No. 797,920. PATENTED AUG. 22, 1905.

C. T. SCHOEN.

ART OF FORGING CAR WHEELS.

APPLICATION FILED MAR. 6, 1905.

2 SHEETS—SHEET 1.

Fig. 1.

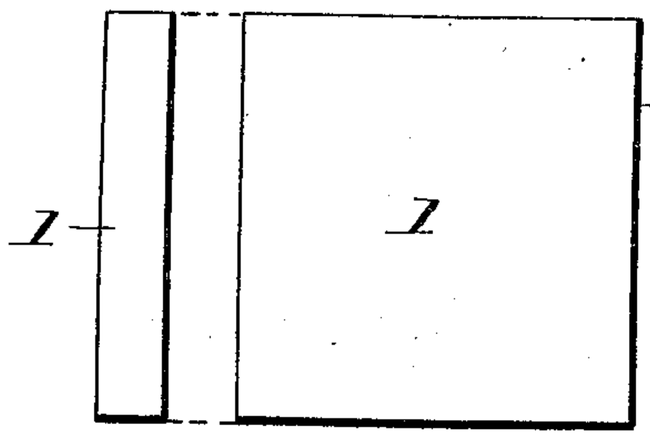


Fig. 2.

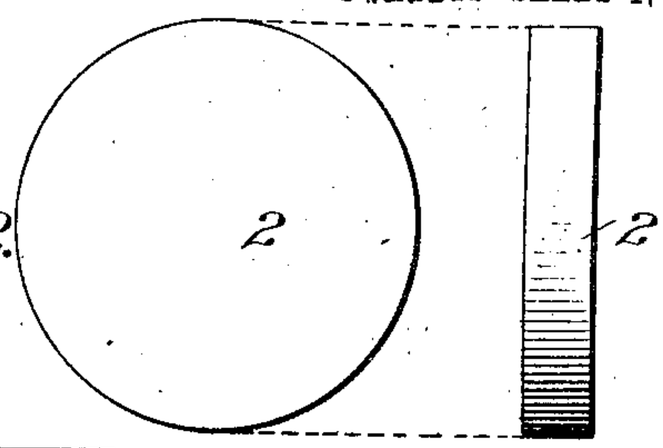
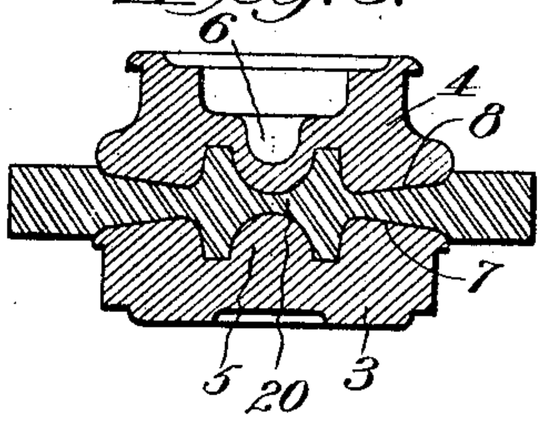


Fig. 4.

Fig. 3.



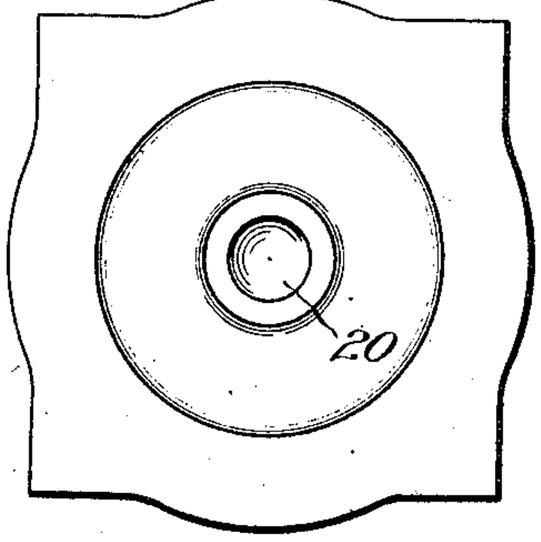


Fig. 7.

