

J. M. HANSEN.
MANUFACTURE OF CAR WHEELS.
APPLICATION FILED NOV. 11, 1909.

1,007,941.

Patented Nov. 7, 1911.

3 SHEETS—SHEET 1.

FIG. 1

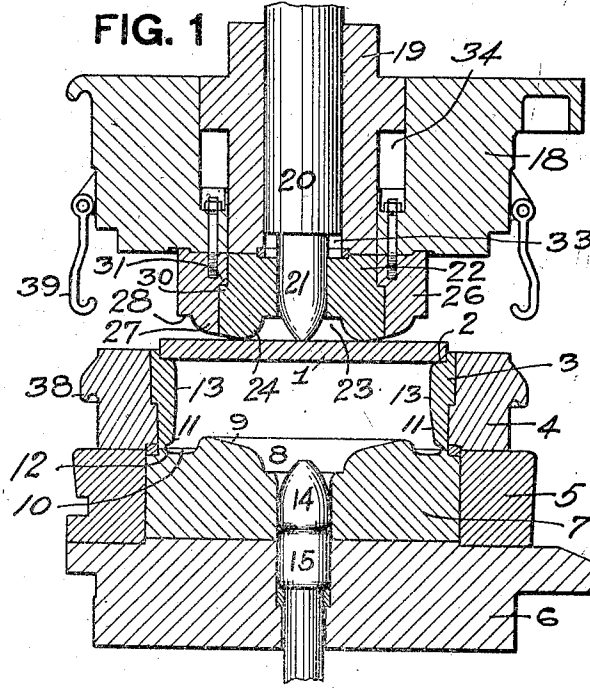
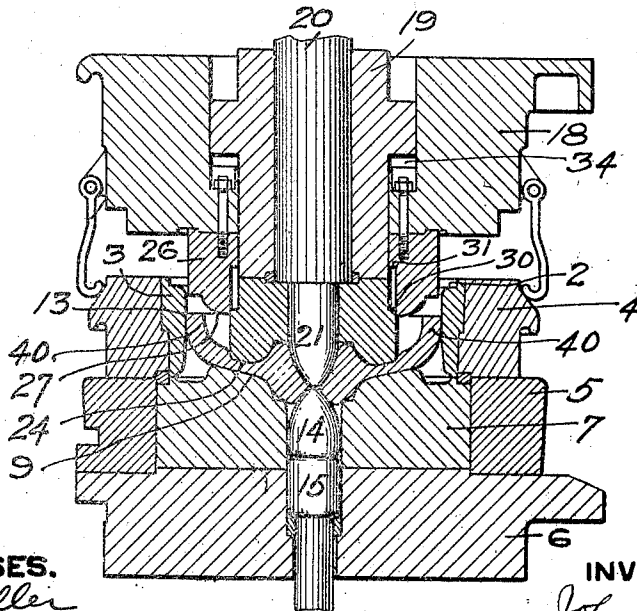


FIG. 2



WITNESSES.

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3 SHEETS-SHEET 2.

FIG. 3

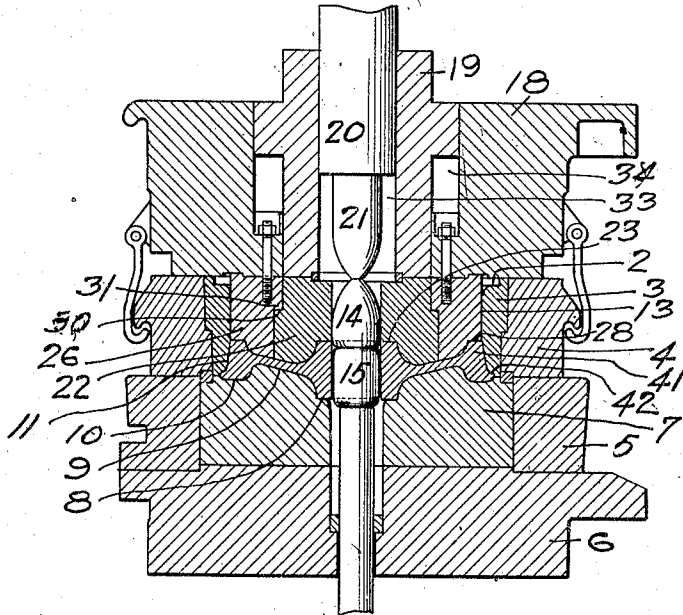
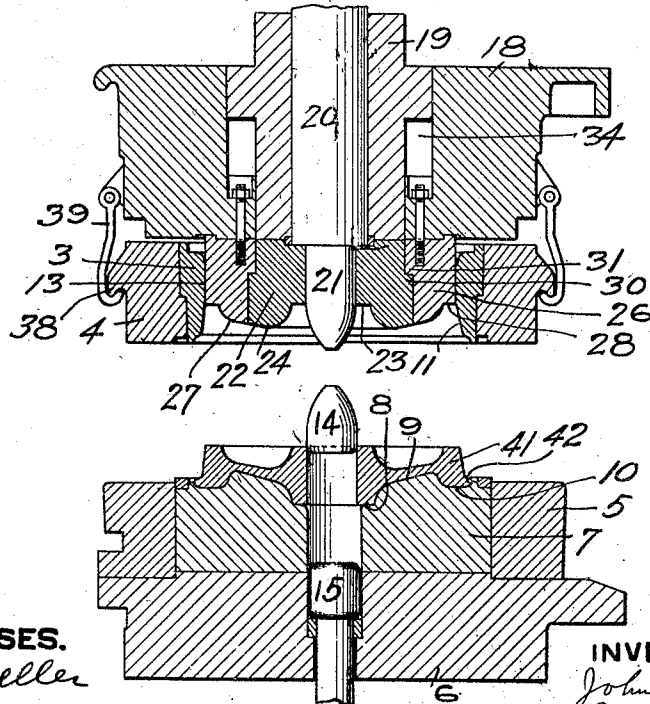


