2 Sheets—Sheet 1.

B. SEVERSON.

Car Wheel.

No. 8,455. Patented Oct. 21, 1851.

Fig. 3.

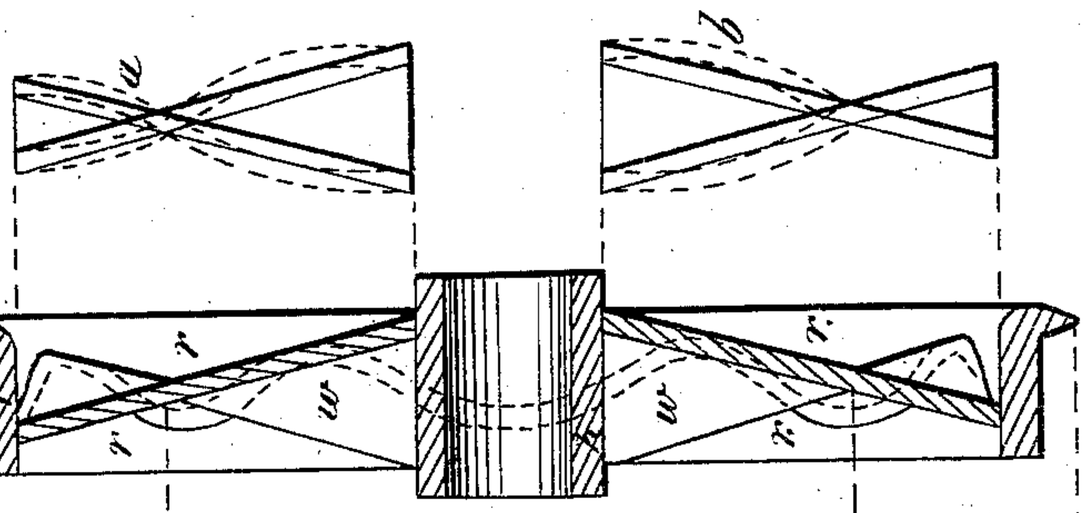


Fig. 2.

