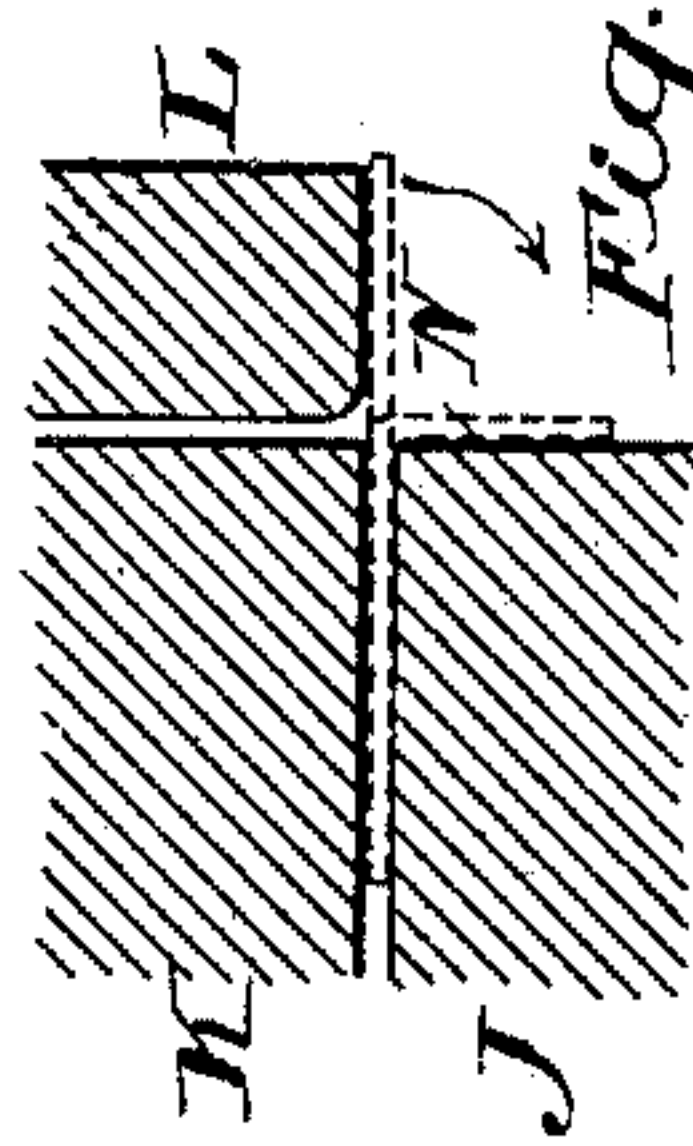


Fig. 3.



Inventor:

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Dec'd.
By her atty. *[Signature]*

UNITED STATES PATENT OFFICE.

ADELINE J. CORSCADEN, OF PHILADELPHIA, PENNSYLVANIA, ADMINISTRATRIX OF THOMAS CORSCADEN, DECEASED.

DIE FOR MAKING SHEET-METAL SPOKE-ARMS FOR PULLEYS.

SPECIFICATION forming part of Letters Patent No. 642,036, dated January 23, 1900.

Application filed October 20, 1898. Serial No. 694,099. (No model.)

To all whom it may concern:

Be it known that THOMAS CORSCADEN, deceased, formerly of the city and county of Philadelphia, in the State of Pennsylvania, did invent an Improvement in Dies for Making Sheet-Metal Spoke-Arms for Pulleys, of which the following is a specification.

This invention has reference to dies for the manufacture of sheet-metal spoke-arms for pulleys; and it consists of certain improvements which are fully set forth in the following specification and shown in the accompanying drawings, which form a part thereof.

In making sheet-metal pulleys the same are so constructed that the spoke-arms are formed integral with each other and with a semicircular central hub portion, which latter is clamped to the shaft or otherwise formed into the hub adapted for support upon a shaft. The present improvements comprehend certain dies for making the said spoke-arms and semicircular hub portions, whereby they may be formed from a flat sheet of metal suitably blanked out and bent, so as to cause the spoke-arms to lie in radial lines from the semicircular hub portion from which they project, and, furthermore, to lie in planes at substantially right angles, or nearly so, to the axis of curvature of said hub portion. In the formation of such spoke-blanks a sheet of steel is first subjected to the action of dies which shall split or cut it to form two or more parallel tongues or arms extending from a transverse portion at one end, which remains uncut. The last-mentioned portion is then bent at substantially right angles to the plane of the tongues and is then subjected to the action of improved dies which curve the said uncut portion into a semicylindrical shape and simultaneously therewith cause the said tongues to spread apart at their free ends, so as to lie in radial lines from the said curved or hub portion, in which position the said tongues form the spoke in the subsequently-finished wheel. In the method of forming the spoke-blank it will be observed that the spokes and hub portion are retained as an integral structure, thereby securing the greatest strength and simplicity in the building up of the wheel, and at the same time the formation of the curvature in the hub portion absolutely and

accurately locates the radial position of the spoke-arms relatively thereto, a feature of the utmost importance in the subsequent finishing and assembling of the wheel structure.