FIG. 4



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3 SHEETS-SHEET 3.

FIG. 5

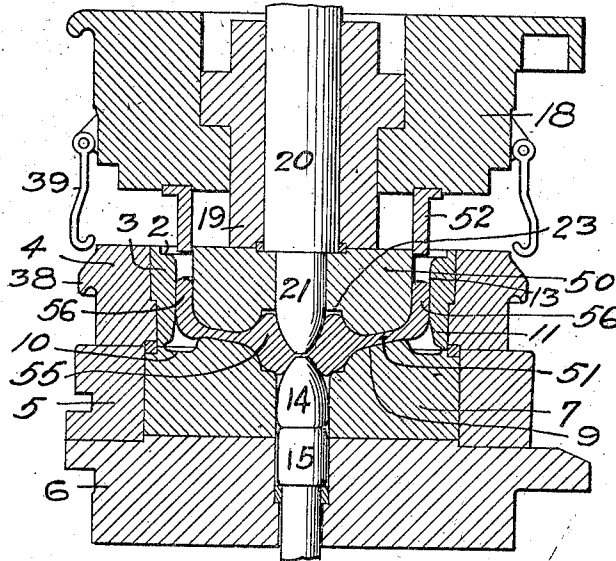
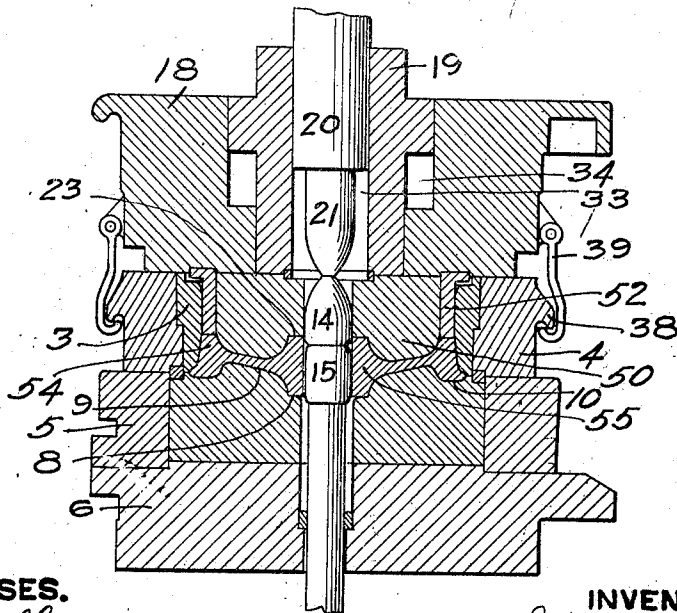


FIG. 6



WITNESSES.

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MANUFACTURE OF CAR-WHEELS.

1,007,941.

Specification of Letters Patent.

Patented Nov. 7, 1911.

Application filed November 11, 1909. Serial No. 527,481.

To all whom it may concern:

Be it known that I, JOHN M. HANSEN, a resident of Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in the Manufacture of Car-Wheels; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to forged steel car and similar wheels. Its object is to produce by the operation of proper forging dies a finished car or like wheel at one heat and within a single forging press.

It consists, generally stated, in first forging the hub portion of a suitable heated blank and while the blank is confined in the dies, forging the rim portion thereof to finished shape, so producing the finished car wheel.

It also consists in certain other improvements, for example, in forging the hub portion with the web or a portion thereof, and then while the metal is confined in the dies, forging the rim portion and so producing the finished wheel.