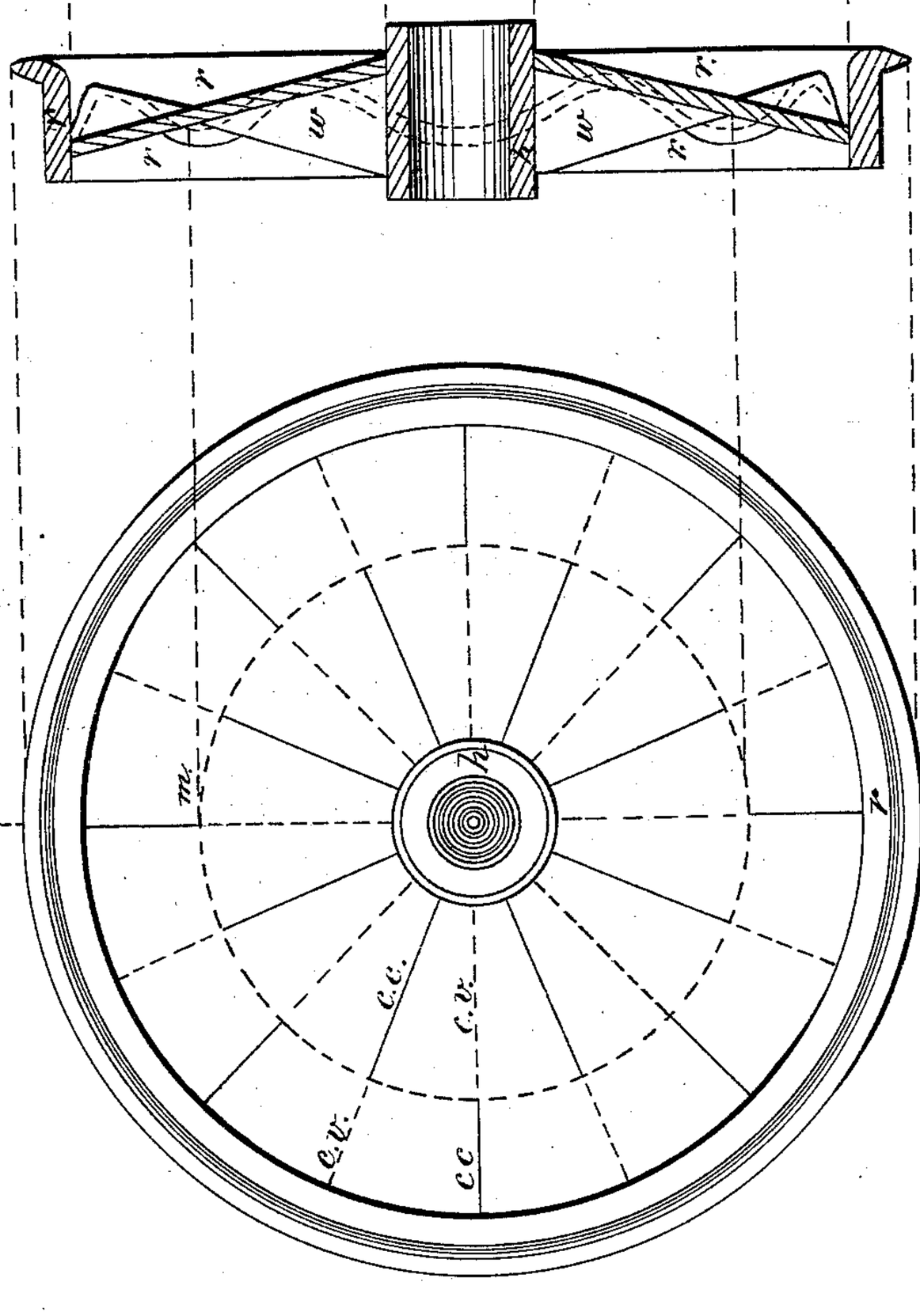


Fig. 1.

2 Sheets—Sheet 2.

B. SEVERSON.

Car Wheel.

No. 8,455. Patented Oct. 21, 1851.

Fig. 4.

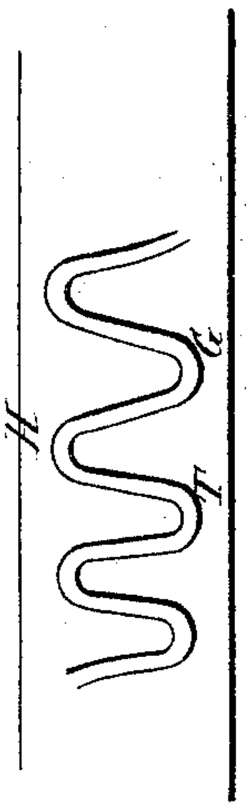


Fig. 5.

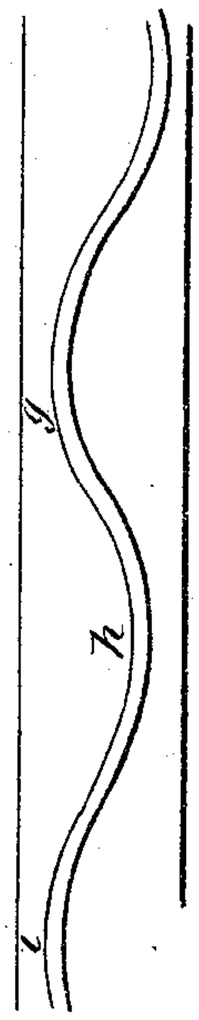


Fig. 9.

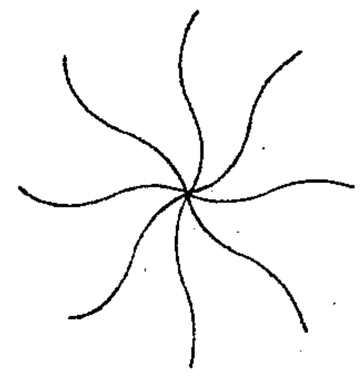


Fig. 6.