The particular apparatus more especially under consideration in this application in connection with the above method of forming the spoke-blanks and embodying this invention is the die mechanism for simultaneously curving the hub portion and causing the spokes to assume radial position relatively thereto, and these die structures consist, essentially, of a curved or recessed die having a guiding-surface over which the tongues or arms rest, combined with a second die having a curvature adapted to the curvature of the recess of the first-mentioned die, and, further, having a flanged portion adapted to fit down over the portions of the spoke-arms adjacent to the hub portion, so that while they are spreading into radial position they are held between the two dies in the proper annular location, and the subsequent pressure of the dies causes the metal to set and the final position of the spoke-arms relatively to the hub portion to be definitely determined.

The improvements will be better understood by reference to the accompanying drawings, in which—

Figure 1 is a side elevation of suitable dies for shaping the sheet-metal spoke-blanks, showing part of the lower die in section. Fig. 2 is a diagonal section of the same on line *x x*. Fig. 3 is a plan view of the blank to be operated upon. Fig. 4 is a similar view of the blank with one edge bent downward. Fig. 5 is a cross-section on line *y y* of Fig. 4. Fig. 6 is a cross-section illustrating the manner of bending the blank shown in Fig. 3 into the shape shown in Figs. 4 and 5. Fig. 7 is a plan view of the blank after leaving the dies, Figs. 1 and 2; and Fig. 8 is a cross-section on line *w w* of Fig. 7.

Reference will first be made to the sheet-metal blank and the operations through which it is put to bring it to the condition to be acted upon by the dies shown in Figs. 1 and 2 and then to the nature and construction of said dies.

A sheet-metal blank is first divided by one or more longitudinal slits or cuts for a por-

tion of its length, so as to form a series of tongues M, united to an uncut transverse portion N, as indicated in Fig. 3. Subsequently the part N is to form the semicircular hub portion, while the parts M constitute the radial spokes. The sheet of metal shown in Fig. 3 may then be placed between jaws J K, Fig. 6, and while the tongues M are clamped the portion N may be bent downward by a descending die L. The blank will then be in the shape shown in Figs. 4 and 5; in which the parts M and N will be arranged at substantially right angles. The parts M will be of any length desired to suit the length of spoke necessary for a given diameter of pulley. The blank, in the form last described, is next placed between the dies G B and subjected to pressure, which performs the function of curving the part N into the semicircular shape N', (shown in Figs. 7 and 8,) so as to constitute a portion of the hub of the wheel. At the same time this operation takes place the parallel tongues or arms M are caused to shift their positions relatively one to the other and arrange themselves in radial lines from the center of curvature of the hub portion N'. It will now be seen that the spoke-arms have been brought into proper relative position for riveting to the rim of the wheel and yet without direct manipulation upon the said arms. It is also advisable in sheet-metal pulleys of this character that the arms M should be slightly oblique to the axis of the hub, and this obliquity is indicated in Figs. 1 and 8, and this is secured by the action of the dies B G, as will be hereinafter explained.

Referring now to Figs. 1 and 2, the frame A is recessed in its upper portion and fitted with a steel die B, clamped in position by the two clamps D D. The die B is formed with a semicylindrical recess or depression B', arranged obliquely.

C is a backing-piece arranged between the lower end of the die B and the body of the frame A. This backing or lining strip takes up the downward oblique thrust of the die B and may also be employed to level up the lower edge *n* of the blank by upsetting it, as is well known in the art of working metal. Where the width of the hub portion N' is to be greater, a wider die B is inserted and a thinner lining-strip C substituted. In this manner the same die-holding frames may be employed for numerous modifications in the size of the blank. It is evident that, if so desired, the lining-plate C may be dispensed with or formed integrally with the frame A. The die B is set on an angle with the direction of movement of the upper die, so that there is a combined pressure exerted upon the internal face B' of the die B, as well as upon the outer oblique face *b* thereof. The downward thrust of the upper die also tends to crowd the lower edge *n* of the blank down upon the lining-plate C, an action which would

not result if the pressure exerted by the upper die were at right angles to the curved face of the die B.