In the accompanying drawings Figure 1 is a vertical section illustrating the preferred apparatus for the practice of the invention and showing the blank in position for the first forging stroke; Fig. 2 illustrates the first forging stroke; Fig. 3 illustrates the final forging stroke; Fig. 4 shows the forging dies removed so that the finished wheel may be withdrawn; Figs. 5 and 6 illustrate other dies suitable for the practice of the invention showing the first and the final forging strokes.

When employing the preferred form of dies for the practice of the invention, I mount the same in any suitable press, a hydraulic press of great power being necessary, and a press generally suitable for the purpose being shown in Letters Patent No. 922,392 granted to Andrew Christiansen, May 18, 1909. The dies are arranged to give the necessary strokes of the die parts as required to produce the wheels and the blanks, and it is not considered necessary to more than describe the movement of the different parts in forging the blank to the finished wheel.

In the practice of my invention I preferably employ the method set forth in Letters Patent previously granted to me, such as the method illustrated in Letters Patent No.

866,020, of September 17, 1907, it being desirable that the metal be forced inwardly from the web portion of the blank to develop or partially develop the hub thereof, though this is not a necessary part of the invention.

As illustrated in Figs. 1 to 4, the blank 1, shown as a heavy rolled slab, rests upon the shoulder or seat 2 of the ring die 3 which is carried in the annular die holder 4 which is normally seated upon the ring portion 5, of the anvil 6, though as hereafter described, to remove the blank it may be raised from such anvil. The bottom die 7 rests within the ring portion 5 and upon the anvil 6, the ring die 3 and bottom die 7 together forming the matrix or female die for the forging of the blank. The bottom die 7 has the central hub cavity 8 and extending out from the same the web forming face 9, while beyond said face is the annular rim forming seat 10, the lower portion 11 of the ring die 3 together with the annular seat 10 providing the flange forming recess 12 while the face 11 forms the molding face for the tread of the wheel. Above the tread forming face 11 which is inclined according to the desired taper of the tread face, is the vertical wall 13 confining the blank as it is bent down into bowl shape, as illustrated in Fig. 2. Centrally of the hub cavity 8 is the piercing mandrel 14 which is operated by a suitable hydraulic plunger 15 to raise the mandrel through the hub portion of the blank and expand the same as part of the forging operation of the wheel. Above the matrix die as so described is a suitable outer annular die carrier 18, and within the same is the annular die carrier 19, while centrally of said dies is the plunger or mandrel carrier 20 which supports and operates the mandrel 21. These several parts are adapted to be operated by suitable hydraulic cylinders which need no special description. The mandrel 21 is supported centrally of the blank and around the same is the inner annular upper die 22 connected to the die carrier 19, said die 22 having the hub cavity 23 and having the annular convex or cheek portion 24 adapted to forge a portion of the web of the blank. Beyond such die 22 is the outer annular upper die 26 which as shown in Figs. 1 to 4, has the face 27 to forge the outer portion of the web of the wheel, and beyond the same has the shoulder 28 to forge one face of the rim thereof.

These dies are suitably connected to their die carriers, and it is to be noted that the annular die 22 has an outwardly projecting shoulder 30 while the annular die 26 has a like inwardly projecting shoulder 31 by which the working faces of the two annular dies are held in proper alinement at the completion of the forging operation. Such shoulders 30, 31, also provide for transmitting the full pressure brought upon the outer die carrier 18 and the outer die 26 to the inner annular die 22, so that the entire power of the press can be exerted for confining and condensing the metal of the finished wheel. Suitable clearance for the independent movement of the several mandrel or die carriers is provided, such as the space 33 between the mandrel carrier 20 and the die 22 and the space 34 between the die carrier 18 and the die carrier 19.

It will be noted that the annular die holder 4 has formed on its sides the lugs or hooks 38 and that the annular die carrier 18 has suitable depending swinging hooks 39 which are adapted to engage with the hooks 38 when the dies are brought to final position as illustrated in Fig. 3; and that in this way the annular die holder 4 after the completion of the forging operation is raised as shown in Fig. 4 to permit the withdrawal of the wheel.

As above stated, the main feature of my invention consists in first forging the hub and while it is confined in the dies, forging the rim portion of the blank. I may therefore use any suitable blank for this purpose, though I prefer to employ a heavy circular rolled slab as indicated in Fig. 1, and I will describe the invention as applied to the forging of a wheel therefrom. The slab is raised to a suitable forging heat, and is placed upon the rest 2 in position to be operated upon by the dies; and in the usual operation the die 22 is forced downwardly, together with the mandrel 21, the first operation of the dies being to bend the blank into substantially bowl form forcing it within the annular vertical portion 13 of the ring die 3. As the dies descend further the metal is compressed between the die 22 and the die face 9 of the bottom die 7, and this acts to force the metal as so engaged inwardly into the hub cavity 8, 23, and around the mandrels 14 and 21, as illustrated in Fig. 2, so developing the hub, which is completely formed by the piercing thereof by the central mandrel. As the blank has thus been forced downwardly from its seat the outer edge 40 of the blank is thrown upwardly and raised within the vertical walls 13 of the female die, as shown in said figure. While the blank is thus confined the die 26 is forced downwardly as shown in Fig. 3 and it forges the edge portion 40 of the blank downwardly into the