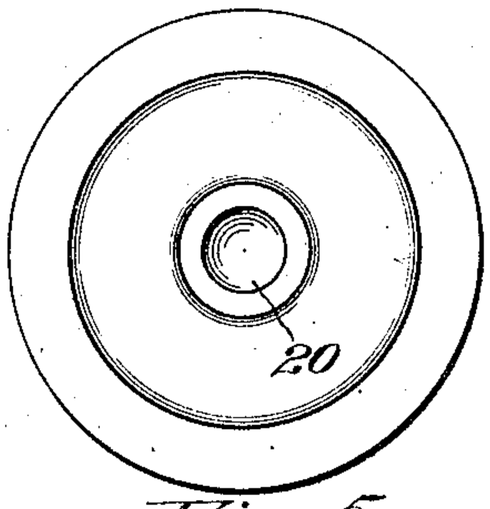
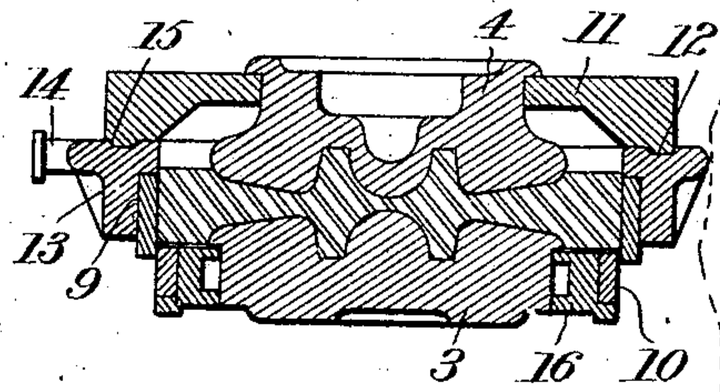


Fig. 5.

Fig. 8.

Fig. 6.



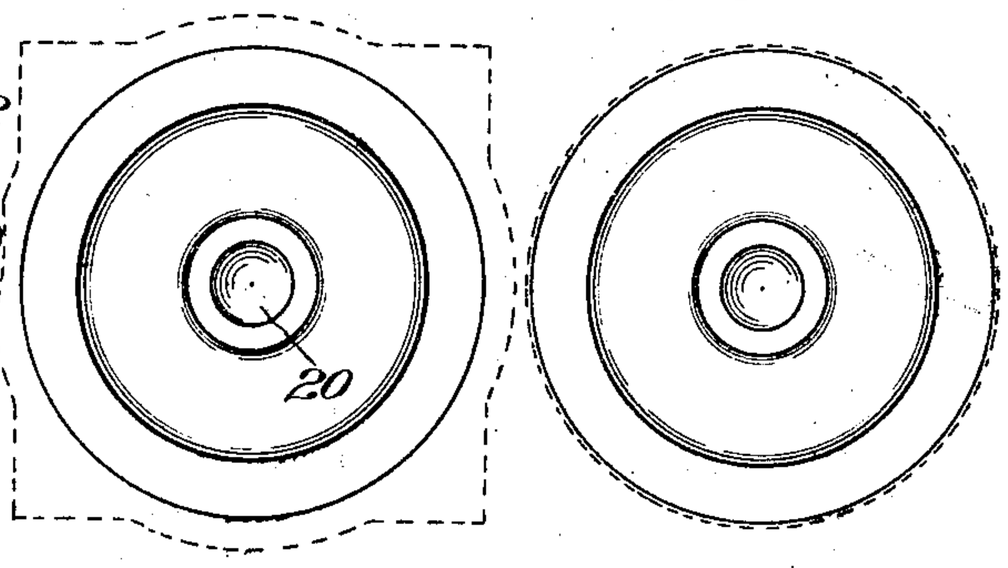


Fig. 9.

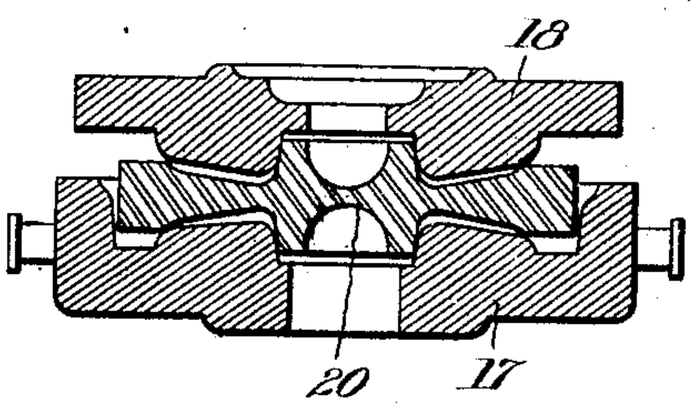


Fig. 10.