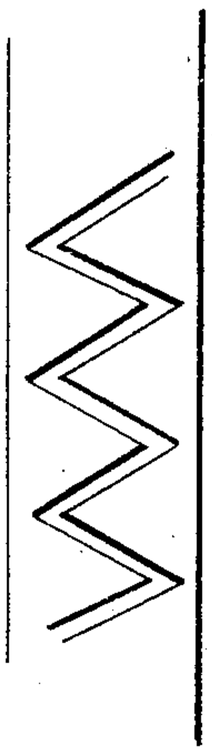


Fig. 7.

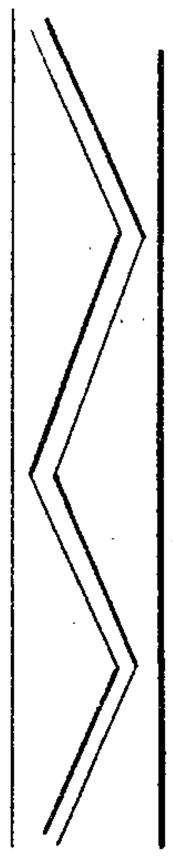
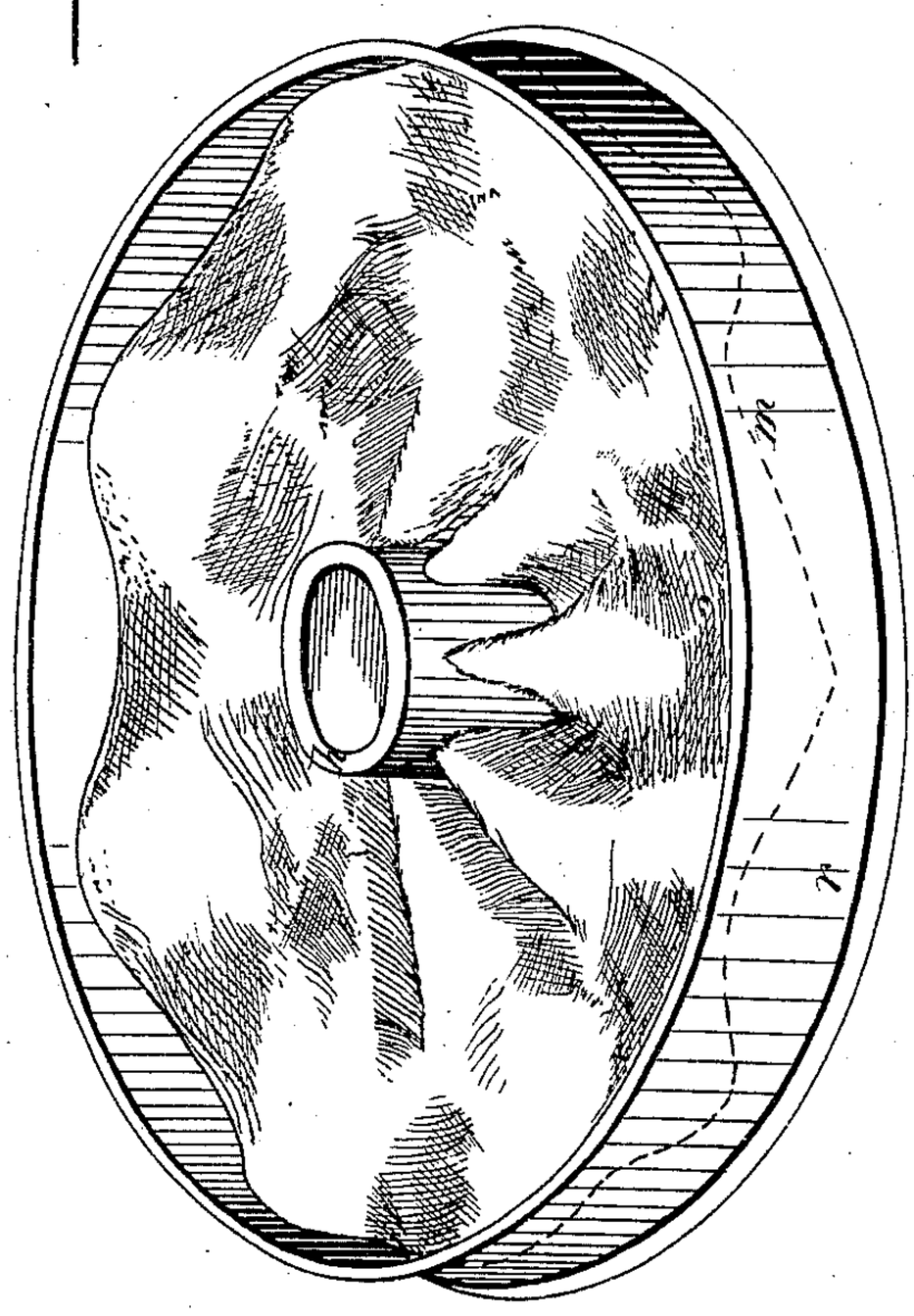