rim and flange forming seat formed by the annular seat 10 of the die 7 and the lower portion 11 of the ring die 3, so forging the rim 41 upon the wheel, and if a car wheel is to be formed as illustrated in the drawing, also forging the flange 42 upon the blank; this forging operation thinning the remaining portion of the web and forcing the metal thereof so as to fill the cavity between the bottom die 7 and the ring die 3 and the dies 22 and 26, so completing the forging of the web and rim. In this descending stroke the shoulders 30, 31, of the dies 22, 26, engage so as to bring the web forming faces 24 and 27, of said dies into proper alinement, and also to distribute the entire forging pressure upon the blank, forcing down the inner annular die 22 with the outer annular die 26, completing the forging of the web and confining the blank for the final piercing of the hub accomplished by the raising of the mandrel 14 by means of the plunger 15. As the blank is so confined an extremely heavy forging pressure can be brought upon the same so as to condense or compact the tread and flange and so complete the forging of the wheel. As the die carrier 18 descends the hooks 39 thereof engage with the hooks 38 of the ring die holder 4, and as the dies are raised as shown in Fig. 4 the die carrier 18 lifts the ring die holder 4 with its ring die, so exposing the forged wheel ready to be withdrawn from the press.

The operation is largely the same in connection with the apparatus shown in Figs. 5 and 6. In this case the upper annular die 50 is made the full width of the web portion 51 of the blank, while the outer annular die 52 is made of substantially the width of the rim portion 54 of the finished wheel, the lower die 7, the mandrel 14, the ring die 3 and its holder 4 and the mandrel 21, together with the die carriers 18 and 19 and the mandrel carrier 20, being the same as in the apparatus illustrated in Figs. 1 and 4. The operation is substantially the same, the annular die 50 descending and bending the blank into substantially bowl shape as shown in Fig. 5 and forcing part or all of the metal of the web portion thereof inwardly to form the hub portion 55, while the edge portion of the blank is turned into upright position as shown at 56. Upon the downward movement of the die carrier 18 the annular die 52 then forces downwardly the edge portions 56 of the blank and so forges the rim portion 54 thereof and compresses the same within the dies, as above set forth.

What I claim is:

1. The improvement in the art of forging steel car wheels, consisting in die forging a heated blank to develop the hub portion of the wheel, and then, while confining the

heated blank in the dies forming such hub portion, forging the rim portion to finished shape of tread and flange.

2. The improvement in the art of forging steel car wheels, consisting in die forging a heated blank to thin the web portion thereof and develop the hub portion, and then, while confining the blank in the dies forming such hub portion, forging the rim portion to finished shape of tread and flange.

3. The improvement in the art of forging steel car wheels, consisting in forging a heated blank into bowl-shape, and then while confining the blank in the dies in which it was so formed, forging the rim portion to finished shape of tread and flange.

4. The improvement in the art of forging steel car wheels and the like, consisting in forging a heated blank to partially develop the hub portion of the wheel and partially form the axle eye in the blank and at the same heat forging the rim portion thereof to finished shape and completing the forging of the axle eye.

5. The improvement in the art of forging steel car wheels and the like, consisting in so forging a heated blank as to thin a portion of the web and force the metal inwardly to develop the hub and then while confining the blank in the dies, forging the remainder of the web and forging the rim portion.

6. The improvement in the art of forging steel car wheels and the like, consisting in so forging a heated blank as to thin a portion of the web and then while confining

the blank in the dies, forging the remainder of the web and forging the rim portion.

7. The improvement in the art of forging steel car wheels and the like, consisting in so forging a heated blank as to force a portion of the metal inwardly in thinning the web, and while confining the blank in the forging dies, by a separate stroke so forging the remainder of the web as to force the metal outwardly.

8. The improvement in the art of forging steel car wheels and the like, consisting in forging a heated blank to develop the hub portion of the wheel, and while confining it in the forging dies, so forging the rim portion as to form a flange along the lower edge of the wheel as confined within the dies, and then separating the matrix die to permit the withdrawal of the wheel.

9. The improvement in the art of forging steel car wheels and the like, consisting in die forging a heated blank to develop the hub thereof, and while confining it within the dies forcing a loose mandrel practically through the hub cavity to develop the axle eye, and delivering the mandrel from the blank after passing entirely through the same.

In testimony whereof, I the said JOHN M. HANSEN have hereunto set my hand.

JOHN M. HANSEN.

Witnesses:

ROBERT C. TOTTEN,
J. F. WILL.