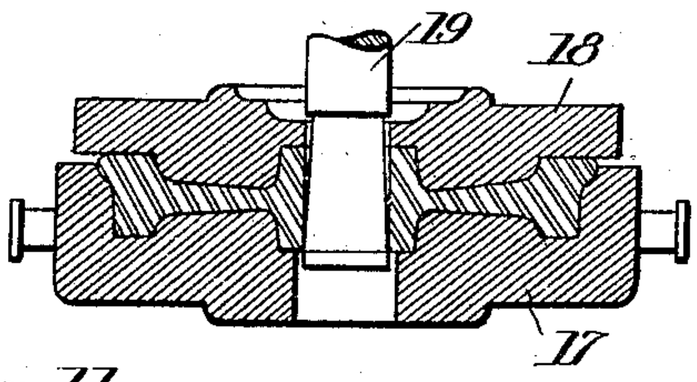
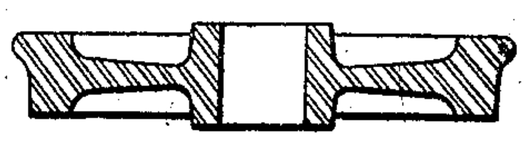


Fig. 11.



Witnesses
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ART OF FORGING CAR WHEELS.

APPLICATION FILED MAR. 6, 1905.

2 SHEETS—SHEET 2.

Fig. 12.

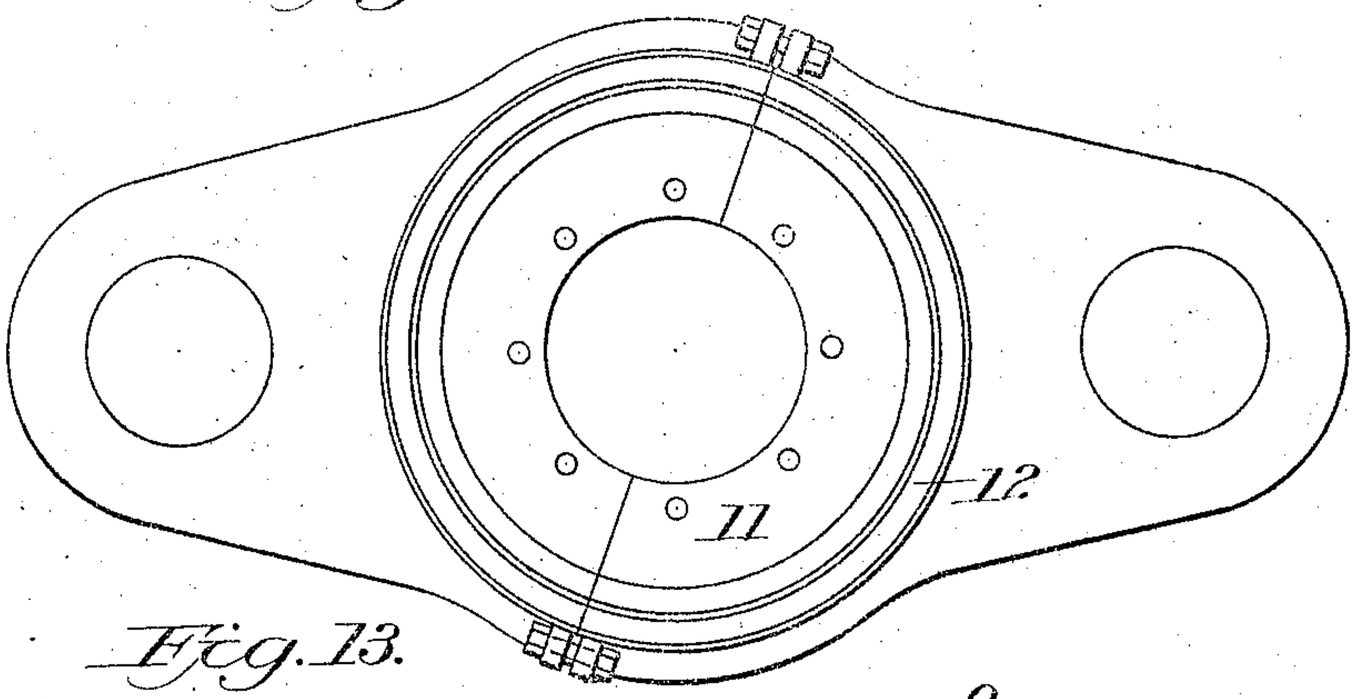


Fig. 13.