F is the upper movable frame and is movable to and from the lower frame A. This frame is notched and receives the upper die G, which is shaped to correspond to the working face of the lower die B, while allowing for the thickness of metal of the blank to be treated. The die G is semicircular, as shown, and is provided at its upper end with a flange H, which extends laterally over the outer and upper face *b* of the die B. Interposed between the upper portion of the semicircular die G and the frame F and arranged at substantially right angles to the flange H is a steel lining-strip I, which directly receives the thrust of the die G and at the same time may be replaced to permit of a larger or smaller die G being employed, to suit variations in the size of the hub. The die G and lining-strip I are held in place on the frame F by a bolt *f*. The adjacent faces *b h* between the die B and the flange H are oblique to the axis of the curvature of the dies B and G, as clearly shown in Fig. 1, so that not only do said faces act upon the spoke-arms M to set them, but they also cause said spoke-arms to be bent at an angle relative to the semicircular portion N', so that they are made to lie in a slightly-oblique position relative to the axis of curvature of said hub portion. While this is most desirable, it is not essential, however. The obliquity of the surfaces *b* immediately in line with the center of each of the spoke-arms extends down to the inner curved face B' of the die B, as shown in Fig. 2; but the intermediate part of said face corresponding to the juncture of the spoke-arms is curved or rounded at the juncture of said face *b* and inner curved surface B', as indicated at E, so as not to put too great a strain upon the metal of the blank at these places. It will be observed that when the dies approach each other, as indicated in Fig. 1, the corner formed between the flange H and the die portion G of the upper die crowds the metal down upon the rounded corners E and sets the radial arms positively at these points, so that their relative positions to each other and to the semicircular portions become absolutely fixed.

The curved surface of the die B is formed with equal radii throughout its entire length, and the conical surface *b* is so formed as to meet the upper edge of said curved surface in a plane lying at right angles to the length of the curved surface B. It will also be observed that the curved edges or portions E are at intervals in the juncture of the parts B and *b* and correspond to the spoke-arms when formed by the action of the dies.

While the construction of the dies herein shown is preferred, the invention is not limited to the minor details thereof, as they may be modified without departing from the principles of the invention.

Having now described the invention, what is claimed as new, and desired to be secured by Letters Patent, is—

1. The combination of two frames relatively movable to or from each other, a die secured to one of said frames and formed with an obliquely-arranged semicircular recess having its curvature formed with equal radii throughout its length, and a semicircular oblique die adapted to the recessed portion of the first-mentioned die and secured to the other movable frame and movable in a direction oblique to the axis of the semicircular recess of the other die.

2. The combination of two frames relatively movable to or from each other, a die secured to one of said frames and formed with an obliquely-arranged semicircular recess having its curvature formed with equal radii throughout its length and its lower edge formed at right angles to its curved surface, a lining-plate also carried by said frame and interposed between it and the lower edge of the die thereon and having its upper working surface lying in a plane at right angles to the curved surface of the semicircular recess of the die, and a semicircular die having its curvature formed by equal radii throughout its length adapted to the recessed portion of the first-mentioned die and secured to the other movable frame and movable in a direction oblique to the axis of the semicircular recess of the other die.

3. The combination of two frames relatively movable to or from each other, a die secured to one of said frames and formed with an obliquely-arranged semicircular recess having all portions made with equal radii and in which the upper and outer surface of said die is made conical and meets the upper curved edge of the recessed portion in a plane at right angles to the length of the curved surface of the recessed portion, and a semicircular die adapted to the recessed portion of the first-mentioned die and secured to the other movable frame and further provided with an upper flanged portion having a conical working face adapted to cooperate with the conical upper surface of the first-mentioned die and movable in a direction oblique to the axis of the semicircular recess of the other die.

4. The combination of two frames relatively movable to and from each other, a die secured to one of said frames and formed with an ob-

liquely-arranged semicircular recess having its curvature formed with equal radii throughout its length and also having an upper flanging-surface the juncture of which with the upper edge of the curved recessed portion lies in a plane at right angles to the length of the curved surface, a lining-plate C or base portion having its upper edge fitting to the bottom of the recessed die and arranged in a plane at right angles to the length of the surface of the recessed portion of said die, and a semicircular oblique die adapted to the recessed portion of the said first-mentioned die and having a flange at the top and in which the length of the semicircular part is greater than the length of the recessed die, whereby when the bottom of the semicircular die rests upon the lining-plate C the flanging portions of the two dies do not touch and movable in a direction oblique to the axis of the semicircular recess of the other die.

5. The combination of the frame A, with the oblique die B having a semicircular recessed surface B' and an outer and upper surface arranged at an angle to said recessed surface, a lining-plate C arranged obliquely in the frame A and upon which the lower edge of the oblique die B rests, an upper frame F and a semicircular die G arranged obliquely thereon provided with a flanged upper portion to operate in conjunction with the upper surface of the die B and further movable in a direction oblique to the axis of the semicircular recessed surface B'.

6. The combination with the frame A, with the oblique die B having a semicircular recessed surface B' and an outer and upper surface arranged at an angle to said recessed surface and which outer and upper surface of the die B is provided with the curved edges E E arranged at intervals about the curvature of the recessed portion as shown, an upper frame F and a semicircular die G arranged obliquely thereon provided with a flanged upper portion to operate in connection with the upper surface of the die B.

In testimony of which invention I have hereunto set my hand.

ADELINE J. CORSCADEN,
Administratrix of the estate of Thomas Corscaden, deceased.

Witnesses:

JERE. J. CROWLEY,
S. WARREN HALL.