Fig. 8.



UNITED STATES PATENT OFFICE.

BENJ. SEVERSON, OF SCHENECTADY, NEW YORK.

CAST-IRON CAR-WHEEL.

Specification of Letters Patent No. 8,455, dated October 21, 1851.

To all whom it may concern:

Be it known that I, BENJAMIN SEVERSON, of the city and county of Schenectady, in the State of New York, have invented a new and Improved Form of Cast-Iron Railroad-Car Wheel; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings and to the letters of reference marked thereon.

The nature of my invention consists in having a solid hub and chilled rim, united by a single web or plate so curved as to give an abundance of compensation for the contraction of itself and of the hub in cooling; after the rim shall have become nearly fixed in consequence of being chilled; and also with a comparatively small amount of metal to give the wheel all the required strength, either in a vertical or in a lateral direction. The requisites of a good cast iron car wheel seem to be a chilled rim and solid hub with the space between the hub and rim closed, and all cast in one piece. Hence the spoke wheel and split hub cannot answer. The double detached plate wheels are liable to break from vibration. Other hollow wheels which have their opposite sides united in various ways are too complicated to be economical, and require too much care and exactness in the making and setting of the cores. They are also expensive on account of the cores themselves. A single plate, it is well known, is much stronger than the same amount of metal in two separate plates of like form. A proper form is important in either case. But the single plate with radial undulations is not a good form for either vertical or lateral strength. Attempts have been made to improve this form by the addition of brackets or ribs of various shapes atached to the sides of the plate. But it is believed that all such devices are bad. They have a tendency, when the wheels are in motion, to agitate the dust of the roads; a thing both unpleasant to travelers and injurious to some parts of the cars. Wheels having only regular annular corrugations do not afford sufficient radial compensation for contraction. Hence it is necessary to anneal such wheels, and the process of annealing is expensive.

The construction and principle of my wheel is as follows. It is formed with corrugations running from the hub to the rim, in the direction of the radii. These corrugations are reversed in passing from the hub to the rim. If, therefore, we suppose the wheel to be laid down horizontally, and a line, at the top or highest point of one of these corrugations, to be drawn, from the hub, in the direction of a radius; this line, at the rim, will be at the bottom or lowest point of the corrugation; and so vice versa. Thus it will appear that radial lines passing along the curve or arch of these corrugations are oblique to the plane of the wheel. And as the two surfaces of the web are similar, if such radial lines were drawn upon all the corrugations, they would cut that plane at the same angle, and alternately from above and from below it.