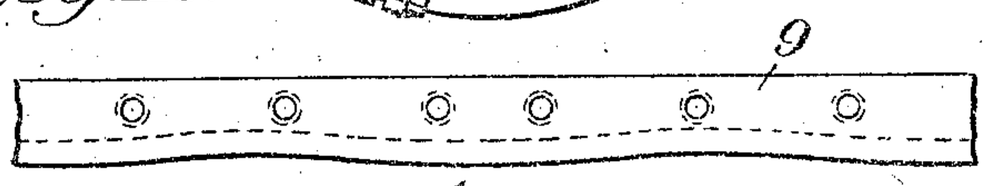


Fig. 14.

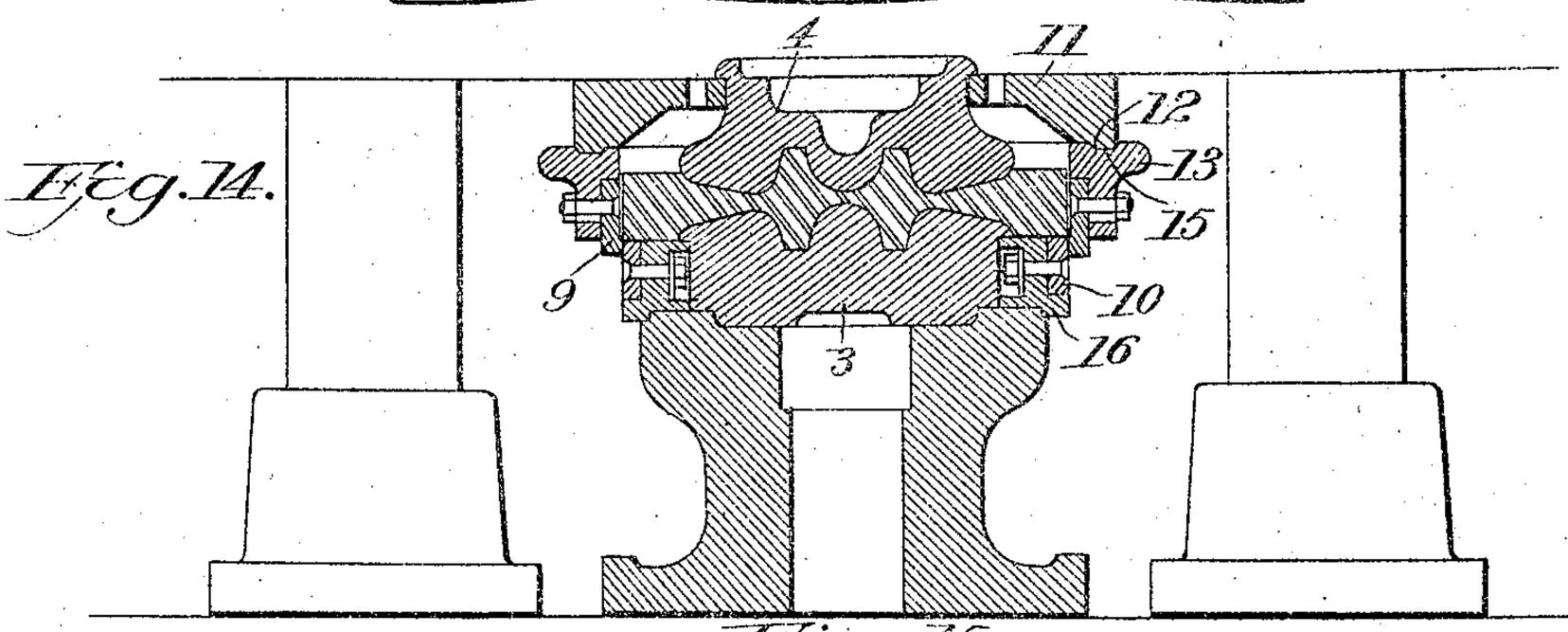


Fig. 15.

Fig. 17.

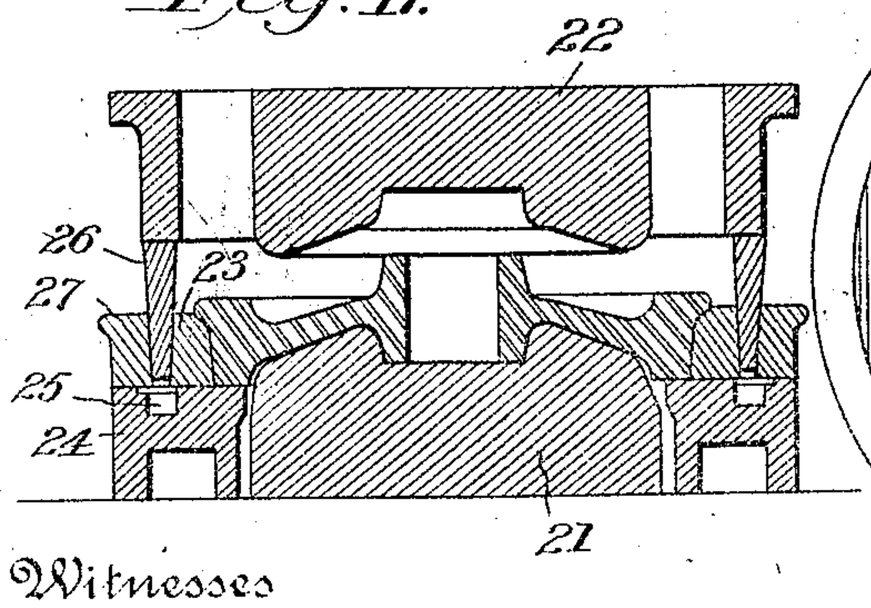
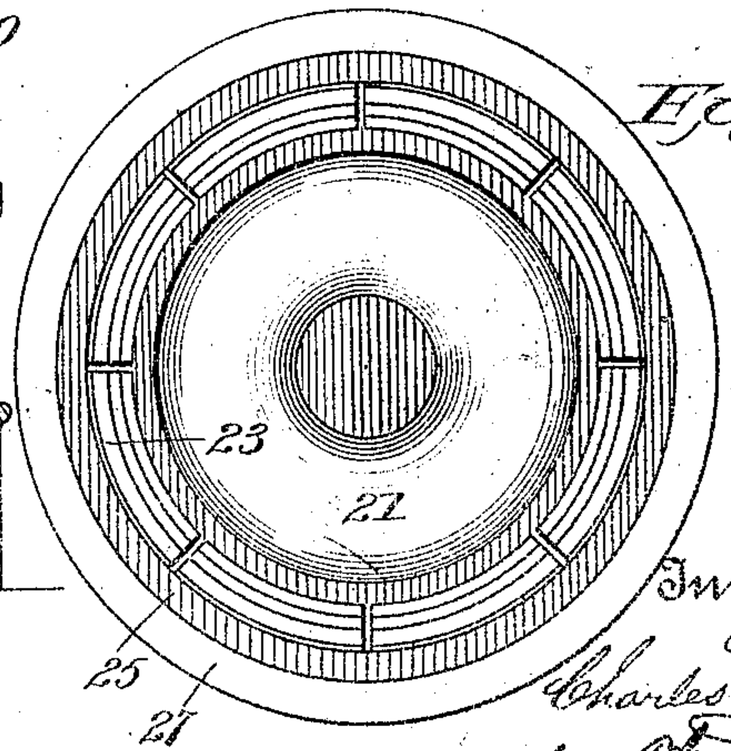


Fig. 16.



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UNITED STATES PATENT OFFICE.

CHARLES T. SCHOEN, OF PHILADELPHIA, PENNSYLVANIA.

ART OF FORGING CAR-WHEELS.

No. 797,920. Specification of Letters Patent. Patented Aug. 22, 1905.

Application filed March 6, 1905. Serial No. 248,704.

To all whom it may concern:

Be it known that I, CHARLES T. SCHOEN, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a certain new and useful Improvement in the Art of Forging Car-Wheels, of which the following is a full, clear, and exact description.