By the natural divergence of the radii from each other, the web will be smoother and less deeply corrugated at the rim where the motion of the wheel is most rapid; and the corrugations will be deepest at the hub where the motion is less rapid, and which is farther from the track and dust, and where the contraction of the wheel in cooling requires most compensation.

In the annexed drawings similar letters refer to corresponding parts.

c, *c*, means concave; *c*, *v*, convex; *h*, hub; *r*, rim; *w*, web.

Figure 1 is a view of the outside of the wheel with the positions of the raised parts of the wheel indicated by dotted, and the depressed parts by black lines. Thus the dotted lines marked *c*, *v*, and all similar lines indicate the place of the middle of the highest or convex parts; and the black lines marked *c*, *c*, and all similar lines indicate the place of the middle of the depressed or concave parts.

In the drawing there are eight corrugations. The number may be greater or less. The web is of an equal thickness throughout, or nearly so. Hence the raised and the depressed parts on its opposite side will of course be the reverse of those indicated in the drawing. This will be more clearly seen in the view represented in Fig. 2 which shows the wheel, as seen looking horizontally at a vertical section made by a plane passing through the points *d* and *c* and through the axis of the wheel.

In Fig. 2 the lightest parts represent a cross section of the hub, web and rim. The sinuous dotted lines represent the shape of the web at its union with the rim, as the same would appear in this view. At *w*, *w*,

are seen portions of the side of the web. It should be observed that the passing of the alternate corrugations from convex to concave and from concave to convex is about the place designated by the dotted circle *m*, Fig. 1. But if a circular section of the wheel, having its center at the center of the wheel, be made either at *m*, or at any distance from the center, this section will not lie in a plane but will be corrugated.

Figs. 4 and 5 are the representations as upon a plane of the lines formed by the web upon the outer surface of the hub and the inner surface of the rim respectively. These figures also show that the corrugations are reversed as above described. The corrugation H convex upward at the hub becomes concave upward at *h*, at the rim, and the reverse is true of I and G which become *i* and *g*. These corrugations may be angular as in Figs. 6 and 7.

In Fig. 3, the black lines show the manner in which the corrugations brace the rim, passing alternately from the lower part of the hub to the upper part of the rim, and from the upper part of the hub to the lower part of the rim. The dotted lines show how the web may be curved in a vertical direction and in the lines of the radii, if more compensation for contraction is required. The web may for this purpose be curved as represented either at *a* or *b*. For a similar purpose a curvature may be given to the corrugations in a direction indicated by the curved radiating lines in Fig. 9.

Fig. 8 is an isometrical perspective view of the wheel, the dotted line *m* showing the line of some of the corrugations as they meet the side of the rim.

Wheels made as above described with webs 7/8 of an inch thick will be stronger and safer than hollow wheels with two plates 5/8 of an inch thick each. Thus there will be a saving, which in a wheel of 33 inches will amount to about 100 pounds of metal, besides a saving of the expense of cores and of annealing.

I do not claim the chilled rim, the solid hub or the single plate with corrugations, nor do I claim simply radial corrugations.

What I claim as my invention and desire to secure by Letters Patent, in the shape of cast iron car wheels, is—

The forming of said wheels with corrugations in the direction of the radii, which corrugations are reversed in passing from the hub to the rim, so that the parts convex at the hub in passing toward the rim gradually lessen their convexity and then become concave and increase in their concavity till they reach the rim; and so that, on the other hand, the parts concave at the hub in passing toward the rim gradually lessen their concavity and then become convex and increase in their convexity till they reach the rim; the arches or center lines of the corrugations thus cutting obliquely and passing through, alternately from one side and from the other, a plane supposed to be at right angles to the axis of the wheel, and to pass through the middle of the hub; and the said corrugations in their radial direction being either straight or curved:—the whole constructed substantially in the manner and for the objects herein set forth.

In testimony whereof I have hereto set my hand this first day of September 1851 in the presence of two witnesses.

BENJAMIN SEVERSON.

Witnesses:

PETER BANTON,

L. H. WILLARD.