The object of this invention is to provide a systematic process for producing integral wrought-metal car-wheels from wrought blanks.

The blank is obtained from selected rolled-steel stock free from pipings and other physical defects and while hot is first die-pressed to form a rudimentary hub and the web adjacent to said hub, the blank being spread out laterally. Then, and preferably while in the dies, the blank is trimmed down to a substantially true circle, and then it is subjected to the action of other dies by which the contour of the hub is perfected, the web reduced, and a rudimentary rim formed and the hub punched, and then the web and rim are further treated by rolls, after which the wheel is dished or coned and the rim trued. In this truing operation the rim is chilled, so as to render it hard and durable.

With this general statement I will proceed now to set forth the best mode in which I have contemplated applying the principle of the invention and then will particularly point out and distinctly claim the improvement in the art which I claim as my invention, it being distinctly understood that the apparatus herein shown and described may be modified or replaced by other equivalent apparatus.

In the accompanying drawings, illustrating the invention, in the several figures of which like parts are similarly designated, Figure 1 shows in edge and plan views an angular blank, and Fig. 2 shows in plan and edge views a circular blank, either of which may be used in the process. Fig. 3 is a vertical section of the first-operation dies. Fig. 4 is a plan view of the angular blank as it comes from the dies of Fig. 3. Fig. 5 is a plan view of the circular blank as it comes from the dies of Fig. 3. Fig. 6 is a vertical section of the dies of Fig. 3 provided with the shearing mechanism. Fig. 7 is a plan view of the sheared angular blank. Fig. 8 is a plan view of the sheared circular blank. Fig. 9 is a vertical section of the second-operation dies with the blank of Figs. 7 or 8 in place therein and before the dies are closed down upon said blank. Fig. 10 is a vertical section of the second-operation dies closed down and with the hub-opening punch at the end of its operation. Fig. 11 is a cross-section of the product of the second-operation dies. Fig. 12 is a bottom plan view of the cross-head carrying the upper die of the second-operation dies. Fig. 13 is an elevation of part of the upper shear-blade. Fig. 14 is a section of the second-operation dies equipped with the shearing apparatus and showing in elevation part of a hydraulic press in which said dies may be used. Fig. 15 is an elevation of part of the lower shear-blade. Fig. 16 is a plan view of the bottom die or matrix of the dishing and truing dies. Fig. 17 is a vertical section of the dishing and truing dies.

The blank 1 may be of angular outline, or the blank may be reduced to a circle, as at 2, Fig. 2, either by shearing or forging or other operation, and in either case this blank is selected from rolled stock free from pipings and other physical defects. The blank in a heated condition is subjected to the action of the first-operation dies, (shown in Fig. 3,) and these dies consist of a matrix 3 and a male die 4, which are respectively provided with the acorn-shaped projections 5 and 6 and the complemental faces 7 and 8, whereby when pressure is applied to the blank a rudimentary hub is formed and the blank stretched laterally and a portion of the web adjacent to the hub produced. The blank substantially as it appears in the operation of these dies is shown in Figs. 4 and 5, is spread out laterally in a somewhat irregular manner, and the next operation consists in shearing off this irregular rim, this shearing being done, preferably, while the blank is in the dies and by the application of an upper movable shear-blade 9 and a complemental lower stationary shear-blade 10, so that after shearing the blank has the appearance shown in Figs. 7 and 8, which is approximately the diameter of the finished wheel. The dotted outlines in Figs. 7 and 8 represent approximately the sheared-off waste.

As shown in Figs. 6, 12, 13, 14, and 15, collectively, the upper die is applied to a die-carrier 11, mounted upon the cross-head of a suitable press, and the die-carrier is provided with a registering wedge-shaped annulus 12,

and the upper shear-blade 9 is bolted to a carrier 13, provided with trunnions 14, whereby it may be swung into place, and this carrier has a complemental groove 15 in its upper face, into which the annulus 12 enters, so as to center it around the blank in the dies. The lower blade 10 is mounted upon the carrier 16, which encircles the lower die. The dies are mounted in any suitable press, preferably a hydraulic press, as indicated in Fig. 14.

The sheared blank of Figs. 7 and 8 is next transferred to the dies, Figs. 9 and 10. The matrix 17 and male die 18 of these second-operation dies are formed with suitable faces to complete the exterior of the hub, reduce the web, and form a flanged rim, and when the dies have been closed to perform these operations then the punch 19 is brought into operation to punch out the diaphragm 20, Fig. 3, left in the interior of the hub by the first and second operation dies.

The wheel may next be subjected to the action of a rolling-machine, having rolls that act simultaneously upon the web to reduce it to proper thickness and upon the tread and flange to finish these parts.

After the wheel leaves the rolling-machine it is coned or dished and trued or rounded, and suitable apparatus for this purpose is shown in Figs. 16 and 17, same consisting of a matrix 21 and male die 22, shaped to impart the proper dish or cone to the wheel when the dies are forcibly brought together. Associated with these dishing or coning dies are truing or rounding dies consisting of the segmental and collapsible die 23, which is supported in any suitable way, as by a stand 24, surrounding the matrix and having in its face a groove 25. The segmental die-sections preferably are beveled on their backs. 26 is a wedge-ring which is adapted to encircle the segmental die and be pressed down about it into the groove in the face of the stand, so as to collapse said segmental die about the tread and flange of the wheel in order to true or round the same. This segmental die is capable of being shifted around the wheel and to be collapsed about it any number of times, so as to complete the circle of the wheel without the necessity for subsequent machining. There may be used in connection with the wedge-ring an abutment-ring 27, although this is not necessary. During the truing operation the faces of the segments of the segmental die are coated or treated with oil or other suitable or equivalent composition, and this, in connection with the comparatively cool dies, has the effect of chilling the rim, and hence increasing its hardness.

It is to be observed that from the time the blank is subjected to the action of the first-operation dies until it comes out finished from the truing or rounding dies its rim or periphery is under constant confinement and compression. In the first-operation dies the portion of metal not immediately subjected to the action of the dies serves as a sort of compress, while there is a mechanical compress applied to the rim of the metal in all of the subsequent operations both in the dies and in the rolling-machine. By reason of this compression of the metal any tendency to split or check is counteracted and a wheel of great homogeneity and strength is produced.

Any defects in the metal will be developed in the first-operation dies, and the blank may be discarded at that period of the operation, so as to save waste of time and minimize the production of imperfect or faulty wheels.

It is of the utmost importance to select sound stock free from defects in the first instance.

The rolling operation may be omitted in some instances, although it is preferred. When the blank is to be rolled, it is forged about an inch and a half or two inches (more or less) less in diameter than the finished wheel, so as to provide for the increased diameter resulting from the thinning of the web and rim by the rolling.

What I claim is—

1. The art of forging car-wheels, comprising essentially die-forging a blank of wrought metal to form a rudimentary hub and adjacent web, next shearing off the outer portion of the thus-treated blank to substantially wheel-diameter, next reducing the web and roughing out the rim, and next punching the axle-hole in the hub, then coning the wheel, and finally truing or rounding the tread and flange and chilling it.

2. The art of forging car-wheels, comprising essentially die-forging a blank of wrought metal to form a rudimentary hub and adjacent web, next shearing off the outer portion of the thus-treated blank to substantially wheel-diameter, next reducing the web and roughing out the rim, and next punching the axle-hole in the hub, next rolling the wheel to complete the web and form the rim, then coning the wheel, and finally truing or rounding the tread and flange and chilling it.

3. The art of forging car-wheels, comprising essentially die-forging a blank of wrought metal to form a rudimentary hub and adjacent web, next shearing off the outer portion of the thus-treated blank to substantially wheel-diameter, next reducing the web and roughing out the rim by means of dies, next punching the axle-hole in the hub, then die-coning the wheel, and finally die-rounding the tread and flange and simultaneously chilling the rim of the wheel while in the rounding-dies.

4. The art of forging car-wheels, comprising essentially die-forging a blank of wrought

metal to form a rudimentary hub and adjacent web, next shearing off the outer portion of the thus-treated blank to substantially wheel-diameter, next reducing the web and roughing out the rim in dies, next punching the axle-hole in the hub, then die-coning the wheel, and finally die-rounding the tread and flange, the rim of the wheel being under compression during the forging operations in the several dies.

In testimony whereof I have hereunto set my hand this 4th day of March, A. D. 1905.

CHARLES T. SCHOEN.

Witnesses:

WM. L. ACHILLES,

HOMER W. BURR.